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Evaluation of the relation between quality of sleep and anxiety among university students

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Abstract

Background: Many young students who are away from their families have some difficulties to cope with in their new place and conditions for university education. Thus their anxieties can increase, may have poor quality sleep, due to new life style. Sleep quality and anxiety is important because they affect the academic performance directly. Aım of study is to evaluation quality of sleep and anxiety among university students.

Method: It is descriptive and held in Eskisehir Dormitory have 803 students. A questionnaire, Pittsburg Sleep Quality Index and Beck Anxiety Inventory were used. Necessary permissions were taken from administration, and Ethical Board's. Chi-square, Spearman Correlation and Regression Analysis are used.

Results: Prevalence of poor sleep was 74.5% among university students. According to PSQI, poor sleep were higher among the women, 20 years old and younger group, the numbers of five or more students sharing–room, students have high family income, among students consumer alcohol, students diagnosed chronicle illnesses. There is positive relation between Anxiety and Sleep Quality (r_s=0.398, p=0.000). According to regression analysis, some characteristics effect sleep quality.

Conclusion: Students have to receive more knowledge about sleep hygiene, sleep improvement, psychological support to improve satisfaction. It is necessary providing consultancy service students increase sleeping quality.

Key words: Pittsburgh Sleep Quality Index, Beck Anxiety Inventory, student

Introduction

Sleep is a physiological process that can alternate between unconscious stages and conscious stages, with internal and external stimulation. Sleep consists of two main stages: NREM (Non-Rapid Eye Movement) and REM (Rapid Eye Movement). Sleeping begins with NREM stages. During the NREM stage, slow eye movements are visible. During the active sleeping period referred to as REM (Rapid Eye Movement), body muscle paralysis, rapid eye movement and rapid brain waves are observed. By undergoing REM and NREM sleep stages and awakenings, one becomes more energetic and vigorous, which enables one to maintain a high level of intellectual activities, such as learning. The average sleeping-awakening cycle is 8.5–9 hours for adolescents, which is more than that found for adults[1-3].

Sleep quality is defined as sleep efficiency and consists of subjective sleep quality, sleep latency, sleep duration, habitual sleep activity, sleep disturbances (such as awakenings from sleep out of discomfort), bad dreams, use of sleeping medication and daytime disfunction such as daytime fatigue as a result of a poor night's sleep[4]. The factors that affect sleep quality include age, gender, environmental factors, occupation, social, economic and health situations, lifestyle, metabolism, illnesses, medicine and physiological situations, such as anxiety[5,6].

For individuals, such as students, who have important learning, memory and intellectual activities, sleeping quality should be especially excellent. Moreover, sufficient sleep and rest prevent work and traffic accidents and increase work/academic efficiency[7-15].

Poor sleep has significant, negative influences on physical[16-18] well-being, studying performance[19-22], mental health status[23-25] and quality of life for students[11, 26-31].

Anxiety is one of the negative factors that influences quality of sleep[14,25]. According to the DSM IV-R, anxiety is defined as "excessive sadness

against to danger or internal threat that is unknown and uncertain for individuals". Suffering from poor sleep or sleeping less than seven hours a day are known to be risk factors for anxiety development[33]. Researchers on anxiety and sleep quality correlation have presented theories that can be divided into three topics. The first topic is explained as anxiety changing sleeping patterns[34, 35]. The second one involves waking up from nightmares during the REM stage due to anxiety, and the last one is interpreted as having difficulties in returning to sleep after wakening[14,36]. Consequently, anxiety affects all the following sub-parts of sleep quality: sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, among others [34,35,37,38]. Insomnia appears in 60% of individuals who suffer from anxiety[39], and anxiety causes daytime sleepiness[23], which is one fundamental sleeping problem. According to research reports, 50% of youth need to sleep during the day at least once a week because of waking up tired[40], and other studies report a student's disorder regarding sleep habits[41]. According to the DSM-IV and ICP, sleep problems can be symptoms of anxiety[37, 42-46].

Emotional, behavioral, sexual, economic, academic and social aspects of youth that involve a plethora of contradictions and conflicts between individuals may cause differences in sleep quality. One important feature of university students, when compared to other youth groups, is that they represent future managers and decision makers. In Turkey, 65% of students leave their families and cities to follow their university education goals. It is confirmed that young people who are away from theır families have some difficulties coping with their new home and surroundings. Thus, increasing anxiety and therefore poor sleep quality are caused by the new, unfamiliar lifestyle and new rules by which they have to abide[7-10,12,13,17,24,31]. It is known that anxiety levels are essentially negative perceptions and thinking abilities. It has been demonstrated that anxiety affects cognitive, somatic, behavioral, emotional and memory competitions. Anxiety may cause individuals to suffer from attention or memory problems. Sleep quality and anxiety are important factors because they directly affect the academic performance of students. It is necessary to understand sleep quality and to evaluate sleep quality and anxiety-provoking situations of students, particularly those who reside in a dormitory. Thus, to enhance students' academic performance, interventions can be proposed and administered to increase their sleep quality.

This study evaluates the relationship between quality of sleep and anxiety among university students who reside in state dormitories in Eskişehir, Turkey.

Methods

Participants

Thıs study was comprised of students who live in a state dormitory called the Eskişehir Dormitory, which is located in the city whose population is 755.427[47]. The city is home to two state universities. Anadolu University has 699.560 (67,1%) continuing students and 341,620 non-resident students, for a total of 1.041.180 students[48]. The University Eskişehir Osmangazi (ESOGU) has 19.211 students[49]. In total, there are 1.060.301 university students in the city of Eskişehir.

Instruments

A questionnaire/survey was prepared by using appropriate literature relevant to the purpose of this study[13,18,25,50-53]. The survey includes questions about the students' social-demographic features (gender, age, education, class, residence, time spent in the dorm, room type and family income), several habits and medical features of students (smoking or non-smoking status, consumption of alcohol, history of chronic illness, asthma-bronchitis, allergic flu, tonsillectomy, adenoid vegetation, history of nose-throat surgery, history of chronic throat infection, presence of a snoring roommate, attention problems related to sleep problems), the Pittsburg Sleep Quality Index (PSQI) and the Beck Anxiety Inventory (BAI).

Procedure and Data Analysis

There are four state dormitories that may accept students who have registrations in the city of Eskişehir. The study was held in the Eskişehir Dormitory, which houses 960 students. Before the collection of data, the dormitory administration granted necessary permission and ESOGÜ Faculty of Medicine Ethical Board's 2011/153 number of approval, then collection of are accepted to be

part of study are taken. After that, a preparation meeting ensued, taking about 15–20 minutes. For our study, 803 (83,6%) students living in dorm rooms were accepted to be part of this study.

When students desire professional consulting for sleep disorders, they are advised to visit the "ESOGU Youth Friendly Center." In this study, the PSQI was used to assess sleep quality. This index was developed by Buysee and his colleagues in 1989[4], and in Turkey, validity and reliability studies were performed by Ağargün and his colleagues in 1996[54]. Although the PSQI has 24 items, it is calculated as 19 items. The index has open-ended questions (e.g., During the last month, when did you go to bed?) and multiple-choice questions (e.g., During the last month, how was your sleep quality?), with answers such as very good, fairly good, fairly bad or very bad. Overall, 0–3 points are given for each question. This index can range from 0 to 21, and values of >5 were considered "poor quality of sleepers", while values of <5 were considered "good quality of sleepers"

In 1988, the BAI scale was developed by Beck and his colleagues for measuring anxiety[55]. In Turkey, validity and reliability studies were performed by Ulusoy in 1993[56]. This scale has 21 questions. Each question has four alternatives, and 0–3 points are given for each question. For the BAI scale, total points may vary between 0–63 points. A higher number of points reflects a high level of anxiety.

Students' self-evaluations of their families' incomes (bad-fair-good) were taken into consideration. In our study, individuals who smoke at least one cigarette a day are identified as smokers[57], and ındividuals who drink alcohol at least 30 gr. in a week are identified as consumers of alcohol[58].

The data obtained in this study are evaluated on a computer by SPSS (version 15,0) Statistic Packet Program A Chi-square test, Spearman Rank Order Correlation and Logistic Regression Analysis are used for statistical analysis. P <0.05 is accepted for statistical meaning.

Results

The study group has 360 (44.8%) male students and 443 (55.2%) female students. Their age range is between 18 and 27, and their average age is 21.30 ±1.91 years. Furthermore, 309 (38.5%) students are under 20-years-old, 276 (34.4%) students are 21–22-years-old and 218 (%27.1) students are more than 23-years-old. In the study group, 123 (15.3%) students study Health Science, 473 (59.0%) students study Social Sciences and 206 (25.7%) students study Applied Science. 213 (26.5%) students are freshman, 220 (27.4%) students are sophomores, 220 (27.4%) students are juniors and 150 (18.7%) students are seniors. In this study, 250 (31.1%) students stayed at the dorm for less than one year, 201 (25.0%) students stayed for one year, 187 (23.3%) stayed for two years and 50 (6.2%) stayed for more than four years. In the dormitory, 553 (66.4%) students stay in four-person shared rooms, and less than four people shared a room.

Family incomes for 94 (11.7%) students were poor, 470 (58.5%) were fair and 239 (29.8%) were good. In this study, 602 (75.0%) students have good sleep quality. For our study, group features of students who either have good sleep quality or poor sleep quality are shown in Table 1.

In our study, we observed that the frequency of smoking is 35.0% (n=281), and it is determined that 30.5% (n=245) of students consume alcohol. The number of permanent drug users is 62 (7.7%). Fifty-nine (7.3%) students have complained about asthma-bronchitis, and 164 (20.4%) students exhibit chronic flu. Forty-four (5.5%) students had tonsillectomy surgery, 27 (3.4%) students underwent surgery for adenoid vegetation, 47 (5.9%) students had surgery of the nose-throat and 137 (17.1%) students had chronic throat infections. Additionally, 637(79.3%) students who had sleeping problems also had attention problems. In the study group, the medical features and habits of students who enjoy good sleep quality and students who have poor sleep quality are shown in Table 2.

The points that students earned from the PSQI range between 0 and 17. The average point total is 6.40 ± 2.97. Grade Point Averages (GPAs) of students range somewhere between 0 and 4, and the average GPA is 2.58 ± 0.66. There is no correlation between GPA and the points earned from the Pittsburg Sleep Quality Scale (r_s=0.006; p=0.870).

The points that students earned from the Beck Anxiety Inventory range between 0 and 54. The average point total is 14.03 ±10.28. There are important and positive relations between Beck Anxiety Inventory Points and Pittsburg Sleep Quality

Table 1. Features of students in the study group who have either good sleep quality or poor sleep quality

Some features	Sleep Quality			Statistical analyses X^2; p
	Good n (%)*	Poor n (%)*	Total n (%)**	
Gender				
Male	131 (36.4)	229 (63.6)	360 (44.8)	44.858; 0.000
Female	70 (15.8)	373 (84.2)	443 (55.2)	
Age group				
≤20	63 (20.4)	246 (79.6)	309 (38.5)	12.177; 0.002
21-22	65 (23.6)	211 (76.4)	276 (34.4)	
≥23	73 (33.5)	145 (66.5)	218 (27.1)	
School name				
Health Sciences	25 (20.3)	98 (79.7)	123 (15.3)	2.912; 0.233
Social Sciences	117 (24.7)	357 (75.3)	474 (59.0)	
Applied Sciences	59 (28.6)	147 (71.4)	206 (25.7)	
Class				
1 (Freshmen)	49 (23.0)	164 (77.0)	213 (26.5)	3.430; 0.330
2 (Sophomore)	60 (27.3)	160 (72.7)	220 (27.4)	
3 (Junior)	61 (27.7)	159 (72.3)	220 (27.4)	
4 and over (Senior)	31 (20.7)	119 (79.3)	150 (18.7)	
Time that spend in the dorm (year)				
<1	70 (28.0)	180 (72.0)	250 (31.1)	5.526; 0.237
1	56 (27.9)	145 (72.1)	201 (25.0)	
2	41 (21.9)	146 (78.1)	187 (23.3)	
3	26 (22.6)	89 (77.4)	115 (14.3)	
≥4	8 (16.0)	42 (84.0)	50 (6.2)	
Room type (number of person)				
≤4	161 (30.2)	372 (69.8)	533 (66.4)	22.625; 0.000
≥5	40 (14.8)	230 (85.2)	270 (33.6)	
Family income				
Bad	14 (14.9)	80 (85.1)	94 (11.7)	11.483; 0.003
Fair	111 (23.6)	359 (76.4)	470 (58.5)	
Good	76 (31.8)	163 (68.2)	239 (29.8)	
Toplam	201 (25.0)	602 (75.0)	803 (100.0)	

**Row is percentage, **Column is percentage.*

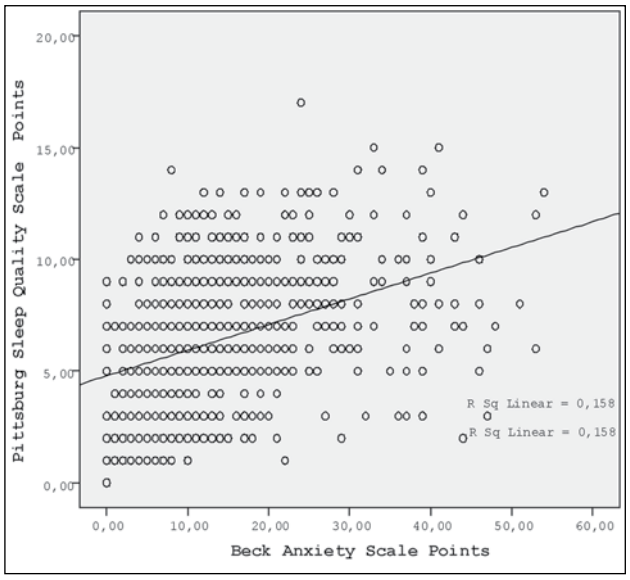
Index Points (r_s=0.398; p=0.000). Graph 1 presents the distribution of Beck Anxiety Inventory Points and Pittsburg Sleep Quality Index Points for students.

A multiple logistic regression analysis was conducted by using significant variables. The independent variables included gender, age, faculty, class, length of stay in the dormitory, number of people in the sharing-room, smoking cigarettes, drinking alcohol, districts, family income, doctor diagnosed chronic illnesses, allergic flu, asthma-bronchitis and throat infections, adenoid vegetation surgery, tonsillectomy, any history of nose-throat surgery, attention capacity and level of anxiety. At the end of the analysis, only five variables (gender, age, drinking alcohol, number of people in the sharing-room and level of anxiety) remained. The results of the logistic regression analysis for several characteristics affecting sleep quality are provided in Table 3.

Table 2. Medical features and habits of students in the study group who have either good sleep quality or poor sleep quality

Some habits / medical features of students	Sleep Quality			Statistical analyses X^2; p
	Good n (%)*	Poor n (%)*	Total n (%)*	
Smoking status				
No	127 (24.3)	395 (75.7)	522 (65.0)	0.391; 0.532
Yes	74 (26.3)	207 (73.7)	281 (35.0)	
Consumption of alcohol				
No	153 (27.4)	405 (72.6)	558 (69.5)	5.559; 0.018
Yes	48 (19.6)	197 (80.4)	245 (30.5)	
Chronicle illness history				
No	194 (26.2)	547 (73.8)	741 (92.3)	6.760; 0.014
Yes	7 (11.3)	55 (88.7)	62 (7.7)	
Asthma-bronchitis history				
No	188 (25.3)	556 (74.7)	744 (92.7)	0.157; 0.581
Yes	13 (22.0)	46 (78.0)	59 (7.3)	
Allergic flu				
No	168 (26.3)	471 (73.7)	639 (79.6)	2.647; 0.104
Yes	33 (20.1)	131 (79.99	164 (20.4)	
Tonsillectomy				
No	194 (25.6)	565 (74.4)	759 (94.5)	1.582; 0.208
Yes	7 (15.9)	37 (84.1)	44 (5.5)	
Adenoid vegetation surgery history				
No	195 (25.1)	581 (74.9)	776 (96.6)	0.014; 0.907
Yes	6 (22.2)	21 (77.8)	27 (3.4)	
Nose-throat surgery history				
No	192 (25.4)	564 (74.6)	756 (94.1)	0.618; 0.432
Yes	9 (19.1)	38 (80.9)	47 (5.9)	
Chronicle throat infection history				
No	174 (26.1)	492 (73.9)	666 (82.9)	2.494; 0.114
Yes	27 (19.7)	110 (80.3)	137 (17.1)	
Attention problem related to sleep problem				
No	60 (36.1)	106 (63.9)	166 (20.7)	13.773; 0.000
Yes	141 (22.1)	496 (77.9)	637 (79.3)	
Level of Anxiety				
Minimal	112 (45.0)	137 (55.0)	249 (31.0)	85.464; 0.000
Mild	60 (21.5)	219 (78.5)	279 (34.7)	
Moderate	19 (11.0)	153 (89.0)	172 (21.4)	
Severe	10 (9.7)	93 (90.3)	103 (12.8)	
Toplam	201 (25.0)	602 (75.0)	803 (100.0)	

**Row is percentage, **Column is percentage.*



Graph 1. The distribution of Beck Anxiety Scale Points and Pittsburg Sleep Quality Scale Points of students

Discussion

In this study, 75% of the students had poor sleep quality. The range of poor sleep quality among university students changed between 19,1% and 29.4% throughout most of the study[13, 17, 24, 50, 53, 54, 59-61]. In this study, we observed a higher incidence of poor sleep quality than found by other studies, which may be related to students who maintain an effective sleeping process under the same conditions. The reasons behind students' poor sleep quality have to do with a stressful academic life, working hard, uncertainties related to living apart from their family as well as financial and moral troubles[2,3,13, 61].

In this study, according to the scores taken from the PSQI, poor sleep quality was more pronounced among females than males ($p<0.05$). Moreover, the logistic model analysis showed that female students experienced "poor sleep" 1.7 times more often than did male students ($p=0.005$; Table 3). Some previous studies have also reported similar results[2,3,13,61]. Some studies report that sleep quality among men is poor[50,60,62-65]. On the other hand, other studies report that there are no differences[13,31,37,66]. The students' complaints about sleep may indicate underlying emotional problems. The relationships between sleep symptoms and emotional symptoms are different for males and females. Other studies suggest that using different diagnostic methods for different populations, different countries and different research methods may yield different results.

It is widely known that young people who are away from their families experience difficulties in coping with their new environment and university education. In this same respect, this study determi-

Table 3. Significant independent variables for Sleep Quality according to the Logistic regression analysis (step 13)

Variables	ß	SE[a]	p	OR[b]	%95 CI[c]
Constant	5.286	0.559	0.727		
Gender (reference: male)					
Female	0.559	0.200	**0.005**	1.749	1.181-2.589
Age (reference: ³23)					
21-22	0.374	0.224	0.095	1.453	0.937-2.253
≤20	0.527	0.225	**0.019**	1.693	1.090-2.630
Alcohol (reference: no)					
Yes	0.546	0.205	**0.008**	1.726	1.155-2.580
Room type (number of person) (reference: ≤4)					
≥5	0.676	0.211	**0.001**	1.965	1.300-2.973
Level of Anxiety (reference: Minimal)					
Mild	0.971	0.201	**0.000**	2.641	1.780-3.921
Moderate	1.603	0.292	**0.000**	4.970	2.806-8.803
Severe	1.612	0.373	**0.000**	5.010	2.410-10.417

SE[a] *=Standard error,* **OR[b]** *=Odd's Ratio,* **CI[c]***=Confidence interval*
(Hosmer and Lemeshow Test: $x^2=5.286$; $p=0.727$)

ned that students who were 20-years-old and younger suffered from poor sleep. According to the scores taken from the PSQI, poor sleep was higher for those 20-years-old and younger than for other age groups ($p<0.05$). The logistic model showed that the lower range of the 20-years-old age group was associated with 1.6 times higher in the "poor sleep" category ($p=0.019$; Table 3). Several articles have reported similar situations regarding this topic[7-10,12,17,24,31].

Many recognize that amount of hours worked, worries about study quality, receiving or not receiving satisfying results from studies and leisure time may vary depending on the field in which the students are studying. Some studies show that Faculty of Economic and Administrative Sciences students enjoy good sleep quality while Health Science students have poor sleep quality[13,23,59,60]. In our studies, we did not find such a relationship ($p>0.05$). The reason for the lack of a relationship between faculties of students and sleep qualities may be that students live in the same environment, which is affected by similar amounts of noise, light and heat.

One would presume that freshmen and senior students experience poor sleep qualities more so than the other classes. The high incidence of poor sleep quality in freshmen is a result of their responsibilities in starting a new educational life, and this brings about new lifestyle and adaptation problems. On the other hand, seniors have irregular studying and resting patterns. Concerns about exams and class relationships with friends also delay their sleeping time[59,67]. As a result, freshmen and seniors have poorer sleep qualities than the other classes. In this study ($p>0.05$), no relationship is found between sleep quality and class year. A similar result is stated in the study by Preisegolaviciute and colleagues[13]. Their reason for not finding any relationship between class year and sleep quality may be that students are exposed to similar amounts of noise, light and heat in the same dorm rooms.

The relationship between sleep quality and length of stay in the dormitory cannot be found, although long-staying time is expected to increase sleep quality thanks to adaptation ($p>0.05$). As a result, the reason for there being a correlation between sleep quality and class year can be explained by the following: students live in the same environment that does not have appropriate conditions such as noise, light and heat, sharing a room with more than one person and different bedtimes.

It is clear that when the number of dorm residents increase, the overall sleep quality is affected negatively. In a situation in which 4 or fewer students share a room, those students enjoy a much better quality of sleep than students living in a room shared by 5 or more students ($p<0.05$). Moreover, the logistic model showed that the increase in numbers of 5 or more students sharing a room caused 1.9 times more "poor sleep" ($p=0.001$; Table 3). Similar results have been obtained in a study by Günay and his colleagues[68].

Furthermore, reports show that people who have low family incomes have poor sleep quality[69]. In our study, however, we observed that students who have high family incomes have poor sleep quality, according to the scores taken from the PSQI ($p<0.05$). There are some studies showing similar results[70,71]. In our study, it is evident that people who have high family incomes may be late going to bed because of social activities, moral dissatisfaction and a disorderly lifestyle.

We did not find any relationship between smoking status (whether a student was a smoker or non-smoker) and sleep quality ($p>0.05$). Studies have shown that smoking causes respiration problems during sleep because of its negative affect on lung capacity[65]. While some studies support this finding[72], other studies have not found a relationship between smoking and sleep quality[73]. The reason for finding any relationship between smoking and sleep quality may be a result of lower smoking frequency and consumption than others.

In this study, according to the scores taken from the PSQI, poor sleep quality was higher for students who consume alcohol than for students who do not consume alcohol ($p<0.05$). Moreover, the logistic model analysis showed us that students who consumed alcohol suffered from "poor sleep" 1.7 times more often than students who did not consume alcohol ($p=0.008$; Table 4). It ıs common knowledge that individuals addicted to alcohol need much more oliguria[74]. Therefore, they experience difficulties in going back to sleep and the risk of having nightmares increases[53,75,76]. In other words, studies suggest that people who consume alcohol have difficulty in falling asleep. After falling asleep, they may have trouble having a

long sleep duration, and even after treatment, this problem may continue. Studies have informed us that these are the reasons alcohol consumers have poor sleep quality[53, 77-79].

For people who suffer from a chronic illness that was diagnosed by a doctor, they usually also have sleeping problems. The reasons that decrease sleep quality[13,18,61,72,80,81] may include diabetic students[46] having nocturia as a result of high levels of glucose, having dyspnea and heart disease resulting in sleep disturbance[65] and cancer patients suffering from excruciating pain who have nightmares as a result of taking specific drugs. Our study also proves that people who have doctor diagnosed chronic illnesses have higher poor sleep quality frequency ($p<0.05$).

As a result of edema and permanent flows due to throat infections or allergic reactions, breathing pathway obstruction occurs. Allergic flu occurs concomitantly with asthma, and this situation obstructs the breathing pathways so that sleep is permanently divided and sleep quality decreases[82,83] In our study, however, there is no relationship between an individual who has allergic flu, asthma-bronchitis or throat infection, and healthy people (for everyone $p>0.05$). The reason for this finding may be explained by their precautions against illnesses, and their prognosis does not evidently affect sleep quality.

The adenoids may affect sleeping quality negatively in different ways, such as obstructing breathing pathways as a result of having low intraluminal pressure, leading to the collapse of the pharynx and snoring[21,22,84-86] . In our study, in terms of sleep quality (for everyone $p>0.05$), a relationship was found between people who undergo adenoid vegetation surgery, tonsillectomy and have a history of nose-throat surgery and healthy people. Any relationship between people who had surgery because of the discussed problems above and people who do not supports the theorical information in our study. This situation may be explained by having problems with organs or tissues such as the adenoids; the tissues may be removed surgically so that sleeping quality is enhanced through improvement of breathing pathways.

Attention capacity is the ability to focus on an ongoing task and process environmental stimuli in appropriate ways. Attention problems are seen in people who have poor sleep quality[7,10,11,87-90] . Furthermore, after a five-hour sleep, routine tasks are not affected. In high cognitive tasks, however, creativity and abstractivity decrease[91]. Moreover, night shifts cause biological rhythm problems as a result of mixing night-day conceptions[11], leading to lack of attention and sleep problems. For our study group, there is a significant relationship between sleep quality and lack of attention ($p<0.05$).

It is reported that having poor sleep quality causes snoring, gas changes due to breathing troubles and hypocsy; all these symptoms decrease learning capacity so that students' academic performance also decreases[7-10,12,19-21,36,52,84,92-96] . In our study, however, there is no relationship between the points taken from the PSQI and academic GPA ($p>0.05$). This result can be explained by students having self-treated hypocsy and by the later starting time of 8.30 for lessons at the university compared to 08.00 in high school.

Increased working hours and working on weekends were the reasons for decreased sleep quality, emotional strain between family and peers, depression and anxiety among young students[80]. Having permanent brain activity due to anxiety, which creates suspicion and uneasiness, makes it difficult to fall asleep[50]. On the other hand, poor sleep quality may cause sleep problems dependent on anxiety. In other words, sleep quality and anxiety affect each other. High levels of anxiety can cause decreasing sleep quality, and low levels of sleep quality can cause increasing anxiety[13,23-25,31,32,35,37,43,50,52-54,61,85]. According to our results in this study, there is a positive relationship between the points taken from the PSQI and BAI ($p<0.05$). Moreover, the logistic model indicated that the increase in anxiety levels caused between a 2.6 and 5.0 times greater increase in "poor sleep" (Mild OR:2.641; $p=0.000$, Moderate OR:4.970; $p=0.000$, Severe OR:5.010; $p=0.000$; Table 3).

Conclusions and suggestions

In our study, we found a negative relationship between anxiety situations of youth and sleep quality. To create a better environment for sleeping, the conditions of decreasing room capacity, ensuring enough TV and reading rooms (while placing them far away from the bedroom) and avoiding

noise between sleeping hours should be provided to students. Before sleeping, alleviating students' worries may be beneficial for a better sleep quality. In this way, a student's sleeping pattern can be fixed, thereby increasing work performance efficiency and success.

Providing consulting services to students will increase their sleeping quality and decrease anxiety and orient them to the types of services they need. Moreover, similar monitoring research is advised. These findings suggest that students must learn more about sleep hygiene, effective ways to address stress, sleep improvement and psychological support to improve satisfaction with their performance in their studies.

Implication

The first important step for health services is determining the risk factors that are the reasons for poor sleep. These risk factors include the following: age, dorming status, addiction to drugs and high levels of anxiety. Second, because there is a certain relationship between sleep quality and anxiety, providing a better environment is necessary for ıncreasing sleep quality.

Limitations

1-It was a defining study.

2-It was performed in a single center.

3-Electroencephalography (EEG) and polysomnographic evaluations were not performed.

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The relationship between physical activity and obesity as measured by percentage body fat via bioelectrical impedance analysis in Korean adults

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Abstract

The purpose of this study was to investigate the relationship between physical activity (PA) and obesity as measured by percentage body fat via bioelectrical impedance analysis in Korean adults. The subjects were 497 Korean adults aged 20–84 years who visited a public health center in Yeongdeungpo-gu, Seoul, Korea, during 2011. Their PA and obesity parameters were assessed at this center. PA level was assessed via the International PA Questionnaire (IPAQ) and percentage body fat was measured using an 8-polar bioelectrical impedance analyzer. The relationship between PA and obesity was assessed using multivariate logistic regression analysis after adjusting for covariate variables such as gender, age, smoking, drinking, and breakfast frequency per week. The prevalence of obesity in the men and women was 36.8% and 25.9%, respectively. The odds ratio (OR) (95% confidence interval [CI]) for undertaking vigorous PA sessions ≥3 times per week and obesity prevalence was 0.612 (0.378–0.991, $p = 0.046$). The OR (95% CI) for undertaking moderate PA sessions ≥5 times per week and obesity prevalence was 0.635 (0.490–0.986, $p = 0.043$). It was concluded that undertaking regular PA sessions was positively correlated with improved weight outcomes. Furthermore, in Korean adults, vigorous PA was more strongly associated with a lower prevalence of obesity than was moderate PA.

Key words: physical activity, obesity, percentage body fat, bioelectrical impedance analysis

Introduction

According to the World Health Organization (WHO), in 2008, 1.5 billion adults were overweight, and 200 million men and 300 million women aged over 20 years were obese, worldwide (1). Furthermore, in 2010, the Korea National Health and Nutrition Examination Survey-V (KNHANES-V) reported that in the Korean population, 36.3% of men and 24.8% of women aged over 19 years were obese, and that the incidence of obesity was continually increasing year by year (2).

Because excess weight is a major risk factor for health disorders such as cardiovascular diseases (mainly heart disease and stroke), type 2 diabetes, musculoskeletal disorders (particularly osteoarthritis), and some cancers (e.g., endometrial, breast, and colon), it has become a focal issue throughout the developed world (2). Accordingly, many studies have investigated the prevention and treatment of obesity by decreasing energy intake (via reduction of dietary sugar) and increasing energy expenditure (via increased physical activity [PA] and exercise) (2-6).

However, while negative effects on health arising from excess body weight are thought to derive from an excess of body fat such as adipose tissue, obesity is generally defined using the body mass index (BMI; kg/m^2), which does not distinguish between the lean and fat components of body weight (7). Thus, BMI is not a "measure," but rather an indicator, of adiposity, and this limitation may bias evaluations of obesity (8).

Because BMI has limitations for defining obesity, more accurate methods such as underwater weighing (densitometry), dual energy X-ray absorptiometry (DEXA), bioelectrical impedance analysis (BIA), magnetic resonance imaging (MRI), and air-displacement plethysmography (BOD POD) (9) have been developed. However, densitometry, DEXA, and MRI are expensive, inconvenient for the participant, and not always feasible in this field because they involve the use of large specialized equipment. Hence, the use of these techniques in many studies has been limited (9). On the other hand, BIA can be conducted rela-

tively quickly (within a few minutes), simply, and noninvasively, and yields reliable measurements of body composition. Notably, BIA studies using regression analyses have shown that the percentage of body fat (%BF) estimated by BIA correlates well with the %BF estimated by DEXA (10-11).

Many studies have reported that low PA is a strong independent risk factor for obesity and that a lower prevalence of obesity is associated with higher PA (12-14). However, in Korea, there is little research that supports this contention. Furthermore, most previous studies used BMI for defining obesity, rather than more accurate methods such as BIA. The purpose of this study was to investigate the relationship between PA and obesity defined by percentage body fat determined via BIA (rather than BMI) in Korean adults.

Methods

Subject

The subjects of this study were 68 male and 429 female adults aged 20–84 years who visited a public health center in Yeongdeungpo-gu, Seoul, Korea, between January 1, 2011, and December 31, 2011, to undergo tests evaluating PA and percentage body fat. All study procedures were approved by the Human Care and Use Committee of the Yeongdeungpo-gu Community Health Center, and all subjects completed a written consent form prior to participation in this study. The characteristics of the subjects are shown in Table 1.

Dependent variables

To determine the level of PA undertaken by the subjects in the study, the following 2 questions derived from the International PA Questionnaire (IPAQ) (15) were asked:

[Q1] "In the last 7 days, how many days did you perform vigorous PA, such as heavy lifting, digging, aerobics, or fast cycling?" with the following response options: [1] no vigorous PA, [2] once, [3] twice, [4] thrice, [5] 4 times, [6] 5 times, [7] 6 times, and [8] every day. Because the American College of Sports Medicine (ACSM) recommends at least 3 days per week of vigorous PA (16), these responses were classified into the following 2 groups for multivariate logistic regression analyses: [1] ≥3 vigorous PA per week and [2] <3 vigorous PA per week.

[Q2] "In the last 7 days, how many days did you perform moderate PA such as carrying light loads, cycling at a regular pace, or doubles tennis?" with the following response options: [1] no moderate PA, [2] once, [3] twice, [4] thrice, [5] 4 times, [6] 5 times, [7] 6 times, and [8] every day. Because the

Table 1. The characteristics of the subjects (M ± SD or N %)

Variables	Category	Men (N = 68)	Women (N = 429)
Anthropometry	Age (years)	52.66 ± 17.80	49.62 ± 13.67
	Height (cm)	169.31 ± 6.61	157.83 ± 5.44
	Weight (kg)	74.01 ± 11.86	60.88 ± 9.13
	Body mass index (kg/m^2)	25.78 ± 3.69	24.45 ± 3.49
	Body fat (%)	22.81 ± 6.63	31.33 ± 6.18
Smoking	Never smoked	63 (92.6%)	393 (91.6%)
	Ex-smoker	0 (0.0%)	15 (3.5%)
	Current smoker	5 (7.4%)	21 (4.9%)
Drinking	Non-drinker	14 (20.6%)	154 (35.9%)
	≥1 drinking session per week	54 (79.4%)	257 (64.1%)
Breakfast frequency per week	No breakfast	10 (47.9%)	22 (5.1%)
	Once	2 (35.9%)	8 (1.9%)
	Twice	8 (47.9%)	13 (3.0%)
	Thrice	7 (35.9%)	29 (6.8%)
	4 times	4 (47.9%)	19 (4.4%)
	5 times	5 (35.9%)	12 (2.8%)
	6 times	2 (2.9%)	6 (1.4%)
	Every day	30 (44.1%)	319 (74.4%)

ACSM recommends at least 5 days per week of moderate PA (16), these responses were classified into the following 2 groups for multivariate logistic regression analyses: [1] ≥5 moderate PA per week and [2] <5 moderate PA per week.

Independent variables

The percentage body fat was assessed using an 8-polar bioelectrical impedance instrument (InBody-720, Biospace, Seoul, Korea). This instrument is used to measure the resistance of the arms, legs, and trunk at frequencies of 5, 50, 250, 500, and 1000 kHz with 8 tactile electrodes: 1 each in contact with the palm and thumb of each hand and with the anterior and posterior aspects of the sole of each foot (17). The subjects were requested not to consume anything for 4 h or exercise for 12 h prior to, as well as not to urinate immediately before, the impedance measurement. The subjects were advised to wear light clothing and remove all metallic items, which could impede the electric current during the measurement. The methods used for assessing body composition followed the recommendations of the book *Applied Body Composition Assessment* (9). Because the book *Advanced Fitness Assessment and Exercise Prescription* based on the ACSM guidelines defines obesity according to percentage body fat (man, ≥25%; woman, ≥35%) (18), the participants were classified into the following 2 groups for multivariate logistic regression analyses: [1] normal: man, <25%; woman, <35%, and [2] obese: man, ≥25%; woman, ≥35%.

Covariate variables

The covariate variables were as follows:

Gender: The 2 response options were (1) male and (2) female.

Age: Data pertaining to the ages of the subjects were used without any modifications.

Smoking: The 3 response options were (1) never smoked, (2) ex-smoker, and (3) current smoker.

Drinking: The 2 response options were (1) non-drinker and (2) ≥1 drinking session per week.

Breakfast frequency per week: The 8 response options were (1) no breakfast, (2) once, (3) twice, (4) thrice, (5) 4 times, (6) 5 times, (7) 6 times, and (8) every day.

Statistical analysis

All results from this study are presented as mean ± standard deviation. Multivariate logistic regression analyses were conducted to determine whether PA was related to obesity as defined by percentage body fat via BIA after adjusting for covariate variables. Statistical significance was set at $p < 0.05$, and all analyses were performed using SPSS version 12.0 (SPSS, Chicago, IL, USA).

Results

The multivariate logistic regression analyses

The prevalence of obesity by PA in Korean adults is shown in Table 2. The results show the prevalence of obesity after adjusting for covariate variables including gender, age, smoking, drinking, and breakfast frequency per week. The odds ratio (OR) (95% confidence interval [CI]) for undertaking ≥3 vigorous PA sessions per week and obesity prevalence was 0.612 (0.378–0.991, $p = 0.046$). The OR (95% CI) for undertaking ≥5 moderate PA sessions per week and obesity prevalence was 0.635 (0.490–0.986, $p = 0.043$). The results show that for those undertaking ≥3 vigorous PA sessions per week, the prevalence of obesity decreased by 38.8% as compared to those undertaking <3 vigorous PA sessions per week. Further, for those undertaking ≥5 moderate PA sessions per week, the prevalence of obesity decreased by 36.5% as compared to those undertaking <5 moderate PA sessions per week.

Table 2. The prevalence of obesity according to PA in Korean adults

	Group	ß	S.E.	OR	95% CI	p
≥3 vigorous PA per week (yes/no)	Normal-weight	Ref.				
	Obesity	-0.491	0.246	0.612	0.378-0.991	0.046*
≥5 moderate PA per week (yes/no)	Normal-weight	Ref.				
	Obesity	-0.454	0.224	0.635	0.490-0.986	0.043*

S.E, Standard Error; OR, Odd Ratio; CI, Confidence Interval; PA, Physical Activity

**p<0.05 tested by multivariate logistic regression analysis after adjustments for covariate variables such as gender, age, smoking, drinking, and breakfast frequency per week*

Discussion

The aim of this study was to investigate the association between obesity and undertaking ≥3 vigorous PA sessions or ≥5 moderate PA sessions per week in Korean adults. The results of our study show that regularly engaging in PA was associated with a lower prevalence of obesity in Korean adults, even after adjusting for obesity-related covariate variables.

Many previous studies have shown that less PA is associated with a higher prevalence of obesity (19-20). Accordingly, the results of our epidemiological study indicate that regular PA may decrease percentage body fat and obesity in Korean adults. Interestingly, this study also indicated that those undertaking ≥3 vigorous PA sessions per week exhibited a lower prevalence of obesity than those undertaking ≥5 moderate PA sessions. This supports a previous study suggesting that vigorous PA is more strongly associated with a lower prevalence of obesity than moderate PA (21). Furthermore, Swain and Franklin (2006) have reported that vigorous PA has more pronounced health benefits than moderate PA with regard to reduction in blood pressure, reduced risk of coronary heart disease (CHD), improved glucose control or insulin sensitivity, and reduced all-cause mortality (22). On the basis of these and our study results, we recommend vigorous PA for the prevention of obesity as well as the accompanying health benefits.

This study has the following limitations: First, this was a reconstructed cohort study. Therefore, we could not elucidate the cause-and-effect relationship and could only assess the interrelationship between PA and obesity. Second, this study was partly conducted by questionnaire; therefore, PA was not measured directly but recorded by the subjects themselves. Thus, some of the questionnaire-based raw data could be inaccurate. Third, the sample did not represent all Koreans, because all the participants resided in Yeongdeungpo-gu, Seoul. Fourth, the number of male participants was disproportionately low, therefore the results may be more widely generalizable to women than men. However, unlike otherwise comparable studies, the subjects in our study were Korean, rendering the results more generalizable to Koreans than previous studies. Moreover, according to central limit theorem, if the number of subjects in each group is over 30 the study has a normal distribution, and thus can be considered reliable (23); as all of the experimental groups in this study contained over 30 subjects, the current study can be considered reliable.

Conclusion

It was concluded that engaging in regular PA was positively correlated with improved weight control. Furthermore, in Korean adults, vigorous PA was more strongly associated with a lower prevalence of obesity than was moderate PA.

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Exploratory and Confirmatory Factor Analysis of Health promotion in Iranian Hospitals

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Abstract

Background: The World Health Organization (WHO) produced the Ottawa Charter for Health Promotion (HPH) then expressed the Budapest Declaration of Health Promoting Hospitals and after determined standards for reorienting hospitals towards health promotion So this study aimed to determine effective factors for Health Promoting Hospitals (HPH) in Iran.

Method: This study was a descriptive - analytical survey in selected hospitals of Iran (38 hospitals from 5 provinces). Method of data collecting was through Exploratory and Confirmatory Factor Analysis by Using AMOS version 16. 0.

Results: Overall In exploratory analysis identified 16 factor in 4 dimension (patient, staff, organization and community health promotion) that in confirmatory factor analysis and based on several goodness-of-fit criteria, It was found that all the variables (factors) in the model significantly confirmed.

Conclusion: Hence, health promotion has always been the core business of medicine in general and hospitals in particular. Hospitals must design a specific system for improving and evaluating health promotion**.**

Key word: Health Promoting Hospitals, Iran

Introduction

Hospital is a social and medical organization with a complete health care (both preventive and treatment sector) (1). But Changing public expectation, growing number of chronically ill patients and hospital staff, who are exposed to physical and psychological stress is leading to hospitals with a health promotion planning (2). Health promotion measures focus on both individuals and contextual factors that shape the actions of individuals with the aim to prevent and reduce ill health and improve wellbeing (3). in fact health promoting program is improving health of patient, staff and community (4). The World Health Organization's (WHO) Ottawa Charter for Health Promotion made a path to the development of a series of 'settings-based' health promotion strategies during mid-1980s (5). One of the settings singled out for particular attention was that of the Health Promoting Hospital (HPH) in 1988. Peculiarly, the progress of HPH has come about a series of influential reports that include The Ljubljana Charter on Reforming Health Care, The Budapest Declaration on Health Promoting Hospitals and The Vienna recommendations on Health Promoting Hospitals (6-11). Involving 20 hospitals from 11 European countries by the European Pilot Hospital Project in 1993–1997, Health-promoting hospitals (HPH) were initiated at the end of 1980s with the WHO model project 'Health and Hospital' (9). The WHO definition of HPH may be seen as providing high quality comprehensive medical and nursing services, also developing a corporate identity that embraces the aims of health promotion. Additionally, to improve the health of patients and staff, support healthy environments and actively cooperate with the community it is expected to incorporate the concepts, values and standards of health promotion into the organizational structure and culture of the hospital, (9, 4, 12).

Recognizing the need for health promotion in hospitals, WHO established a working group at the 9th International Conference on Health Promoting Hospitals, Copenhagen, May 2001. thereafter several working groups and country networks have been working on the development of HPH concept (13). After these three workshops the standards for health promotion in hospitals are considered to be in their final format (subject to future revision once new evidence emerges). it can be said Due to the nature of these standards that today's role and responsibility of hospitals is health promotion of patient, staff, organization and community (14). Many studies apprai-

se the role of training for staff and patient in upgrading and carrying out health promotion in hospitals (15-19). Another study presents a content analysis of 216 programs that were conducted by measuring seven variables (target group, presentation format, fee, health focus, program providers, contact frequency, and activity) for health promotion programs (20) Groene has expressed health promotion activities in hospitals in four domains (patient oriented, staff-oriented community and organization, -based) (21). Johnson offers four different types of organizational approaches to health promoting hospitals. In hospitals of type 4, the hospital is Improving health promotion of patient, staff, organization and community (22). 17 health-promoting hospitals that have accreditation certificate, incorporate health promotion concepts, values and standards into its organizational culture and daily routines (23). Groene in his research piloted the health promotion standard in nine European countries (36 hospitals). Used standards for health promotion in hospitals were developed by a task force of the International Network of Health Promoting Hospitals, (24). One of the main obstacles against the development of HPH is shortage of supplies, personnel and training, time, managers understanding of the concept and principles of health promotion in hospital and professional skills (25). Some studies show that hospitals with high health promotion do four categories of activities related to the patient, staff,organization and community (21). Research in 124 hospital in Iowa including 99 rural hospitals and 25 urban hospitals indicated that 98. 9 % of rural hospitals offered health promotion services to community (26). Health promotion program has been implemented in Swan Hill Hospital (District hospital) in three dimensions of staff, patients and community (27). Peter Olden has stated management as one of the stages of health promotion implementing. (28). A survey for Health promotion in staff was conducted to indicate areas of weakness in stress management and physical activity, Strategies for this issue and educational/experiential classes (29).

Method

The methodology used in this study involved a combination of descriptive, analytical and cross-sectional studies during 2011. At fist, A series of in-depth interviews were conducted with some experts in the field of Health promotion to determine Health promotion factors in hospital. Then the final questionnaire was developed based on these interviews and relevant literature. Population was academic faculty that knowing about health promotion, nursing and managers of selected hospital in Iran's' medical university.

The study sample consists of 100nurses, 129 managers 51 academic member and (totally 280 people) who were selected through stratified randomized sampling. The questionnaire consist of two section. Section one was demographic information including sex, age, management, experience, education level, and Section two consist of questions in relation to Health promotion dimensions (patient, staff, organization and community Health promotion). That named as latent factors. To assess the validity of the questionnaire, expert judgment method was applied. Reliability of this questionnaire calculated by test- retest method was 0. 81 and internal consistency was 0. 81 using Alpha Cronbach method. It showed that the questionnaire was reliable. Then the Bartlet test of sphericity was used to establish whether the correlation matrix was an identity matrix and Kaiser-Meyer-Olkin approach was used to determine the sampling adequacy. In order to handle any missing data, an expectation- maximization algorithm was employed. The estimation of parameters was based on the maximum likelihood method.

Data analysis

Analyses were conducted in two stages. That described in detail below. In the first stage, Exploratory Factor Analysis (EFA) is to calculate factor loading for determining significant of each variable within the factor category. The EFA was performed with maximum probability approach. in the second stage confirmatory factor analysis (CFA) via AMOS Graphics was used to test the measurement model. CFA is a structural equation modeling technique used to determine the goodness of fit of model.

Model Evaluation

Evaluation of each model was based on considering a variety of fit measures:There are three categories of fit indices for model evaluation. The

first group is called absolute fit indices. They do not use an alternative model as a base for comparison. Rather, they are derived from the fit of the obtained and implied covariance matrices. For example GFA (Goodness of Fit), AGFI (Adjusted Goodness of Fit) and RMSEA (Root Mean Square Error of Approximation) are all absolute indices (30).

The second group is called comparative (incremental) fit indices. They compare values for the model tested with the null model. NFI (Normed Fit Index) and NNFI (Non-Normed Fit Index) are relative indices (30). The third group is called parsimonious fit Indices. They are calculated by subtracting the degree of freedom of the model from the chi-square after adjusting for sample size. It has been suggested that researchers should report at least two indices from each category.

If CFI, GFI, NFI, NNFI, IFI, RFI and AGFI are higher than 0. 90 and RMSEA and RMSRI are less than 0. 050, it proves a desirable and appropriate fitness (31).

Results

Finding in this research is in a 3 categore as a follow:

Descriptive Analysis

Generally, The mean score of patient Health promotion was (3. 1 ±. 04) and in its factors, need assessment for different disease patient group had the highest amount (3.5 ±. 04) and Patient empowerment in management of chronic illness had the least (2.2 ±. 08). (Table 1), The mean score of staff Health promotion was (2. 9 ±. 05). and in its factors, Staff empowerment in lifestyle development had the highest amount (4. 4 ±. 04) and Definition of guidelines for safety and staff Health had the least (2.0 ±. 07). The mean score of organization Health promotion was (3.06 ±. 06). that, Documentation of interventions and expected results had the highest amount (4.2 ±. 03) and Cooperation and coordination with other organizations had the least (2.1 ±. 08). finally The mean score of community Health promotion was (3.9 ±. 03). and in its factors, Community empowerment in participation in treatment had the highest amount (4.5 ±. 04) and Community empowerment in lifestyle development had the least (2.6 ±. 06). (Table 1)

Exploratory factor Analysis

The explanatory factor analysis was used to identify the most effective factor which influence the health promotion and also to identify the amount of factor loading on each component (table1). It was performed with maximum probability approach. In exploratory analysis identified 16 factor as follow:

- 5 factor for Patient Health Promotion (PHP), 3 factor for Organization Health Promotion (OHP). 4 factor for Staff Health Promotion (OHP) and 5 factor for Community Health Promotion (OHP). summary results of the EFAs is displayed in Table 1.
- A factor loading value of + or - 0. 30 is considered significant, and a factor loading of + or -0. 50 is considered very significant.

In the Rotated Component Matrix of Patient Health Promotion (PHP), factors were in two component. That Patient empowerment in self care with factor loading of 0. 979 was the first priority. In the Staff Health Promotion (SHP),Staff empowerment in lifestyle development with factor loading of 0. 906 was the first priority and 62% of its variance is explained by this factor. And In the Organization Health Promotion (OHP) dimension, Cooperation and coordination with other organizations with factor loading of 0. 926 was the first priority and 77% of its variance is explained by this factor (Table 1). At Community Health Promotion (CHP) dimension Community empowerment in self care with factor loading of 0. 796 was the first priority and 48% of its variance is explained by this factor.

Confirmatory factor analysis

After doing EFA to identify the factors influence health promotion in hospital, confirmatory factor analysis (CFA) has been used. CFA is a statistical technique used to verify the factor structure of a set of observed variables. Table2 reports the goodness-of-fit indicators of the research model. For the final model, the Chi-square divided degrees of freedom was 2. 9 and The other fit indices (GFI=0. 94; TLI=0. 90; CFI=0. 93) and the low standardized root mean square residual (RMR=0. 053) are all within acceptable ranges and show that a substantial amount of variance is accounted

Table 1. Result of factor loading in dimensions of Health Promotion

dimention	code	Factor	Mean ±SD	Component		٪ of variance	Eigen value
				1	2		
Patient Health Promotion (PHP)	**PH1**	Patient empowerment in self care	2. 3 ±. 08		. 962	43. 006	2. 150
	PH2	Patient empowerment in participation in treatment	3. 4 ±. 07		. 955	39. 247	1. 962
	PH3	Patient empowerment in management of chronic illness	2. 2 ±. 08		. 726	16. 171	. 809
	PH4	Patient empowerment in lifestyle development	3. 4 ±. 07	.	579	1. 097	. 055
	PH5	Need assessment for different disease patient group	3. 5 ±. 04	. 978		. 478	. 024
	Total	**Patient Health Promotion**	3. 1 ±. 04				
Staff Health Promotion (SHP)	**SH1**	Staff empowerment in lifestyle development	4. 4 ±. 04	. 906	-	**62. 703**	**2. 508**
	SH2	Staff empowerment in self care	2. 0 ±. 07	. 844	-	**18. 199**	**. 728**
	SH3	Staff empowerment in participation in treatment	3. 3 ±. 06	. 760	-	**13. 822**	**. 553**
	SH4	Educational planning for safety and staff Health	2. 1 ±. 08	. 630	-	**5. 275**	**. 211**
	Total	**Staff Health Promotion**	2. 9 ±. 05				
Organization Health Promotion (OHP)	OH1	Cooperation and coordination with other organizations	2. 1 ±. 08	. 926	-	**77. 733**	**2. 332**
	OH2	Documentation of interventions and results	4. 2 ±. 03	. 891	-	**15. 452**	**. 464**
	OH3	schedule and program for cooperation and collaboration to meet partners (partner's health)	3. 8 ±. 04	. 825	-	**6. 815**	**. 204**
	Total	**Organization Health Promotion**	3. 06 ±. 06				
Community Health Promotion (CHP)	CH1	Community empowerment in self care	4. 2 ±. 04	. 798	-	**48. 000**	**2. 400**
	CH2	Community empowerment in participation in treatment	4. 5 ±. 04	. 704	-	**19. 770**	**. 988**
	CH3	Community empowerment in management of chronic illness	3. 5 ±. 06	. 697	-	**14. 592**	**. 730**
	CH4	Community empowerment in lifestyle development	2. 6 ±. 06	. 694	-	**11. 633**	**. 582**
	CH5	Strengthen community infrastructure to meet public needs	3. 0 ±. 07	. 549	-	**6. 005**	**. 300**
	Total	**Community Health Promotion**	3. 9 ±. 03				

for by the model. Hence the model is a reasonable representation of the data.

Discussion

The purpose of this study is to propose a effective factor of HPH by using Exploratory and Confirmatory Factor Analysis. Overall in the health promotion dimension, the community Health promotion had the highest amount (3. 9 ±. 03). that showing Importance of Community empowerment. That also expresses in another study (32). In fact, improve the health of the community lead to health promotion of hospital.

Staff Health promotion had the least (2.9 ±. 05). This means that, attention to staff health promoti-

Table 2. Fitness indexes calculated for the Models

Model	Model Fit Indices								
	absolute fit indices				comparative fit indices		parsimonious fit Indices		
PHP		df	p	GFI	CFI	TLI	RMSEA	PNFI	CMIN/DF
	17/2	6	. /003	91/.	94/.	91/.	0/047	0/61	8/2
SHP	2/5	1	. /004	93/.	97/.	93/.	0/047	0/63	5/2
OHP	8/8	3	. /000	95/.	99/.	92/.	0/065	0/61	9/2
CHP	5/8	2	. /002	90/.	96/.	92/.	0/064	0/61	9/2
Final model	35/6	12	. /000	94/.	93/.	90/.	0/053	0/63	9/2

on in Iran's hospitals is very poor. Although many studies have demonstrated that hospital physicians are confronted with high workload and work-related stress and must notice on hospital staffs health promotion. (33). Another result show that Educational planning has the last priority. Although One important element in creating a health promoting hospital is training to staff and patients. That is emphasized in many studies (15-20). Nevertheless education and training Un regarded, Staff empowerment in lifestyle development had a high factor loading. Also WHO emphasis on empowerment in lifestyle for staff.(21) In this study a WHO health promoting hospital dimension was used. That expressed four domains for health promotion in the hospital (patient - oriented, staff-oriented,organization and community - oriented) so it is similar to another research (21, 22, 24, 27). Documentation of interventions Had a highest score in organization health promotion domain.

As international Network of HPH emphasis that: In order to realize the full potential of the HPH approach Develop and implement a structure for regular observation, monitoring, documentation, evaluation and reporting is needed (34). Self care or self maintenance that is mention in 18 specific HPH core strategies (21) is one of the important factors in this study. Patient empowerment in self care had a first priority with. /962 factor loading in Patient Health Promotion (PHP),and staff empowerment in self care had a second priority with. /844 factor loading in staff Health Promotion. Community empowerment in self care had a first priority with. /798 factor loading in Community Patient Health Promotion. patient need assessment is a one component of patient health promotion with. /978 factor loading. Also Greene study (21) emphasis on risk factors and health needs as a important factors of patients' assessment. and so another study show that Identification of customer need is a fundamental element in organization (35).

Patient empowerment in management of chronic illness had the least score in patient health promotion (2.2 ± .08). Although A literature search indicates that a large number of studies have considered health promotion amongst chronically patients (36-39). Finally The results of confirmatory factor analysis indicated that 16 factor in 4 dimension for HPH implementation in Irans hospital is necessary.

Conclusion

Hospitals have had to learn to adjust to continuously changing environments and thecnology, such as rising health care costs (40), that is a Perennial theme. Therefore, it is necessary for them to observe new reform and proceedings in their environments,. For most hospitals, this was the case with quality. In fact,In the last 20 years, there have been many developments in health promoting hospitals and health services (HPH) (41), so far no research has been done in HPH in Iran. But researches showed that hospitals in Iran do appropriate activities in order to move towards health promotion. particularly in giving appropriate information to patients and their relatives. And having responsibility for responding to patient demands for health information (42).

Hospitals must design a specific system for improving and evaluating health promotion, and so encourage policy-makers and health service administrators to invest resources in HPH (39). After more than a decade of promotion from WHO, HPH is now proved not to be only a vision, but also a concrete development strategy for hospitals (43).

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The relationship between grade's of the gastro-esophageal reflux disease and hiatal hernias

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Abstract

Aim: The aim of this retrospective study is to evaluate the relationship between grade's of the gastro-esophageal reflux disease(GERD) and hiatal hernias(HH).

Material and Methods: A retrospective review of the records of 3256 patients who underwent Esophagogastroduodenoscopy was carried out. Date about patient's age, sex,weight and endoscopic findings were collected. Grade's of GERD was assessed according to the Los Angeles Classification.

Result: The HH was seen significantly higher in patients with GERD than patients without GERD. However, we found no significant differences when we compared the patients according their GERD score in the HH negative group.

Conclusions: According to this study, there is a linear relationship between grade's GERD and HH. HH intensifying reflux esophagitis, but isn't as the primary cause of GERD. Other factors should be considered as a cause of reflux esophagitis.

Key words: hiatal hernia, gastro-esophageal reflux

Introduction

Gastro-esophageal reflux disease(GERD) is a chronic disease, that rarely resolves spontaneously, and it is associate with frequent relaps. Several studies have investigated the prevelence of GERD, though few have spesifically targeted the elderly[1]. GERD is defined as an increased frequency or duration of exposure of the distal esophagus to gastric contens.

The pathophysiology of hiatal hernias(HH) is incompletely understood. HH disrupts both the anatomy and physiology of the normal antireflux mechanism. It reduces lower esophageal sphincter length and pressure, and impairs the augmenting effects of the diaphragmatic crus. It is associated with decreased oesophageal peristalsis, increases the cross-sectional area of the esophago-gastric junction, and acts as a reservoir allowing reflux from the hernia sac into the oesophagus during swallowing[2]. The nature of the relationship between HH and GERD is still not clear[1]. GERD is a multifactorial disease. The roles of environmental, dietary, and host physiological factors are well established. There is still a controversial association between GERD and HH[3,4]. This study was designed to investigate the relationship between HH and grade's of the GERD.

Material and method

This retrospective study was conducted between March 2008 and September 2010 in the Surgery Department of New City State Hospital, Sakarya, Turkey. Esophagogastroduodenoscopy (EGD) was performed by the same staff. The study was approved by the hospital ethical committee. 3381 consecutive patients underwent EGD. 125 of these patients were not tolerated device of gastroscopy and excluded from this study. Patient characteristics and indications for EGD were variable. Endoscopic appearing of distal esophageal mucosal breaks were assessed according to the Los Angeles Classification.

EGD procedure was started with a period of fasting (6 hours). After this period, patients were placed on their left side and the oropharynx was anesthetised by topical anesthetic, lidocaine (xylocain spray %10®). Intubation of the esophagus was usually done under direct vision. The esophagus, stomach and duodenum (the superior part and the descending part) were inspected after intubation. The gastric fundus was also seen by retroverting the gastroscope. Multiple biopsy materials were taken into antrum and anywhere that was necessary after inspection. The biopsy materials were put into the %10 formol solution for pathological examination.

Endoscopic appearing of distal esophageal mucosal breaks were described in four category according the Los Angeles Classification;

Los Angeles classification[5]:

Grade I: (one or more mucosal breaks no longer than 5 mm, none of which extends between the tops of the mucosal folds),

Grade II: (one or more mucosal breaks more than 5 mm, none of which extends between the tops of the mucosal folds),

Grade III: (mucosal breaks that extends between the tops of two or more mucosal folds, but which involve less than 75% of the esophageal circumference),

Grade IV: (mucosal breaks which involve at least 75**%** of the esophageal circumference).

Statistical analysis was performed with student t test, the chi-square or Fisher's exact test for categorical factors. Statistical significance was assumed for $P<0.05$.

Results

The study groups consisted of 1933 male (%59,3) and 1323 female (%40); the mean age was 44.54(12-92) years. Some parameters, such as sex, age and weight were compared, and no statistically significant differences were found between both groups of patients ($p>0.05$).

The HH was seen significantly higher in patients with GERD 1024 (%96,6) than patients without GERD 34(%3,4) ($p<0.05$). However, we found no significant differences when we compared the patients according their GERD score in the HH negative group., (Table I) ($p>0.05$).

The HH was seen significantly higher in patients who had grade IV GERD 515(%50) than patients had grade I GERD 80(%8)($p<0.05$). Whereas, grade I GERD 907(%70) was seen significantly higher than grade IV GERD 9 (%8) in patients who hadn't HH (Table II).

Discussion

EGD is usually the first investigation for dysphagia, odynophagia, dyspepsia, gastro-oesophageal reflux, recurrent vomiting and so on. The procedure also allows intervention such as biopsy. EGD is relatively insensitive for making the diagnosis of GERD. However, the presence of erosive esophagitis and/or Barret esophagitis(BE) is highy suggestive of GERD. The presence of normal mucosa at EGD does not rule out the diagnosis of GERD[1].

GERD starts in the stomach. It is caused by gastric distention due to overeating or ingestion of fried foods. Sign of injury to the exposed squamous epitelium are erosions, ulseration, fibrosis, and columnar metaplasia. This process results in the loss of muscle function and the sphincter becomes mechanically defective, allowing free reflux with progressively higher degrees of mucosal injury[10,11]. Inıtially,the symptoms of GERD were associated with a HH. This led to the conclution that the hernia itself was the cause of the symptoms[10]. A hiatal hernia can also contribute to an esophageal propulsion defect due to loss of anchorage of the esophagus in the abdomen[11]. It seemed reasonable to attempt to correct these symptoms by surgically reducing the hernia with simple closure of the crura. The problem was that 50% of patients,the symptoms recurred[10].

GERD is comprised of a spectrum of related disorders, including hiatal hernia, reflux disease with its associated symptoms, erosive esophagitis, peptic stricture, Barrett's esophagus, and esophageal adenocarcinoma. Besides multiple pathophysiological associations among these disorders, they are also characterized by their comorbid occurrence in identical patients and by their similar epidemiologic behavior[5].

HH is commonly associated with GERD, particularly reflux esophagitis and Barrett's esophagus. HH may increase with age as a result of fibromuscular degeneration. Obesity increases intra-abdominal pressure and may increase the risk of HH. A meta-analysis was undertaken to assess the influence of risk factors for HH[6,7]. The pathogenesis of hiatal hernias at the molecular and cellular levels is poorly described. To date, no single theory has proved to be the definitive explanation for HH formation, and its pathogenesis appears to be multifactorial[8,9]. In this study; HH intensifying reflux esophagitis($p<0.05$). But HH is not observed as the primary cause of GERD($p>0.05$).

The occurrence of GERD is shaped by marked temporal and geographic variations, suggesting the influence of environmental risk factors in the etiology of these diseases. Variations by Time, Geo-

graphy, and Race: Between 1975 and 2005, the incidence of GERD and esophageal adenocarcinoma increased fivefold in most western countries[6,7]. The incidence of GERD also appears to be rising in the most developed countries of Asia. All severe forms of GERD, such as erosive esophagitis, peptic stricture, Barrett's metaplasia, and esophageal adenocarcinoma, are more common among whites than other ethnic groups. Affluence and Obesity as Risk Factors: Barrett's esophagus and esophageal adenocarcinoma tend to occur slightly more often in subjects with higher income. Overweight and obesity contribute to the development of HH, increase intra-abdominal pressure, and promote gastroesophageal reflux. Weight gain increases reflux symptoms, whereas weight loss decreases such symptoms. Other risk factors, such as smoking, alcohol, dietary fat, or drugs, play only a minor role in shaping the epidemiologic patterns of GERD[5,6,7,8,9].

Daily reflux symptoms affect about 4 to 7 percent of the population; erosive esophagitis occurs in about 2 percent[6]. During the past three decades, hospital discharges and mortality rates of gastric cancer, gastric ulcer and duodenal ulcer have declined, while those of esophageal adenocarcinoma and GERD have markedly risen. These opposing time trends suggest that corpus gastritis secondary to helicobacter pylori infection protects against GERD[9,10,11]. This hypothesis is consistent with the geographic and ethnic distributions of GERD. Case-control studies also indicate that cases with erosive esophagitis are less likely to harbor active or chronic corpus gastritis than controls without esophagitis[5,6,8].

In conclusion; According to this study, there is a linear relationship between grade's GERD and HH. HH intensifying reflux esophagitis, but isn't not as the primary cause of GERD. Other factors should be considered as a cause of reflux esophagitis. Thus, although hiatus hernia may or may not be an initiating factor at the inception of reflux disease, it clearly can act as a sustaining factor accounting for the frequently observed chronicity of the disease[10].

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Health outcomes for quality of work life as evaluated by Rasch methods: An example using the Chinese version of the Job Content Questionnaire

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Abstract

Background: When a set of items is designed to measure the same construct (e.g., quality of life), item scores are often summed to represent the level of the construct. This summation method assumes that all items contribute equally to the construct and that the item scores are on an interval scale. These assumptions are problematic, especially for producing the attenuation paradox on scale reliability and validity not increased together. In recent years, the Rasch model has been developed to resolve these problems by yielding person measures that are on an interval scale. The aim of this study was to examine whether these two methods yield a similar or a different prevalence rate for job strain on workers.

Methods: The Chinese-version of the Job-Content Questionnaire (C-JCQ) was used to compare the prevalence rate for job strain on workers using Rasch analysis when deriving a person measure to represent his/her level of a construct. The data were collected from 1,124 employees at a hospital in Taiwan. The dimensionality was evaluated by the principal component analysis on Rasch residuals. The prevalence of job strain was calculated. A visual presentation was displayed to use in workplaces.

Results: The five-factor structure of the Job-Content Questionnaire was supported by the parallel analysis. Four types of jobs were classified using two subscales of the C-JCQ. When the summation method was used to classify workers into the four types, it yielded similar results to those from the Rasch analysis, different results were found in both the hypothesis testing and the confidence interval estimation, but same inference making. Rasch analysis has an advantage over the summation method in the treatment of missing data and resolving the attenuation paradox. To facilitate the use of the Rasch method, an Excel module, combined with the computer program WINSTEP, was developed to reveal valuable information for workers and mental health consultants.

Conclusion: It is recommended that the Rasch method replace the summation method when representing the levels of latent traits for individual workers when missing data are in existence. The Rasch method is not only theoretically sound and capable of handling missing data, but the summation method might yield different results for hypothesis testing and the attenuation paradox from the results achieved by the Rasch method that is based on the alleged theoretical advantages of this approach. The Excel-VBA module is helpful in facilitating the Rasch method and reveals valuable information about workers' job strain.

Key words: attenuation paradox, Rasch analysis, Job-Content Questionnaire, quality of life

Background

It is common that a set of items is developed to measure the same construct (latent trait), for example, quality of life (QoL). Often, a raw score, which is the summation of the item scores, is used to represent a person's level of the latent trait [1-3]. This summation method is problematic because raw scores are not on an interval scale and are dependent on the test (i.e., a person will receive a

high raw score in an easy test but a low raw score in a difficult test) as well as are producing the attenuation paradox on scale reliability and validity not increased together when extreme scores are endorsed [4]. The Rasch model successfully resolves these problems [5] and yields person measures on an interval scale that are not test dependent [6-8]. It is interesting to investigate whether these two methods yield a similar or a different result for a QoL survey.

Two key issues faced in QoL studies

1. The issue of an interval scale

Every measure consists of some measurement error. In classical test theory (CTT) [9], scores are assumed to be on an interval scale [10]. This assumption may hold for physical measures (e.g., height and body temperature) with a very small amount of measurement error. However, it may not hold for test scores in the social sciences, when measures often (if not always) include a large measurement error [6]. Ignoring measurement error can cause serious mistakes in hypothesis testing and in estimating confidence intervals [6, 9]. An even more serious problem is that raw scores are not on an interval scale and should not be treated as such. Whether the result of ignoring measurement error can always cause serious differences in hypothesis testing is needed to study. Another important issue is regarding attenuation paradox of a test that is a property such that the validity of the test is not a monotonic function of that property [11].

2. The issue of missing data

Another serious limitation of the summation method is that it cannot manage missing data [6]. Missing data occur in most surveys. The summation method becomes unworkable when different persons miss different items because the same raw score that comes from different pieces of missing data may represent different levels of a latent trait. Likewise, a higher raw score may not necessarily represent a higher level than a lower raw score when they are summed with different pieces of missing data. Accordingly, the issue of missing data needs to discuss as well.

Two methods for creating composite scores that are often used in QoL studies

When a set of items measure the same latent trait, a composite score is computed to represent a person's level of the latent trait, and subsequent statistical analyses (e.g., multiple regression or ANOVA) can be conducted. There are two major methods for obtaining a composite score. In the summation method, where item scores are summed to form a total score, items are treated equally and item scores are treated as interval data. In reality, item scores are treated as ordinal variables, rather than on an interval scale, so that total scores are ordinal, not on an interval scale.

The Rasch measurement is specifically developed to resolve these problems [12-15]. When data meet the Rasch model's expectation, interval measures for items and persons can be theoretically derived. These person measures are not test dependent. Furthermore, even when different persons miss different items, their person measures are still comparable. This study aims to examine whether these two methods yield a similar or a different prevalence rate for job strain on workers.

Quality of work life as measured by the JCQ

1. Occupational health drawn attentions

The evolution of the quality of work life (QWL) began in the late 1960s, and emphasised the relationship between the worker and the working environment [16]. With increasing concerns related to job stress for workers, many researchers [17-19] have addressed psychosocial job stress and its adverse effects on health. Occupational stress has received considerable research attention because, from a QoL perspective, it is highly related to occupational health. Many studies that adopt different scales report the prevalence of work-related stress among workers in various workplaces [20-23]. However, it is difficult to compare these measures of the prevalence of job stress because raw scores as person measures are test dependent [6].

2. Applications of the JCQ

The Job Content Questionnaire (JCQ) was developed based on Karasek's demand-control model, which is one of the leading theoretical work-related stress models [24, 26]. Many epi-

demiological studies adopt the JCQ to measure general work content. The JCQ is applicable to all jobs and all workers for predicting job related stress and coronary heart disease [23-25] and for studying work motivation, job satisfaction, absenteeism, and labour turnover [24, 28, 29].

3. Four diagnostic quadrants separated by two polarised scales

In the demand-control model, workplace stress is a function of job demand and decision latitude. Job demands represent the psychological stressors in the work environment, and decision latitude refers to employees' control over their tasks and how those tasks are executed. Four types of jobs are classified: (a) passive (low latitude and low demand), (b) active (high latitude and high demand), (c) high strain (low latitude and high demand), and (d) low strain (high latitude and low demand) [23, 24]. High strain jobs are the most likely to cause adverse psychological reactions [23-25]. It is interesting to know whether the simple summation method and the Rasch method will yield a similar or a different prevalence rate for job strain on workers.

Comparison of CTT and IRT-based Rasch approaches for the JCQ

Classical test theory (CTT) is the underlying theory that supports the summation method. CTT has been widely used to assess the psychometric properties of the JCQ, such as factor structure and reliability [24, 26, 30]. In this study, we applied the Rasch technique to analyse the Chinese version of the JCQ (denoted as C-JCQ). Detailed steps are shown in the Methods section.

CTT and Item Response Theory (IRT) are measurement theories that transform item scores to person measures [24, 28]. In CTT, an observed test score is assumed to consist of a true score and an error score [31,32]. In IRT, a latent trait is assumed to affect a person's response to an item through a mathematical function. In IRT, but not CTT, it is applicable to estimate the location of persons on the scale for a set of items. It is also possible in IRT to estimate the location of items on the basis of their scores endorsed by a set of persons. The location of a person is called their latent trait level, and the location of the item is called the item location or the item difficulty [23, 33, 34]. There are many types of IRT models [35]. Among them, only the models of the Rasch family have good measurement properties (e.g., specific objectivity) and yield person measures on an interval scale [6]. We thus adopted the Rasch model to derive person measures on an interval scale and to examine whether the advantages of the Rasch model over the CTT-based simple summation method using the C–JCQ data.

Objectives

Using the C-JCQ data, we aim to compute a prevalence rate for job strain on workers for a workplace using Rasch analysis. In addition, Graphical representations of the C-JCQ scores were presented in Excel to reveal the QWL (quality of workplace life) for individual workers.

Methods

Study Participants

The study setting is a 900-bed hospital in southern Taiwan. A total of 1,823 full-time workers in the studied hospital participated in a job perception survey in May of 2009. The self-administered questionnaire and a cover letter explaining the research motivation and purpose were distributed to all hospital employees. No reminder or follow-up was made to encourage responses to the questionnaire. A total of 1,257 employees completed the questionnaire (return rate = 68.95%). One hundred fifteen participants were excluded because they did not provide information on age, gender, had not worked for more than three months, were part-time workers, or did not answer all of the C-JCQ 22 items (i.e., missed any one of the 22 items). As a result, the responses of 1,124 workers (62.64% of 1,823) were analysed (Table 1). Proportion bias may occur in gender, age, work tenure, job type, marital status, or education level due to differences in response rates among subgroups, where one subgroup is over- or under-represented in the total sample. It is notable that 31 respondents were excluded from this study because of missing data on any one of the 22 items. The inability to handle missing data is a serious limitation for the summation method, but not for the Rasch method.

Table 1. Demographic characteristics and work conditions of the study population (n = 1,124)

Variable	Mean	Male SD	Range	Mean	Female SD	Range	Total	Statistical Test
Age (years)	33.23	5.79	25-54	29.1	4.32	21-57		t=9.65***
Work tenure (years)	5	4	.28-21	3.9	3.3	.25-24		t=3.45**
	N	%		N	%			
Proportion for gender	120	10.68		1004	89.32		1124	χ^2=909.62***
Age (Average years)								χ^2=52.98***
1.21~30	33	5.5		567	94.5		600	
2.31~45	80	15.69		430	84.31		510	
3.46~60	7	50		7	50		14	
Work tenure								χ^2=12.07**
1. Within 1 year	6	10.71		50	89.29		56	
2. 1-39 years	33	7.48		408	92.52		441	
3. 3.1-10 years	65	11.95		479	88.05		544	
4. Above 10 years	16	19.28		67	80.72		83	
Job type								χ^2=26511***
1.Administration staff	65	26		185	74		250	
2.Technician	24	19.67		98	80.33		122	
3.Nurse	10	1.38		715	98.62		725	
4.Physician	21	77.78		6	22.22		27	
Marital status								χ^2=22.79***
1.Single	60	7.91		699	92.09		759	
2.Married	60	17.29		287	82.71		347	
3.Widowed/Separated/ Divorced		0		8	100		8	
Employment status								χ^2=1.11
1.Managers/administrators	19	13.77		119	86.23		138	
2.Low-skilled staff	98	10.37		847	89.63		945	
Education level								χ^2=36.83***
1.Senior high school	4	18.18		18	81.82		22	
2.College	22	6.43		320	93.57		342	
3.University	76	10.76		630	89.24		706	
4.Graduate school	18	33.33		36	66.67		54	
*p<0.05; **p<0.01; ***p<0.001								

The Questionnaire and checking dimensions

1. The 22-item C-JCQ

The C–JCQ was used with permission from the author [30]. It consists of 22 four-point Likert items (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree) on five subscales: skill job discretion (six items), decision authority (three items), psychological job demand (five items), supervisor support (four items), and coworker support (four items) [30].

2. Scores created byRasch model

To represent job strain exposure in a graphical plot, we created scores for each subscale with Rasch method. In the Rasch method, the computer program WINSTEPS [36] was used to calibrate the item and the persons measures and the mean of the person measures was set at zero.

3. Job content dimensions and item fit

The dimensionality of the C–JCQ was evaluated with Rasch model. Beforehand, one method was the exploratory factor analysis with a parallel analysis on the raw scores [37, 38]. The other method was a principal component analysis on the

Rasch residuals [39, 40]. The first method was performed to determine the number of dimensions in the C–JCQ. The second method was then performed to confirm the unidimensionality of the resulting subscales in the C-JCQ that were found in the first method. The following criteria were used to determine whether additional domains were present in the residuals: 1). a cutoff of 60% of the variance explained by the Rasch factor; and 2) eigenvalues smaller than 3 and the percentage variance explained by the first contrast of less than 5% [14,36,40]. Through the Rasch analysis, the raw scores are transformed to theoretically interval measures with the logit (log odds) unit [6, 14, 15]. Rasch analysis has been used to develop and evaluate instruments of health status and QoL in many published papers [14, 15]. The weighted (infit) and unweighted (outfit) mean-square errors can be used to assess item and person fit [41]. A mean-square error between 0.70 and 1.30 indicates a good model-data fit [41, 42]. The low threshold (=0.70) examine the correlation among responses for all items taken in pairs is zero and called it local independence on a muted/Guttman scale [43]. The high one (=1.30) inspect the noisy/erratic response patterns to the model.

Statistical analyses and comparisons

1. Inference statistics

Student's *t*-test was performed to evaluate gender differences in age and work tenure. A chi-squared test was applied to evaluate the association between demographic characteristics (age, work tenure, job type, marital status, employment class and education level) and gender. ANOVA was then used to evaluate the differences between employment classes across subscales. The nominal level was set at 0.05.

2. *A comparison of the two methods in creating scores*

The score of the psychological job demand (PD) subscale was used to represent the degree of job demand. Traditionally, the sum scores of the two subscales of skill job discretion (SD) and decision authority (DA) are used to represent the degree of decision latitude. With these two variables of decision latitude and job demand, four types of job were classified: high strain, low strain, passive, and active. It was expected that most nurses and physicians would be classified as having active jobs (high latitude and high demand) [24].

3. *Prevalence rate of high strain on workers*

The prevalence rate is the ratio of the number of existing events in a specified period over the number of people exposed to risk in that period. It reveals the percentage of participants with work-related stress within the total population that is at risk of contracting that stress.

Ethics Review Board Approval

The Research and Ethics Review Board of the Chi-Mei Medical Center approved the protocol of this study.

Results

Descriptive Statistics

Table 1 summarises the demographic characteristics of the 1,124 studied respondents. The mean age was 33 and 29 years for men and women, respectively. The mean duration of work tenure was approximately 5 and 3 years for men and women, respectively. The majority of respondents were nurses (64.5%), and only 2.4% were physicians. Chi-squared tests showed that all variables, except for employment status, were significantly associated with gender.

Study 1 (checking C-JCQ dimensions):

1. Item fit and dimensionality

The exploratory factor analysis with parallel analysis on the raw scores identified five factors in the C-JCQ (in the right panel of Figure 1). The two domains of SD and DA, although very close to each other (in the left panel of Figure 1), did not belong to the same factor according to the criteria of Rasch PCA (Table 2). The subscales of supervisor support (SS) and coworker support (CS) had different factor loadings and were clustered in a horizontal direction. However, the CS items were easier when the scores lower than the SS items, indicating that workers in the hospital were more satisfied in a cordial atmosphere with coworkers than with supervisors. Considering that the five-

subscale structure was not only consistent with the intention of the original developer and with the literature, but was also supported by the parallel analysis, we decided to check whether each of the five subscales measured a single dimension. The data of each of the five subscales were thus analysed with the Rasch rating scale model [43]. The data are assessed for fit to the Rasch model using WINSTEPS [36]. The principal component analysis on Rasch residuals yielded all the variances explained by the Rasch factor greater than 60% as well as an eigenvalue of 1.3, 1.5, 1.4, 1.5, and 1.7, respectively, for the first contrast for the five subscales. None of the values was larger than the cut-point of 3, and none of the unexplained variances in the first contrast of the five subscales was greater than 5%. Thus, each of these five subscales can be treated as unidimensional [40]. The item infitt mean squares (in Table 2) were smaller than 1.30, also suggesting a fairly good fit [41, 42].

Table 2. Item difficulties and unidimensional test[1] by MNSQ within .6 and 1.4

	Items (Likert 4-point scoring scale)	Logit		MNSQ Infit	Cronbach's Alpha
	Strongly disagree, Disagree, Agree, Strongly agree	Delta	S.E.		
DL	**SD: Skill job discretion**				
	1. My job requires that I learn new things	-2.05	0.07	0.94	0.73
	2. *My job involves a lot of repetitive work	-1.47	0.07	1.04	
	3. My job require me to be creative	0.24	0.07	1.00	
	5. My job requires a high level of skill	0.34	0.07	0.94	
	7. I get to do a variety of different things in my job	1.29	0.07	1.02	
	9. I have opportunities to develop my own special abilities	1.65	0.06	0.98	
	DA: Decision authority				
	4. My job allows me to make a lot of decisions in my job	-0.55	0.07	1.00	0.57
	6. *In my job, I have very little freedom to decide how I do my work	0.63	0.07	0.98	
	8. I have a lot of influence over what happens in my job	-0.09	0.07	1.00	
PD	**PD: Psychological job demand**				
	10. * My job requires working very quickly	-0.98	0.06	1.05	0.81
	11. *My job requires working very hard	-1.43	0.06	0.99	
	12. I am not asked to do an excessive amount of work	-0.09	0.05	0.98	
	13. I have enough time to get the job done	0.91	0.05	1.02	
	14. I am free of conflicting demands that others make	1.58	0.05	0.94	
WS[2]	**SS: Supervisor support**				
	15. My supervisor is concerned about the welfare of those under him/her	0.58	0.11	1.14	0.88
	16. My supervisor pays attention to what I am saying	0.33	0.11	0.90	
	17. My supervisor is helpful in getting the job done	-0.52	0.11	0.71	
	18. My supervisor is successful in getting people to work together	-0.39	0.11	1.18	
	CS: Coworker support				
	19. People I work with are competent when doing their jobs	2	0.12	1.15	0.84
	20. People I work with take a personal interest in me	-0.07	0.12	0.78	
	21. People I work with are friendly	-0.58	0.13	0.77	
	22. When needed, my colleagues will help me	-1.35	0.13	0.99	

Note. reverse scoring response*

[1]Workplace support = supervisor support + coworker support

[2]Unexplained variances in 1st contrast for 5 domains are 1.3, 1.5, 1.4, 1.5, and 1.7, respectively.

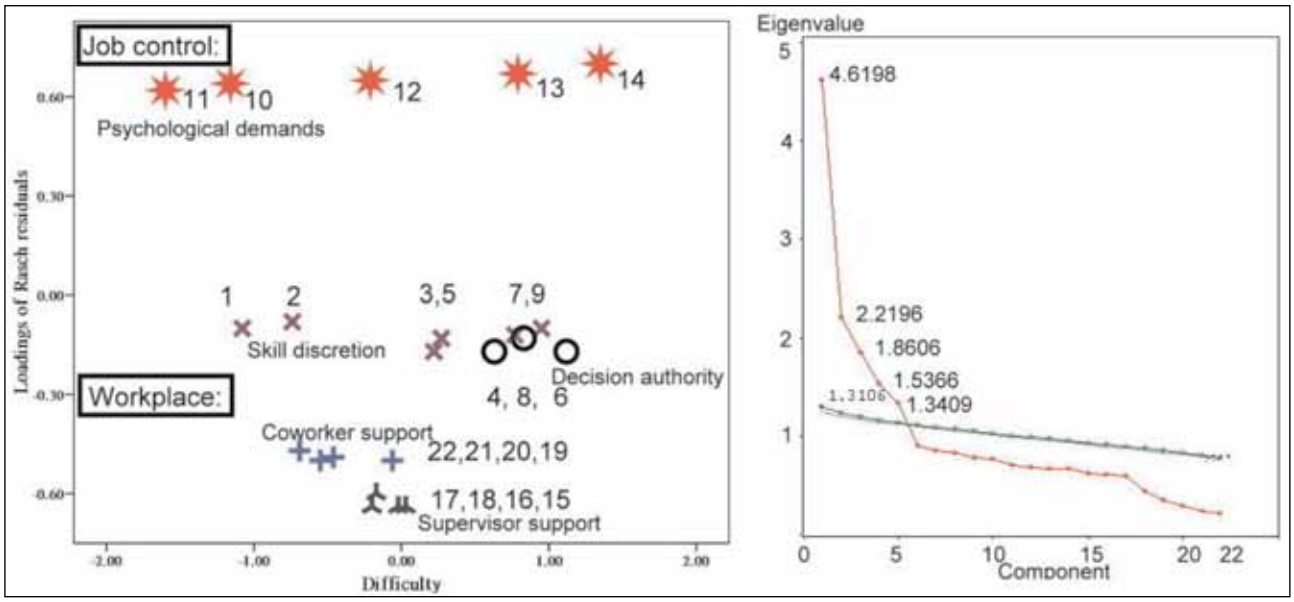

Figure 1. Principal component analysis (left panel) and parallel analysis (right panel) for C-JCQ items
Note: Five factors were extracted by parallel analysis (right panel)
Five components analysed by PCA of the Rasch residuals (left panel)

2. The DL comprises only DA as one dimension

As shown in Tables 2, the SD and DA subscales did not measure the same latent trait. Their correlation was very low (r = .24). Thus, it was not appropriate to combine these two subscales to represent the degree of Decision Latitude (DL). Because DA was closer in content meaning to DL than SD, we chose to use the DA subscale to represent DL for this study.

Study 2 (comparing results):

We found the numbers of workers with active jobs (667), low strain jobs (240), passive jobs (59) and high strain jobs (158). The prevalence rate of high strain on Chinese hospital workers was 14.57%. Table 3 reveals group differences between administration staff, technicians, nurses, and overall workers in the five subscales for the two methods.

Study 3 (developing the Excel module):

1. An Excel module for a scatter plot of C-JCQ across four exposure groups

We developed an Excel module to plot the relationship between four exposure groups using the Rasch method, where the DL was represented by the DA subscale. They were 325 (28.89%), 208 (18.49%), 500 (44.53%), and 91(8.09%) for high strain, low strain, active, and passive jobs, respectively.

2. Excel module for a personal C-JCQ report

In Figure 2, a person was classified as having high strain in the VI quadrant (symbolised by a red circle for a DA measure of -1.35 logits). However, the person also had a low score on SS (= -2.77 logits in a blue square symbol) and CS (= -2.02 logits in a green square symbol), indicating that the person had the intention to leave the job and suffered from an obviously depressive disorder related to a job environment without satisfactory social support in the workplace.

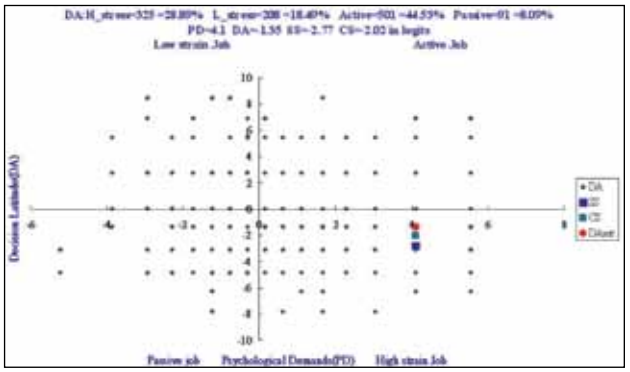

Figure 2. JCQ report in Excel shows high strain with low workplace support for an examinee
Note. PD on the horizontal axis; DA, SS, and CS on the vertical axis.

3. An Excel module for plotting a scatter pair with SD and DA onto PD

The graphical representation in Excel can help consultants examine the QWL for individual workers. In the Rasch method, most hospital workers (44.53%) were classified as having active jobs, which was consistent with the literature [24].

Discussion

Key findings

The results show that the prevalence rate of high strain on Chinese hospital workers was 14.57%. SD and DA are not the same construct, so they should not be used jointly to represent DL. An Excel module combined with WINSTEPS was created to facilitate the Rasch method for the measurement of QWL.

What this research adds to what is already known

In CTT, scores are assumed to be on an interval scale. This assumption may hold for physical measures (e.g., height and body temperature), but it does not hold for QoL observed scores in the social sciences. Rasch analysis transforms raw scores into interval scores in a logit unit and resolves the problems that arise from comparing persons with missing data. The C-JCQ with five distinct dominant factors is confirmed through the Rasch analysis.

What is the implication and what should be changed

Traditionally, the sum score of DA and SD is used to represent the DL. However, this study reveals that the correlation between DA and SD was rather low (r = .24) and that they are two different constructs (Tables 2). It is therefore recommended that DA alone is used to represent the DL because DA is conceptually closer to DL than is SD.

Strength of this study

Most analysis of QWL questionnaires is based on CTT. In recent years, CTT has been gradually replaced by IRT. In this study, we used an IRT-based Rasch analysis to report QWL according to the job demand-control model. To our knowledge, this study is the first to apply the Rasch technique to the JCQ and the classification of job types. An Excel module combined with WINSTEPS allows one to: (a) generate person measures that are comparable to other studies using the C-JCQ; (b) describe the eigenvalue scree plot and item standardised factor loadings for the PCA of Rasch residuals (Figure 1); and (c) depict individual C-JCQ locations in relation to other workers.

Implication in Rasch measurement

1. From the theoretical and practical perspectives

From a theoretical perspective, the Rasch technique is a diagnostic tool used to identify the noise in our data and to create theoretically interval scales. When data do not follow the Rasch model's expectation, "objective measurement" is not feasible because item parameters and person parameters cannot be separated. Even a well fitting Rasch model does not prove that the latent trait is on an interval scale, since the latent density is only indentified in a limited number of points. Furthermore, most Rasch model's programs use one of three estimation methods to estimate persons' measures: joint maximum likelihood (JML), conditional ML(CML), and marginal ML (MML)[44]. Alternative computational algorisms may not estimate an identical Rasch transformed interval scores. Lindsay et al.[45] described how certain latent class models could be used to estimate item parameters of the Rasch model, and that these are the same as the conditional ML estimates. de Leeuw et al.[46] argued that JML(proposed by Wright and Haberman) and CML(proposed by Rasch and Andersen) are related to the MML(studied by Sanathanan, Andersen, Tjur,Thissen, and others) in the structural Rasch model. Andersen[47] explained Rasch's philosophical basis, his concern with basic measurement problems in all sciences, his disinterest in chi-square tests and estimator consistency, his focus on individuals, his animosity to the normal distribution, his delight with graphical techniques. The interested readers are recommended to read the literature [44-47], and particularly the discussion in Fischer and Molenaar [46].

From a practical perspective, in this study we did not consider measurement errors in the raw scores or the Rasch scores when performing the subsequent data analyses (e.g., correlation and ANOVA), mainly because this is the standard procedure. In fact, any

measure contains measurement error, and measurement error should be considered in subsequent data analyses. The Rasch model can be extended to take into account measurement error directly, which calls for latent regression of the Rasch models [48] and for multidimensional Rasch models [49].

2. To validate the scale and manage missing data

The advantage of the Rasch analysis is the insight gained concerning the validity of the scale [6]. Added benefits include better management of missing data, which is hard to compensate for in CTT. Interested readers are referred to the relevant literature [50-53].

3. Checking dimension

The Rasch fit statistics may not be powerful enough to detect dimensionality when two dimensions have equal item length and moderate correlations [54]. It has been suggested that exploratory factor analysis, particularly with parallel analysis, be undertaken to check the dimensionality [55]. We followed this recommendation to check the dimensionality of the C-JCQ. Factor analysis is also recommended when data are equally dominated by uncorrelated factors and Rasch analysis when the data are dominated by highly correlated factors or a single factor [55]. Based on the subscale structure of C-JCQ, we used PCA on the Rasch residuals and item fit to confirm the unidimensionality of each subscale (Table 2).

Limitations of the study

Chi-squared tests showed that all variables, except for employment status, were significantly associated with gender. The sample was rather homogeneous because it was selected from a 900-bed hospital in southern Taiwan. Samples recruited from a variety of worksites would be more heterogeneous. The α coefficients for the five subscales of C-JCQ were 0.73, 0.57, 0.81, 0.88 and 0.84 for the SD, DA, PD, SS and CS subscales, respectively, which were slightly different from Cheng's study [30] (α = 0.71, 0.69, 0.55, 0.86 and 0.86). The low Cronbach's α for the DA subscale (0.57) might be due to the short test length (3 items).

Any scale should be examined against important criteria, such as dimensionality, item fit, person fit, appropriateness of threshold levels[56], and invariance (or so-called differential item functioning [57]). Many methods are available for evaluating dimensionality [58-61]. For more details of these analyses, the interested reader is referred to [14, 62, 63].

Future studies could be conducted to add more items to the DA subscale to increase its test reliability. Other psychometric properties of job strains and stressors that were not evaluated in this study, such as the differential item functioning [57] across groups and job strain levels of different worksites, should be investigated in future studies.

The results of job strain prevalence research cannot be generalised to other workplaces in different cultures, although the JCQ has been translated to many languages (http://www.jcqcenter.org/Translations.html). It is of great value to apply the Rasch method to other JCQ results in other contexts and to compare for similarity or difference in the prevalence rate and in the classification of job types.

Applications

Although the sum score is a sufficient statistic for the latent Rasch score [43].The classification of job types is identical between the summation method and the Rasch method for this particular data set, these two methods generate slightly different results in other analyses (Tables 3). It is likely that these two methods generate different variances for the same data sets [6, 9], because raw scores are not linearly related to the Rasch scores, and these two types of resulting scores have different degrees of measurement error. The variations of these two types of scores might be very different, which leads to different *F*-ratios in the ANOVA (see the last column in Table 4).

Raw scores are not on an interval scale and should not be analysed as such. Mistreating raw scores as interval measures may mask ineffective treatments, hide effective methods, and yield inaccurate inferences or conclusions [42, 64, 65]. The Rasch method, although theoretically sound, may be too difficult for practitioners to access. It is worth developing a user-friendly Excel module to facilitate the use of the Rasch method, especially in the field of QWL research. This study made progress on this development.

All of the C-JCQ items have been anchored with WINSTEPS commands in the downloadable

Excel module so that the results of job strain prevalence can be compared across different studies. Because WINSTEPS has been integrated into the Excel-VBA module, Excel can yield the following regular reports:

1. Individual person measures with standard errors.
2. Eigenvalue scree plot and item standardised factor loadings produced by the PCA of the Rasch residuals.
3. Four quadrants of job types for the specific worker and other workers.

The four-quadrant JCQ plot allows mental health consultants to easily, quickly and clearly compare the specific worker with other workers. Readers who are interested in assessing the prevalence of employees' job strain with the Rasch model can download these files. Note that the Excel module should be placed in the same folder as the examples of WINSTEPS.

Further studies and suggestions

Applications of the Rasch technique to the field of QWL are not yet common. Practitioners may find it difficult to conduct a Rasch analysis in their own studies. It is hoped that, in the future, more applications of the Rasch technique will be published in the field of QWL and more user-friendly computer programs will be developed.

In this study, we used the DA subscale, not the SD subscale, to represent the DL. This decision is different from that commonly seen in the literature, where both the DA and SD subscales are used to represent the DL. Research into this issue is of great value. In addition, our sample is rather limited and homogeneous. In the future, it would be preferable to select a more heterogeneous sample or a national sample. Finally, the Excel module deserves to have further study done on its feasibility and effectiveness in clinical practice.

Conclusions

The five-factor structure of the C-JCQ is supported, and item and person measures on a Rasch-transformed interval scale can be achieved through Rasch analysis. The Rasch method is recommended as a replacement for the commonly used summation method because the Rasch method is not only theoretically sound and capable of handing missing data but also because the summation method for hypothesis testing often (but not in this study) yields results that are not identical from the Rasch method and leads to the attenuation paradox on scale reliability and validity not increased together.. To verify it, more applied research studies are encouraged in future.

List of abbreviations

Alpha: Cronbach's α
CTT: classic test theory
CS: coworker support
IRT: item response theory
DIF: differential item functioning
DA: decision authority
DL: decision latitude
JCQ: job content questionnaire
PA: parallel analysis
PCA: principle component analysis
PD: psychological job demand
QWL: quality of work life
SD: skill discretion
SS: supervisor support
VBA: visual basic for application

Authors' contributions

TW, CC and WT collected all data, generated the database, designed and performed the statistical analysis and wrote the manuscript. WW, CC, CY and SY contributed to the development of the study design and advised on statistical analysis. The analysis and results were discussed by all authors together. TW contributed to the Excel programming, interpreting the results and drafting the manuscript. All authors read and approved the final manuscript.

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Correlation between cancer patients Demographic and Socioeconomic factors and informational sources

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Abstract

Introduction: Evidence emphasize on information provision that can facilitates adjustment to cancer by increasing perceptions of control, reducing feelings of threat and anxiety, and improving quality of life (QoL) and if patient's information needs are not addressed, they are likely to continue feeling anxious and distressed about treatment and may fail to complete treatment.

Objective: The goals for this study were to realize which sources of information more frequently used by patients and evaluate the relation between patient's characteristics with source of information.

Method: This cross-sectional study was performed at the Iranian cancer institute of Imam Khomeini hospital of Tehran University of Medical Science (TUMS). 154 cancer patients were chosen nonrandom sampling participated in this study who were 43 male (27.9%) and 111 female (72.1%).Two questionnaires were used contain Background information (Demographic, Socioeconomic, Medical information) and Informational need: Sources that patients received information (oncologist, medical doctor, nurse, consular, family, friends, media) and Satisfaction of received information from sources. frequency and chi-square test and Fisher's exact test were used for analyzing.

Result: Ages group of our subjects were: teen (8.45), young (37.75), middle age (37.75), elder (15.6%) and their educational level predominately were primary school (28.6%). The most frequency source that had been used was specialist physician (n=119, 77.3%) and less frequencies belong to NGO informational source (n=1, 0.6%), socialist (n=1 <0.6%). 80.7% of patients who used specialist physician as a informational source were satisfied. There was significant relationship between type of cancer, age with satisfaction of patient from information that they received (p=0.03).

Conclusion: Our result shows that availability of informational sources can influence patient's informational source preference. Healthcare team is reliable and available sources for cancer patients. We recommend that all members of healthcare team should be aware of patient's informational needs.

Key words: informational source, cancer

Introduction

The diagnosis and treatment of cancer generates a more alarming response and produces great trauma for patients than other disease. Cancer patients because of his/her chronic disease, various treatment and complication after treatment, faced to many physical burdens (fatigue, nutrition, sleep disturbance, etc.), psychological concerns (fear, anxiety, depression, living with uncertainty, etc.) and social concerns (fertility, appearance, etc.)[1] that all of these, lead to patients have multi-dimential needs. Information needs are related to how patients obtain information about their disease, diagnosis, treatment and follow up[2].And if patient's information needs are not addressed, they are likely to continue feeling anxious and distressed about treatment and may fail to complete treatment.[3]

Evidence emphasize on an adequate information provision is vital throughout the cancer experience and it can facilitates adjustment to cancer by increasing perceptions of control, reducing feelings of threat and anxiety, and improving quality of life (QoL)[4]. There is a categorization for different sources that include formal channels (e.g. doctor and nurses), informal channels (e.g. friends) and media channels (e.g. newspaper, television and internet).Most of the information that patients receive about cancer and its treatment is provided

by health care professionals, If the information provided by health care professionals was not sufficient, especially when patients felt threatened by their diagnosis and treatment, then it is logical that patient would seek more information to understand more about their own disease[5] from other informational sources.

There are a strong evidence that Not only information provision depend on access to information sources, but also patient's characteristics like demographic factor: age, race... and life condition such as socio-economic factor: income, marital status, educational level and...[6] and satisfaction of received information[7] effect on information seeking.

According to WHO, in 2020 we will have 20'000'000 cancer patient in all over the world that 60% of them incidence in developing countries and More than 70% of all cancer deaths occurred in low- and middle-income countries. Cancer is the third leading cause of death in Iranian population[8] thus it seems necessary that providing useful and accessible information sources for these patients can reduce effect of disease and treatment on patient and his/her family's life. Attention to lack of study in Iran about assessing informational need in cancer patient and importance of meeting this need in patients to cope with their disease, we assessed these items and patient characteristics.

The goals for this study were to: 1-identify informational needs of cancer patients, 2- realize which sources of information more frequently used by patients and 3-evaluate the relation between patient's characteristics and socio-economic factors with information need and source of information.

Material and Method

This cross-sectional study was performed at the Iranian cancer institute of Imam Khomeini hospital of Tehran University of Medical Science (TUMS). The sample included 155 patients with cancer admitted in this institute who were selected by simple non randomised sampling. The inclusion criteria were 1) his/her cancer pathologically had been diagnosed 2) able to understand Persian language, 3) have no psychologically (any mental disorder or retardation) disorder, 4) no history of Addiction.

The medical charts were checked to evaluate which of the patients met the inclusion criteria, and then patients were approach to determine whether they would agree to participate.

Instruments for this study were 2 questionnaires that their items were generated from literature review by authors. Data were collected from patients using following instrument:

Background information: patient's background information was obtained, including:

Demographic factors(age, gender, race, religion, nationality), Socioeconomic factors(marital status, educational level, insurance, occupation), Medical information: (clinical stage, and anti-cancer treatment).

Informational sources: Sources that patients received information: oncologist, medical doctor, nurse, consular, family, friends, media.

Satisfaction of received information from sources with a 0-5 scoring system in which "0 represents: not satisfied", "1: very low satisfaction", "2: low satisfaction", "3: moderate satisfaction", "4: intermediate satisfaction" and "5 represents satisfaction".

Patients seeking information from these sources: physician, nurse, other members of health group, book, media (newspaper, TV and radio, internet), family, friends.

Efficacy of Information measured about these subscales (composed of 7 items): disease sign and symptom, diagnosis procedure, diet, treatment, complication of treatment, feature of disease with a 0-5 scoring system in which "0-2 represents: not efficient ", "3-5 represents efficient ".

Descriptive statistics (frequency, percentage, means, and standard deviations) were used to analyze the background characteristic, informational sources, informational needs. To test for differences between means student's t-test was used. To test for differences between sources of information and age, gender, educational level, medical information, the chi-square test and Fisher's exact test were used. Statistical significance was accepted if $p<0.05$.

Results

There were 154 participants in this study that 27.9% of them were male, 74% female. Our subject's age groups were teenager (8.45%), young (37.75%), middle age (37.75%) and elder group (15.6%). The most frequencies of marital status belonged to married participants (72.1%) and the less

frequencies belonged to remarried patients (1.3%), their educational level predominately were primary school (28.6%) .Patient's demographic characteristics and their types of cancer presented in table 1.

Table 1. Patient's demographic factor and their types of cancer

	Frequency	Percent %
Sex		
Male	43	27.9
Female	111	72.1
Age		
Teen aging	13	8.4
Young	58	37.7
Middle age	58	37.7
Aging	24	15.6
Missing	1	0.6
Educational level		
Illiterate	29	18.8
Primary	44	28.6
Guidance school	18	11.7
High school	9	5.8
Diploma	36	23.4
Bachelor of science	17	11.0
Master of science	1	0.6
Marital status		
Single	24	15.6
Marriage	111	72.1
Separation	6	3.9
Divorce	6	3.9
Widow	5	3.2
remarriage	2	1.3
Type of cancer		
Colon	41	26.6
Breast	39	25.3
Stomach	11	7.1
Osteosarcoma	12	7.8
Ovary	9	5.8
Uterus	6	3.9
Lymphoma and blood cancer	6	3.9
Other (derma, lung, prostate, bowel, esophagus, Bladder, head and neck, nerve system, liver, testis)	23	15.7
Missing	6	3/9

The most frequency of information sources that had been used was specialist physician (77.3%) and less frequency belonged to NGO informational source (n=1, 0/6%), socialist (n=1 <0.6%) .Details of information source showed in table 2.

There was relationship between sex (p=0/030), educational level (p=0.028), marriage status (p=0.047) and type of cancer (p=0.010 and p=0.016) with types of informational source. Results showed that male patients didn't use media (TV, news paper...) but female did. Patients with guidance school, high school & diploma and Bachelor of Science and Master of Science received information from other informational sources whereas illiterate and primary school patients didn't received from them. Our single samples received information from medical physician but the other did not. Patients with respiratory, digestion and reproductive system cancer received information from license practical although patients with lymphoma, blood cancer, osteosarcoma and other types of cancer didn't. On the other hand patients with gastrointestinal cancer and other didn't received information from friends as an informational source but respiratory, reproductive system cancer lymphoma; blood cancer and osteosarcoma received it. These relationships showed in table 3.

Middle age patients with gastrointestinal cancer and osteosarcoma were unsatisfied from friend as a informational source (n=12) the middle age patients with reproductive system cancer were satisfied from friend as a informational source. In middle age, there was relationship between types of cancer with satisfaction from informational source (p=0.030) . Also there was significant relationship between seeking for alternative informational sources with types of cancer in middle age group (p=0.046), middle age patients with gastrointestinal cancer, osteosarcoma, lymphoma and blood cancer didn't seek for TV and radio as a informational sources, but in the same age group with reproductive system and respiratory system cancer sought for TV and radio as a alternative informational source (n=55).

On the other hand, we identified that there was association between types of cancer and efficacy of each types of information (p=0.038).Young patients with gastrointestinal, respiratory system cancer and osteosarcoma expressed efficacy of information about pathophysiology, sing and symptom of cancer but reproductive system cancer reported no sufficient information.

Table 2. Used informational sources

	no		yes		missing
	frequency	Percent %	frequency	Percent %	
Specialist physician	34	22.1	119	77.3	
General physician	141	91.6	13	8.4	
Nurse	107	69.5	47	30.5	
Counselor/psychologist	151	98.1	3	1.9	
physiotherapist	150	97.4	4	2.6	
Socialist	153	99.4	1	0.6	
Radiologist	143	92.9	11	7.1	
Licensed practical	147	95.5	7	4.5	
Dietitian	148	96.1	6	3.9	
Family	122	79.2	32	20.8	
Friend	138	89.4	16	10.4	
Related association	153	99.4	1	0.6	
Media (Newspaper, TV...)	102	66.2	51	33.1	1 (0.6%)
Other	142	92.2	11	7.1	1 (0.6%)

Table 3. Relationship between sex, educational level, marital status and cancer type with Types of informational sources

Types of informational sources (significant p value)					
	Medical physician	Licensed practical	Friend	Media (newspaper, TV, ...)	other
Sex				0.030	
Educational level					0.029
Marital status	0.047				
Type of cancer		0.010	0.016		

Table 4. Relationship between types of cancer with satisfaction from informational source, seeking information in middle age group and young patients

	Type of cancer
	P(value)
Middle age and seeking information	0.046
Middle age and satisfaction	0.030
Young and efficacy of each types of information	0.038

Table 5. Relationship between educational level and marital status with efficacy of types of information

	Educational level	Educational level and type of cancer		Marital status
		Guidance school	High school	Married patients
	P value	P value	P value	P value
Efficacy of types of information		0.030	0.015	
Efficacy of pathophysiology of cancer	0.039			
Efficacy of diagnosis procedure	0.045			
Efficacy of medical treatment Center related to cancer	0.047			0.043
Efficacy of pain relief methods	0.016			
Efficacy of treatment method				0.011
Efficacy of prognosis of selected treatment				0.014
Efficacy of disease complication				0.031
Efficacy of future of disease				0.001

Educational level related with efficacy of types of information: path physiology of cancer (p=0.039), diagnosis procedures (p=0.045), medical treatment centre related to cancer (p=0.047) and pain relief methods (p=0.016). In this study investigated relationship level of education, types of cancer between efficacies of informational types that had been received. There was relationship between educational such as guidance school level (p=0.030), high school (p=0.015), types of cancer and efficacy of informational types.

Our result determined that marriage status associated with expressing efficacy of informational types. Married patients reported efficacy of information about medical treatment centre related to cancer (p=0.043), treatment methods (p=0.011), prognosis of selected treatment (p=0.014), disease complication (p=0.031) and future of disease (p=0.001).

Discussion

This study has demonstrated whether informational source that had been used by cancer patient related to demographic factors and types of cancer, satisfaction of informational source and efficacy of types of information. If patient's information requirements remain unrecognized by professionals, lead to subsequent dissatisfaction with information provision[4].

Our result showed that the most informational sources that had been used by patients were specialist physician. It shows that Ready access to a wide variety of information sources may have overcome demographic characteristics that traditionally have been barriers to information seeking[6] and health professionals are the most frequently cited information source emphasize the crucial role that physicians, nurse, and other health care professionals play in meeting patients information needs[9]. Then our results emphasized that physicians are an important sources of information however nurses and other healthcare professional can be equally important sources of information.

There was relationship between sex, educational level, marriage status and type of cancer with types of informational source. In previous study, there was relationship between age, education Income with the kind of informational source used by patients[7] additionally our results showed that sex, marital status and type of cancer can influence type of used informational sources. Thus to change the attitude of patient about using special types of informational source, we should consider demographic characteristics' of patients.

We found that there was relationship between types of cancer with satisfaction from informational source. We couldn't find any supportive study for this finding but It would be new aspect of effective variables on patient's satisfaction of used informational sources. Additional results of our study were about association between educational levels, types of cancer with efficacy of received information. Cancer type impacted on health related quality of life (HRQL)[10] and the other hand quality of life strongly influenced by patient's satisfaction[11] and information satisfaction is important for perceived QoL in individuals with cancer and predictor of overall QoL[4], as a conclusion, further studies are suggested including quality of life as a mediating factor of correlation between satisfaction of information and quality of life in cancer patients.

The method of selection subject for this study was non randomised sampling; it can count as a limitation of our study because of possible bias in selection of the respondents.

Conclusion

The purpose of this study was investigating relationship between socio-demographic factors with informational source, satisfaction of informational source and efficacy of types of information that had been received by cancer patients. evidence emphasize on information provision that can facilitates adjustment to cancer by increasing perceptions of control, reducing feelings of threat and anxiety, and improving quality of life (QoL)[4] . And if patients information needs are not addressed, they are likely to continue feeling anxious and distressed about treatment and may fail to complete treatment[3] .Our result showed that the most informational sources that had been used by patients was specialist physician then availability of informational sources can influence patient's informational source preference. Healthcare team is reliable and available sources for cancer patients.

There were relationships between patient's characteristics with types of informational source and association was observed among type of cancer with satisfaction, marriage and educational level with efficacy of type of information that were received. Thus when healthcare professionals decided to educate cancer patients should consider socio-demographic and disease characteristic to achieve an effective education.

We recommend that all members of healthcare team should be aware patient's informational needs. Further research might explore gap between received information with efficacy of them to improve patient's knowledge, and further studies are suggested to assess other variables such as quality of life and their relation with satisfaction of received information.

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Combining employment with breastfeeding

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Abstract

Objective: The objective of this study was to determine the effect of maternal working conditions on breastfeeding.

Methods: This cross-sectional, analytical study which has fundamentally descriptive features was carried out between January 2005 and January 2006 in the well child clinic of a university hospital in Istanbul. Mothers of these babies were grouped according to their working status using the layered randomized sampling method. The study comprised data from 54 working and 57 non-working mothers.

Results: Half of the working mothers in the study had begun to work before their children were six months old. Of all the mothers, 12.9% had stopped breastfeeding due to reasons related to going back to work. There was no statistically significant difference between working and non-working mothers in terms of exclusive breastfeeding and total breastfeeding durations.

Conclusions: The findings indicate that a working mother can continue breastfeeding if she can find appropriate support.

Key words: breastfeeding, working, mothers, maternity leave.

Introduction

Despite awareness of the many advantages of breastfeeding, its rates often fall short of recommended practice. According to the results of the 2008 Turkish Demographic and Health Survey (TDHS), 22% of babies aged 4-5 months were exclusively breast-fed [1]. Breastfeeding initiation rates at birth are quite high in Turkey but the exclusive breastfeeding rate is below the desired levels [2, 3].

In the last decade, more women have chosen to breastfeed their infants. However, returning to work can be a significant barrier to successful breastfeeding. For many new mothers, the combination of breastfeeding and employment may require a major effort and/or lifestyle changes [4-7]. Most findings indicate a negative relationship between the probability of breastfeeding and postpartum return to work [8-11]. For working women, the challenge of balancing breastfeeding and paid work has been reported to be an important reason for weaning in the first 6 months [12]. Postpartum maternity leave may have a positive effect on breastfeeding among full-time workers, particularly for those who experience psychosocial distress [12].

Understanding the nature and level of competition between breastfeeding and employment is important for policy development dealing with paid or unpaid maternity leaves. Increased maternity benefits are potentially expensive to employers, but may be offset by improved infant health, greater employee morale and productivity [7].

In Turkey, according to labor regulations, the duration of ordinary maternity leave is 8 weeks before delivery and 8 weeks after delivery. If the mother wishes, the period of 5 weeks before the delivery can be transferred and added to the 8-week leave after delivery, thereby extending the postpartum leave to a total of 13 weeks. The duration of unpaid maternity leave after delivery is two year. Every mother is allowed to have paid breastfeeding breaks that total 1.5 hours a day. During these breaks, a working mother can go to her home and nurse her baby [13].

Supporting working women may help to increase the ratio of breastfeeding and protect the health of both children and society, and, in the long run, will contribute to improving the country's economy [2, 14]. On the other hand, the working mother can be a good role model in the community [2, 3].

Understanding the nature and the level of competition between breastfeeding and employment is important for policy development, especially given the increased pressure for benefits such as paid or

unpaid maternity leave. To our knowledge, there are no reported studies on the problems of working mothers in relation to breastfeeding in Turkey.

The aim of this study was to evaluate the effect of maternal working conditions on breastfeeding.

Methods

Study Design, Setting and Sample

This cross-sectional, analytical study which has fundamentally descriptive features was carried out between January 2005 and January 2006 in the well child clinic of a university hospital in Istanbul. The babies are enrolled to this clinic soon after delivery and followed up every month until 6 months of age, every 3 months between 6 and 18 months of age, and every 6 months thereafter.

In the well child clinic, every child has a personal health record, and the data are digitally saved and stored. The computer records of 420 children who were between 12-30 months of age created the universe of the study. Mothers of these babies were grouped according to their working status using the layered randomized sampling method. A sample of 111 participants was required out of a population of 420 at a confidence interval (0.73-0.81) of 95%. Data was gathered from 122 mothers using the simple randomized sampling method. Data from 11 mothers who had worked for a period before and after delivery but had quit work were excluded. The study comprised data from 54 working and 57 non-working mothers.

The criteria used in selection of the mothers are listed below:

1. To be the mother of an infant 12-30 months of age
2. To be primiparous
3. To have delivered in a hospital
4. To have an infant with a gestational age of 37 weeks or more
5. To have an infant with no major congenital anomalies
6. To have no impediment to breastfeeding
7. To be working before and after delivery (for mothers in the working group)

The Data Collection Procedures

The data were collected by a questionnaire designed by the researchers. Following the preparation of the questionnaire, it was sent to two specialists in Department of Pediatri. Required corrections in the questionnaire were made in light of comments of specialists. Final version of the questionnaire consisted of total 40 questions. Data that described the mother, her working life, breastfeeding behaviour and her care of the baby were obtained through a comprehensive questionnaire. Before collecting the data, the questions were tested by a pilot study. The questionnaire was applied to the mothers by trained interviewers during a home visit.

Definitions of types of breastfeeding: Breastfeeding terms and definitions used in this study are those internationally recomended by the World Health Organization.

Initiation of breastfeeding after the birth: Initiation of breastfeeding within the first hour of life

Exclusive breastfeeding: That is the infant only receives breast milk without any additional food or drink, not even water

Total breastfeeding duration: The total length of time that an infant receives any breast milk at all.

Ethical considerations

Before the study, written approval was obtained from the university management office and from faculties in which the study would be carried out. In cooperation with the faculty managements, participants were informed about the purposes of the study. They were assured of confidentiality and voluntary participation. Informed consent was obtained from all participants. To protect the privacy and anonymity of the information, the participants were reminded not to write their names on the questionnaire.

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Statistical analysis

The data were analysed using the Statistical Package for the Social Sciences version 11. A chi-square test, t test and Mann Whitney tests were used for comparisons among categorical variables. A significance level of $p = 0.05$ was accepted for all analysis.

Results

A total of 122 mother were invited to participate in the study and 111 completed the baseline questionnaire (54 working, 57 non working mothers).

Table 1 shows the characteristics of the mothers in the two groups. The age women ranged from 19-42 years, with an average age of the working mothers 31.5 years (SD=4.4) and non working mothers 26.4 years (SD=3.9). The mean age and the mean years of education of the working mothers were significantly high (Table 1).

According to the responses of the mothers, 94% of the working women and 89.5% of the non-working women had received advice or support on breastfeeding from medical personnel.

The problems with breastfeeding after the birth who working and non working mothers difference were not statistically significant (Table 2)

The mean duration of exclusive breastfeeding in the first 6 months who working and non working mothers were not difference statistically significant (Table 2).

At the time of the study, 79.6% of the working mothers and 70.2% of the non-working mothers had stopped breastfeeding. The mean duration of total breastfeeding who working and non working mothers were not difference statistically significant (Table 2).

There was no statistically significant difference in the duration of exclusive breastfeeding and total breastfeeding between mothers who began working 6 months before or after delivery (Table 3).

Of the working mothers, 76% had benefited from their maternity leave (11% between 1 and 2 months, 37% between 3 and 6 months, and 28% between 6 and 12 months). Of these mothers, 9.7% stated that they had difficulties in obtaining maternity leave.

Almost half (49.1%) of the 27 mothers who had begun to work before the baby was 6 months old had been able to take "breastfeeding breaks". Mothers had taken "breastfeeding breaks" by leaving work 1.5 hours early, not going to work once a week, going home or to the baby care center during the day, or by adding these breaks to their maternity leave. The reasons for not having "breastfeeding breaks" were part-time work, long distances between home and work, or lack of permission from the employer.

Table 1. Characteristics of the Mothers

Variable	Working mothers (n=54)	Non-working mothers (n=57)	Comparison
Age mean (mean± SD years)	31.5 ± 4.4	26.4 ± 3.9	t:6.37, p<.001
Education level (mean± SD years)	14.2 ± 2.8	9.9 ± 3.5	MWU= 6.2, <.001
Marriage (mean± SD years)	4.8 ± 2.5	3.9 ± 1.6	MW U=1.7, p<.05

t: t test, MWU: Mann Whitney U test, SD: Standard deviation

Table 2. Breastfeeding Practices and Working Situation

Variable	Working mothers (n=54)	Non-working mothers(n=57)	Comparison
Initation of breastfeeding after delivery (%)	38.9	61.2	χ^2=0.65, p>.05
Problems with breastfeeding (%)	53.7	40.4	χ^2=1.99, p>.05
Exclusive breastfeeding rate under 6 months of age (%)	64.2	43.6	χ^2=4.63, p<.05
Exclusive breastfeeding duration (mean± SD days)	141.3 ± 62.2	126.9 ± 69,2	t:1.14, p>.05
Ttotal breastfeeding duration (mean ± SD months)	12.8±5	14.4±6,8	MWU=1.31,p>.05

t: t test, MWU: Mann Whitney U test, SD: Standard deviation

Table 3. Duration of Breastfeeding and Working Status

Variable	Time of starting work		Comparison
	Working before 6 months (n:27)	**Working after 6 months** (n:27)	
Exclusive breastfeeding (mean± SD)	122.4 ± 76.7 days	149.5 ± 5.9 days	MWU=2.0, p>0.05
Total breastfeeding (mean± SD)	12.2 ± 4.9 months	13.2 ± 5.1 moths	t=0.62, p>0.05

t: t testm, MWU:Mann Whitney U test, SD: Standard deviation

Only one-third of the mothers had a day care center at their workplace. Of the working women, 14.8% continued breastfeeding by going home or to the workplace day care center during the day.

Of all mothers who began to work after delivery, 16.6% breastfed their babies by expressing milk. Six of them expressed their milk in an empty room and the rest did so in the kitchen, behind closets or in the toilet. Five of the mothers used manual breast pumps, while others used electrical pumps or their hands. Mothers stored their milk in the administrator's/office refrigerator.

Of working mothers who stopped breastfeeding, 53.5% and 40% of non-working mothers said that they had not succeeded in breastfeeding their babies as long as they wanted. Of the working mothers, 37.2% stated that they had stopped breastfeeding because they could not produce milk anymore and 21% because their babies constantly wanted to suckle. On the other hand, 25% of the non-working mothers quit breastfeeding because they could not produce milk anymore and 57.5% because their babies were always in need of milk. Of all working mothers, 12.9% stated that beginning to work prevented them from continuing to breastfeed their babies.

When we matched the educational status of the mothers, we found that working mothers with a school attendance of 11 years or less breastfed their babies for 7 ± 4.5 months whereas non-working mothers of the same level of education breastfed their babies for 14±7 months. There was a statistically significant difference between these groups ($U=2.36$, $p<0.05$). The negative impact of working conditions on lactation was significant among mothers with low levels of education. Mothers with higher levels of education (working or not) breastfed their babies for longer periods. This finding indicated that it was not the working status of mothers but their educational level that had an impact on the duration of breastfeeding. In general, the total duration of breastfeeding became longer as exclusive breastfeeding time increased (working mothers $r=0.36$, $p<0.05$, non-working mothers $r=0.58$, $p<0.01$).

Discussion

In accordance with the recommendations of the World Health Organization the Turkish Ministry of Health also states that children should be exclusively breastfed for the first 6 months of life, and breastfeeding should be continued at least until two years of age [1, 15]. According to TDHS data, 22% of infants aged 4-5 months are exclusively breast-fed [1]. In our study, 64% of the non-working mothers and 44% of the working mothers had exclusively breastfed their babies during the first six months of life. The exclusive breastfeeding rate among babies attending this unit was higher than the average rate reported for the country [1]. The general negative impact of employment on breastfeeding duration has been reported by some researchers. Research has found that the duration of leave from work significantly and positively affects the duration of breastfeeding [7, 9, 11]. In this study, which was carried out in a well child unit of a baby-friendly hospital, no distinctive difference was observed between working and non-working mothers in terms of breastfeeding ratios and duration. This can be explained by the higher educational level of the working mothers and by the breastfeeding counselling they received from the well child unit. In the unit where the research was carried out, the breastfeeding counselling service was regularly conducted. Valdes et al showed that good support was important for a successful breastfeeding rate among working mothers [2]. Our results showed that working was not an obstacle in breastfeeding, if good counselling and a support system could be provided.

In our study, one-fourth of working mothers used the right of unpaid maternity leave, and one-tenth of these women had experienced problems in taking their unpaid leave. Mothers have the right to take "nursing breaks" of 1.5 hours every day for a period of six months. In our study, almost half of the mothers who had begun to work before 6 months were not able to have breastfeeding breaks. In big cities like Istanbul, where the mother's home and workplace are far away from each other, breastfeeding breaks cannot be used appropriately. However, in the event these breaks cannot be used appropriately, extending the period of paid leave after delivery or granting permission to work part-time can be effective in supporting breastfeeding [6, 8]. The results of some studies indicated that mothers who worked part-time or who were not working outside the home were more likely to continue breastfeeding relative to those working full-time [7, 8]. In the present study, since no mot-

her was working part-time, the impact of part-time working on lactation could not be analyzed.

One-third of the working mothers had a day care center in their workplaces and around fifteen percent continued to breastfeed by going to this center. Baby care facilities near or within the workplace appeared to be important for the promotion of breastfeeding [2, 9]. In our study, 16.6% of the working mothers reported that they pumped their breasts. Expressing breast milk has been associated with longer breastfeeding duration and mothers who had access to their infant during the working day were reported to have a longer duration of breastfeeding than those without access [9, 11]. Wolfe et al. showed that expressing **milk** on a regular schedule, compared with occasional, was positively **associated** with maternal employment [11]. For mothers whose work separates them from their infants, milk expression can help them continue to provide their infant with milk and maintain their breastfeeding. Providing a suitable environment for working mothers to express and store their milk should be taken into consideration; this is an issue of human rights [6, 10]. Day care centers at the place of employment are another option for employers to consider in reducing conflict among breastfeeding employees while cutting costs for themselves. On-site child care can make breastfeeding more manageable as it allows a mother to actually nurse her baby during breaks. The convenience of on-site accessibility benefits employers by reducing employee time spent away from work, and would likely decrease time-based conflict for working mothers as well.

In our study, 12.9% of the mothers stopped breastfeeding after they started working. Vogel et al reported this as 9.4 % [16]. In another study, employment status was the second strongest significant predictor of breastfeeding at 6 months after delivery [7]. The findings of these studies showed that mothers stopped breastfeeding if they planned to start working. The reasons for stopping breastfeeding has been examined in many studies [8, 17, 18].

According to our findings, half of the working mothers started to work before their babies were 6 months old. Fein and Roe found that full-time but not part-time employment delayed the initiation of breastfeeding or reduced the duration [8]. In a multivariate model of occupational factors, returning to work within 6 weeks was the strongest predictor of breastfeeding cessation [12]. Guendelman et al. showed that short postpartum maternity leave among full-time working mothers was associated with a higher risk of early breastfeeding cessation [12]. When the mother and baby are separated early, this causes stress for both and negatively affects breastfeeding. Working part-time would make it easier for the baby and mother to get used to the mother's working life. The right to have part-time work after the period of paid maternity-leave should be granted to mothers [6, 8, 12]. According to Guendelman et al. the negative effects of short (<12 weeks) postpartum maternity leave may be stronger in subgroups of women working in inflexible or non-managerial jobs [12].

In our study, the duration of breastfeeding increased with the duration of maternal education. Many other studies also found a significant relationship between education and breastfeeding [12, 17, 19]. Rossem et al. reported that educational differences were in effect in starting breastfeeding and its continuation in the first 2 months of life, but not in breastfeeding continuation between 2 and 6 months [19].

Conclusions

There was no statistically significant difference between working and non-working mothers in terms of exclusive breastfeeding and total breastfeeding durations. One-third of mothers stopped breastfeeding because they began working. These results indicate that a working mother continues breastfeeding if she finds appropriate support. Our findings led us to think that merely establishing maternity leave policies without encouraging their use and making them economically feasible is not a sufficient measure in promoting breastfeeding.

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Erectile dysfunction and its reflexes in male mental health

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Abstract

Introduction: Erectile dysfunction may be caused by organic or psychic problems and, once developed due to any etiology, it becomes an injury for man's mental health.

Methods: Two databases were surveyed and 18 articles in Portuguese and Englishe were selected and reviewed, including publications about erectile dysfunction and male mental health as cause or consequence.

Results and discussion: Men with erectile insufficiency report more frequently negative repercussions of psychosocial problems. Even occasional unsuccessfull attempts generate illness and frustration for the patient. Erectile dysfunction constitutes, not rarely, a precipitant factor for depressive symptoms among predisposed patients. It accounts on the subjectivity of manhood and virility.

Conclusion: Erectile dysfunction is intimately related with psychic health. It compromises the well-being and the quality of life of affected men. It can also be an indicative for the existence of some subjacent pathology.

Key words: erectile dysfunction, sexual impotence, mental health, andrology.

Introduction

Erectile dysfunction is characterized by a difficulty or inability for a man to start or mantain his penis minimally erect and for sufficient time to establish a satisfatory sexual relationship for the couple[1]. It may be caused by organic or psychic problems and, once developed due to any etiology, it becomes an injury for man's mental health[2].

For comprehending erectile dysfunction in a more integral way, it is necessary to delimitate some subjective concepts about manhood and virility[3]. Historically, phallic forms and the simbology of masculine sexuality are linked with power and realization. The impossibility to mantain an erection can be translated, in the male mind, as a situation of low self-esteem and shame, what determines psychic illness[4].

Traditionally, male population looks for health services less frequently than female. This can mantain untouchable several pathologies which compromise their quality of life and represent great risks for their health[5]. In the case of erectile dysfunction, independently of its etiology, it is one of main targets for Brazilian national policy for men's health, instituted by Ministry of Health in 2009[2].

The objective of this review is to collect, in the medical literature, some concepts about the intersection between erectile dysfunction and male mental health, evaluating eventual psychic disorders either as cause or consequence of erection difficulties and suggesting approaches to minimize damage and improve the comprehension about this problem.

Methods

This article results from a literature review performed between february and march of 2012. Two databases were surveyed: SciELO (Scientific Electronic Library Online) and VHL (Virtual Health Library) with the keywords "erectile dysfunction", "sexual impotence", "mental health", "male health" and its correspondents in Portuguese. A total number of 42 articles in Portuguese and English was obtained, but only 18 were selected, dating from 1994 to 2010. Selection criteria were based in the research's focuses, aiming to describe publications which have made links between erectile dysfunction and male mental health or diagnosed psychopatologies, as cause or consequence.

Results and discussion

"Sexual impotence" achieves a pathologic meaning when it occurs in more than 50% of the attempts to establish a sexual relationship for a period longer than six months and this fact creates frustration for the patient[3]. In this case, it deserves medical attention and, eventually, clinical or, more rarely, surgical interventions[5]. Even when these unsuccessfull attempts are occasional, occurring under tiredness, anxiety or emotional stress, for example, they generate illness and frustration for the patient, although without comorbidities[6].

The erectile dysfunction compromises the well-being and the quality of life of affected men. It can also be an indicative for the existence of some subjacent pathology, notably those related with the cardiovascular system[7]. Many studies have demonstrated clear association between erection problems and hypertension, decreased myocardial perfusion and diabetes mellitus, for example[8]. Other researches have also linked it to socioeconomic factors, like low income and unemployment[9].

A study dated from 2006 shows a 45.1% prevalence of some level of erectile dysfunction among male Brazilian population: 31.2% of them minimal, 12.2% moderate and 1.7% complete[10]. In the United States, data from The Massachussetts Male Aging Study disclosed a prevalence about 52% in a population composed by men between 40 and 70 years[11], while French data, with patients from 18 to 70 year-old, show 39%[10].

According to the Brazilian Study of Sexual Behavior, men with erectile insufficiency refer more frequently negative repercussions of psychosocial problems. Low self-esteem, problems at the workplace and difficulties in relationship with pair, friends or children are more frequently reported by patients with erectile dysfunction than by those carrying other sexual problems. In the same study, factors like average number of sexual partners and average age for the first sexual relationship seems not to influence the prevalence[10].

Patients with erection difficulties, more frequently than among general population, had troubles in the start of their sexual lives, received less information about sex in childhood and present less stable bonds with their female pairs. These factors probably represent a worse hability for having a healthful sexual life and can lead, in some moments, to develop different sexual disorders[12].

Depression, according to medical literature, is an independent risk factor for erectile dysfunction. Two components of its diagnosis are linked with psychic causes of impotence: decreasing of self-esteem and reducing of libido. Both are factors which can compromise importantly sexual performance, resulting in successive episodes of insufficient erection. In such cases, erectile dysfunction is secondary to an established depression[13].

Otherwise, previously higid patients regarding to mental health, after facing insufficient or inexisting erections, they experience a feeling of frustration, what constitutes, not rarely, a precipitant factor for depressive symptoms among predisposed patients[13]. This illness affects the subjectivity of manhood and virility, starting from instinctive components until sociocultural impositions[14].

Beside depression, other psychiatric pathologies have links with erectile dysfunction. Patients with affective bipolar disorder tend to express an exacerbated sexuality in the mania or hypomaniac phase, alternating it with periods of supression of these characteristics: that is when patient presents erectile insufficiency. Carriers of schizophrenia and alike disorders usually report sexual impotence in the period between crisis[15].

The strong bond between erectile dysfunction and mood disorders have its origins probably in the neurophysiology. The disarrange of neurotransmissors and hormones caused by such diseases influence the proccess of desire, erection and orgasm. Serotonin, for example, is produced in pulses during sexual relationship, but this capacity is reduced in patients with negative symptoms[16]. Epinephrin, released when there is stress and anxiety, acts as a potent periferic vasoconstrictor, difficulting the blood flow to penis and, consequently, the erection[17].

If psychopathologies can cause erectile dysfunction, it is even more frequent to exist a compromising of patient's sexual capacity when he uses psychoactive drugs, such as antidepressives and antipsychotics. An important part of these medications lead to a reduction of libido, that can cause erection problems. Otherwise, some of these drugs decrease anxiety and improve self-esteem, excluding two obstacles to male erection[18].

Conclusion

According to literature, psychological aspects are frequently responsible for erectile dysfunction. In patient's point-of-view, they account on sexual problems even more than organic disorders. In the same way, episodes of sexual impotence can contribute as precipitant factor for the development of psychiatrics symptoms.

This bond between impotence and psychic illness showed in literature turns even more clear that patients with erectile dysfunction need to be subjects of a multidisciplinary approach. Urologists should have an integral comprehension of this problem and suggest, eventually, psychologic treatment.

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Prevalence and several effective factors on maternity blues

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Abstract

Introduction: maternity blues is a transitory phenomenon of mood changes that may begin within 1-5 days after delivery and last from 1 day through twist week postpartum. It is reported in 50-80% of puerperal women and is a high risk condition for postpartum depression. The aim of this research is determining frequency and several effective factors on maternity blues.

Method: In this study with 450 participations, Beck test and part of structured questionnaire completed in third trimester when prenatal visit and rest of it filled in first day after postpartum. Also Stein test was completed in 1,5,10 postpartum days.

Result: the prevalence of maternity blues was 55/3%. The predictor factors of maternity blue include economic status, parity, past admission in pregnancy, unwanted pregnancy, and mode of delivery, antenatal mood disorder and time of skin to skin contact.

Conclusion: the prevalence of maternity blues was 55/3%.There were significant relation between maternity blues and some of individual, obstetrical factors. Obstetricians and midwives have to consider it in strategies for prevention and management of postpartum depression.

Key Words: Maternity Blues, Postpartum Depression, Risk factor

Introduction

There are some stages in during of life of any woman that effect on her life deeply, such as pregnancy and after that which accompanies with very important psychological and physiological changes (1). In fact, pregnancy and after childbirth has been known as times that cause mood damages (2). The postpartum period is rapturous and stressful time because of birth of newborn and on the other hand due to physical, social and emotional variations, Women may be embroiled mood changes in this period (3).

The woman experiences highest amount of stress in the duration of after childbirth especially in the first month that psychological disorders are 18 times more current than pregnancy period and the stress due to birth of first child has been categorized as severe stresses in psycho-social stress tables and the mother needs to protection for spending these periods healthy (4). Mood disorders after childbirth cause functional and emotional disturbance and they can influence family depend on severity of problem (5).

"Maternity Blues" is the most current mood disorder after childbirth that has outbreak from 30 to 85% and first time was explained by Lean and Polatin in 1950(6). Scientists represented "Maternity Blues" as disturbed illness that occurs at the first 10 days of childbirth (5) and recommends the first weeks after childbirth as crisis for mothers and also he knows Maternity Blues as the source of anxiety for mothers who need to learn new skills and its signs are transient mood, insomnia, confused and forget ness, exhaustion, worry, anxiety, lack of appetite and therefore he assumes it as a pathological problem (7).

The real reason of this disorder have been known yet but many Scientifics believe that a set of psychological, endocrine and obstetrics' factors can be discussed as probable factors of mood disorders (8).

In the field of reasons and factors related to this disorder, it is related to quick endocrine changes, mental inconsistency after childbirth, perception and anxiety of increasing responsibility and acceptance of motherhood role, worry of how protect of child, previous history of depression, lack of social protection, suspicion toward married life and hard childbirth (6,9,10).

Recognition and protection of women who are in the risk of maternity blues is an important and necessary matter because 20% of them would suffer from postpartum depression due to insufficient support (11, 12).

Few study proved that maternity blues can effects on depression after one year of childbirth and moreover this disorder has bad effects on motherhood interest (13). And mothers who are suffered maternity blues don't wish to lactate to their newborns until first week of birth (14). While the researches show that lactating at first and second days of birth is the effective factor on the period of lactating (4). Maternity blues can cause privation of exclusive breastfeeding and its profits on growth and development, promotion immunity and mental useful effects in newborns.

In the survey of women with maternity blues found out that they didn't wish to protect their newborns and moreover they had problems in establishing contact with their husbands (12). Lack of interest to care of newborn can be derived from her anxiety in accepting the new motherhood role, lactating and protecting of newborn. As a result it can cause that mother keeps away from her newborn and this defective cycle can be continued due to lack of sufficient education and protection, because 10.8% of mothers experienced maternity blues more than a week (15). Therefore in attention to the prevalence of maternity blues, this phenomenon can lead to postpartum depression and occasionally can lead to suicide or killing the newborn by mothers. Identifying the factors that can be helpful in forecasting and recognizing this phenomenon is very important and it can be as an effective step in increasing mother's health.

Materials and Methods

For 1 year, all pregnant women (481) who carried out prenatal care and delivered in Imam Ali hospital in Amol city were recruited for study. Study participations were arbitrary and they were sure that their information's will be secret. Pregnant women recruited on the third trimester and aims and procedure of the study had been explained for participations. 31 women were excluded from study. 16 participants delivered in another hospital and 15 of them were excluded due to loss of follow up and have exclusion criteria. Exclusion criteria were birth of dead newborn, birth of the newborn with congenital malformations, birth of the newborn needs to intensive care, recognized psychological illness in mother, death of first grade family at 6 months ago, usage of alcohol and cigarette by mother.

Testing procedure

Pregnant women were first assessed with Beck test for to determine antenatal mood disorder in the third trimester at prenatal care visit then questionnaire containing demographic (age, marriage age, education level, home status, occupation, satisfaction of economic status), psycho-social factors (matrimony involvement, domestic protection, relation quality with husband family and woman feelings toward her husband) and factors related to pregnancy(history of abortion, stillbirth, and infertility unwanted pregnancy, parity, hospital admission during current pregnancy) fulfilled. Information's about childbirth and baby (method of delivery, length of labor, time of delivery, satisfaction of midwives and obstetrician, fear of pregnancy and delivery, gender of newborn, babys weight, time of first skinny contact) completed at first day postpartum on their medical records and interview.

The mothers completed either translated Persian version the MBS[1] or Stein test in the first, fifth or tenth postpartum days. MBS is a special scale for measuring maternity blues that study 13 symptoms. According to Stein scale the minimum score is zero and the maximum one is 26. The women whose scores were equal or more than8 on Stein scale in at least one day after childbirth, were classified as cases of MB. The symptoms include depression, anxiety, calmness, restlessness, dreaming, exhaustion, headache, poor concentration, irritability, forgetfulness, and confusion. Scores of each item is 0, 1, and 2(15). Because most studies have shown that maternity blues start from first postpartum day, peak of maternity blues is fifth day, and it remit tenth day, in this study MB was assessed in 1, 5, and 10 days after delivery. MBS was completed at postpartum ward in first day and because mothers were discharged 2 days after childbirth, we carried out telephone interview in 5 and 10th postpartum days for M BS completion.

1 Maternity Blues Scale

Results

Data showed that the mean of women's age was 23.78±0.23. 5.8% of women were occupying and rests of them were housekeeper. The average of their marriage age was 18.96±0.91 and 56.4%had secondary school education.

Prevalence of the "maternity blues" was 55.3% and it's frequency at the first, fifth and tenth day was 30%, 34.4% and 11.3% respectively. Average score of maternity blues at the first day 5.59±0.19, fifth day 5.86±0.21 and tenth day was 2.43±0.17. The results show that 63% of mothers for one day, 27% of women for 2 days and 6% of them for 3 days suffered from "maternity blues" disorder. Moreover the most current signs after childbirth at the first, fifth and tenth days were exhaustion, depression and anxiety respectively.

There wasn't any meaningful relationship between demographic characteristics and maternity blues. Maternity blues didn't show any meaningful relationship with psycho-social factors such as matrimony involvement, domestic protection, relation quality with husband family and woman feelings toward her husband.

The results showed that risk factors significantly with maternity blues were unwanted pregnancy (p=0.05), private home (p=0.05), satisfaction of economic status (p=0.00), antenatal mood disorder (p=0.00), parity (p=0.02), past admission in duration of pregnancy (p=0.01), and the time of first skinny contact (p=0.01).

Surveying this disorder and factors related to pregnancy and childbirth denoted that the method of delivery effect on maternity blues. Of course comparison between N.V.D and elective surgery childbirth didn't have meaningful difference but there was a difference between emergency surgery and any way of N.V.D and elective surgery childbirth (table 1).

Discussion

Prevalence of the "maternity blues" was 55.3% at the study and the maximum of mean score was shown at fifth day and the minimum at tenth day. Also in Japan (4), Greece (14), Hong Kong (16), and in England (17) reported MB as 33.7%, 44.5%, 44.3% and 76% respectively. In the most studies, the rate of MB was about 40% to 60 % (17). The difference in frequency maternity blues in various countries proved this fact that MB is a phenomenon depended to culture. On the other hand, difference in method and instrument for measuring maternity blues are another reasons for it. Some depression scales, such as the Zung Self Rating Depression scale, Beck Depressive Inventory, and Edinburgh Postnatal Depression Scale were used in some studies to determine maternity blues, but there are 3 specifically scale for measuring the blues that include Pitt's Blues Rating Scale, Kennelly's Blues Questionnaire and the MBS. Out of the 3, the MBS is the most widely accepted across cultures (15).

This phenomenon usually starts from 1 to 5 days after childbirth and maximizes at 4th or 5th day (7). It was proved that highest point of MB is 4 days after childbirth that at this time endocrine changes have highest level (17). Our findings showed a peaking on day 5. This is consistent with other studies.

There is a significant relationship between MB and unwanted pregnancy. In studies argued that unwanted pregnancy and lack of positive acceptance by mother related to MB and intensification of psychological signs (6, 15). Ross and et al. found out that 50 % of women who suffered from MB involved psychological problems in the duration of pregnancy and or trapped unwanted pregnancy and they hadn't positive acceptance from their pregnancy (8).

Table 1. Comparison method of delivery on maternity blues

groups / Method delivery	MB[1].N (%)	NMB[2].N (%)	p.value
NVD[3] (1)	110(54.7)	129(51.8)	P(1,2)=0/27
Elective CS(2)	71(35.3)	66(26.5)	P(2,3)=0/001
Emergency CS(3)	20(10)	54(21.7)	P(1,3)=0/0004

1. MB: maternity blues

2. NMB: non maternity blues

3. NVD: normal vaginal delivery

MB was higher in mothers who didn't satisfy from their economic position. Max recommended the revenue below 40 thousands dollars as the other factors that lead to depression after childbirth (18). The newborn accounts as an economic burden for his/her parents and leads to difficult circumstances and places parents in a stressful position. Professional occupations have known effect on economic situation in family. In this study, 53.4% of husbands in MB group have official occupations. As a result, if official occupations didn't effect on MB directly, it could effect on family's economics. Anton found out that low social class and informal occupations are the important factors on MB (19).

In our findings Mothers, who lived separate from her or her husband's family, suffered from this disorder less. In some studies quality of couple's relationship and husband protection are other factors that effect on MB. Maybe separating from parents can reduce their interference and improve couple's relation.

Method of delivery and parity were effective on MB. In a study, cesarean was represented as the risk factor for MB and believed that surgery stress is added to endocrine changes and psycho-social factors that effect on MB. According to it, anxiety and stress at childbirth are strong factors on MB (14). Also Hannah knew the surgery as important criteria on MB. According to Hannah's findings, there is a relationship between score of MB scale and stressful childbirth (20). It must be said that merely the kind of delivery don't lead to MB, maybe amount stress of childbirth is more effective. Few studies resulted that MB is more likely in primary pare women in comparison to multi pare women. (21, 22). It seem inexperience primary pare mothers in protect infant and anxiety in acceptance new role as mother can influence on appearance of MB.

The most current reasons for hospitalizing mothers in study in duration of pregnancy were hyper emesis gravid arum and pyelonephritis. Some studies proved stress and lack of healthy mental in women with past history of hospitalization. Some medical problems such as severe infection, anemia and electrolytic imbalance had meaningful relation with developing mood disorders after childbirth. Prior history of hospitalization in duration of pregnancy as a predictive factor in developing the MB (15, 21).

The time of first skinny contact between mother and newborn has a relation with suffering to MB. The earlier contact is the more effective on reducing phenomenon. Researches shown that the skinny contact is effective on motherhood behavior and feelings and it causes increasing willing to protect the newborn (23, 24, 4).some authors believed that the skinny contact between mother and infant reduced MB and when scores of MB is greater, attachment behaviors could be weaker and the anxiety increased (14, 24, 25).

Researchers showed anxiety and depression during pregnancy have been introduced as an important risk factor for postpartum blues (14). And also poor emotional condition during pregnancy is associated with negative mood postpartum period (26). Adewuya resulted mood changes during pregnancy can affect mood of person in the postpartum period (15). Ian Broking ton also represented a history of psychiatric illness during pregnancy, stress during pregnancy and history neurotic disorders are effective in the incidence of postpartum blues (6).

Conclusion

In the light of results of the research and high prevalence of maternity blues is suggested that with the contribution of hygienic employees especially midwives for identifying mothers who are in risk and protecting them and perfect education to mothers and family, we will increase health and mental hygiene level women and society.

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The Role of Fetal Gender in Prolonged Pregnancies

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Abstract

Aim of the study: We aimed to investigate fetal gender's effect of prolonged pregnancies in this retrospective study.

Methods: Singleton pregnancies who gave birth at 37 weeks and over in GATA Haydarpasa Training Hospital, Department of Obstetrics and Gynecology between 2008 and 2009, were included in this study. Patients were divided into two groups, one of these who gave birth between 37+0 and 39+6 weeks as the control group, the other who gave birth 40 weeks and over as the study group. The two groups were compared for maternal age, number of previous birth, cesarean birth rates, male and female infants rates and average infant birth weights.

Results: 937 singleton pregnancies were included in the study. 819 patients were defined as the control group, also 118 patients were defined as the study group. No significant difference could be obtained between the two groups regarding maternal age, number of previous births and infant gender rates. However, rates of caesarean section (28.8% and 11.6%, p=0.001) and mean infant birth weights (3475±379 g and 3335±424 g, p=0.000) in the study group were detected statistically higher than the control group.

Conclusion: As a result, there was no statistically significant correlation between the prolonged pregnancies and fetal genders.

Key words: fetal gender, postterm pregnancy, prolonged pregnancy.

Introduction

Gestational age is calculated by last menstrual period (LMP). Accordingly, a pregnancy that extends to 41 weeks and beyond (completed the forty-first week) is defined as post-term and a pregnancy that has progressed up to and beyond 40 weeks is defined as prolonged pregnancy (1). The incidence of prolonged pregnancies is approximately 10%. The most important reasons for this are incorrectly calculated LMP and gestational age (2). The reasons for this incidence in case of correctly calculated gestational ages are maternal age, number of parity, ethnic origin, low socioeconomic status, as well as the lack of some placental and fetal enzymes and hormones have also been investigated and many theories have been proposed. We found no significant correlation with most of the parameters (3.4).

Prolonged pregnancies are found to be associated with an increase in fetal macrosomia, acute fetal distress (AFD), meconium aspiration, intrauterine death, and cesarean section (5). Although we have the prediction of second-trimester cervical length measurements in relation to the premature birth, but there is yet no indicator for such a prolonged pregnancy (6).

Our aim is to investigate the relationship between fetal gender and prolonged pregnancies, and also whether prolonged pregnancies are associated with an increase in caesarean section rates.

Materials and Methods

Regional ethical committee approval was obtained before the study. In this study, singleton pregnancies who delivered between January 2008 and December 2009 in GATA Haydarpasa Training Hospital, Department of Gynecology and Obstetrics were retrospectively reviewed. Multiple pregnancies, pregnancies with congenital or chromosomal abnormality, pregnant women who gave birth before 37 weeks, pregnant women who delivered by elective caesarean section, and pregnancies complicated by diabetes, intrauterine growth retardation and hypertension were excluded from the study.

Gestational weeks were calculated according to last menstrual period confirmed by ultrasonograp-

hic measurements in early weeks of gestation, and antenatal surveillance was performed according to these dates. Patients were divided into two groups as a control group including pregnant women who gave birth between 37+0 and 39+6 weeks and a study group including pregnant women who gave birth at and after 40th week. Patient's age and the number of gravidity and parity were recorded at the beginning of follow-up. Gestational age at delivery, root of delivery, gender and weight of infants were detected after the birth. Subsequently, maternal age, number of previous births, cesarean birth rates, ratio of male and female infants and mean birth weight of infants were compared between the two groups.

All the data obtained have been computerized. Statistical analyzes of data was performed using SPSS 17 software (Statistical Program for Social Sciences). Descriptive statistics were presented as frequency and percentage. After assessing the compliance of data with the normal distribution by the Kolmogorov-Smirnov test, Student's t test and Mann-Whitney-U test were performed for normally distributed continuous data and non-normally distributed data, respectively. Chi-square test was used for categorical variables. Statistical significance was considered to be $p<0.05$.

Results

937 pregnant women eligible for the study were enrolled in the study. 819 patients who gave birth between 37+0 and 39+6 weeks were defined as the control group, whereas 118 patients who gave birth at and after 40th week were the defined as study group. Table 1 shows the comparison between the two groups and the statistical significance. There was no statistically significant difference between the study and control group in terms of maternal age (28.1±3.9 and 27.7±3.8, p=0.178) and the number of previous pregnancies (0.47±0.06 and 0.53±0.07, p=0.731). However, a high rate of prolonged pregnancies is observed with the first pregnancies (63.6%), whereas this rate is decreased with the increasing number of pregnancies (27.1% with the second pregnancy, and 8.5% with the third pregnancy). There was a statistically significant difference between the study and control group in terms of cesarean birth rates (28.8% and 11.6%, respectively, p=0.001) and mean birth weight of infants (3475±379 g and 3335±424 g, p=0.000). But there was no statistically significant difference between the study and control group in terms of percentages of male and female gender (50% vs. 50% and 51.9% vs. 48.1%, p=0.701). In addition, mean birth weight of male infants in all groups was 3415±420 g, while mean birth weight of female infants in all groups was 3282±418 g (p=0.607). In addition, nulliparity rate was 52.9% in patients who gave birth to a male infant and 47.1% in patients who gave birth to a female infant. (p=0.466).

Discussion

A prolonged pregnancy is defined as a pregnancy that has progressed up to and beyond 41 weeks (287 and above) (1.7). In recent studies, however, fetal and maternal risks detected during the antenatal surveillance were observed to occur beyond 40 weeks. In addition, given that many women may have menstrual irregularities and show differences in their time of ovulation, the boundaries of the definition of prolonged pregnancy become questionable (8). Metaanalysis revealed an incidence of 5 to 10% for prolonged pregnancies (2). 18%

Table 1. The comparison of maternal and fetal parameters between the study group and control group

	Study group (n=118)		Control group (n=819)		p
	Mean	+/-SD	Mean	+/-SD	
Maternal age (years)	28.1	3.9	27.7	3.8	0.178
The number of previous births	0.47	0.06	0.53	0.07	0.731
Infant birth weight (g)	3475	379	3335	424	**0.000**
Cesarean birth rate (%)	28.8	-	11.6	-	**0.001**
Rate of male infants (%)	50	-	51.9	-	0.701
Rate of female infants (%)	50	-	48.1	-	0.701

Results are given as mean ±standard deviation (SD) and percentage. Student-t test, Mann Whitney-u test and Chi square test were used for data.

of pregnancies continue until the 41st week of pregnancy, whereas 10% continue until the 42nd week of pregnancy (7). According to the criteria of our study, the rate of pregnancies that continue beyond 40 weeks was 12.5%.

The most important reason for the occurrence of prolonged pregnancies is unknown or incorrectly calculated last menstrual period. In a study conducted, a routine early first-trimester ultrasound examination that is performed to determine the gestational age was found to be more effective. When compared with an ultrasound examination that is performed in the second trimester of pregnancy, it reduces the rate of prolonged pregnancies by 14% (9). Likewise, Boyd et al. found the rate of prolonged pregnancies of which gestational age exceeded 293 days as 7.5% by using only the last menstrual period, as 2.6% by using only the early ultrasonographic examination, and as 1.1% by using both methods (10). In the estimation of gestational age, the measurement of the diameter of the gestational sac between 5th and 10th week of pregnancy has an error margin of ± 0.64 days, and crown-rump length (CRL) measurement between 7th and 14th week of pregnancy has an error margin of ± 2.7 days. This error margin is ± 6.7 days with the measurement of femur length (FL) between 12 and 24th gestational weeks. Biparietal diameter (BPD) is the latest measurement to be used in the estimation of gestational week in the second trimester. Instead transverse cerebellar diameter may be preferable (11). Dates of last menstrual period in all patients in our study were confirmed by early first-trimester ultrasound examination.

The most important risk factors identified are nulliparity and a history of previous prolonged pregnancy. In our study, there was no history of prolonged pregnancies in our study. However, the incidence of prolonged pregnancy in first pregnancies was higher in accordance with the literature (12). There has been a decrease in prolonged pregnancies with increasing number of pregnancies, and nulliparity has been an important predictive factor in prolonged pregnancies. In a study conducted in Norway, the chance of a post-term pregnancy was found to be 27% and 39% in the second and third pregnancies of a patient with a history of post-term pregnancy in her first pregnancy, respectively (13). There are studies showing that having a family history of prolonged pregnancy increases the risk of prolonged pregnancies (14, 15). Albeit rare, the other factors leading to prolonged pregnancy are the fetal adrenal insufficiency, placental sulfatase deficiency, anencephaly, and chronic use of nonsteroidal anti-inflammatory drugs. In addition, a study conducted by Dibon et al showed that the mothers carrying a male fetus were exposed to prolonged pregnancy more frequently. In our study, the percentages of male and female fetuses were found to be same in prolonged pregnancy group. It was not found statistically significant to use fetal gender as a predictive data (16).

In some studies, perinatal mortality rates have been shown to be increased after 41st week of pregnancy. The most common causes of death were found to be intrapartum asphyxia and meconium aspiration (17). Intrapartum period is of greatest risk for the fetus in prolonged pregnancy, because the amniotic fluid is decreased with advancing gestational age, which has a facilitating effect on the compression of the cord. Decreased diameter of the umbilical cord leads to fetal distress syndrome, especially in conjunction with oligohydramnios. This syndrome triggers the mechanism leading to meconium aspiration syndrome. Placental apoptosis is also facilitated with advancing gestational weeks (18, 19). The fetus gains weight quickly until 38th week of pregnancy, which continues up to 42nd week of pregnancy in a decreasing manner. This therefore leads to macrosomic infants (20). In our study, a statistically significant difference was found between the study and control groups in terms of birth weights. Due to many factors described above, given the risk of fetal or maternal morbidity and mortality, the cesarean rates were observed to be higher in prolonged pregnancies. Our study also found a significantly higher rate of cesarean section.

The first of the important points regarding antenatal management of post-term pregnancies is that on which week of pregnancy antenatal intervention should be performed. The other is to monitor post-term pregnancies by antenatal tests or to decide about performing an elective induction of labor. American College of Obstetricians and Gynaecologists (ACOG)'s recommendations suggest that non-routine antenatal follow-ups between 40th and 42nd gestational weeks do not improve outcomes and it would be appropriate to commence these follow-ups after the 42nd week of gesta-

tion. No single antenatal follow-up is superior to others. There is no proven superiority between the follow-up and induction and one of them should be preferred after the 42nd week of gestation (21).

In conclusion, no significant association was found between prolonged pregnancies and fetal gender. However, prolonged pregnancies were found to be associated with a statistically significant increase in birth weights and cesarean delivery rates. In addition, the rate of prolonged pregnancies was found to be higher in the first pregnancies.

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The Study of Body Composition Variables as Predictor Factors on Back Spines Bone Mineral Density of Basketball Players

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Abstract

Aim: This study investigated the relative contribution of body composition to back spines bone mineral density (BMD) in national level basketball players.

Method: The study was performed in thirty Indian young healthy basketball players. The BMD in back spines (L1, L2, L3, L4 and total back spine) and fat free mass (FFM) and lean body mass (LBM) were assessed by dual-energy X-ray absorptiometry (DEXA); body height and weight were also measured, and body mass index (BMI) was calculated. We used Pearson correlation for measuring the correlation between BMD-BMI, BMI-LBM, BMD-LBM, BMD-FFM and BMI-FFM in national level basketball players. Relationships among variables were assessed by stepwise multiple regression. Significant level of test was at 0.05.

Results and Conclusions: The results of Pearson correlation among BMI and BMD of positions of back spines, LBM and FFM showed that, BMI have a significant positive linear correlation with LBM and FFM. BMI have positive correlation with total back spine, L1, L2 and L3 positions of spines also, so BMI correlate with L4 position, but it is not a significant correlation. In the results of this study with Pearson correlation among LBM and BMD of positions of back spines, LBM had a positive liner correlation with total spine, L1, L2, L3 and L4 spines. The results showed that LBM (β= .525), BMI (β=.365) and FFM (β=.401) were the variables that entered the regression model for total back spine BMD. LBM was a significant contributor in all adjusted models and considered as the best predictor of amount of total back spine in national level basketball players. The FFM is the second predictor of amount of back spines and there after BMI can be the predictor of amount of total back spines BMD. But in other positions in orderly basis, LBM (β=.540), BMI (β=.450) and FFM (β=.392) entered the regression model for L1, LBM (β=.498), BMI (β=.355) and FFM (β=.380) entered the regression model for L2 and in order LBM (β=.501) and LBM (β=.490) only entered the regression model for L3 and L4 in regression model.

Key words: Body composition, Back spine, Bone mineral density, Fat free mass, Lean body mass and National level basketball players.

Introduction

Osteoporosis is a systemic skeletal disease characterized by low bone density and micro architectural deterioration of bone tissue with a consequent increase in bone fragility. Osteoporosis is a disease of aging (1), and there is growing emphasis on prevention. There are very much studies about the effect of sport and different activities on the bone health and bone minerals (2, 3, 4 and 5).

The effect of several body composition components on the human skeleton are widely explored and investigated because they are thought to be important determinants of bone mineral accrual and maintenance (6, 7,8 and 9). In addition BMI maybe were associated with BMD and fracture risk (10, 11and12). These findings seem to imply the beneficial effect of higher BMI on bone, but if such a concept is applied to the prevention of osteoporosis, it would be confusing and misleading for public health. The reason is simple; higher BMI is also closely associated with cardiovascular risk factors even in children and youth (13).

Therefore, it is necessary to determine the effect of BMI on BMD. Although there is a strong correlation between BMI and body composition, such as FFM and LBM (13 and14), it remains disputable as to whether FFM or LBM contribute

more to the correlation between BMI and BMD. Some investigators believe that FFM is the major determinant for bone mass (15), while others have found that LBM has a more significant effect on BMD (16 and17). It is important to make it clear to what extent the FFM and LBM could exert their individual influence on back spine BMD.

A great deal of research has focused on the influence of body composition on bone mineral during the growth period and the period of common bone deterioration because of aging. There is uncertainty in the literature about whether there is a relationship between body composition and bone mineral after growth and before aging, and if so, which component of the body composition is the best predictor of bone mineral during this period (18). Finally, most of what we know of (young) adult skeletal development has been determined from cross-sectional studies.

Consequently, the long-term effects of body composition on bone mineral during youth are not fully understood and should be evaluated (19). Therefore, little is known about this relationship among the general population during the third and fourth decade of life. The present study is one of the first studies which were conducted in the age of 18 to 28. Most of the previous studies in this field were done on women or on elderly people, or on the people who were on their growth age.

So, we investigated the relationships among BMI, fat mass, lean mass and BMD in national level basketball players.

Materials and Methods

In this study, 30 Indian National level basketball players (with mean+/-SD, age 21±1.71years, height: 182.33 ±9.2 cm, weight: 75±8.12 kg, BMI: 22.2 ± 3.12) participated. All the participants were the members of basketball teams in first league of India. The selections of the participants were done through simple random sampling.

At the first stage the participants were given some information about the goal and different stages of data collection and then they filled a testimonial of participation in the research. Participants had no bone tear, bone hollow in family records and diseases such as diabetes, hyperthyroidism, hyperparathyroidism, cardio-respiratory diseases and they were not using alcohol, cigarette, anti-respiratory medicines and Cortone. Players have regular exercise of basketball for more than six years and they have six session's trainings in a week regularly. They are members of a team and are regularly training under supervision of the trainer. All the subjects in this study have Non-vegetarian diets.

We used one questionnaire in this study. The questionnaire was divided into two parts. The first part consisted of personal information of players (such as age, length, weight, etc.) and the second part evaluated medical information (such as bone tear, not using smoke, alcohol, medicine, etc.) of them. BMD of back spines such as L1, L2, L3, L4 and total spines of subjects was measured by DEXA machine in Sir Sunderlal hospital of BHU in Varanasi. In this method the base of mass measurement is, using two high and low energy sources which make different absorption from soft and bony tissues. For determining the Body Fat Mass and Low Body Fat Mass we used the DEXA machine also. Their weights were also measured and their weights were recorded to the nearest 0.1 kg. Height was measured without shoes and recorded to the nearest 0.1 cm. BMI was calculated as weight (kg) divided by height squared (m^2).

Statistical Procedures

Spss was used to analyze the data and data were analyzed through descriptive and deductive statistics. In descriptive statistics, indexes such as average, standard division, frequency table related to age, length, weight, etc. were used. In deductive statistics, we used Pearson correlation for measuring the correlation between BMD-BMI, BMI-LBM, BMD-LBM, BMD-FFM and BMI-FFM in national level basketball players. Relationships among variables were assessed by stepwise multiple regression. Significant level of test was at 0.05.

Results

The mean values for anthropometric indices, body composition, total and amount of BMD of thirty participants are given in Table 1.

Pearson correlations results

The results of Pearson correlations among BMI and BMD of back spines, LBM and FFM show that BMI have positive correlation with total spi-

nes, L1, L2 and L3 positions of spines, so BMI correlate with L4 position, but it is not a significant correlation (Table 2).

Table 1. Amount of some anthropometric parameters, BMR and BMD in Indian national level basketball players

Variable	Mean
Age(years)	21±1.71
Weight(kg)	75±8.12
Height(cm)	182.33 ±9.2
BMI(kg/m2)	22.2 ± 3.12
Body Fat(kg)	11.52± 3.2
Body fat percentage	15.27± 3.17
Lean body fat(kg)	63.42± 4.21
BMI(kg/m2)	22.2±3.12
L1	1.154
L2	1.239
L3	1.192
L4	1.213
Total Spines	1.198

*Table 2. Pearson correlations among BMI with BMD of back spines (*P≤.05)*

variable	N	Pearson Correlation with BMI	Sig. (2-tailed)
L1	30	.538*	.012*
L2	30	.496*	.035*
L3	30	.401*	.047*
L4	30	.324	.072
Total Spines	30	.429*	.035*

In the results of this study with Pearson correlations among LBM and BMD of back spines, we found that LBM have a positive linear correlation with total spines, L1, L2, L3 and L4 spines (Table 3).

*Table 3. Pearson correlations among LBM with BMD of back spines (*P≤.05)*

variable	N	Pearson Correlation with LBM	Sig. (2-tailed)
L1	30	.740	.005*
L2	30	.591	.027*
L3	30	.680	.019*
L4	30	.730	.009*
Total Spines	30	.670	.025*

Also results of Pearson correlations among FFM and BMD of back spines were significantly related to total spines BMD, L1 and L2 but FFM was not significantly related to L3 and L4 BMD (Table 4).

*Table 4. Pearson correlations among FFM with BMD of back spines (*P≤.05)*

variable	N	Pearson Correlation with FFM	Sig. (2-tailed)
L1	30	.477	.018*
L2	30	.501	.031*
L3	30	.349	.094
L4	30	.140	.513
Total Spines	30	.469	.034*

The results of multiple correlations

In this study for Analysis of anthropometric parameters, body composition and BMD, we used the stepwise multiple correlation. To explore the impact of body composition on BMD, a multiple regression analysis was conducted with BMI, FFM and LBM as independent variables, and total spines and all positions of back spies BMD as dependent variables, respectively. The results showed that LBM (β= .525), BMI (β=.365) and FFM (β=.401) were the variables that entered the regression model for total spines BMD. LBM was a significant contributor in all adjusted models and considered as the best predictor of amount of total spines in national level basketball players. The FFM is the second predictor of amount of spines, and then BMI can be the next predictor of amount of total spines BMD. But in other positions orderly, LBM (β=.540), BMI (β=.450) and FFM (β=.392) entered the regression model for L1, LBM (β=.498), BMI (β=.355) and FFM (β=.380) entered the regression model for L2 and orderly LBM (β=.501) and LBM (β=.490) only entered the regression model for L3 and L4 in regression model (Table5).

Table 5. Amount of the standardized coefficient β in three variables entered the multiple regression models for back spines

	Standardized coefficient		
	LBM	BMI	FFM
L1	*.540*	*.450*	*.392*
L2	*.498*	*.355*	*.380*
L3	*.501*	-	-
L4	*.490*	-	-
Total Spines	*.525*	*.365*	*.401*

Discussion

The present study is one of the first studies which were conducted in the age of 18 – 28. Most of the previous studies in this field were done on women or on elderly people, or on the people who were on their first years of growth age (1, 10, 16, 18 and 20). According to the importance of the third decade of life on the increase in the amount of BMD and prevention of osteoporosis on the future decades, the study of the relationship of predictor and affecting factors on BMD has very much importance. So in this study the most important result is that LBM is the most important predictor of BMD. But in the previous studies FFM was introduced as the most important predictor factor of BMD, while in our study it is second or third factor which determines the BMD. It can be because of the age of the group that we studied.

From the body composition components, LBM appeared to be the most important predictor of the total spines and four positions in national level basketball players, but BMI and FFM were the second and third important predictors of the total spines, L1 and L2 BMD in Indian national level basketball players not in L3 and L4 positions.

The significant finding of this study is that the most consistent contributor to BMD at total spines and four positions of spines is LBM, while orderly BMI and FFM are associated with BMD at three positions: total spines, L1 and L2 positions of spines.

This is in contrast with the results of Reid et al. (2002). They found that BMD was related to FFM and LBM in healthy women, and LBM and FFM was the main determinant of total body BMD (21, 22, 23). However, their conclusion was drawn from the regression model with LBM, BMI and FFM as independent variables.

The results of Pearson correlations among LBM and BMD of four positions of spines show that, LBM has a significant correlation in total and four positions of spines. But FFM and BMD of spines has a significant correlation in three positions of total spines, L1 and L2.

The data confirmed the linear correlation between BMI and BMD at total spines and some positions of spines.

BMI is a very reliable estimator of body fat, FFM and LBM, especially in middle-aged adults (24) while DEXA provides a significant advancement in measurement techniques for body composition (24 and 25).

One researcher reported significant relationships between total body BMD and FFM and FM in young women and men. Strong relationships of FFM to BMD of the total body BMD femur and back spines in adolescent girls and boys have also been reported (11, 26 and 27).

Jian Min and et al. (2004), found that LBM was the only independent variable entering the model, indicating that LBM was the sole determinant for total BMD. LBM had positive relationship with spine, total femur and total body bone mineral density. Winters et al. (2000) also found that LBM was a robust independent factor predicting BMD at whole body 40 years' women.

Ferretti et al. (1998) studied the relationship of total body bone mineral content and density, LBM and FFM in 700 children and adolescents of 2-20 years of age and 600 adults. They found that total bone mineral content and total bone mineral density was closely related to LBM in various age groups. The effect of LBM on total bone content and total bone mineral density was superior in comparison to the influence of FFM or other body composition (20). Recently, studies with children, adult and adolescents as well as 20 to 80 years old men and women have shown similar results (18and 30). However, a longitudinal study in pre pubertal girls and boys found that LBM had an important effect on bone mineral measures during linear growth, but that FFM was predominant thereafter, but effect of LBM was more than FFM in total body mass and total body mineral (31 and32). Less LBM was related to lack of physical activity, and thus prone to bone loss (33); on the other hand, a large amount of FFM could influence postural stability (28). It was even reported that the percentage of fat was inversely related to total BMD in normal youth. If FFM could be considered as a marker for lack of physical activity, then, the increase in FFM during the growth period, might affect the gain of peak bone mass (34). Some studies in early postmenopausal women found that LBM was the strongest predictor of bone changes in these women (35). There are studies which have indicated that LBM and bone density are under genetic and environmental regulation (36), and there are also some ethnic differences (14).

Even though the present study was performed in Indian national level basketball players, but the similar findings were also reported in Japanese (37) and Caucasian (18 and30) men and women.

Conclusion

This present study confirmed the linear correlation between BMI and BMD at total spines and some positions of spines. Also the results show that, LBM have a significant correlation in total and four positions of back spines. But FFM and spines BMD have significant correlation in some positions, total spines, L1 and L2. From body composition components, LBM appeared to be the most important predictor of the total spines and four positions of back spines in national level basketball players, but BMI and FFM were the second and third important predictors of the total spines, L1 and L2 BMD in Indian national level basketball players, but not in L3 and L4 positions.

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Arterial stiffness and central hemodynamics in apparently healthy adults with impaired glucose regulation or high-normal blood pressure

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Abstract

Aims: To compare the impact of high normal blood pressure (HNBP) and/or impaired glucose regulation (IGR) on arterial stiffness and central hemodynamics in general Chinese adults.

Methods: A random sample of 266 apparently healthy subjects aged 19 to 82 years with HNBP and/or IGR was examined in a cross-sectional study. Regional arterial stiffness was assessed by non-invasively measuring carotid-femoral (PWVc-f) and carotid-radial pulse wave velocity (PWVc-r). Central blood pressure and heart rate corrected augmentation index (AIx-75) were estimated by pulse wave analysis.

Results: Individuals with IGR (n = 145) had lower brachial SBP and pulse pressure (PP), but higher central SBP, PP, PWVc-f, and AIx-75 as compared with the HNBP population (n = 98). The HNBP + IGR group (n = 23) had the highest plasma high sensitivity C-reactive protein levels among the three groups. Subjects with HNBP + IGR had higher PWVc-f and AIx-75 than the HNBP population, but did not differ when compared with the IGR group. Correlation and multivariate stepwise regression analyses revealed that 2 h BG, but not FBG, was independently associated with PWVc-f; central SBP, but not brachial SBP, was an independent predictor for both PWVc-f and AIx-75. Blood glucose level and blood pressure showed no significant correlation with PWVc-r.

Conclusions: IGR preferentially deteriorates central over peripheral hemodynamics and core arterial stiffness. Postprandial glucose and central SBP could be reliable indicators of large artery stiffening. The presence of HNBP and IGR synergistically increases the severity of inflammation and deteriorates peripheral hemodynamics.

Key words: atherosclerosis, hypertension, diabetes, arterial stiffness, epidemiology

Introduction

Hypertension and diabetes are two major established risk factors for the development of atherosclerosis and cardiovascular disease (CVD). Impaired glucose regulation (IGR), including impaired fasting glucose (IFG), impaired glucose tolerance (IGT), and high normal blood pressure (HNBP) are considered as preclinical status of diabetes and hypertension. Recently, slightly abnormal glucose tolerance and elevated blood pressure results, even within the "normal range," have been found to be associated with high cardiovascular risk [1, 2]. Such high-risk patients, although common in clinical practice, are often unrecognized and undertreated. The mechanisms through which these pathologies increase cardiovascular risk remain unclear but might involve premature artherosclerosis [3].

Arterial stiffness occurs early in the atherosclerosis process and carries a poor prognosis for CVD [4]. Pulse wave velocity (PWV), central blood pressure, and pulse wave analysis are all noninvasive indices for early detection of arterial stiffness, each of which reflects different facets of the pathophysiological abnormalities underlying functional vascular damage. The augmentation index (AIx) is a composite parameter reflecting both large and distal arterial properties. Carotid-femoral PWV（PWVc-f）and carotid-radial PWV (PWVc-r) represent arterial stiffness at the aortic (elastic arteries) and peripheral (muscular arteries) levels, respectively. Central pulse pressure is a surrogate hemodynamic marker for cyclic stress on the aortic wall, which relates to increased left ventricular afterload and decreased myocardial perfusion [5]. Discrepancies have been observed among different studies and different indicators [6]. Likewise, it is not certain that the different instruments used to assess arterial stiffness are equivalent.

Growing evidence demonstrates that either IGR or HNBP has a relationship with some of these arterial stiffness indicators [7, 8]. However, the results are far from sufficient and conclusive because most of the previous studies only analyzed their association using sub-groups of patients with diabetes [1] or hypertension [9], or in selected populations [10]. In addition, only one or two estimates of central artery stiffness were targeted. To our knowledge, there is little research comparing regional PWV, AIx, and central blood pressure in the general population with IGR or/and HNBP. To clarify this complexity, we investigated, in a population-based study of 266 apparently healthy people with HNBP, IGR, or both, the associations of glucose tolerance status and HNBP with noninvasive arterial stiffness and central hemodynamic indices.

Subjects and Methods

A total of 266 consecutive subjects (146 male and 120 female, aged 19 to 82 years, 46.25 ± 13.33 years) with either HNBP [defined as systolic blood pressure (SBP) 130–139 mmHg and/or diastolic blood pressure (DBP) 85–90 mmHg, according to 2010 Chinese guidelines for the management of hypertension] [11], IGR [defined as IFG or IGT, where IFG refers to fasting blood glucose (FBG) of 5.6–6.9 mmol/L, and IGT was defined as FBG < 7.0 mmol/L and 2 h blood glucose in a 75 g oral glucose tolerance test (2 h BG) of 7.8–11.1 mmol/L, according to the criteria of the 2011 ADA guidelines on medical care in diabetes [12], or combined IGR and HNBP, were studied, all of whom underwent a routine annual health checkup during the period from May 2010 to July 2011 in Beijing. All subjects were otherwise healthy (no overt CVD, hypertension, diabetes, or chronic kidney disease) and none were taking any medications affecting blood pressure (BP) and arterial stiffness. The study was approved by the Ethics Committee of the Chinese People's Liberation Army General Hospital, and each subject provided written informed consent prior to participation.

Questionnaire and anthropometric measurements

A questionnaire was filled out for each subject at inclusion using a face-to-face interview method. The survey assessed traditional cardiovascular risk factors, including age, family history of premature cardiovascular events, cigarette smoking, and history of hypertension, cardiovascular disease, and diabetes. Subjects were considered non-smokers if they had never smoked or if they had given up smoking for at least three consecutive years. The investigation was completed by physicians trained by the research team.

Physical examinations, including anthropometry and blood pressure measurements, were performed after an overnight fast in the morning for each patient in the supine position. Brachial BP was measured with a mercury sphygmomanometer (Yuyue, Armamentarium Limited Company, Jiangsu, China) after 15 minutes of recumbent rest. Phases I and V of the Korotkoff sounds were used as the SBP and DBP, respectively. Pulse pressure (PP) is the difference between SBP and DBP. The mean blood pressure (MBP) was calculated from the following formula: MBP = DBP + PP/3. Two measurements at an interval of 3 minutes were averaged. Anthropometric measures (height, body weight, and waist and hip circumferences) were recorded by a standardized protocol. Body mass index (BMI) was calculated as weight (kg)/height (㎡). Waist –to – hip ratio was calculated as waist / hip circumference.

Laboratory measurements

All subjects were advised not to eat, smoke, or drink coffee before examination. A venous blood sample was collected by venipuncture after an overnight fast. The baseline plasma total cholesterol (TC), triglyceride (TG), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), FBG, creatinine, uric acid, and high sensitivity C-reactive protein (hs-CRP) were measured by a qualified technician using enzymatic assays (Roche Products Ltd., Switzerland) on a fully automatic biochemical autoanalyzer (COBAS c6000, Roche Products Ltd., Switzerland). All subjects who were not aware of diabetes were submitted to an OGTT using a meal of 75 g glucose dissolved in 300 ml water. 2 h BG was measured as usual.

Arterial stiffness and wave reflections evaluation

PWV was assessed using automatic waveform analyzers (Complior, Artech Medical, Pantin,

France) as previously described [13]. All individuals were examined after resting in the supine position for at least 5 minutes. Different pressure waveforms were obtained simultaneously at three sites: the right carotid, radial, and femoral arteries. Transit distances were assessed between each pulse-recording site. PWVc-f and PWVc-r were then automatically calculated from measurements of pulse transit time and the distance between the two sites from tonometry waveforms and body surface measurements as previously described. The mean PWV of at least 10 consecutive pressure waveforms was calculated for further analysis.

Central blood pressures (central SBP and central PP) and AIx were estimated by pulse wave analysis [8]. The peripheral pulse wave was recorded from the radial artery using the method of applanation tonometry with the patient in the sitting position and resting their arm on a rigid surface. The radial pulse wave was transformed into the central pulse wave of the aorta through analysis of the pulse wave with the Sphygmocor device (Sphygmocor, AtCor Medical, Sydney, Australia). From this aortic pressure waveform, the augmentation pressure (AP) and AIx were calculated. The AP is defined as the height of the late systolic peak above the inflection point on the waveform and may be positive or negative depending on the relative heights of the two peaks. AIx is defined as AP divided by central PP and is expressed as a percentage. AIx was averaged from 10 to 12 successive waves and was corrected for a steady heart rate of 75 beats/min (AIx-75).

The same observer, unaware of the subjects' clinical and biochemical data, performed all of the measurements. The interclass correlation coefficients between the first and second measurements were 0.95 for the AIx-75, 0.92 for PWVc-f, and 0.89 for PWVc-r. The coefficients of variation for the AIx-75 and PWV were less than 5%.

Statistical analyses

Statistical analyses were performed with SPSS 11.0 software (Statistical Package for the Social Sciences, Inc., Chicago, IL, USA). The data are presented as mean values ± standard derivation or percentages, unless otherwise stated. One-way analysis of variance (ANOVA) was used to compare groups for continuous variables and the chi-square test to compare categorical variables. In addition, differences in non-parametric variables were compared using the Mann Whitney U-test. Pearson correlation and partial correlation (adjusted by age, sex, height, weight, LDL-C, and current cigarette smoking) analyses between arterial stiffness and plasma glucose, blood pressure, or other variables of interest were calculated to examine potential relationships. Multivariate stepwise regression analyses were then performed to look for independent associations between arterial stiffness and the variables that were found to have a significant association with arterial stiffness in a univariate analysis. $P < 0.05$ (two-tailed) was considered statistically significant.

Results

Among the 266 apparently healthy subjects, 98 (60 male and 38 female) were classified with HNBP, 145 (71 male and 74 female) with IGR, and 23 (15 male and 8 female) with combined HNBP with IGR.

Selected clinical and demographic characteristics of the subjects are shown in Table 1. As expected, plasma glucose levels were higher, while the blood pressure profile was lower, in individuals with IGR as comparison to those with HNBP. In addition, the IGR group had the most favorable cardiovascular risk profiles, including lower waist to hip ratio, lower plasma TG and TC, and lower metabolic syndrome rates, whereas individuals with either HNBP or HNBP+IGR exhibited an unfavorable profile. Individual risk factors for CVD were not statistically different between the HNBP and HNBP+IGR categories. Subjects with HNBP had higher blood creatinine levels than those with IGR. Although the levels of hs-CRP and LDL-C were comparable between the IGR and HNBP groups, they were much higher in those with IGR and HNBP combined. Subjects with HNBP, IGR, or both did not differ in terms of age, sex, proportion of smokers, and plasma uric acid concentration.

Hemodynamics parameters of study subjects in the three groups

Table 2 and Figure 1 provide information on hemodynamics for each group. Although subjects in the IGR group had the lowest mean brachial blood pressure and PP, they had the highest central SBP, PP, AP, and PWVc-f among the three

Table 1. Selected clinical and demographic characteristics of the survey population

Variable	HNBP (n = 98)	IGR (n = 145)	HNBP+IGR (n = 23)	P-value
Age (years)	47.26 ± 13.69	44.92 ± 13.4	50.39 ± 10.21	0.121
Male (n/ %)	60/61.2%	71/49.0%	15/65.2%	0.099
Current smoker (n/ %)	33/33.7%	39/26.9%	9/39.1%	0.339
Obesity (n/ %)	40/40.8%	41/28.3%	13/56.5%	0.011
Metabolic syndrome (n/ %)	20/20.4%	20/13.8%	17/73.9%	0.000
Height (cm)	165.85 ± 8.47	163.52 ± 7.82	163.13 ± 9.678	0.075
Weight (kg)	71.80 ± 13.19	65.67 ± 11.59a	73.04 ± 10.22	0.000
BMI (kg/m^2)	26.03 ± 4.04	24.477 ± 3.44a	27.46 ± 3.19	0.000
Waist circumference (cm)	87.16 ± 9.94	82.11 ± 10.24a	90.04 ± 10.00b	0.000
Hip circumference (cm)	99.85 ± 8.64	96.74 ± 7.12a	102.52 ± 7.651b	0.000
Waist-to-hip ratio	0.87 ± 0.06	0.85± 0.06a	0.88 ± 0.05b	0.002
TC (mmol/l)	5.01 ± 1.01	4.8 ± 0.85	5.08 ± 0.86	0.139
TG (mmol/l)	1.77 ± 1.52	1.32 ± 0.84a	1.62 ± 1.01	0.011
HDL-C (mmol/l)	1.39 ± 0.31	1.46 ± 0.35	1.29 ± 0.28b	0.03
LDL-C (mmol/l)	2.78 ± 0.8	2.79 ± 0.64	3.16 ± 0.64ab	0.05
BUN (mmol/l)	5.32 ± 1.41	5.39 ± 1.32	5.98 ± 1.29	0.39
Creatinine (μmmol/l)	73.29 ± 17.34	65.46 ± 16.3a	66.33 ± 24.8	0.003
Uric acid (μmmol/l)	306 ± 77.16	303.86 ± 79.49	308.42 ± 77.23	0.956
hs-CRP (mg/dl)	0.31 ± 0.26	0.28 ± 0.22	0.81 ± 1.49ab	0.000
FBG (mmol/l)	4.84 ± .51	5.11 ± 0.75a	4.87 ± 0.78	0.005
2 h BG (mmol/l)	5.55 ± 1.25	8.85 ± 1.2a	8.59 ± 1.14a	0.000

Data are expressed as means ± SD. a, P < 0.05 vs. HNBP. b, P < 0.05 vs. IGR.
Abbreviations: HNBP, high normal blood pressure; IGR, impaired glucose regulation; BMI, body mass index; TC, total cholesterol; TG, triglyceride; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; hs-CRP, high sensitivity C-reactive protein; BUN, blood urea nitrogen; FBG, fasting blood glucose; 2 h BG, 2 h post blood glucose in OGTT.

Table 2. Hemodynamic parameters of the studied population

	HNBP (n = 98)	IGR (n = 145)	HNBP+IGR (n = 23)	P-value
Brachial SBP (mmHg)	131.48 ± 3.73	114.6 ± 9.97a	129.63 ± 5.75b	0.000
Brachial DBP (mmHg)	78.87 ± 6.11	72.55 ± 6.83a	80.65 ± 6.07b	0.000
Brachial PP (mmHg)	52.61 ± 8.08	42.05 ± 8.16a	48.98 ± 10.51b	0.000
Brachial MBP (mmHg)	96.41 ± 3.87	86.56 ± 7.03a	96.98 ± 3.33b	0.000
PWVc-f (m/s)	9.9 ± 2.34	11.79 ± 2.86a	11.79 ± 2.27a	0.000
PWVc-r (m/s)	9.48 ± 1.32	9.38 ± 1.36	9.68 ± 1.35	0.575
Central SBP (mmHg)	115.11 ± 18.65	121.79 ± 18.06a	116.04 ± 16.85	0.015
Central PP (mmHg)	38.61 ± 12.29	44.49 ± 14.8a	43.35 ± 13.43	0.005
AP (mmHg)	7.61 ± 7.52	11.16 ± 8.98a	10.74 ± 7.7	0.005
AIx-75 (%)	18.52 ± 13.76	25.17 ± 10.34a	25.35 ± 9.99a	0.000
Tr (s)	86.32 ± 71.34	90.81 ± 63.73	93.22 ± 63.45	0.84

Data are expressed as means ± S.D. a, P < 0.05 vs. HNBP. b, P < 0.05 vs. IGR.
Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; MBP, mean blood pressure; PWVc-f, carotid-femoral pulse wave velocity; PWVc-r, carotid-radial pulse wave velocity; AIx-75, augmentation index at heart rate 75/min; AP, augmentation pressure; Tr, transit time.

groups. In addition, AIx-75 was higher in the IGR group as compared with the HNBP group, while comparable to that of the HNBP + IGR group. The HNBP + IGR group did not show higher peripheral and central SBP or PP than the isolated HNBP group; however, their brachial blood pressure and PP levels were significantly higher than those of the isolated IGR group. Moreover, the IGR +

HNBP group had higher PWVc-f and AIx-75 as compared with the HNBP group, but did not differ in peripheral and central blood pressure profiles. PWVc-f and AIx-75 were comparable between the HNBP+IGR group and the isolated IGR group. The three groups did not differ in transit time (Tr) and PWVc-r.

Correlation analyses

The associations of plasma glucose level and brachial and central blood pressure with PWV and AIx-75 are presented in Table 3, Figure 2, and Figure 3. FBG had no relationship with any the three surrogates of arterial stiffness. In contrast, increased 2 h BG was positively correlated with PWVc-f and AIx-75 in both Pearson correlation and partial correlation (adjusted for age, sex, height, weight, smoking habit, and hypercholesterolemia) analyses. Although brachial SBP was inversely, though weakly, correlated with PWVc-f and AIx-75 in an unadjusted Pearson correlation analysis, this association disappeared in a multivariate adjusted partial correlation analysis. In contrast, central SBP and PP were positively cor-

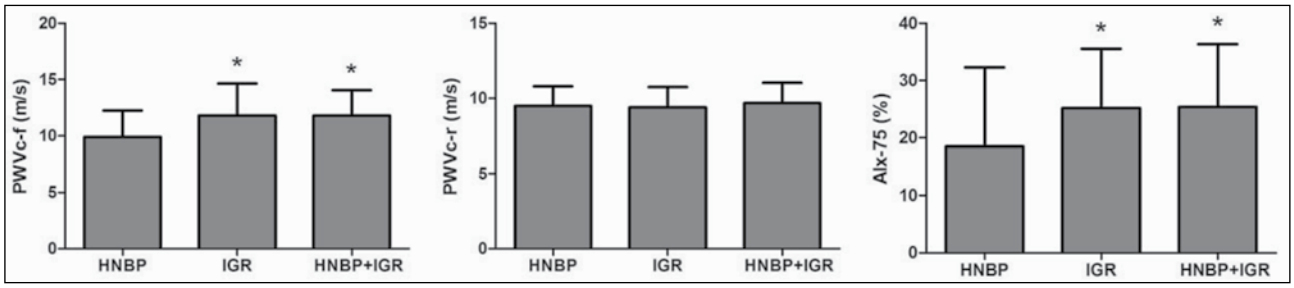

*Figure 1. Arterial stiffness in HNBP, IGR, or HNBP+IGR groups. *P < 0.05 compared with HNBP*

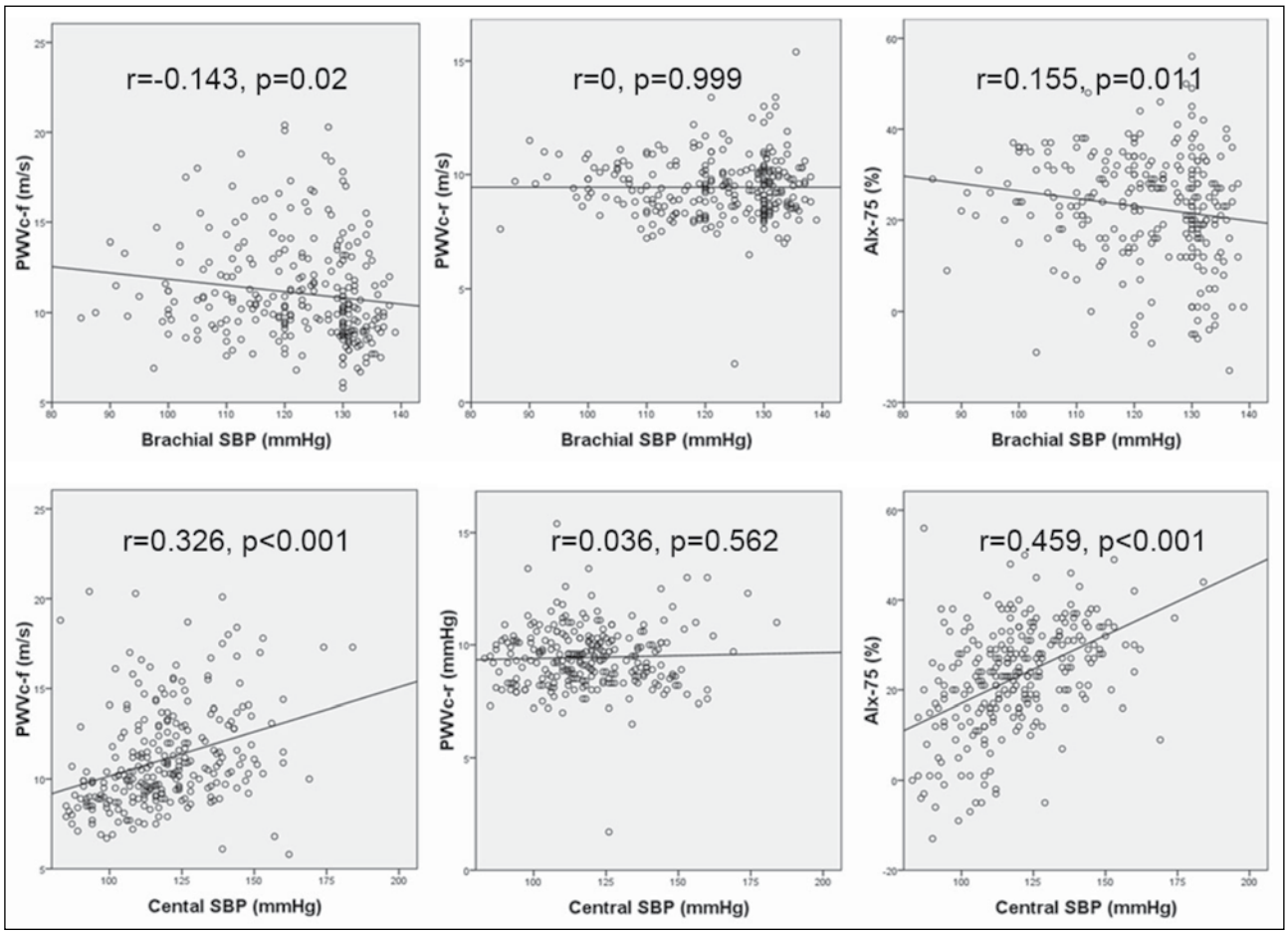

Figure 2. Relationship of brachial and central systolic blood pressures (SBP) with arterial stiffness. r expresses the Pearson correlation coefficient

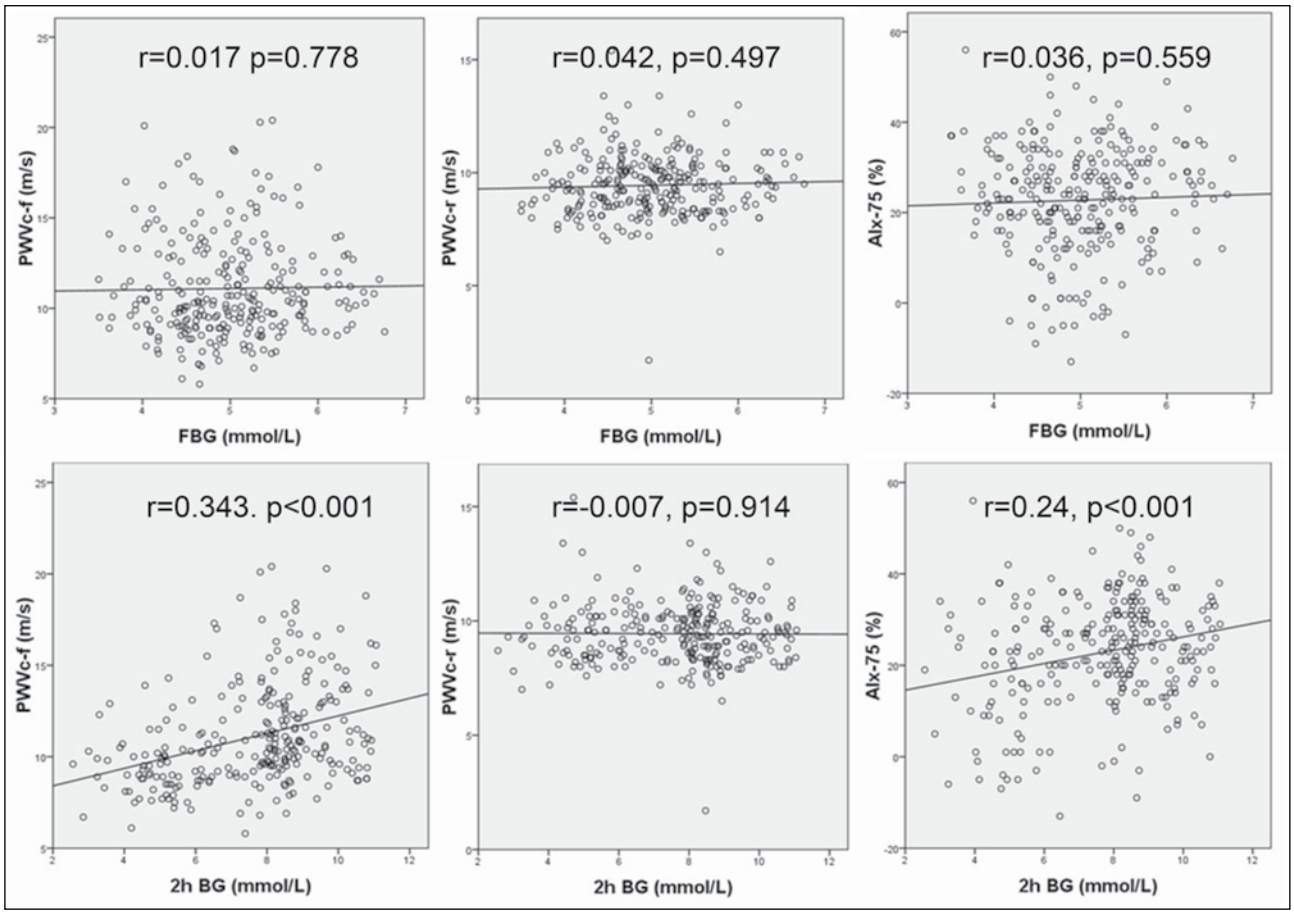

Figure 3. Relationship of fasting (FBG) and 2 h OGTT blood glucose (2 h BG) with arterial stiffness. r expresses the Pearson correlation coefficient

related with PWVc-f and AIx-75 in both unadjusted and adjusted correlation analyses. PWVc-r was not correlated with blood sugar or peripheral blood pressure. Only hs-CRP was associated with PWVc-r (Table 3).

Multivariate stepwise regression analysis

We performed a multiple regression analysis for the entire subject sample. In this analysis, we selected age, sex, smoking habits, BMI, central SBP, 2 h BG, uric acid, creatinine, and LDL-C

Table 3. Univariate associations of serum glucose level and blood pressure with surrogates of arterial stiffness

	PWVc-f		PWVc-r		AIx-75	
	r	r'	r	r'	r	r'
FBG (mmol/l)	0.017	0.003	0.042	0.078	0.036	-0.053
2h BG (mmol/l)	0.343**	0.245**	-0.007	0.041	0.240**	0.191*
SBP (mmHg)	-0.143*	-0.067	0.000	-0.051	-0.155*	-0.08
DBP (mmHg)	-0.126*	-0.099	-0.017	-0.06	-0.1	-0.11
PP (mmHg)	-0.073	-0.006	0.013	-0.015	-0.107	-0.012
Central SBP (mmHg)	0.326**	0.329**	0.036	0.038	0.459**	0.458**
Central PP (mmHg)	0.434**	0.429**	-0.104	-0.101	0.485**	0.475**
hs-CRP (mg/dl)	0.001	-0.002	0.184*	0.206**	-0.114	-0.142
Uric acid (µmmol/l)	0.129*	0.24**	0.215**	0.264**	-0.198**	-0.219*

r: Pearson correlation

r': Multivariate– adjusted partial correlation (adjusted for age, sex, height, weight, smoking habit, and hypercholesterolemia)

** P value < 0.05; ** P value < 0.01.*

Table 4. Independent determinants of arterial stiffness in a stepwise multiple regression analysis

	Unstandardized Coefficients		Standardized Coefficients	t	P-value
	B	SE	β		
AIx-75 (R^2 = 0.159, SE = 8.45, F = 16.739, *P* = 0.000)					
(Constant)	21.377	4.868		4.392	0.000
Creatinine	-0.169	0.037	-0.317	-4.59	0.000
Central SBP	0.13	0.035	0.255	3.702	0.000
PWVc-f (R^2 = 0.13, SE = 2.71, F = 8.745, *P* = 0.000)					
(Constant)	3.256	1.761		1.849	0.066
2 h BG	0.366	0.115	0.224	3.17	0.002
Uric acid	0.007	0.003	0.187	2.634	0.009
Central SBP	0.028	0.011	0.173	2.449	0.015
PWVc-r (R^2 = 0.122, SE = 1.071, F = 8.126, *P* = 0.000)					
(Constant)	7.78	.368		21.142	0.000
Creatinine	0.011	0.005	0.173	2.119	0.035
Uric acid	0.003	0.001	0.174	2.152	0.033
hs-CRP	0.311	0.148	0.15	2.098	0.037

B: unstandardized regression coefficient; SE: standard error; β: standardized regression coefficient. Only variables that entered the final model are reported in the table.

concentration as explanatory variables. The results showed that creatinine level and central SBP were independently associated with AIx-75; 2 h BG, uric acid, and central SBP were independent risk factors for PWVc-f. Creatinine, uric acid, and hs-CRP concentration were independent determinants for PWVc-r. All the explanatory variables are shown in Table 4.

Discussion

This cross-sectional study was conducted to compare noninvasive artery stiffness measurements in apparently healthy subjects who had HNBP and/or IGR. The main findings of our study were as follows: (i) IGR preferentially increases central over peripheral artery stiffness. Postprandial glucose plays a more important role than fasting blood glucose in central arterial stiffening, as reflected by increased PWVc-f. (ii) Impaired central SBP estimated by noninvasive pulse wave analysis, but not the more commonly used cuff sphygmomanometer-measured brachial SBP, serves as an independent predictor for higher AIx-75 and PWVc-f. (iii) Subjects with both HNBP and IGR have more severe inflammation and deteriorated peripheral hemodynamics as compared to those with isolated HNBP or IGR.

Several studies have found that artery stiffness is associated with glucose tolerance status. Stehouwer et al. reviewed studies in which regional stiffness estimates were compared in different arterial segments; results showed that diabetes preferentially affects the central rather than peripheral portion of the arterial tree or has a similar impact on the stiffness of central and peripheral segments [14]. In contrast, in studies where stiffness estimates have been assessed locally at different (mainly peripheral) arterial sites, the deleterious effects of diabetes were stronger at the more muscular (i.e., radial, brachial, and femoral) rather than the more elastic (i.e., carotid) arteries. However, preferential stiffness of elastic over muscular arteries has also been shown [14]. Because most of the studies investigated one particular vascular territory only, no consistent picture has yet emerged with regard to preferential central or peripheral stiffening in diabetes.

Moreover, whether pre-diabetes status has a different impact on central and peripheral arterial stiffening also remains unclear. Most studies, including the Hoorn Study and the Framingham Heart Study [15], showed that IGR is associated with increased central artery stiffness, as determined by the time-decay method of aortic PWV or ultrasonically estimated arterial compliance. The Hoorn Study also showed that deteriorating glucose tolerance is

associated with worse peripheral arterial stiffness than central arterial stiffness [3, 16]. In the present study, we used PWVc-f and PWVc-r to quantify independent associations of fasting glucose and post-challenge glucose with central or peripheral arterial stiffness. The results showed that in apparently healthy members of the general population, although the IGR group had more favorable cardiovascular risk factors such as less central obesity, lower peripheral blood pressure, lower TG level, and proportionally less metabolic syndrome, central SBP and PP were much higher and PWVc-f was increased when compared with the HNBP group. Further analyses showed that post-challenge glucose was a more powerful metabolic predictor for PWVc-f than FBG or LDL-C. In contrast, IGR and 2 h BG had no relationship with PWVc-r. These results indicate that glucose intolerance preferentially deteriorates central over peripheral artery stiffness, which might be the underlying reason for high sugar-related large vessel complications.

The mechanisms by which hyperglycemia affects arterial stiffness are not fully understood. The formation of advanced glycation end products (AGEs) on the arterial wall, increased local renin-angiotensin-aldosterone system activities, low-grade inflammation, and endothelial dysfunction might also play important roles in artery stiffening [17].

Recent studies underlined the role of inflammation in the stiffening of large arteries. Accumulative studies have shown that arterial stiffening was associated with inflammation in hypertension and diabetes, as reflected by increased tumor necrosis factor-alpha, interleukin-6, or hs-CRP [18,19]. Baseline hs-CRP was not only an independent predictor of PWVc-f and the central augmentation index [20], but also of the reduction in peripheral pulse pressure after antihypertensive treatment during the REASON (PREterax in Regression of Arterial Stiffness in a ContrOlled Double-BliNd) study [21]. However, the relationship between noninvasive arterial stiffness surrogates and inflammation and IGR or HNBP remains elusive. In our study, we found that hs-CRP was lower in the isolated IGR or HNBP groups, but much higher in the HNBP + IGR group, which indicates that inflammation might be accelerated when more risk factors are present, and may therefore result in increased arterial stiffness. Furthermore, in a multivariate regression analysis, hs-CRP served as an independent predictor for PWVc-r, but not for PWVc-f and AIx-75. This result suggests that different cardiometabolic risk factors have different effects on regional arterial tree stiffness.

Previous studies have found that subjects with IFG/ IGT presented with more unfavorable cardiovascular risk factor profiles than those with normal glucose intolerance [22]. Although in some studies IGT was more strongly associated with hypertension [23], hypertriglyceridemia, and elevated levels of C-reactive protein [24], in general there are no substantial differences between IFG and IGT [25]. In our study, the proportion of IFG was less than 8%; therefore, we did not split subjects into isolated IFG or IGT groups. Some studies compared the impact of IFG or IGT on arterial stiffness, but with inconclusive results. In Ando's reports, IGT, but not IFG, was a risk factor for early-stage atherosclerosis [26]. In contrast, Webb et al. found that IFG and IGT had similar PWVc-f (m/s, 9.71 ± 0.12 vs 9.82 ± 0.24, p = 0.83) [27]. Whether IFG and IGT have different impacts on regional arterial stiffness requires additional investigation.

The association between higher glucose level and AIx is far from conclusive. Lukich et al. found that AIx and central arterial pressure increased consistently with the deterioration of glucose tolerance. AIx remained significantly higher in IFG groups as compared to normal, even after adjustment for cardiovascular risk factors and concomitant medications [28]. Hornum et al. reported that AIx did not differ among pre-diabetic uremic patients, normoglycemic uremic patients, and healthy controls [10]. Our studies found that, although both 2 h BG and central SBP were positively related to AIx-75 in Pearson correlation and multivariate adjusted partial correlation analyses, the relationship disappeared in a stepwise multivariate stepwise regression analysis. This might indicate that higher blood pressure affects systemic arterial stiffening independent of hyperglycemia, even in the normal range.

Previous studies have shown that HNBP might progress to hypertension over time and is considered a risk factor for CVD and stroke [2]. In the Chinese guidelines for the management of hypertension published in 2009, patients are considered to be in a high-risk group if they have diabetes [11], or additional risk factors, target organ dama-

ge, or CVD. This is true even if they have only high-normal blood pressure. In all cases appropriate antihypertensive therapy should be initiated.

A previous study confirmed that blood pressure is a very strong determinant of arterial stiffness. Tomiyama et al. [9] found that brachial-ankle pulse wave velocity (baPWV) was increased according to the severity of hypertension. The age-related increase of baPWV was shown to be augmented in phases according to the severity of hypertension, and this augmentation occurred even between the normal and prehypertensive stages. Gedikli et al. [8] found that arterial functions were impaired even at the prehypertensive stage. These results support the JNC-7 recommendations for strict control of blood pressure even in the elderly [29].

Unlike previous studies, we did not include subjects with normal blood pressure; therefore, we could not determine whether PWV or AIx-75 was normal or increased in the HNBP group. However, our results confirmed that elevated brachial SBP, although proven to have a close association with artery stiffness, is less important than central SBP and PP; the association was no longer significant in a multivariate model. Meanwhile, we found that central SBP was significantly correlated with PWVc-f and AIx-75, and it also served as an independent surrogate for central or systemic arterial stiffening.

Central blood pressure is dependent on the stiffness of large arteries and pulse wave reflection. Recent studies have shown that central blood pressure is a better predictor of CV risk than brachial pressures. Left ventricular mass and carotid artery remodeling are related more closely to central rather than brachial pressures [5]. Therefore, simply assessing blood pressure in the brachial artery may fail to reveal potentially important differences in different aortic pressure or stiffness. There is little evidence comparing the influence of HNBP or IGR on central arterial pressure and wave reflections. In the present study, for the first time, we showed that AIx-75, a composite measure of wave reflections and arterial stiffness, is significantly increased in apparently healthy subjects with isolated IGR and combined HNBP+IGR, when compared with subjects with isolated HNBP. Approximately 50-60% of all type 2 diabetes patients are hypertensive. The concomitant presence of both conditions increases cardiovascular morbidity and mortality [30]. However, combined prehypertension and prediabetes status in the present study was not associated with more increased arterial stiffening than isolated IGR. Given that wave reflections determine central aortic pressures and thus the afterload that the left ventricle must cope with, the absence of a relationship between wave reflections and HNBP raises skepticism as to what extent blood pressure might exert unfavorable effects on cardiac performance through wave reflections. Moreover, the increased wave reflections observed in patients with IGR or HNBP+IGR reinforces the possibility that it might be the glucose metabolic status, and not slightly elevated blood pressure, that adversely affects wave reflections. More studies are needed to confirm these observations, which may have important therapeutic implications.

Limitations

Several limitations of this study must be considered. First, the main limitation of this study is its small sample size. As a result, we could not establish with certainty whether the carotid-femoral PWV in this group was normal or increased, and this issue requires further study. Second, based on the cross-sectional nature of this study, we cannot address any cause and effect relationships regarding risk factors and arterial stiffness. Third, we did not split subjects into isolated IFG or IGT groups. Furthermore, we did not determine insulin concentrations, which may contribute to the increase in arterial stiffness indices associated with IGR. Therefore, we could not investigate the relationship of hyperglycemia and hyperinsulinemia with arterial stiffness and wave reflection. Although there exist several limitations, to the best of our knowledge, this is the first time correlations of IGR and/or HNBP have been compared with multiple arteriosclerosis measurements, which might extend the findings of other studies.

Conclusion

In conclusion, the results of this cross-sectional study show that central artery stiffness is greatly associated with IGR status separate from HNBP, which might have different prognostic results with CVD risks. Subjects with both HNBP and IGR

have more severe inflammation and deteriorated peripheral hemodynamics than those with HNBP or IGR alone. A crucial next step is to investigate whether measures of central artery stiffness have prognostic value in people with IGR or HNBP, as they do in other populations. If so, these measures could be used in clinical practice for risk assessment and to monitor the effects of interventions to decrease arterial stiffness. Additional studies are needed to clarify these issues.

Acknowledgments

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Abbreviations

AIx, augmentation index; AIx-75, AIx corrected for a steady heart rate of 75 beats/min; AP, augmentation pressure; BMI, body mass index; CVD, cardiovascular disease; DBP, diastolic blood pressure; DM, diabetes mellitus; FBG, fasting blood glucose; HDL-C, high-density lipoprotein cholesterol; HNBP, high normal blood pressure; hs-CRP, high sensitivity C-reactive protein; IFG, impaired fasting glucose; IGR, impaired glucose regulation; IGT, impaired glucose tolerance; LDL-C, low-density lipoprotein cholesterol; MBP, mean blood pressure; MDRD, modification of diet in renal disease; OGTT, oral glucose tolerance test; PP, pulse pressure; PWV, pulse wave velocity; PWVc-f, carotid-femoral pulse wave velocity; PWVc-r, carotid-radial pulse wave velocity; SBP, systolic blood pressure; TC, total cholesterol; TG, triglyceride; Tr, transit time; 2 h BG, 2 h post blood glucose in OGTT.

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Any difference in sociodemograpic variables and risk factors of patients hospitalised with cardiovascular diseasse (CVD)?

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Abstract

Background and aim: As well known the best method in treating CVD is first prevention. Although major cardiac risk factors have been well defined, the sociodemographic characteristics and incidence of risk factors may vary with regional differences. The purpose of our study was to investigate the sociodemographic characteristics, own and family histories and life styles of patients diagnosed and hospitalised with CVD in a research and training hospital in east Marmara.

Methods: This study approved by the Ethical Board in the University was conducted in a research and training Hospital between December 2009-July 2011. Data were collected by one-to-one interviews from the patients hospitalized in coronary intensive care unit and cardiology service. A questionnaire developed by researchers included sociodemographic variables (age, sex, marital status, rank of birth in parent family, educational level, economical status, etc.), own medical history, family history of CVD and risk factors(smoking, alcohol, physical activity,etc). The data were analysed by using a statistical packet programme. Data were descriptively presented as percentages.

Results: 118 patients were enrolled in the study. 51.7% were women, 48.3% were men. 38.1% were in the age range of 51-65 years, 51. 7% were ≥65. 83.1% had a middle income. 8.5% were the first, 12.7% were the second,16.9% were the third, 23.7% were the fourth and 38.1% were ≥fifth child in their parent family.45.8% of the women were in menapause. 48.3% had CAD in their family. Death from CAD in the family was 50. 8%. 39.8% were sedantary, 42.4% were overweight, 22.9% were found obese by BMI. 70.3% were passive smokers, 27.1% were smoking, 24.6% were exsmokers. 58.5% had unhealthy diet style.

Conclusion: This study had an interesting result for the demographic characteristics. The risk of CVD raised as double exponential as in which row the patient was in birth in his-her parent family which needs confirmation with more studies. The other risk factors in the range of incidence were passive smoking (70.3%), unhealthy diet style (58.5%), genetic tendency 48.3%, overweight (42.4%), physical inactivity (39.8%), 27.1% smoking, 24.6% exsmoking.

In order to prevent CVD sociodemographic characteristics and risk factors that may vary regionally should be clearly identified

Key words: CVD, risk factor, sociodemographic variable

Introduction

CVD are the leading causes of death throughout the world. It is estimated that the death rates from CVDs between 1990-2020 will rise from 28. 9% to 36.3% (1) and CAD mortality rates will double with approximately 82% of the increase attributable to the developing world (2).

Cardiovascular diseasses are also the leading causes of death in Turkey which is a country with 70.5 million population with a median age of 29 according to 2007 statistics and the coronary mortality rates are about 5 per 100 person per year higher than most European countries (3).

The incidences may vary between countries and between regions in a country such as urban and rural areas due to varying sociodemographic charasteristics and varying risk factors. Since the most effective way to treat CVD is prevention

evaluation and manipulation of risk factors is of utmost importance.

In this study we tried to evaluate the sociodemographic characteristics, own and family histories and life styles of patients diagnosed and hospitalised with CVD in a research and training hospital in east Marmara.

Materials and Methods

The study was approved by the Ethical Board in Sakarya University and study started after receiving approval from related local authorities.

This descriptive study was conducted in a Unıversıty Hospital in the Sakarya city center in Turkey which is an urban area between December 2009 and July 2011. 118 voluntary patıents with well diagnosed coronary artery disease by ınvasive and non invasive methods hospitalised in the CCU and cardiology service who were concıous enough and stabilised to answer the questions were included in the study.

Data were collected by one-to-one interviews from the patıents hospitalized in coronary intensive care unit and cardiology service. A questionnaire developed by researchers included sociodemographic variables (age, sex, marital status, rank of birth in parent family, education level, economical status, etc.), own medical history,family history of CVD and risk factors (smoking, alcohol, physical activity, etc).

Statistical analysis

The data were analysed using a statiscal packet programme (SPSS:16). Data are presented as mean + standart deviation (SD). Chi-Sguare Test was used for statistical analysis. Differences were considered significant at $p< 0,05$. Other data were descriptively presented as percentages.

Results

51.7% were women, 48.3% were men. 38.1% were in the age range of 51-65yrs, 51.7% were ≥65yrs. 83.1% had a middle income.%63.6 had only primary school education. 8.5% of the patients were the first, 12.7% were the second,16.9% were the third, 23.7% were the fourth and 38.1% were ≥fifth child in their parent family. 45.8% of the women were in menapause. There was no statistically significant ınteractıon between gender and the variables in Table 1.

Table 1. Participant demographics (N=118)

Characteristics of Participant	n	%
Gender		
Female	61	51,7
Male	57	48,3
Age		
20-35	1	0,8
36-50	11	9,3
51-65	45	38,1
>65	61	51,7
Which Child of His-Her Family		
1st	10	8,5
2nd	15	12,7
3rd	20	16,9
4th	28	23,7
5th >	45	38,1
Marital Status		
Married	116	98,3
Single	2	1,7
Level of Education		
İlliterate	18	15,3
literate	21	17,8
Primary school	75	63,6
University	4	3,4
Profession		
Worker	17	14,4
Official	8	6,8
Self-employed	25	21,2
Housewife	55	46,6
Retired	13	11
Economical Status		
High-income	16	13,6
Middle income	98	83,1
Low-income	4	3,4
Menapouse (n=61)		
Yes	54	45,8
No	7	5,9

%33.1 had diabetes mellitus % 42.4 had hypertension and %18.6 had hyperlipidemia 48.3% had CAD in their family. Death from CAD in the family was 50.8% (Table 2).

39.8% were sedantary, 70.3% were passive smokers, 27.1% were smoking, 24.6% were exsmokers. 58.5% had unhealthy diet style. (Table 3). Active (p=0,000), and passive smoking (p=0,001) and alcohol consumption (p=0,001) was correlated to gender being prominent in men.

42.4% were overweight 22.9% were found obese by BMI (Table 4). There was no correlation between gender and BMI (F=0.86, p=0.770).

Table 2. Medical and Family Characteristics of participants (N=118)

	n	%
Own history		
Diabetes Mellitus		
Yes	39	33,1
No	79	66,9
Hypertension		
Yes	50	42,4
No	68	57,6
Hyperlipidemia		
Yes	22	18,6
No	96	81,4
Family history		
Diabetes Mellitus		
Yes	32	27,1
No	86	72,9
Hypertension		
Yes	18	15,3
No	100	84,7
CAD		
Yes	57	48,3
No	61	51,7
Sudden death		
Yes	51	43,2
No	67	56,8

Table 3. Behavioral variables (N=118)

Behavioral variables	n	%
Smoking status		
Current	32	27,1
Never	57	48,3
Ex-smokers	29	24,6
Exposure to cigarette smoke		
Yes	83	70,3
No	35	29,7
Alcohol consumption		
Yes	9	7,6
No	109	92,4
Feeding Habits		
Düzenli	49	41,5
Düzensiz	69	58,5
Physical activity		
Sedanter	47	39,8
Only house work	47	39,8
Regular daily exercise	24	20,3

Table 4. Participant demographics (N=118)

Body mass index (kg/m2) (According to WHO)	n	%
Underweight	6	5,1
Normal range	35	29,7
Overweight	50	42,4
Obese	27	22,9

Discussion

Cardiovascular diseases, of which coronary heart disease is the most common, are still the leading cause of death in western industrialized countries, accounting for up to 50% of all deaths depending on the region (4–7).

Cardiovascular diseases are also the leading causes of death in Turkey. The prevelance of CAD in patients aged 40 is %3, between 50-59 yrs %11 and over 60 yrs is %27(8).

As for the the coronary mortality rates in men Turkey is the 3rd in Europe following Letonya and Estonya and is the first in women (9).

The development of cardiovascular disease is strongly related to lifestyle characteristics and associated risk factors. These characteristics are largely determined by social and cultural factors and are therefore modifiable (10).

The Framingham Study (11) was the first to show the classical risk factors such as the modifiable ones as smoking, hypertension, diabetes, hyperlipidemia and obesity and nonmodifiables such as age, family history and gender. Another important study was the Interheart study (12) that raised the awareness about lifestyle factors such as exercise, healthy nutrition and psychosocial factors and in Turkey the outstanding results came first from the study by Mahley et al (13) .

Although many of the major risk factors for coronary disease have been identified researchers are still evaluating different modifiable factors that may influence cardiovascular diseases.

There is mass amount of scientific evidence that lifestyle modification and risk factor reduction can retard the development of cardiovascular disease both before and after the occurrence of a clinical event (14–15).

This has utmost importance as many studies have shown that the best approach to decrease CVD mortality is by risk factor modification (16-19).

Although cardiovascular mortality both in absolute terms and as a share of overall mortality persists to be high among Turkish adults, with similar rates in urban and rural areas (20). We believe in identification of risk factor profiles and special sociodemographic variables showing regional differences in a country for the prevetion of CAD. We undertook this study in Sakarya which is a city with characteristics of Mediterranean and Black Sea regions, the 2 regions with high prevelences of CAD in Turkey.

The socioeconomic status of the family has been shown to be important in Turkey where the risk of Cad decreased as the wealth of the family increased (21). Among the sociodemographic variables, family income and education show great difference in Sakarya when compared to other cities in Turkey.

In this study 83.1% of the patients were found to have a middle income and %3.4 were income-deprived. As shown in many studies much of the excess CHD associated with the socio-economically disadvantaged can be explained by the corresponding patterning in cardiovascular disease (CVD) risk factors, particularly smoking (22, 23)

Smoking was shown to be both a powerful CVD risk factor and the strongest contributor to socio-economic differences in CHD mortality in both Scottish and English populations (24). According to TEKHARF 1990 , %59.4 of men and %18.9 of women were found to smoke in Turkey with the rates increasing in women in 2001/02 and decreasing in men (25).

In our study 70.3% of the patients were passive smokers,27.1% were smoking, 24.6% were ex-smokers.Active and passive smoking and alcohol consumption was correlated to gender being prominent in men.

In one interesting study evaluating sociodemographic variables, social level was found to be associated with general death rates and education was found to be associated with CVD (26).

In another report by UNDP it was reported that in countries with similar income adult deaths were associated with education (27).

In our study % 63.6 had only primary school education -very low levels when compared to urban areas. It was shown that not having completed high school was associated with hypertension, high plasma cholesterol and triglyceride levels and physical inactivity advising Rural health promotion initiatives to take account of the needs of these population subgroups (28).

Another well known CV risk factor is being overweight with the prevelance rising becoming a global diasester throughout the world.

As for the correlation between social income and smoking, being overweight was shown to be associated with the individual's level of education and more highly educated individuals (having completed high school or with a university degree) were found to hava a significantly lower body mass index ($p=0.031$ in men and $p<0.001$ in women) (29).

In TURDEP study the obesity prevalence in Turkey (BMI>29.9 kg/m²) was found to be 21.9% (30) while in TEKHARF study it was found as 21.1% among males and 43.0% in females. In our study 42.4% of the patients were overweight and 22.9% were found obese by BMI with no correlation between gender and BMI.

Among the other wellknown risk factors the prevelance of DM is %13. 7 in Turkey(31)and the the prevelance of Hypertension is %31.8 according to PatenT - Prevalence, Awareness and Treatment of Hypertension in Turkey study (32) . In our study however %33. 1 had diabetes mellitus,%42.4 had hypertension and %18.6 had hyperlipidemia and when compared to general prevelance the prevelance of DM and HT in our patients is of concern.

A positive parental history of a myocardial infarction (MI) is an independent risk factor for cardiovascular diseases (CVD). The National Cholesterol Education Program Third Adult Treatment Panel (NCEP ATP III) recommended that cut-off points should be age of onset before age 65 in the father and before age 55 in the mother (33).

In our study 48. 3% had CAD in their family. Death from CAD in the family was 50. 8%.

Physical activity also requires special attention as it has been well appreciated that a person should perform moderate level physical acitivity for 25-50 min per day (34).

INTERHEART has shown that prevelance of daily physical activity ın patients with AMI was %14.3 when compared to those without AMI (%19.3) (35).

And According to TEKHARF in Turkey the prevelance was found %6 and %3 between the age 20-29 and %30 and %52 in those over 70 in men and women (36,37).

In our study similar results were obtained as 39.8% of the patients were found sedantary . Among the risk factors and sociodemographic variables healthy nutrition is also aglobal problem underlying in DM, obesity and CAD. Diet without adequate vegetable and fruıt comsumptıon was found to be the reason of %3. 9 of all cause diseases with 70.3 % of this belonging to ıschemic coronary artery didease (38). In our study 58. 5% of the patients had unhealthy diet style.

Beyond these all classical risk factors the most interesting result came from the sociodemographic variables in our study. While expanding the study to see the correlation between breastfeeding and coronary artery disease we asked the women patients how many children they had. We also asked all the patients that based on the order of birth which child they were in their parent families (first child, second child, third child, etc of the family). We saw that Cad risk increased as the order of birth increased. When compared to the first child the second, third etc child had increased risks. While evaluating the literature we found no such reports. The only reports were the correlation between death from coronary heart disease and low birth weight that was assumed to be the consequence of poor prenatal nutrition (39).

It was also demonstrated that development of risk for adult CVD began very early in life even before birth and advanced maternal age might be associated with adverse reproductive outcomes(40). Advanced maternal age might be a reasonable explanation for our finding too.

There are also other reports stating that exclusive breast feeding is associated with less low-grade inflammation, supporting the notion that early feeding patterns could program cardiovascular disease risk factors later in life (41).

One reason of our result may also be the foetal programming as in a study by Delisle H et al.(42) it was hypothesized that intrauterine growth retardation, which may reflect in large part maternal malnutrition in poorer communities, may contribute to chronic disease risk through foetal programming. According to this hypothesis Foetal programming implied that during critical periods of prenatal growth, permanent changes in metabolism or structures resulted from adverse intrauterine conditions. So improving the nutrition of women was demonstrated to be more imperative when considering that it contributed to preventing chronic diseases in the next generation.

Almost the same results came from Godfrey et al. (43) suggesting that several of the major diseases of later life, including coronary heart disease, hypertension, and type 2 diabetes, originated in impaired intrauterine growth and development. Since the result of all these mentioned studies may in part be the explanation of our result we still need large scale multicentric studies to reach to a conclusion.

Conclusion

The lacking point in our study was evaluating the interaction between the duration of breastfeeding and the order of birth. New studies also will be needed evaluating this interaction.

Efforts in prevention of cardiovascular diseases have been successful in very important areas such as lowering the levels of hypertension and cholesterol (primarily in susceptible age-groups) and should continue on this way.

Further reduction in risk factors such as obesity and smoking, and intensified care for less educated people and people with various clustering of risk factors due to sociodemographic differences in various parts of a country still holds great potential for improved public health. Thus demonstration of regional differences in risk factors and sociodemographic varieties still remains the major corner to turn for prevention of this epidemic disaster.

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Effects of two proprioceptive neuromuscular facilitation techniques in different planes on hamstrings muscles of healthy subjects

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Abstract

Introduction: The proprioceptive neuromuscular facilitation technique (PNF) has been proven to be efficient, since it was found higher gain of joint range-of-motion compared to the classic stretching. This study aimed to perform a comparison between the muscular stretching techniques and the PNF hold-relax on the internal and external sagittal/diagonal plane.

Method: Randomly divided in 3 groups by a drawing, 30 healthy male individuals have undergone the test. In group I the hold-relax technique was utilized on the sagittal plane, grupo II receveid hold-relax on the internal and external diagonals, and group III, on which an evaluation was performed, worked as control. All the groups went through tests on the first, fifth and fifteenth day after the application of the different approaches. In this evaluation it was used a Flexis® Fleximeter.

Result: Group II (diagonal) obtained statistically significant gain of 13.99% in the immediate post-test and post test later obtained a loss of 4.81%, group I (sagittal) showed no statistical difference as the group III (control).

Conclusion: We conclude that the technique of PNF in the diagonal plane is effective in the flexibility of the hamstring muscles.

Key words: Stretching; Muscle Stretching Exercises; Muscles; Lower Extremity.

Introduction

Musculoskeletal disorders have received great attention worldwide [1-5]. The range of motion (ROM) is considered normal when there are no restrictions and is performed when there is active contraction of muscles that cross the joint. If there is an adaptive tissue shortening, inside or outside the muscles, it leads to a decreased flexibility of the muscle and it will result in a restricted ROM [6-8].

Stretching is a type of work that addresses the maintenance of acquired levels of flexibility and the promotion of ROM with minimal restrictions [9]. Several stretching techniques are used to gain ROM, including the classic stretching, which includes static and dynamic as well as proprioceptive neuromuscular facilitation (PNF), which was proven by some studies to be more effective to ROM gain compared to the classic stretching. The study by Brentano et al [10] found that the hold relax PNF technique promotes a greater variation of the hip compared to static stretching. Ferber et al. [11] and Sharman et al. [12] reported that PNF produces significantly better results compared to other techniques such as static and ballistic stretching. The studies showed better results with PNF, however, there are controversies, since Spernoga et al. [13] presented a different conclusion, they observed that the protocol used to PNF was not more effective than static stretching.

The PNF techniques are performed with an active contraction of muscles to be stretched causing an autogenic inhibition and/or reciprocal, occurring muscle relaxation reflex, which associated with passive stretching, promotes increased ROM [14].

The PNF has several techniques that differ in the way they are implemented and their goal. The hold relax technique consists of a concentric active contraction of the muscles to be stretched, i.e., contraction of the antagonist movement, followed

by elongation and relaxation with subsequent slow static ROM. It causes an inhibition of the antagonist muscle and, hence, the shortened muscle stretches more easily, increasing the ROM [16-18].

A recent study investigated the efficacy of two modified proprioceptive neuromuscular facilitation stretching techniques in subjects with reduced hamstring muscle length [18]. They reported that the hold relax technique produced an 11º gain in knee extension angle within a single stretch session. On the other hand, no previous study observed the effects of this procedure in different planes and different muscles on healthy subjects. Thus, this study was undertaken to evaluate the effects of the hold relax PNF technique in different planes on hamstring muscles.

Methods

Study Population

This is a prospective, randomized and longitudinal study, composed of 30 males with an average age of approximately 24 years old (19-40 years old). They were students of our Institution. The stretching techniques were applied in the Laboratory of Human Kinetics, Faculty of Medical Sciences, on the afternoon. We included healthy subjects who were not performing regular physical exercise and/or not under some kind of stretching training. All subjects signed a consent letter and all procedures were approved by the Ethical Committee in Research of our Institution (protocol 1090/09).

Exclusion Criteria

We excluded subjects with systemic vascular diseases such as diabetes mellitus, thrombosis, atherosclerosis, heart disease, neurological diseases, individuals who practiced some exercise regularly associated with stretching, those with body mass index higher than 28, who presented genuflexum or recurvatum and a history of elbow pathologies or dysfunctions of the spine, which would affect the design intent.

Protocols

The subjects included in the study were randomly selected and divided into three groups. In the group I (n=10) the subjects performed the hold relax technique in the sagittal plane, in group II (n=10) the subjects performed the hold relax technique in the diagonal plane and group III (n=10) served as control (no technique performed).

We proposed a protocol which mixed the procedures proposed by Gama and colleagues [19] and Spernoga and colleagues [13]. According to our protocol three isometric contractions of five seconds were performed. Subsequently, the patient relaxed the muscles and had the hip passively flexed with the knee extended, until relating discomfort. The limb was kept at this position for 15 seconds and it was maintained an interval of 30 seconds between each other.

The hold relax technique in the sagittal plane consisted in the maximal isometric contraction of the hamstrings muscles for five seconds each limb. It was performed a relaxation of the individual and the limb was kept at this position for 15 seconds. In total six consecutive repetitions were made (Figure 1).

Figure 1. Hold relax technique in the sagittal plane

The hold relax technique in the diagonal plane approaches the isometric contraction of the hip abductors and adductors muscles for five seconds followed by 15 seconds of relaxation of the individual to gain more ROM by the therapist. Three contractions in the medial plane and three contractions in the lateral plane were made. In total six consecutive repetitions were made (Figure 2 and 3).

We used the Flexis fleximeter® to measure ROM, which was positioned below the knee joint on the side of the non-dominant member of the volunteer and then it made three active hip flexions and for each flexion it was collected the corresponding angle (Figure 4).

Figure 2. Hold relax technique in the external diagonal plane

Figure 3. Hold relax technique in the internal diagonal plane

Figure 4. Hip ROM measurement with extended knee

All subjects participated in a total of six sessions, which consisted of five consecutive days. We measured ROM before the 5th day, before the last intervention, and 15 days after the last session of application of the techniques.

Statistical Analysis

We applied the Shapiro-Wilk test in order to evaluate the distributions. Considering that all distributions were normal (parametric), we applied one way ANOVA followed by the Neuman-Keuls post test. The differences were considered significant when the probability of a Type I error was lower than 5% ($p<0.05$).

Results

According to Table 1, we observe gain of flexibility in both groups I (sagittal) and II (diagonal) in the post test immediately, while in group III (control) there was no gain. In the later post test the gain in group I remained. For Group II the loss was higher, even with this loss it still remained higher than group I. In group III the values increased. Table 2 displays the p values of the comparison. We noted more expressive findings in the diagonal plane.

Table 1. Values of ROM (º) in the sagittal, diagonal and control groups

Condition	1st day	5th day	15th day
Sagittal group			
ROM (°)	61.7±13.8	64.8±10.1	64±6.7
Gain	-	5.02	-0.15
Diagonal group			
ROM (°)	63.8±8.7	72.8±7.3	69.3±7.4
Gain (%)	-	13.9	-4.8
Control group			
ROM (°)	61.6±12.6	61.3±14.9	69.3±14.9
Gain (%)	-	-0.54	1.7

Table 2. P-values regarding the comparison between the three conditions

Condition	1st vs. 5th	1st VS. 15th	5th vs. 15th
Sagittal	0.21879	0.35448	0.95892
Diagonal	0.0005*	0.0214*	0.0027*
Controle	0.85081	0.58130	0.265267

The percentage gain in the immediate post test and late post test are observed in the Figure 5, which presents a reduction in the diagonal technique and no changes in the sagittal technique.

The gain of ROM before and after the sagittal technique is presented in Figure 6. We observe that there is a slight loss of ROM in individual post test compared to delayed post test immediately in most volunteers. It is important to note that the number

of patients 3, 5 and 9 presented a decrease in the ROM after completion of stretching. The patient 3 reduced the ROM from the pretest to the 5th day. The patient 5 also decreased the ROM from the pretest to the 5th day.

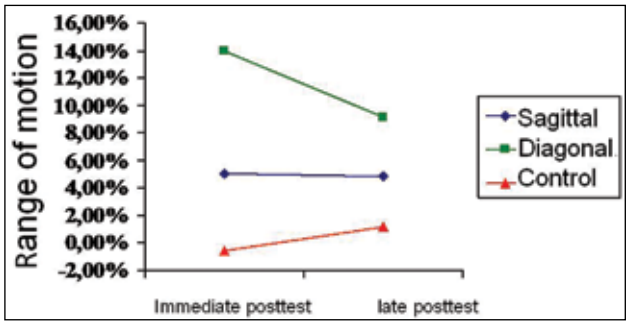

Figure 5. ROM gain in immediate post-test and late post test

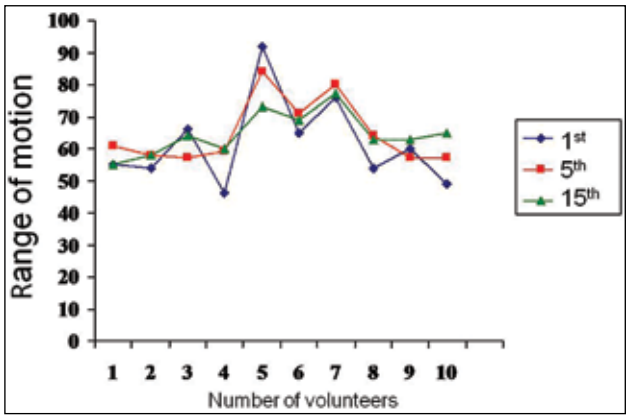

Figure 6. ROM of each volunteer group in the pretest, immediate posttest and delayed posttest in the sagittal group

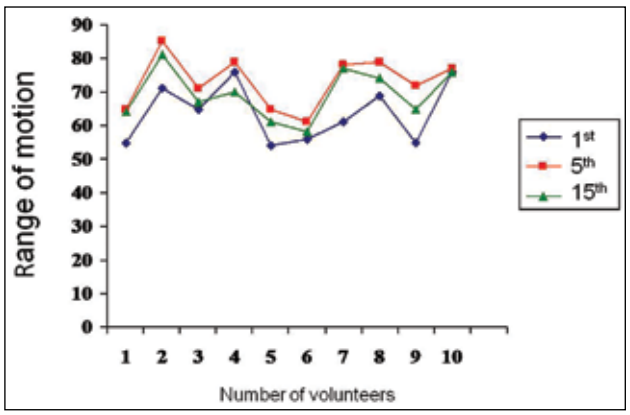

Figure 7. ROM of each volunteer group in the pretest, immediate posttest and delayed posttest in the diagonal group

The gain in ROM before and after the sagittal technique is presented in Figure 7. There was loss of ROM in the late post test compared to the immediately post test in most volunteers. However, even with the greater loss than the sagittal group, the diagonal group remained with higher values.

Figure 8 addresses the values of ROM in the pretest, immediate post test and late post test in the control group. It is noted minor discrepancy, remaining the same values.

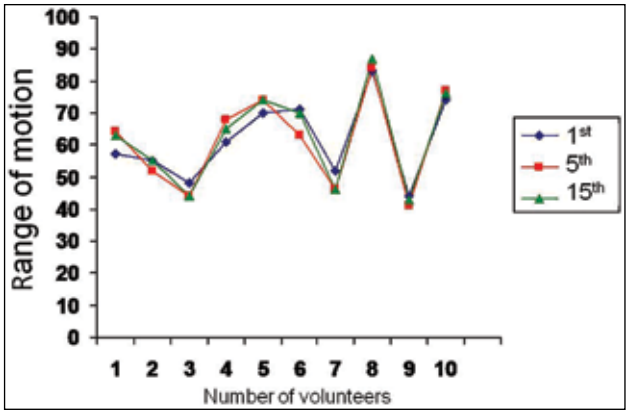

Figure 8. ROM of each volunteer group in the pretest, immediate posttest and delayed posttest in the control group

Discussion

In this study we investigated the effects of the hold relax PNF technique in different planes on hamstring muscles of healthy subjects. As a main finding, we reported more expressive results in the diagonal plane. Several authors [10, 19, 20] carried out the measurement of ROM only before, during and after therapy procedures, failing to verify whether the technique persisted later. This study addressed the technical results of 15 days after the last intervention, in addition to data collected in the first and fifth day before the intervention.

By performing a series of stretching, it was expected that the ROM would increase in all groups. Nonetheless, it was not observed in the sagittal group, which showed no significant results. It is possible that the non significance difference was due to the patients 3, 5 and 9. On the other hand, on average, the group has made an overall improvement of 5.02%. These data may be explained by the high level of standard deviation shown by all groups and also by the error provided by the measuring instrument (Fleximeter), which may be, on average, 5 degrees, which corroborates a previous study [21].

We reported that the flexibility of the hamstring muscles of subjects from the diagonal group presented higher gain of ROM compared to other groups. However, this group showed significant loss of flexibility in post test, which was not presented by other groups. Opposite to Spernoga et al. [13], which observed immediate gain of hamstring flexibility using a hold relax technique in the sagittal plane.

Training flexibility has the immediate effect of increasing ROM due to the muscle viscoelasticity decrease. After a period of training this increase in amplitude is due to the increased serial sarcomere [22]. This assumption is contrary to Magnusson et al. [23], who conducted a study to investigate the effects of stretching on the properties of the contractile tissue and skeletal muscles stretching tolerance, by applying a protocol of three weeks. They observed that the properties of the contractile tissue remained unchanged. Nevertheless, they noted gain of flexibility that was explained by the increased tolerance of the individual over the stretching.

Our study showed a non significant gain of 5.02% after the implementation of the protocol for five consecutive days in the sagittal group. Conversely, Tanigawa [24] reported a significant increase in hamstring flexibility using the PNF hold relax in the sagittal plane and static stretching techniques. However, it was demonstrated a loss of flexibility, both in static stretching and PNF stretching one week after the application of protocols and suggested that maintaining the gains of flexibility requires a regular routine of stretching.

The gain of flexibility in the diagonal group reported in our study was based on a protocol carried out with an interval of 24 hours between each session. The literature have already investigated the influence of the time interval between sessions of stretching on hamstring flexibility gains and indicated that the stretching protocols used with rest intervals of 24-48 hours were effective for increased flexibility of the hamstrings, using the hold relax technique in the sagittal plane for ten sessions. The group with a shorter interval between sessions increased flexibility faster. They concluded that the sooner the sessions are applied, the faster the ROM gain occurs [25].

Regarding the frequency of stretching, we used six repetitions based on five seconds of contraction followed by 15 seconds of relaxation and stretching. In the sagittal plane we applied three repetitions for each diagonal for five seconds of contraction and relaxation and stretching for 15 seconds. Gamma et al. [26] reported that the later effect of stretching in the sagittal plane is the same regardless of the frequency of application (three or six repetitions) in a protocol applied for one week. They also showed that three repetitions presented an immediate increased. We may suggest that the frequency used in this study for both techniques contributed to the gain of flexibility, especially in the diagonal group.

We were based on the maximum intensity when stretching after a maximal isometric contraction for both techniques to achieve the flexibility gain obtained. Chagas et al. [27] found that the ROM gain between the pretest and posttest is different for maximal and submaximal intensities of contraction before stretching. The authors indicated that four repetitions for 15 seconds after maximal contraction intensity was able to increase ROM. On the other hand, Feland and Marin [28] suggested that maximal isometric contraction of 20% and 60% are as effective as 100% contraction.

We encourage future studies to address the diagonal hold relax technique for an extended period associated with physical therapy techniques to address the functionality, including diseases related to restriction of movement, aiming to increase the ROM, the submaximal force, the peak torque and to promote improvement in postural arrangement due to the improvement of flexibility.

This study presents some points that should be addressed. Firstly, we investigated a small population. However, the statistical tests provided significant differences. Secondly, we evaluated healthy men. We suggest future studies to investigate subjects with limited flexibility or musculoskeletal disorders and women.

Our findings are important for prescribing stretching sessions. Based on our data, we indicate diagonal PNF hold relax technique in situations which the patient or athlete requires accelerated rehabilitation with an interval of 24 hours between sessions.

Conclusion

The PNF hold relax technique in the sagittal plane is effective for maintaining the gain and flexibility of the ROM involved by the hamstring muscles.

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Waist-to-height ratio and body mass index are better measures of percent body fat (%BF) than waist circumference and waist-to-hip ratio in elderly Korean women

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Abstract

The purpose of this study was to investigate which of the 4 anthropometric indexes-body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR)-is a better measure of percent body fat (%BF) in elderly Korean women. The study included 119 elderly women who were older than 60 years and had visited the Promotion of Health Center at Yang-Cheon Gu, Seoul, Korea, between March 1, 2012, and April 30, 2012. The BMI, WC, WHR, and WHtR were calculated, and %BF was determined using an 8-polar bioelectrical impedance analysis instrument. In all the subjects, %BF showed a significant positive correlation with BMI ($r=0.831$, $p<0.001$), WC ($r=0.661$, $p<0.001$), WHR ($r=0.284$, $p=0.002$), and WHtR ($r=0.775$, $p<0.001$). Furthermore, on assessing the relative strength of these associations, we found that the association between BMI (standardized coefficient [SC]=0.580, $p<0.001$), WC (SC=0.342, $p=0.017$), WHR (SC=0.032, $p=0.687$), and WHtR (SC=0.623, $p<0.001$) and %BF was significant. The SC indicated that, of the 4 anthropometric indexes, WHtR and BMI showed strong association with %BF, while WC showed the weakest association, and WHR did not show any association with %BF. We conclude that in elderly Korean women, both WHtR and BMI are better anthropometric indexes than WC and WHR and that %BF has a stronger correlation with WHtR and BMI than with WC and WHR.

Key words: body mass index, elderly, waist circumference, waist-to-hip ratio, waist-to-height ratio, Korean women

Introduction

Obesity is becoming a serious public health problem worldwide. In 2008, the World Health Organization (WHO) reported that 1.5 billion adults were already overweight, 0.2 billion men and 0.3 billion women aged over 20 years were already obese, and the prevalence of obesity is continually increasing each year worldwide (1). Furthermore, in 2010, the Korea National Health and Nutrition Examination Survey-V (KNHANES-V) reported that 36.3% of Korean men and 24.8% of Korean women above 19 years were already obese (2). This percentage of obese people is similar to that reported by the US Centers for Disease Control and Prevention (CDC; approximately 33.8%) (3).

Several techniques are available for measuring obesity, for example, dual-energy x-ray absorptiometry (DEXA), magnetic resonance imaging (MRI), computed tomography (CT), dilution techniques, air-displacement plethysmography, and bioelectrical impedance analysis (BIA) (4-6). However, although these techniques are reliable and valid and can accurately measure body composition, they are relatively expensive, inconvenient for participants, impractical for routine clinical settings or large-scale studies, have complex measurement methods, and are not feasible for field studies because the equipment used is large and specialized (4-6).

Therefore, for field studies, body composition may be conveniently assessed by simple anthropometric measurements such as body mass index (BMI), waist circumference (WC), and waist-to-hip ratio (WHR); previous studies have reported that these measures correlate reasonably well with laboratory-based techniques of measuring body composition, such as DEXA and CT (7-8).

Several recent studies have reported that the waist-to-height ratio (WHtR) of adults is a better measure of body composition than other simple anthropometric measurements (9-11). However, although these studies have provided evidence that the WHtR of adults is a better measure of body composition, no study has investigated the relationship between WHtR and body composition in the elderly, especially in the Korean population.

Therefore, the purpose of this study was to investigate which of the 4 anthropometric indexes-BMI, WC, WHR, or WHtR-is a better measure of percent body fat (%BF) in elderly Korean women.

Methods

Subjects

The study population comprised 119 elderly female volunteers (age, 60–77 years) who had visited the Promotion of Health Center at Yang-Cheon Gu, Seoul, Korea between March 1, 2012, and April 30, 2012. Their age, height, and weight were measured, and their BMI, WC, WHR, WHtR, and %BP were calculated. All the subjects submitted a written consent form before participating in this study. Moreover, all the study procedures were approved by the Human Care and Use Committee of the Yang-Cheon Gu Community Health Center. The characteristics of the subjects are shown in Table 1.

Table 1. The characteristics of the subjects

Variables	Elderly Women (n=119)
Age (years)	65.87 ± 3.81
Height (cm)	154.88 ± 5.05
Weight (kg)	59.26 ± 6.29
Body mass index (kg/m^2)	24.72 ± 2.56
Waist circumference (cm)	87.48 ± 6.38
Waist-to-hip ratio (%)	0.92 ± 0.06
Waist-to-height ratio (%)	0.57 ± 0.04
Body fat (%)	33.11 ± 4.01

Data are expressed as mean ± standard deviation.

Experimental procedures

The height and weight of each subject were used for calculating the BMI (kg/m^2). The WC of each subject was measured according to the following procedure: the subjects stood with their feet approximately 25–30 cm apart, and the WC was measured at a point on the trunk that was midway between the lower costal margin (bottom of the lower rib) and the iliac crest (top of the pelvic bone) by using a Gulick tension tape. The measurer stood beside the subject and adjusted the tape carefully at the waist with standardized tension, without compressing any underlying soft tissue. At the end of normal expiration, the circumference was measured to the nearest 0.5 cm (12). The waist and hip circumferences were measured for each subject, with the hip measurements taken at the widest point, and the WHR was calculated. The subjects' waist and height measurements were obtained for WHtR.

The %BF was evaluated using a multi-impedance frequency 8-polar BIA instrument (Inbody-720, Seoul, Korea). The BIA instrument was used to measure the resistance of the right and left arms, trunk, and right and left legs at 6 frequencies (1, 5, 50, 250, 500, and 1000 kHz) via 30 impedance measurements at each of the 5 sites. In this instrument, 8 tactile electrodes are used as follows: 2 electrodes are in contact with the palm and thumb of each hand and 2 are in contact with the anterior and posterior aspects of the sole of each foot (13). The subjects wore light clothing, and all metal items on them were removed so that these items would not interfere with the electric current during the measurements.

Statistical analysis

The results of this study have been provided in terms of mean and standard deviation values for each parameter. For the correlation analysis between %BF and the 4 anthropometric indexes (BMI, WC, WHR, and WHtR), the partial correlation coefficient was used to adjust for age. Furthermore, in order to assess the relative strength of these associations, we used multivariate regression analysis, after adjusting for age. The statistical significance was set at $\alpha < 0.05$, and the Statistical Package for the Social Sciences (SPSS) ver. 20.0 (Chicago, IL, United States) was used for the analysis.

Results

The results of the partial correlation analysis between %BF and the 4 anthropometric indexes (BMI, WC, WHR, and WHtR) after adjusting for age are shown in Table 2. The %BF showed a significant positive correlation with BMI ($r=0.831$, $p<0.001$),

Table 2. The results of the correlation analysis between %BF and the 4 anthropometric indexes

Variables	Body fat (%) in elderly Korean women (n = 119)	
	R	p-value
Body mass index (kg/m^2)	0.831	<0.001***
Waist circumference (cm)	0.661	<0.001***
Waist-to-hip ratio (%)	0.284	0.002**
Waist-to-height ratio (%)	0.775	<0.001***

***p < 0.01, ***p < 0.001, tested by partial correlation analysis after adjusting for age*

Table 3. The results of the multivariate regression analyses that were used to assess the relative strength of these associations between the 4 indexes

Variables	Percent body fat					
	Standardized coefficients (beta)	t	p-value	R^2	F	p-value
Body mass index (kg/m^2)	0.580	5.785	<0.001***	0.758	70.766	<0.001***
Waist circumference (cm)	0.342	2.421	0.017*			
Waist-to-hip ratio (%)	0.032	0.404	0.687			
Waist-to-height ratio (%)	0.623	4.419	<0.001***			

**p < 0.05 ***p < 0.001, tested by multivariate logistic regression analysis after adjusting for age*

WC (r=0.661, p<0.001), WHR (r=0.284, p=0.033), and WHtR (r=0.775, p<0.001) in all the subjects.

Furthermore, the results of the multivariate regression analyses that were used to assess the relative strength of these associations between the 4 indexes after adjusting for age are shown in Table 3. BMI (standardized coefficient [SC]=0.580, p<0.001), WC (SC=0.342, p=0.017), and WHtR (SC=0.692, p<0.001) were found to be associated with %BF, but WHR (SC=0.032, p=0.687) did not show any association.

Discussion

The aim of this study was to investigate the association between %BF and the 4 anthropometric indexes in elderly Korean women. The results of this study showed that BMI and WHtR were strongly associated with %BF, WC is weakly associated with %BF, and WHR does not show any association with %BF, even after adjusting for age.

On the basis of the results of previous studies that involved Caucasian, Japanese, and Chinese subjects (9-11, 14-15), we hypothesized that in elderly Korean women, WHtR might also have a stronger association or might be a better measure of %BF than WC, WHR, and BMI. Although the partial correlation analysis results showed that BMI, WC, and WHtR showed similar correlation with %BF (r = 0.661–0.831, p < 0.001) (Table 2), the multivariate regression analyses results indicated that WHtR and BMI were better anthropometric indexes in elderly Korean women (Table 3).

BMI has been commonly used to define obesity (16). However, BMI has limitations because it does not include body composition parameters such as %BF, fat mass, and fat-free mass (17-18). Nevertheless, this study showed that in elderly Korean women, BMI had a greater association with %BF than other parameters.

Rosenberg (1989) had reported an epidemiological study on "sarcopenia," a condition involving age-related muscle loss (19). Iannuzzi et al (2002) reported that sarcopenia is observed in more than 25% of the elderly who are older than 65 years and in more than 50% of the aged older than 80 years (20). This indicates that although young and elderly persons have similar body shape, weight, and BMI, the elderly have higher %BF and fat mass and lower fat-free mass in their body than younger people. We assume that because the elderly have high %BF and fat mass and because %BF is the highest during old age, the %BF of the aged might be correlated with their BMI.

Using MRI scans, Chan *et al.* (2003) found that WC is a better measure of abdominal fat than

WHR (8). However, using CT scans, Ferland *et al.* (1989) found that WHR is a good measure of abdominal fat (21). Wu *et al.* (2009) recently reported that among WC, WHR, and WHtR, WHtR is the best measure of abdominal fat (10). Our findings are in accordance with those of previous studies that have also shown that WHtR is considerably a better measure of body composition than BMI, WC, and WHR (8-10). In the case of elderly Korean women, BMI was also found to be a considerably good measure of body composition. The present study has provided evidence that both WHtR and BMI are important surrogate markers of %BF in elderly Korean women.

However, our study has 2 limitations. First, the sample of this study did not represent the entire population of elderly Korean women, because all the participants were residents of Seoul, Korea. Second, the sample population (N = 119) was small. Therefore, better-designed studies should be conducted to determine the extent to which these anthropometric variables represent %BF in elderly Korean women.

Conclusion

We conclude that in elderly women, both WHtR and BMI are better anthropometric indexes than WHR and WC and that %BF shows stronger correlation with these parameters than with WC and WHR.

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Leptin Levels in Slow Coronary Flow

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Abstract

Objective: It has been accepted that slow coronary flow (SCF) is a variant of coronary artery diesease (CAD). It is not known that leptin plays an important role in the etiopathogenesis of CAD. We aimed to evaluate whether there was a significant difference in serum leptin levels between patients with normal coronary flow and those with SCF.

Method: The study population consisted of a total of 80 subjects, 40 patients with SCF and 40 healty subjects with normal coronary arteries (NCA). Serum leptin levels were determined by a radioimmunoassay technique.

Results: Age, Gender, hypertension, diabetes mellitus (DM), body mass index (BMI), systolic blood pressure, and levels of total cholesterol, creatinine, C-reactive protein and other biochemical parameters were not different between SCF group and NCA group, as were serum leptin levels (32.6±40.9 versus 44.2±43.8, $p>0.05$). When SCF and NCA groups were divided into two groups according to the presence or absence of DM, leptin levels were again did not differ between those with DM in SCF and those with DM in NCA, as were between those without DM in SCF group and those without DM in NCA group ($p>0.05$). It was found that leptin levels correlated with BMI, height and levels of serum CRP, LDL-cholesterol, trigliseride, white blood cells and platelets ($p< 0.05$).

Conclusion: We did not find any statistically significant differences in leptin levels between SCF and NCA groups. Correlation of leptin levels with LDL-C, trigliseride, CRP and BMI may suggest that leptin may play an important role in the atherosclerotic process.

Key words: leptin, slow coronary flow, normal coronary flow

Introduction

The slow coronary flow phenomenon (SCF) is an angiographic finding characterized by delayed distal vessel opacification in the absence of significant large vessel coronary disease (1). Leptin levels decrease in coronary artery disease. It was reported in recent studies that leptin plays an important role in the pathogenesis of coronary artery disease by disrupting anti-inflammatory responses and developing endothelial dysfunction (2-3). It has been suggested that SCF is a variant of obstructive coronary artery disease. However, it is not known whether leptin plays a role in the pathogenesis of SCF. The aim of this study was to evaluate whether there was a significant difference in serum leptin levels between patients with normal coronary flow and those with SCF.

Materials and Methods

Study population

The study was conducted in both a prospective and a cross-sectional manner. Subjects were recruited consecutively from patients who undergone coronary angiography due to suspected coronary artery disease in our hospital. Our study population consisted of two groups. The first group composed of 40 patients who had normal epicardial coronary arteries (NCA) (NCA group, 24 female, mean age 52.7 ± 9.6) and the second group composed of 40 patients who had SCF but otherwise normal epicardial coronary arteries (SCF group, 17 female, mean age 56,3 ± 12.3). The study was approved by local ethics committee and written informed consent was obtained from all patients.

Coronary angiography and determination of coronary slow flow

Coronary angiography was performed by standard Judkins technique using Philips Integris Allura monoplane X-ray system (Philips Medical Systems,

Eindhoven, Netherland) and results were analyzed by two interventional cardiologists. Nitrates were not given in any patient before coronary angiography. Contrast agent used in our study was Iopromide (Ultravist-370, Schering AG, Germany) and manually injected (4-5 mL/s) in all patients. Coronary flow rates of all patients were calculated by Thrombosis In Myocardial Infarction frame count (TFC). TFCs were determined for each major coronary artery in each patient according to the method described firstly by Gibson et al. (4). According to this method, the first frame is defined as the frame in which injected contrast touches the two borders, but does not fully opacify it. The end frame is defined the first frame in which contrast appears in the distal landmark of reference vessel. These landmarks are as follows: the most distal branch nearest the apex of the left ventricle for the left anterior descending coronary artery (LAD), the last branch off the most distal obtuse margin for left circumflex artery (LCx) and first branch off posterolateral branch for right coronary artery (RCA). Thereafter, the final count was subtracted from the first and the exact TIMI frame count was calculated. Because LAD is longer than other major coronary arteries, corrected TIMI frame count (CTFC) was calculated for LAD by dividing TFC of the LAD by 1,7 (4). The cut-off values for normal visualization of coronary arteries were 36.2±2.6 frames (CTFC is 21.1±1.1) for LAD, 22.2±4.1 frames for LCx, 20.4±3 frames for RCA (4). Any value obtained above these cut-offs were considered as SCF.

Determination of Leptin level

All patients had 20 ml of venous blood drawn in the morning after an overnight fast. The blood samples for determination of leptin were placed in ice immediately after collection and centrifuged at 3000 revolutions per second for 20 minutes. The resulting plasma was frozen at –70°C for further determination of leptin. Leptin was determined by radioimmunoassay (RIA) using the commercial Human Leptin RIA kit (Linco Research, Inc. USA).

Exclusion criteria

Subjects were excluded from the study if they had a body mass index (BMI) over 30 kg/m^2, atherosclerotic heart disease with significant lesions in their angiography, acute coronary syndromes, previous history of myocardial infarction and/or coronary revascularization (coronary by-pass, percutaneous transluminal coronary angioplasty), chronic renal failure, chronic pulmonary diseases, thyroid disorders, cardiac arrhythmias, connective tissue disorders, structural valvular diseases, congestive heart failure and cardiomyopathies.

Statistical analysis

The SPSS statistical packet (version 12; SPSS) was used for the calculations. Continuous variables were presented as means ± SD and categorical variables as counts and percentages. The association between study groups were examined by Student's *t* test for continuous variables and Fisher's exact test or chi-square test for categorical variables where appropriate. To determine the relationship between plasma levels of leptin and various laboratory parameters, Pearson correlation analysis was used and only significant correlations were presented. All p values were two-tailed and threshold for significance was set at $p<0.05$.

Results

Baseline characteristics of the study population were presented in Table 1. There were no significant differences between NCA and SCF groups with regard to age (52.7± 9.6 years versus 56.3 ± 12.3 years, respectively), gender (female, 60% vs 42.5%, respectively), BMI (27 ± 3.6 kg/m^2 vs 27.5 ±4,5 kg/m^2, respectively), hypertension (42.5% vs 37.5%, respectively), diabetes mellitus (37.5% vs 27.5%, respectively), hyperlipidemia (50% vs 47.5, respectively), family history of coronary artery disease (52.5% vs 32.5%, respectively) and smoking (22.5% vs 22.5%, respectively). In addition, no significant differences were not found between the two groups in laboratory parameters such as serum glucose, blood urea nitrogen, creatinine, total cholesterol, LDL-C, trigliseride, WBC, hemoglobin, hematocrite, platelets, sodium, potassium and CRP.

Leptin levels did not differ statistically between NCA and SCF groups (32.6±40.9 ng/ml vs 44.2±43.8 ng/ml, p=0.22, respectively). After subjects were divided according to presence or absence of DM in NCA and SCF groups, leptin levels were again compared. There was no statistically significant differences between patients with

Table 1. Baseline Characteristics of the Study Population

Variable	NCA group (n=40)	SCA group (n=40)	P value
Age, years	52.7 ± 9.6	56,3 ± 12.3	NS
Gender, female (%)	24 (60)	17 (42.5)	NS
Weight, Kg	75.7 ± 12.6	78.5 ± 12.7	NS
Height, cm	166.6 ± 8	169.2 ± 8.1	NS
BMI, kg/m²	27 ± 3.6	27.5 ± 4.5	NS
SBP, mmHg	117.6 ± 13	118.6 ± 13.2	NS
DBP, mmHg	74.8 ± 8.2	76 ± 8	NS
HR, beat/minute	76.7 ± 12	72.2 ± 10.9	NS
Hypertension, n (%)	17 (42.5)	15 (37.5)	NS
Diabetes Mellitus, n (%)	15 (37.5)	11 (27.5)	NS
Hyperlipidemia, n (%)	20 (50)	19 (47.5)	NS
Family History of CAD, n (%)	21 (52.5)	13 (32.5)	NS
Smoking, n (%)	9 (22.5)	9(22.5)	NS
Glucose, mg/dL	122.2 ± 66.8	103.3 ± 27.4	NS
Urea, mg/dL	37.6 ± 12.3	35.3 ± 10	NS
Creatinine, mg/dL	0.8 ± 0.1	0.9 ± 0.2	NS
Total cholesterol, mg/dL	214.9 ± 44.2	187.2 ± 32.2	NS
LDL-C, mg/dL	126.6 ± 30.7	114.5 ± 25	NS
Trigliseride, mg/dL	159.2 ± 49	148.5 ± 62.3	NS
WBC, 10^3 / μ L	8.06 ± 2.54	8.5 ± 1.86	NS
Hemoglobin, g/dL	13.6 ± 1.3	14.2 ± 1.4	NS
Hematocrite, (%)	41.6 ± 4.6	41.4 ± 4.2	NS
Platelets, 10^3 / μ L	246.1 ± 87.3	262.5 ± 55.6	NS
Sodium, mmol/L	139.9 ± 3.1	140.5 ± 2.5	NS
Potassium, mmol/L	4.3 ± 0.4	4.2 ± 0.5	NS
CRP, IU/mL	12.1 ± 6.8	9.8 ± 3.5	NS

BMI= Body mass index, CAD= Coronary artery disease, DBP= Diastolic blood pressure, HR= Heart rate, SBP= Systolic blood pressure, LDL-C= Low density lipoprotein cholesterol, CRP= C-reactive protein, WBC= White blood cell, NS= non significant

DM in NCA group when compared to those with DM in SCF group. In the same way, no statistically significant difference was not found in patients without DM in NCA group when compared to those without DM in SCF group (Table 2).

Leptin levels was found to be correlated positively with CRP, BMI, LDL-C, trigliseride, WBC, platelets and negatively correlated with height (Table 3). Correlation with other laboratory parameters was not statistically significant.

Discussion

It is accepted in all cardiology community that similar eitopathogenetic factors play a role in eitopathogenesis of coronary slow flow as it is in KAH.

Table 2. Leptin Levels in Patients with and without Diabetes Mellitus in NCA and SCA group

	NCA group	SCA group	p-value
Total	n=40	n=40	
Leptin ng/mL	44.2 ± 43.8	32.6 ± 40.9	0.22
Patients with DM	n=15	n=11	
Leptin ng/mL	63.1 ± 49.8	55.9 ± 43.1	0.70
Patients without DM	n=25	n=29	
Leptin ng/mL	32.8 ± 36.1	23.7 ± 37	0.36

DM= Diabetes mellitus, NCA= Normal coronary artery, SCA= Slow coronary artery

Table 3. Correlations between Leptin Levels and Laboratory Parameters in the Study Population

	CRP	BMI	Height	LDL-C	Trigliseride	WBC	Platelet
Leptin	r=0.269 P=0.02	r=0.318 p<0.001	r=-0.378 p<0.001	r=0.229 p=0.01	r=0.326 p<0.001	r=0.249 p=0.02	r=0.194 p=0.04

CRP= C-reactive protein, BMI= Body mass index, LDL-C= Low density lipoprotein cholesterol, WBC= White blood cell

In this study by taking a number of studies which alleged that leptin levels increase in coronary artery disease, we investigated serum leptin levels in SCF which is considered to be a variant of atherosclerosis. However, we could not find a meaningful difference in the leptin levels of SCF group in comparison to NCA group. It has been well known that similar etiopathogenetic factors also play a role in the etiopathogenesis of slow coronary flow as it is in coronary artery disease. Many studies previously reported increased leptin levels in coronary artery disease. In this study, we investigated serum leptin levels in patients with SCF. However, we did not find any significant difference in leptin levels in SCF group as compared to NCA group.

A number of studies have demonstrated that SCF is an atherosclerotic process that involves small and large vessels and it causes an increase in microvascular resistance (5-6). Structure of the coronary wall in patients with SCA has been considered as normal because of the absence of prominent atherosclerotic lesions and an increase in microvascular resistance had been cited as responsible for this. However, with the advent of IVUS, it was revealed that coronary vascular tree in patients with SCF was not normal. In contrast, it was observed that there were atherosclerotic changes and calcifications in coronary wall in patients with SCF (7). As a result of this finding, considering SCF as a subcategory of CAD will be better. Progressive changes occur in the vessel wall in the early course of atherosclerosis. Atherosclerotic lesions can progress without compromising the lumen because of compensatory vascular enlargement and this entity is called positive remodelling. By taking this into consideration, SCF can be considered as CAD detected in early stages.

Leptin is a key hormonal regulator of energy balance that acts upon hypothalamic neurons to decrease food intake and increases energy consumption. The level of plasma leptin is positively correlated with adipose tissue mass and leptin is secreted exclusively by adipocytes (8). It is closely related to body fat content and decreases with wieght loss (9). Leptin receptors are expressed in a number of different tissues. For this reason, leptin has a variety of effects especially on cardiovascular and immune system and researchers need to redirect their attention on this issue(10-13).

The findings obtained from human and animal studies in which leptin was evaluated has demonstrated that hyperleptinemia may be responsible for the increased cardiovascular morbidity. Increased leptin levels in humans are associated with insulin resistance, inflammation, abnormal haemostasis and an increase in coronary calcification in females independent of myocard infarction, obesity and traditional risk factors for CAD (14-16). Many studies showed elevated leptin levels in hypertensive patients and a positive correlation between hypertension and leptin levels (17).

It has been reported that leptin acts in synergism with other inflammatory markers in the development of atheromatous plaques (18). Leptin induces smooth muscle proliferation and hypertrophy in vitro and increases platelet aggregation (19). In addition, leptin may induce CRP expression in human coronary artery endothelial cells (20). Leptin also has been demonstrated to play an important role in the early stage of atherosclerosis in the aortic endothelium (21). Besides, administration of exogenous leptin in rats was shown to reduce antiatherogenetic activity of paraoxonase enzyme in the aorta, renal medulla and cortex (19).

In our study, there was no statistically significantly difference in leptin levels between SCF and NCA groups. However, we observed that leptin had positive correlations with LDL-C, trigliseride, CRP and BMI as found in previous studies (22).

Conclusion

We did not find any significant difference between patients with SCF and those with NCA. Correlation of leptin levels with LDL-C, trigliseride, CRP and BMI may suggest that leptin may play an important role in the atherosclerotic pro-

cess. In addition, rather than considering leptin as a cause of atherosclerotic process, it will be better to understand that high levels of leptin may present in patients with diabetes mellitus and hyperlipidemia in which CAD may be expected. Larger studies are needed to fully evaluate the daily use of this molocule in SCF independent of traditional atherosclerotic risk factors.

Study limitations

There are several potential limitations that should be adressed. Firstly, this study included small number of patients in both groups. In addition, patients with SCF has angiographically normal coronary arteries without luminal irregularities, although there are extensive atherosclerotic plaques as documented by IVUS and autopsy studies. So, this was another limitation to exclude IVUS in our study.

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Information Security Behavior among Nurses in an Academic Hospital

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Abstract

Background: High quality healthcare services can be achieved only by utilizing information technology. Information security is an ongoing challenge and security breaches emerging from user misbehavior are considered to be a devastating latent source of threats to patient data. This study evaluated information security practices of nurses at the King Saudi University Hospitals in Saudi Arabia.

Method: A random sample of nurses (n=352; 328 females and 24 males; age 40 ± 0.6 yr (mean ± SE)) was interviewed.

Results: The results show that while 92% of nurses agree that the principle of password authentication is important, their behavior in practice is completely inconsistent with this principle. This is clearly indicated by the fact that 81% of the interviewed nurses have never changed their system generated passwords, 54% do not change their passwords after these have been released to unauthorized persons, 33% share and communicate passwords with colleagues, 32% allow others to use their account credentials, and 16% do not log off applications after work sessions.

Conclusion: The current study has demonstrated that the information security practices of nurses may represent a potential threat to the information security and privacy of patients. The study calls for raising the level of security awareness among nurses to reduce the security threats posed by user misbehavior.

Key words: hospital information systems, information security, nursing informatics, privacy, user behavior

Introduction

Information technology (IT) has become an integral part of the modern healthcare industry. Healthcare organizations have exploited the great advances in information and communication technologies to achieve their goals and boost the quality and efficiency of the services provided to patients (Vaast, 2007; Stanton, 2004). Recent studies have shown that high quality healthcare services can only be delivered when relevant patient information is easily and electronically accessible to clinicians (Linden, 2009). Utilization of IT in healthcare delivery, where services are provided by multidisciplinary teams of healthcare professionals in a shared environment, has been accompanied by several challenges related to protecting the privacy and confidentiality of patient information (Lekkas, 2007). These challenges have become a major concern for healthcare providers and regulators especially with the progressive worldwide transition from traditional paper-based patient records to electronic patient records (EPR) (Yang et al., 2006; Gobuty, 2003; Safran & Goldberg, 2000). In particular, any breech of electronic patient information is associated with an unbearably high loss that leads not only to financial losses, but also to threatening the safety of patients and jeopardizing their lives. This is obviously the case when an organization's information system is exposed to the risk of cyber attacks or damage (Farahmand, 2003).

In many countries, the privacy and confidentiality of patient information is strictly protected by laws and legislations, e.g., the Health Insurance Portability and Accountability Act (HIPAA) of the United States (Kilpi, 2001). The American Recovery and Reimbursement Act (ARRA) of 2009 officially established the Office of the National Coordinator for Health Information Technology (ONCHIT) within the Department of Health and Human Services (HHS) to promote the development of a nationwide interoperable health IT infrastructure and to propose methods that ensure the privacy and security of patient data (Steinbrook, 2009).

The enforcement of strict information security polices therefore, has become one of the top priorities for healthcare organizations to protect patient data from hacking and unauthorized access

(North, 2006; Jaferian, 2008; Hembroff, 2008). In the Kingdom of Saudi Arabia, although there are still no regulations legalizing the protection of patient privacy and health data, healthcare institutions have to a lesser or greater extent introduced their own regulations.

Information Security Behavior and Privacy Protection

It is well understood that technology alone cannot provide all the aspects of information protection required by healthcare organizations (Gobuty, 2003). Technology can help in preventing security threats and breaches in information systems infrastructure, computer system security, and secure transmission of information, but not in cases where unsolicited disclosure of information takes place in a variety of ways through personnel behavior, such as acts of disloyal employees (Machado, 2006). Users of hospital information systems, such as doctors and nurses, routinely use EPR, lab systems, and picture archiving and communication systems (PACS) for patient care purposes. Some of their practices, however, intentional or not, may endanger the security of hospital information systems and the privacy and security of patient data (Gobuty, 2003). Threats, such as leaking confidential information and unauthorized information access are very common in healthcare environments (Cappelli, 2006). Due to the latent nature of user threats that makes them more difficult to detect by ordinary intrusion or access control mechanisms, and because user behavior is not consistent across different organizations, this issue has been the topic of many research studies and investigations.

Objective

The main objective of the current study is to assess the nurses' information security behavior at the King Saud University Hospitals (KSUHs) and how they maintain their accounts on the hospital information systems.

Methods

The study relied on a self developed survey questionnaire distributed to a random sample of nine hundred (900) nurses at the KSUHs. The population of the study covered all nurses at the KSUHs, however, based on the inclusion criterion, only nurses with access privileges to the hospital information systems were eligible to participate. In addition to background information, the questionnaire included a section on the respondents' use of the hospital information systems, and another section on their security practices. Participants were not asked to reveal their identities at any stage.

The analysis was based on 352 completed questionnaires giving a response rate of 39% (n=352 nurses; 328 females and 24 males; age 40 ± 0.6 yr (mean ± SE)).

Besides the core hospital information system (HIS), the KSUHs have other IT systems including a picture archiving and communication system (PACS), a laboratory system (Lab), and email and internet services. Access privileges to each of the KSUH systems is given by the system administrator in such a way that a user can view only the part of information relevant to the duties of his/her job. The study was approved by the KSUHs board director, as no formal ethical committee existed at the time of the study. Nurses comprise over 30% of the staff in the KSUHs and are granted access to most of the hospital information systems because of their patient care responsibilities.

Analysis of the data was accomplished using SPSS 16. The non-parametric chi-square test was used for various comparisons. Results were deemed statistically significant for $p \leq 0.05$.

Results

The demographic characteristics of the sample show that 93% of the nurses are female (328 females and 24 males). The mean age ± standard error is 40 ± 0.6 years. The average duration of employment for nurses at the KSUHs is nine years, with actual values ranging from 1 month to 30 years, while the average period of using hospital information systems is 6 ± 5 years (mean ± SD).

Saudi nurses constitute only 2% of the sample, no significant difference is reported when correlating nationality against factor expected to affect security of password. A gender difference (p=0.012) is observed regarding the behavior of saving password in the login box (36% and 16% for male and female nurses respectively). Furthermore, 50% of

males have changed password at least once after being issued by system administrator and only 17% for female nurses, $p < 0.0001$). A significant difference is observed between age of user and the behavior of "logout application" after work sessions, ($p=0.03$).

Figure 1 shows that 52% of the nurses use the HIS mainly for viewing and editing patient records. The PACS and Lab systems are used by 29% and 11% of the nurses, respectively, while only 5% of the nurses have access to internet services as the computer workstations in the clinics and wards are restricted from accessing the internet and email services in accordance with hospital policy.

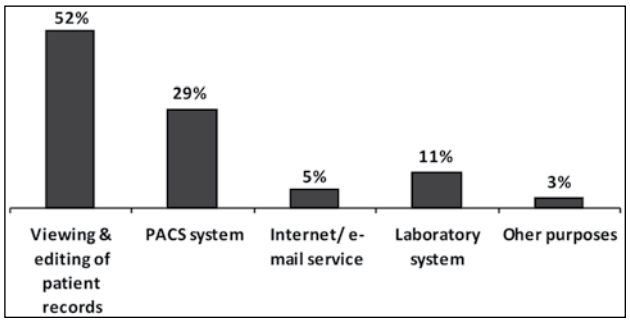

Figure 1. Usage of hospital systems by nurses

Table 1 summarizes the frequency of responses for the 352 participants on different information security issues. The table reveals that 81% of the nurses have never changed the default system generated passwords, 54% do not change their password after it has been compromised, 33% communicate their passwords to colleagues and office mates, while 32% allow others to use their account credentials.

It can be clearly seen from Figure 2 that 88% of respondents have a password composed of either digits or letters alone. No user has a complex password of digits, letters, and symbols. In addition, only 5% of nurses have a user password with a minimum of eight characters as illustrated in Figure 3.

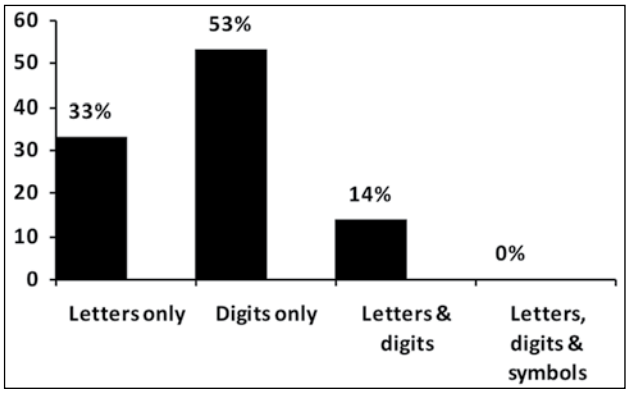

Figure 2. Password structure

Table 1. Security practices of nurses at the KSUHs

Security practice	Response	Percentage (%)
Logging off an application after work sessions	Yes	84
	No	16
Allowing others to use the account without disclosing the password	Yes	32
	No	68
Communicating the password to colleagues and office mates	Yes	33
	No	67
Changing the password if it is known to someone else	Yes	46
	No	54
Changing the password provided by the administrator	Yes	19
	No	81
Saving the password in the login box	Yes	17
	No	83
Frequency of changing passwords	Never changed the default password	81
	Every 6 months or less	5
	Every 6-12 months	2
	More than 12 months	12
Importance of password to access hospital systems	Yes	92
	No	8
Responsibility of protecting user passwords	The user himself	65
	The system administrator	5
	Both the user & administrator	33

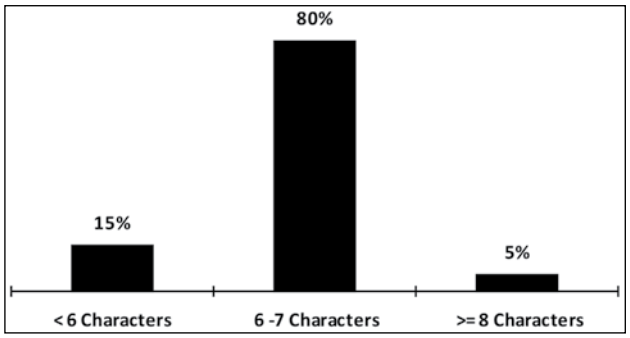

Figure 3. Length of password

Discussion

The current study focused on one critical dimension of information security related to user behavior. Although different techniques have been developed to secure information systems and data, they are all based on the principle of preventing unauthorized access by implementing access control policies and better password management measures. It is clear that user behavior is the prevalent and main security threat for data privacy and security in a hospital environment. Bardram (2005) reported that user authentication (name and password) is the principal theme in information security and is even more important in a multi-user computer environment. The practice of user authentication, however, despite being effective, is in most cases undermined by the users themselves.

Results of the current study show that 92% of the nurses are aware of the importance of using password authentication to access hospital systems, which leads to the assumption that nursing staff strictly follow secure policies and procedures to protect the privacy and confidentiality of patient data. Findings of the study however, are totally inconsistent with this assumption especially with respect to password practices. The results reveal that 81% of participants have never changed their default system generated password. This contradicts even the most basic security principles requiring users to change their passwords immediately after being issued by the information system administration (Shay, 2007). Further contradicting results are emphasized by the findings that 54% of the interviewed nurses would not change their passwords if they were known to others, 33% have in the past communicated their passwords to office mates and colleagues, and 31% allow others to use their account credentials. Comparable results were reported in a study by Stanton et al. (2004) in which 23% of the employees surveyed sometimes disclosed their passwords to colleagues and staff members. Woodhouse (2007) stated that 38% of his sampled end-users expressed the likelihood of sharing passwords with people within the same organization.

Furthermore, 16% of the nurses do not routinely log off from the application they have been working on. Results shown here appear to be in agreement with previous studies, which concluded that users in general have a good understanding of the potential threats of password breeches; nevertheless, they do not take a proactive role in protecting their systems (Furnell, 2008). Nurses also may view the meaning of information security as something not related to the security of patient information. Instead, they may understand it as a technological issue concerned merely with the computer system components (Vaast, 2007).

In line with the argument by Haak (2003) and Forget et al. (2008) that users tend to favor simple easy to recall passwords, the study shows that not a single nurse reported having a complex password. The majority of passwords can be classified as "weak" because they do not satisfy the minimum requirements of a good password as defined by Kuo et al. (2006); that is, a password should be composed of at least eight characters, with a mixture of lower and upper case letters, numbers, punctuation, and special characters. Poor passwords represent a potential threat to information security as they can easily be manipulated by hacking and cracking. This behavior is a clear indication of the lack of awareness and training on information security management.

Threats emerging from user behavior have been the subject of discussion in several studies. Bardram (2005) stated that a totally secure system from a technical point of view could become totally insecure due to user malpractices. D'Arcy (2007) recommended promotion to comply with security policies and raising end-user awareness on security issues through education as the best practices to reduce security threats in the working place environment. Woodhouse (2007) on the other hand, emphasized that the participation of all staff members of the organization in the security process is the best way to maintain information security.

The findings of this study demonstrate the nurses' lack of adequate awareness of information security management when dealing with confidential patient data. These results also call for questioning the effectiveness of hospital orientation and training programs on information security issues and password management. Previous studies by Kuo et al. (2006), Garrison (2006), and Woodhouse (2007) have shown that password education yields significant improvement in user behavior and information systems security.

Conclusion and Recommendations

Information security and privacy, and the confidentiality of patient data in a healthcare work environment should not be regarded merely as policies and procedures, but rather as the culture and practice. These should be considered part of the healthcare process and medical ethnicity. This study examined breaches of information security originating from nursing staff malpractices at the KSUHs. It highlighted that such behavior may pose a latent potential threat to the hospital information systems and patient data. This is manifested in many aspects of the nurses' practices such as the high proportion of nurses who do not change their passwords even after the password has become known to others, communicate their passwords to others and share account credentials. It has been clearly proven that technical security measures alone cannot prevent all security breaches. The results emphasized that awareness, training and education of users on information security issues are very important for achieving a reliable level of information security in healthcare organizations.

To reduce the security breaches in a hospital environment, the following recommendations should be considered.

Increasing the level of security awareness among nurses through mandatory training. Nurses should understand the critical nature of patient information, which under no circumstances, should be accessed by unauthorized persons. They should also realize that information security is the responsibility of everyone in the healthcare organization.

Enforcement of security policies and encouraging staff to comply with these, besides fostering information security behavior in the hospital environment through cooperation of all hospital staff.

Observing and enforcing security policies by system automated processes such as auto-logoff and system alert messages informing users to change their passwords.

Further studies need to be carried out to investigate the information security behavior of other staff members in a hospital environment to arrive at more conclusive results.

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Effect of Hepatitis B Virus Infection on the Autonomic Dysfunction

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Abstract

Background: Hepatitis secondary to infection with the hepatitis B virus (HBV) is one of the most common causes of viral hepatitis worldwide. Multiple extrahepatic manifestations of HBV infection have been recognized. Impaired autonomic function has been described in patients with chronic liver diseases from different aetiologies, and has proven to be a poor prognostic indicator. However, The effect of HBV infection on the autonomic nervous system is unknown. Therefore, in this study we aimed to examine heart rate variability (HRV) in patients with chronic HBV infection and healthy controls.

Methods and Results: The study included 55 HBsAg positive patients and 50 persons for control groups. We performed transthorasic echocardiography to all participants. Autonomic function was assessed by determining heart rate variability (HRV) indices. HRV time and frequency domain indices were lower in patients with HBV infection compared with healthy controls (156 ± 12 and 361 ± 21 ms², for low-frequency HRV; 182 ± 19 and 388 ± 25 ms² for high-frequency HRV, $p<0.001$, respectively). Nevertheless statistically significant difference was found between two groups with regard to the other HRV indices.

Conclusion: Our results suggest that impaired autonomic function is caused by chronic HBV infection. Further studies are needed, however, to identify the underlying mechanisms.

Key Words: Hepatitis B virus; autonomic dysfunction; arrhythmia.

Introduction

The Hepatitis B virus (HBV) infection is a major public health problem worldwide. Hepatitis B is an infectious disease, associated with an estimated 350 million chronically infected patients (1,2).

The clinical course of hepatitis B is determined by the interaction of viral replication status and host immune response. HBV infection is generally asymptomatic but HBV is the most common and important cause of cirrhosis and hepatocellular carcinoma worldwide (2,4).

It is known that chronic HBV and hepatitis C virus (HCV) infection triggers autoimmune disorders. As many as 20% of patients with HBV infection experience a spectrum of extrahepatic disorders that includes dermatologic disease, polyarthralgias and arthritis, glomerulonephritis, polymyositis, aplastic anemia, neuropathy, vasculitis and myocarditis Recent studies revealed that the virus has extensive reservoirs of extrahepatic replication. HBV proteins and nucleic acids have been found in a number of non-hepatic tissues including lymph nodes, spleen, bone marrow, kidney, colon, stomach, periadrenal ganglia, skin, thyroid, pancreas, testis, ovaries, brain, heart and lung tissue (5,6).

Cardiovascular autonomic dysfunction has been described in both chronic alcoholic and non-alcoholic liver diseases, including primary biliary cirrhosis and chronic hepatitis C virus infection (7, 8, 9). The effect of HBV infection on the autonomic nervous system is unknown.

Autonomic function can be assessed by reproducible non-invasive methods. Parasympathetic activity and basal vagal outflow can be determined by various indices of heart rate variability (HRV).

To our knowledge, there has been no study evaluating autonomic functions in HBV patients. Our present study was conducted to research the effect on autonomic functions Samong the persons with HBV infection.

Methods

Selection of the patients

55 patients mean age was 35 ± 9 years (range: 20-65 years.), who has been followed in the

outpatient clinic of infection diseases department because of the chronic hepatitis B (HbsAg positive, anti-HBs negative for at least 6 months), has normal liver enzymes and has not received antiviral treatment, are included in the study.

The control group was consisted of 50 successive persons, mean age was 29 ± 13 years (range:19-53 years). who appealed to the cardiology outpatient clinic because of various reasons and did not have any structural cardiac pathologies identified.

Patients with coronary artery disease, heart failure, valve disease, cardiomyopathy, hypertension, diabetes mellitus, chronic lung disease, hepatic and renal dysfunction, thyroid dysfunction, and anaemia were excluded from the study. The study did not include intravenous drug abusers, alcohol drinkers, HIV and hepatitis C virus carriers. All of the patients were in sinus rhythm and none of them were taking cardioactive medications like antiarrhythmics, antipsycotics, and antihistaminics. Every patient signed an informed consent form and a local ethics committee has approved the study.

Echocardiographic Measurements

Two-dimensional, M-mode, pulsed and colour flow Doppler echocardioagraphic examinations of all subjects were performed by the same examiner with a commercially available machine (Vivid 7 pro, GE, Horten, Norway, 2-4 mHz phased array transducer). During echocardiography, a one-lead electrocardiogram was recorded continuously.

M-mode measurements were performed according to the criteria of American Society of Echocardiography (10,11). Left atrium (LA) diameter, LV end-sistolic and end-diastolic diameters were measured. LV ejection frection (EF) was estimated by Simpson's rule.

All patients and controls underwent 24-hour Holter monitoring. All patients were in sinus rhythm throughout the recording period. The HRV analysis was assessed over a 24-hour period and was performed in time domains according to European Society of Cardiology/North American Society of Pacing and Electrophysiology guidelines (12). The following time-domain parameters were calculated: Standard deviations of all NN intervals (SDNN); the square root of the mean of the sum of the squares of differences between adjacent NN intervals (RMSSD); the number of pairs of adjacent NN intervals differing by more than 50 ms divided by the total number of all NN intervals (pNN50); as well as low-frequency (0.05–0.15 Hz) and high-frequency (0.15–0.4 Hz) power of RR variability (termed LF and HF).

Statistical Analyses

SPSS 16.0 statistical program (SPSS, Chicago, IL, USA) was used for statistical study. All values are given as mean ± standard deviation. Values between different groups were compared using the independent-samples t-test. A Chi-square test was used to assess differences between categorical variables. The relationship between parameters was determined using the Pearson coefficient of correlation. P-values <0.05 were considered significant.

Results

There was no statistically significant difference between HBV group and controls with regard to age, gender, diameters of the left atrium and the left ventricle, blood pressure, body mass index and smoking status (Table 1).

Table 1. Comparison of clinical and echocardiographic features of HBsAg positive patients and controls group

	Patients (N=55)	Controls (N=50)	P-Value
Age (years)	35 ± 19	29 ± 13	NS
Male/female(n/n)	26/29	20/30	NS
BSA (m2)	1.8 ± 0.2	1.9 ± 0.6	NS
BMI (kg/m2)	23 ± 5	26 ± 6	NS
LA diameter(cm)	3.3 ± 0.9	3.2 ± 0.6	NS
LV EDD (cm)	4.6 ± 1.5	4.3 ± 0,5	NS
LV ESD (cm)	2.7 ± 0.7	2.8 ± 1.2	NS
LVEF (%)	63 ± 11	64 ±10	NS
Heart rate (mean)	72 ± 12	65 ± 5	NS
SBP (mmHg)	123 ± 11	121 ± 6	NS
DBP (mmHg)	77 ± 14	75 ± 9	NS
Smoking (n)	9	9	NS

BSA: body surface area, BMI: body mass index, LA: left atrium, LVEDD: left ventricular end-diastolic dimension, LVESD: left ventricular end-systolic dimension, LVEF: left ventricular ejection fraction, SBP:systolic blood pressure, DBP: diastolic blood pressure, NS: nonsignificant

In the group of the patients with HBV, HRV sequence indices (SDNN, RMSSD, pNN50) and frequency-domain indices (LF and HF), were lower compared with controls (P<0.01) (Table-2)

Table 2. Comparison of HRV parameters of HBsAg positive patients and controls group.

	HBV patients (n=55)	Controls (n=50)	p
pNN50 (%)	6.2 ± 8.7	13.7 ±11.9	<0.001
SDNN (ms)	39 ± 23	73 ± 16	<0.001
RMSDD (ms)	19 ±15	43 ±16	<0.001
LF (ms2)	156 ± 12	361 ± 21	<0.001
HF (ms2)	182 ± 19	388 ± 25	<0.001

SDNN, standard deviation of R–R intervals; pNN50, percentage of R–R intervals that differ >50 ms; RMSSD, root mean square of successive R–R interval differences; HF, high-frequency (0.15–0.4 Hz) power of R–R interval variability; LF, low-frequency (0.05–0.15 Hz) power of R–R interval variability.

Discussion

Multiple extrahepatic manifestations of HBV and HCV infection have been recognized (13). Cardiovascular autonomic dysfunction has been described in both chronic alcoholic and non-alcoholic liver diseases, including primary biliary cirrhosis and chronic HCV infection.(7-9). The effect of HBV infection on the autonomic nervous system is unknown.

To our knowledge, this is the first case–control study addressing autonomic function in patients with chronic HBV infection. Impaired cardiovagal autonomic activity is well known in chronic liver diseases (8). In addition, autonomic neuropathy in chronic liver disease is associated with a five-fold increased mortality within 4 years, independent of the severity of the liver disease (14). Heart rate variability analysis has been used as a predictor of Sudden cardiac death or as a marker of the progression of cardiovascular disease in several high-risk populations, and diminished HRV is associated with increased sympathetic and decreased vagal modulation (12,15).

In a recent prospective study, decreased HRV indices predicted a poor prognosis and a high mortality in patients with liver cirrhosis (16).

Numerous central and peripheral nervous system dysfunctions have been described in patients with HCV and HBV infection. The pathophysiology of these extrahepatic symptoms remains largely unknown (17), HBV can cause peripheral neuropathies by vascular- or immune-mediated pathology (17,18,19).

Hepatitis related neurological symptoms were found to be associated with impaired hepatic function, virus-triggered immune mediated mechanisms, direct nerve infection and glucose neurotoxicity caused by insulin resistance in patients with chronic HCV infection (20).

Despite a large number of studies done about the relation between cardiomyopathy, myocarditis and heart faliure, the data about cardiac autonomic effects of HBV is limited.

Recently Osztovit et al. were found association HCV infection and cardiac autonomic dysfunction (9). Similarly in our study, we found lower HRV indices in patients with HBV.

The most significant limitation of our study is the insufficient number of the patients. Other limitations of our study are that our study is not prospective and does not include anti-HBc levels showing active infection, and an unknown duration of HBV infection. For hepatic failure, further evaluation other than AST, ALT and imaging studies were not performed. That matter is another restriction of our study.

In conclusion, HBV infection seems to be associated with cardiac autonomic dysfunction although the mechanisms of these are not known thoroughly. Therefore, cardiac autonomic dysfunction and neuropathy should be considered during the follow-up of a patient with HBV infection for extra hepatic involvement and these patients should be monitored with Holter electrocardiography. It is clear that further comprehensive studies are needed in regard to this issue.

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The Effects of Acupressure on Preoperative Anxiety Reduction in School Aged Children

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Abstract

Introduction: A majority of children experience significant anxiety in the preoperative period. This study aimed to investigate the effects of acupressure on preoperative anxiety reduction in school aged children.

Methods: The study population included 80 subjects (aged 9-12 years) who had to undergo elective surgery. Children were randomly assigned to the acupressure (N=40) and sham groups (N=40). Anxiety in the preoperative period was measured by the State-Trait Anxiety Inventory for Children (STAIC). Acupressure was carried out by an acupressure-bead causing a constant pressure of 70 g/cm^2. In the acupressure group, the bead was fixed on the Yin Tang point (the midpoint between eyebrows) while in the sham group, it was put on a sham point outside the eyebrows line. Half an hour later, the STAIC was filled out by the children again.

Results: The results revealed significant differences between anxiety values at baseline and 30 minutes after applying pressure on the sham point ($P < 0.007$).

Conclusion: Further research is needed to decide whether acupressure could be used as an effective non-pharmacological substitutive method for preoperative anxiety reduction in children.

Key words: Acupressure, Preoperative Anxiety, School Aged Children

Introduction

A majority of children experience significant anxiety in the preoperative period.(Vagnoli, Caprilli, and Messeri 2010 Postoperative maladaptive behaviors such as new onset enuresis, nutrition disorder, apathy and withdrawal, and sleep disturbances may also result from anxiety before surgery.(McCann and Kain 2001) In fact, studies have indicated that up to 60% of all children undergoing surgery may present negative behavioral changes at 2 weeks after surgery.(Dreger and Trembback 2006) Most studies suggest that preoperative preparation programs reduce anxiety and enhance coping in children. For these reasons, researchers have sought out interventions to treat or prevent childhood preoperative anxiety and possibly decrease the development of negative postoperative behaviors.(Maranets and Kain 1999, Dilek Aygin.2011) Such interventions include sedative premedication, parental presence during anesthetic induction, behavioral preparation programs, music therapy, and acupuncture.(Caumo et al. 2000)

Yin Tang acupressure point, placed in the middle of the eyebrows, is one of the points which have been found to be effective in anxiety. Researchers showed acupressure bead intervention at Yin Tang acupoint to reduce pre-procedural anxiety in children undergoing endoscopic procedures.(Wang SM 2008) The aim of this study was to investigate the effects of acupressure in reducing preoperative anxiety in school aged children.

Methods

After obtaining approval from the Ethics Committee at Tehran University of Medical Sciences, the study was carried out from April 4th until September 12th, 2010. A total number of 80 children (40 males and 40 females) with a mean age of 10.67 ± 1.2 years were selected from among the

inpatients at the Department of Pediatric Surgery. In order to be included in the study, the patients had to age 9-12 years and undergo elective surgery. They were not selected if they had any history of acupressure, mental or psychiatric disorders, or any contraindication of acupressure (such as an open wound). Written informed consents were signed by all parents.

The participants were randomly divided into two groups. Subjects in the experimental group received acupressure between at Yin Tang acupoint before the surgery by a researcher who was trained to perform acupressure. In this study, acupressure interventions were conducted using an acupressure bead attached to a self-adhesive tape that secured the bead in place and created a constant standardized pressure of 1.3 psi as measured by a tonometer. On the other hand, the control group received sham treatment, i.e. pressure was applied above the lateral border of the left eyebrow. Both acupressure and sham treatment were delivered 30 minutes prior to the surgery.

The anxiety in participants was measured using the State-Trait Anxiety Inventory for Children (STAIC). The instrument has been designed to be used with upper elementary or junior high school children and consists of two twenty-item scales. The STAIC is the definitive instrument for measuring anxiety in children. Moreover, it is easy to read and can be administered verbally to younger children.(Spielberger and Vagg 95-97) The measurements were done at baseline and 30 minutes after applying acupressure or sham treatment.

$SPSS_{16}$ for Windows was used for analysis of the obtained data. The major statistical procedures applied were frequency, percentage, mean and standard deviation, chi-square, t-test and analysis of variance (ANOVA). The significance level was set at a P value of less than 0.05.

Results

There were no significant differences in baseline demographic characteristics or trait anxiety data between acupressure and sham groups (Table 1). The t-test showed a significant difference in anxiety values at baseline and 30 minutes after applying pressure on the sham point ($P < 0.007$) (Table 2).

Table 1. Anxiety scores before the experiment in the two group

Anxiety Score	Acupressure Group		Sham Group	
	N	%	N	%
20-33	24	61.5	19	47/5
34-47	10	25.6	17	42/5
48-60	6	12.8	4	10
Total	40	100	40	100
Mean ± SD	**32.76 ± 8.54**		**34.85 ± 9.14**	
	P = 0.296 df = 77 t = -1.05			

Table 2. Anxiety scores before and after the experiment in the sham group

Anxiety Score	After the Experiment		Before the E-xperiment	
	N	%	N	%
20-33	19	47.5	24	60
34-47	17	42.5	14	35
48-60	4	10	2	5
Total	40	100	40	100
Mean ± SD	**34.85 ± 9.14**		**32.53 ± 8.41**	
	P = 0.007 df = 39 t = 2.86			

Discussion

This randomized sham-controlled trial did not show acupressure to have a positive effect as a preventive method for preoperative anxiety reduction in school aged children. A recent randomized controlled trial evaluated the effects of needling Yin Tang point on Bispectral Index (BIS) values and preoperative anxiety[6]. However, it did not find a significant difference in preoperative anxiety reduction between the acupuncture and sham acupuncture at Yin Tang point in patients undergoing minor or moderate surgeries.

Studies on adults performed by Chen and Chen; kober et al indicated acupuncture to reduce pain and anxiety(Chen, Chang, and Hsu 341-50;Kober et al. 1328-32). However, these two studies used Sanyinjiao (above the ankle) point while we utilized a self-adhesive acupressure bead with constant pressure on Yin Tang acupoint. Furthermore, the contrasts in findings might be related to differences in the acupressure stimulation techniques applied. Another study on children used the same acupuncture method as we did and found acupressure via a self-adhesive bead/pellet at the Yin Tang acupoint to be ineffective on BIS prior to surgery.[6]

What distinguishes this research from previous studies is using a sham point in the sham group. Previous clinical trials aiming to determine the effects of acupressure have been conducted in two ways: a) applying constant pressure on a chosen point for creating a sense of heat and weight in the experimental group while using superficial touch in the control group; and b) applying pressure on an effective point in the experimental group while applying pressure on sham points in the control group. Norris reported the stimulation of a sham point to be about 33%-50% effective.(Norris 3-6) Therefore, in order to completely benefit from acupressure, the right points are ought to be stimulated. A study reported a significant reduction in preoperative anxiety among patients of a placebo group right after applying pressure on a sham point ($P<0.001$).(Agarwal et al. 978-81) Although there are many controversies about the effectiveness of acupressure,(Edzard 333-36) using right points at the right time is important in determining the real effects. Thus, further research is needed to evaluate acupressure as an effective non-pharmacological substitutive method for preoperative anxiety reduction in children.

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Organizational commitment in healthcare sector workers: Sample of Denizli city

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Abstract

Objective of the Study: In the most general terms, organizational commitment can be defined as adoption of organizational goals and values by the workers, the workers' endeavour to be a part of organizations, and workers' belief in the organizational goals. Organizational commitment depends on various factors such as the complex structure of the health sector and prominence of human life etc. have resulted in the increasing significance of organizational commitment in health sector.

This study, aimed to determine the level of organizational commitment of the workers at the Oral and Dental Health Center in Denizli.

Methodology: In order to achieve this goal, a questionnaire on organizational commitment which was developed by Allen and Meyer was used. In this questionnaire, questions inquiring about the three defined sub-dimensions of organizational commitment; emotional commitment, continuity commitment and normative commitment.

Results: It is found that the affective commitment levels were higher than the other commitment types and there was a significant difference for the relation between the marital status and the workers' level of affective commitment (p=0.001) and normative commitment (p=0.000). As for the normative commitment levels (p=0.005), it is found that statistically significant difference in its relation with educational status and this is thought to be result from the high school graduates.

Conclusions: Considering the importance of human health for healthcare sector, it is stressed that error risks may be minimized with a personnel with high organizational commitment who feels belonging to the organization she/he works for.

Key Words: Organization, organizational commitment, healthcare sector.

1. Introduction

When the literature is viewed, it becomes obvious that there are various definitions for the organizational commitment concept and this concept varies depending on many factors. Organizational commitment is accepted to be a key concept to keep the expert personnel within the organization in the modern life in which competition is common (1). When the explanations related to organizational commitment are reviewed, it is found that the concept is defined as the adoption of organizational values and goals and it becomes important for the personnel to feel a part of the organization (2,3,4,5). From the organizational perspective, it is stated that the commitment of the personnel to the organization is stressed to increase the productivity and efficacy of the personnel (6). From this perspective, organizational commitment leads the personnel to be more productive and decreases the rate of leaves and discontinuance (7).

In the explanations by Allen and Meyer on organizational commitment, an emphasize is put on the existence of three sub-dimensions and these are named as affective, continuance and normative commitment. For affective commitment concept, it is stressed out that the workers in an organization continue to their work because they want to and they are communed with the goals and values of the organization. In the continuance commitment, it is pointed out that the workers behave rationally and they continue to be a member of the organization considering the expenses it will cost when they leave the organization. As for the normative commitment, the workers behave with a sense of responsibility and they think staying in the organization almost a duty (8,9).

All of these explanations show that organizational commitment is very common and impor-

tant for the organizations especially in healthcare sector. For that reason in this study, it was aim to determine the organizational commitment levels of the workers in healthcare sector. Some hypotheses were developed for reaching this aim. These are at below;

H1: There is statistically difference between age and dimensions of the organizational commitment.

H2: There is statistically difference between gender and dimensions of the organizational commitment.

H3: There is statistically difference between marital status and dimensions of the organizational commitment.

H4: There is statistically difference between educational status and dimensions of the organizational commitment

H5: There is statistically difference between task status and dimensions of the organizational commitment.

H6: There is statistically difference between income and dimensions of the organizational commitment.

H7: There is statistically difference between working duration and dimensions of the organizational commitment.

H8: There is statistically difference between their total terms of office in the involved organization and dimensions of the organizational commitment.

H9: There is statistically difference between their total terms of office in the related department and dimensions of the organizational commitment.

H10: There is statistically difference between having knowledge about organizational commitment and dimensions of the organizational commitment.

2. Methods

This study was aim to assess the organizational commitment levels of the workers in health sector and the workers of a dental and oral centre in Denizli town (N=193) composed the population of the study. After getting required permission; in order to achieve the goals stated in the study, a questionnaire on three dimensioned commitment which was developed by Allen and Meyer was employed and the workers were surveyed in terms of the three sub-dimensions of organizational commitment (emotional, continuance and normative). In the Likert-type scale, it was coded as I completely disagree=1, I disagree=2, I I am undecided=3, I agree=4,and I fully agree=5. Furthermore, 103 of the questionnaires were returned at the end of the study done between February-April 2011. The percentage for return of the questionnaires was found as 53.4%. To analyze the data, Statistical Package for the Social Sciences (SPSS) 13.0 were used. Descriptive statistics, Mann Whitney U test and Kruskal Wallis Variance Analysis were carried out. Also calculations are made to test the reliability of the scale and the Cronbach α value was found to be 57.

3. Results

When the socio-demographic characteristics of the population is viewed, it is seen that of the health center workers, 50.5% were between 25-30 years old; 77.7% were female; 72.8% were married; 34.1% had associate degrees; 85.4 % worked as health staff; the working duration for 44.7% ranged from 11 years to 15 years; the term of office for 75.7% in the involved organization and for 76.7% in the involved unit ranged from 1 years to 5 years and 82.5% had no knowledge about organizational commitment (Table 1).

From the perspective of normative commitment level which suggests that the worker felt morally duty-bound to the organization and administrators, the involved mean score suggests the indecisiveness of the workers on this topic, however it is found that the affective commitment levels were higher than the other commitment types. This result is significant in that it shows the organization workers continued to work because they wanted to and they were communed with the goals and values of the organization (Table 2).

Table1. Distribution of Staffs' Regarding Socio-demographic Features (n=103)

Variables	Number	%
Age Groups		
18-24 years old and between	14	13.6
25-34 years old and between	52	50.5
35-44 years old and between	25	24.3
45-50 years old and between	12	11.7
Gender		
Woman	80	77.7
Man	23	22.3
Marital Status		
Married	75	72.8
Single	28	27.2
Educational Status		
High School	30	29.1
Associate degree	35	34.1
Licance	19	18.4
Master and Docrorate	19	18.4
Task Status		
Health staff	88	85.4
Administrative staff	15	14.6
Working Duration (Year)		
Less than 1 year	6	5.8
1-5 years and between	39	37.9
6-10 years and between	12	11.7
11-15 years and between	46	44.7
Total term of office (Year)		
Less than 1 year	15	14.6
1-5 years and between	78	75.7
6-10 years and between	10	9.7
Working Duration in Involved Department (Year)		
Less than 1 year	18	17.5
1-5 years and between	79	76.7
6-10 years and between	6	5.8
Weekly Working Hour		
40 hours	53	51.5
45 hours	50	48.5
Monthly Average Income (TL)		
501-1000	44	42.7
1001-2000	33	32.0
2001-3000	6	5.8
3001 and above	20	19.4
Knowledge About Organizational commitment		
Available	18	17.5
Not available	85	82.5
Total	**103**	**100.0**

Table 2. The Distribution of Staffs' Organizational Commitment Levels (n= 103)

Dimensions	n	Mean Rank	SS
Affective commitment	103	3.23	0.47
Continuance commitment	103	3.05	0.70
Normative commitment	103	2.83	0.69

Scale: 1 = Completely Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Completely Agree

According to Kruskal Wallis Variance Analysis, on p=0.05 level, there was statistically no significant difference for the relation between the age groups and the workers' level of affective commitment (KW=4.45, p=0.217), continuance commitment (KW=0.66, p=0.881) and normative commitment (KW=3.74, p=0.290) (Table 3). And also it is seen that there was statistically no significant difference for the relation between the gender and the workers' level of affective commitment (p=0.377), continuance commitment (p=0.943) and normative commitment (p=0.306) according to the results of Mann Whitney U test (Table 4).

When the Table 5 is viewed, it is found that there is a significant difference for the relation between the marital status and the workers' level of affective commitment (p=0.001) and normative commitment (p=0.000) according to the results of Mann Whitney U test. Accordingly, single people were found to be more communed with the goals of the organization than married people and they were acting with a sense of responsibility. Considering the continuance commitment level (p=0.063), there is no significant difference found about the relation of it with marital status.

In the table 6, it is seen that on p=0.05 level, there was statistically no significant difference for the relation between the educational status and the workers' level of affective commitment (KW=3.86, p=0.277), continuance commitment (KW=2.97,p= 0.396) according to the results Kruskal Wallis Variance Analysis. As for the normative commitment levels (KW=13.01, p=0.005), it is found to display a statistically significant difference in its relation with educational status and this is thought to be result from the high school graduates. As the educational levels of the workers decreases, their possibility to regard staying in the organization as a duty increases, perhaps due to the weak possibility to find another job.

Table 3. The Distribution of Organizational Commitment with Regard to Age (n= 103)

Dimensions	Age	n	Mean Rank	KW	p
Affective Commitment	18-24 years old and between 25-34 years old and between 35-44 years old and between 45-50 years old and between	14 52 25 12	66.82 51.24 46.86 48.71	4.45	0.217
Continuance Commitment	18-24 years old and between 25-34 years old and between 35-44 years old and between 45-50 years old and between	14 52 25 12	48.82 54.00 51.76 47.54	0.66	0.881
Normative Commitment	18-24 years old and between 25-34 years old and between 35-44 years old and between 45-50 years old and between	14 52 25 12	60.14 54.88 45.58 43.38	3.74	0.290

Table 4. The Distribution of Organizational Commitment with Regard to Gender (n= 103)

Dimensions	Gender	n	Mean Rank	Mann Whitney U	p
Affective Commitment	Woman Man	80 23	53.38 47.20	809.5	0.377
Continuance Commitment	Women Man	80 23	51.89 52.39	911.0	0.943
Normative Commitment	Woman Man	80 23	53.60 46.43	792.0	0.306

Table 5. The Distribution of Organizational Commitment with Regard to Marital Status (n= 103)

Dimensions	Marital Status	n	Mean Rank	Mann Whitney U	p
Affective Commitment	Married Single	75 28	45.84 68.50	588.0	0.001
Continuance Commitment	Married Single	75 28	48.67 60.91	800.5	0.063
Normative Commitment	Married Single	75 28	45.74 68.77	580.5	0.000

Table 6. The Distribution of Organizational Commitment with Regard to Educational Status (n= 103)

Dimensions	Educational Status	n	Mean Rank	KW	p
Affective Commitment	High School Associate degree Licance Master and Docrorate	30 35 19 19	58.37 50.86 54.34 41.71	3.86	0.277
Continuance Commitment	High School Associate degree Licance Master and Docrorate	30 35 19 19	56.50 45.91 57.92 50.18	2.97	0.396
Normative Commitment	High School Associate degree Licance Master and Docrorate	30 35 19 19	64.92 43.71 59.37 39.50	13.01	0.005

When the other finding is reviewed, on p=0.05 level it is seen that there was statistically no significant difference for the relation between the task status and the workers' level of affective commitment (p=0.584), continuance commitment (p=0.160) and normative commitment (p=0.581) according to the results of Mann Whitney U test (Table 7).

In the Table 8 according to the results of Kruskal Wallis Variance Analysis, on p=0.05 level, it is found that there is a significant difference for the relation between the income and the workers' level of affective commitment (KW=7.90, p=0.048) and normative commitment (KW=10.82, p= 0.013). When it is estimated that the workers with low income were mostly covenanted employees, it is thought that the risk of leaving job is influential on this result. It is found that there was statistically no significant difference for the relation between the income and the workers' level of continuance commitment (KW=3.97, p=0.264).

Table 7. The Distribution of Organizational Commitment with Regard to Task Status (n= 103)

Dimensions	Task Status	n	Mean Rank	Mann Whitney U	p
Affective Commitment	Health staff Administrative staff	88 15	51.34 55.87	602.0	0.584
Continuance Commitment	Health staff Administrative staff	88 15	53.70 42.03	510.5	0.160
Normative Commitment	Health staff Administrative staff	88 15	52.66 48.10	601.5	0.581

Table 8. The Distribution of Organizational Commitment with Regard to their Income (n= 103)

Dimensions	Monthly Average Income (TL)	n	Mean Rank	KW	p
Affective Commitment	501-1000 1001-2000 2001-3000 3001 and above	44 33 6 20	58.84 52.20 27.67 43.93	7.90	0.048
Continuance Commitment	501-1000 1001-2000 2001-3000 3001 and above	44 33 6 20	55.75 46.64 36.67 57.20	3.97	0.264
Normative Commitment	501-1000 1001-2000 2001-3000 3001 and above	44 33 6 20	62.83 42.50 52.25 43.78	10.82	0.013

Table 9. The Distribution of Organizational Commitment with Regard to their Working Duration (n= 103)

Dimensions	Working Duration (Year)	n	Mean Rank	KW	p
Affective Commitment	Less than 1 year 1-5 years and between 6-10 years and between 11-15 years and between	6 39 12 46	66.33 56.10 42.79 49.05	3.77	0.287
Continuance Commitment	Less than 1 year 1-5 years and between 6-10 years and between 11-15 years and between	6 39 12 46	65.08 56.03 37.83 50.58	4.70	0.195
Normative Commitment	Less than 1 year 1-5 years and between 6-10 years and between 11-15 years and between	6 39 12 46	69.00 57.67 49.42 45.65	5.61	0.132

According to the results of Kruskal Wallis Variance Analysis, on p=0.05 level, it is seen that there was statistically no significant difference for the relation between the working duration and the workers' level of affective commitment (KW=3.77, p=0.287), continuance commitment (KW=4.70, p= 0.195) and normative commitment (KW=5.61, p=0.132) (Table 9).

In the Table 10 according to the results of Kruskal Wallis Variance Analysis, on p=0.05 level, it is found that there is a significant difference for the relation between the terms of office in the involved organization and the workers' level of affective commitment (KW=8.16, p=0.017) and continuance commitment (KW=10.86, p= 0.004). As the term of office in the organization increases, it is thought that they took the expenses in cases of leaving the organization into consideration, as well as their internalization of working for the organization. It is found that there was statistically no significant difference for the relation between the terms of office in the involved organization and the workers' level of normative commitment (KW=1.12, p=0.132).

Table 10. The Distribution of Organizational Commitment with Regard to their Total Terms of Office in the Involved Organization (n= 103)

Dimensions	Total Term of Office (Year)	n	Mean Rank	KW	p
Affective Commitment	Less than 1 year	15	45.20	8.16	0.017
	1-5 years and between	78	5.012		
	6-10 years and between	10	76.85		
Continuance Commitment	Less than 1 year	15	43.80	10.86	0.004
	1-5 years and between	78	49.89		
	6-10 years and between	10	80.75		
Normative Commitment	Less than 1 year	15	52.00	1.12	0.132
	1-5 years and between	78	50.80		
	6-10 years and between	10	61.35		

Table 11. The Distribution of Organizational Commitment with Regard to their Total Terms of Office in the Related Department (n= 103)

Dimensions	Working Duration in Related Department (Year)	n	Mean Rank	KW	p
Affective Commitment	Less than 1 year	18	43.36	5.29	0.071
	1-5 years and between	79	52.19		
	6-10 years and between	6	75.42		
Continuance Commitment	Less than 1 year	18	43.78	5.84	0.054
	1-5 years and between	79	51.92		
	6-10 years and between	6	77.67		
Normative Commitment	Less than 1 year	18	53.06	0.18	0.912
	1-5 years and between	79	52.13		
	6-10 years and between	6	47.17		

Table 12. The Distribution of Organizational Commitment with Regard to Whether the Workers Have a Knowledge About Organizational Commitment (n= 103)

Dimensions	Knowledge About Organizational Commitment	n	Mean Rank	Mann Whitney U	p
Affective Commitment	Available	18	58.06	656.0	0.339
	Not available	85	50.72		
Continuance Commitment	Available	18	41.47	575.5	0.098
	Not available	85	54.23		
Normative Commitment	Available	18	49.72	724.0	0.719
	Not available	85	52.48		

According to the results of Kruskal Wallis Variance Analysis, on p=0.05 level, it is seen that there was statistically no significant difference for the relation between working duration in the related department and the workers' level of affective commitment (KW=5.29, p=0.071, continuance commitment (KW=5.84,p= 0.054) and normative commitment (KW=0.18, p=0.912) (Table 11).

In the Table 12, according to the results of Mann Whitney U test, on p=0.05 level, it is seen that there was statistically no significant difference for the relation between whether they have knowledge about organizational commitment and the workers' level of affective commitment (p=0.339), continuance commitment (p=0.098) and normative commitment (p=0.719).

4. Discussion

Organizational commitment is very important for an organization to continue its existence and to achieve the established goals efficiently and effectively. When looked from the perspective of organizational commitment, it is observed that workers, particularly those with high affective commmitment, commune with the organizational goals better and endeavour to achieve these goals.

According to the results of this study; there was statistically no significant difference for the relation between the some variables (such as age groups, gender, task status, total working duration, total terms of office in the related department and having knowledge about organisational commitment) and the workers' level of dimensions of the organizational commitment. Due to the these results hypotheses H1, H2, H5, H7, H9 and H10 were rejected. According to the results of another study by Somunoğlu ve Yılmaz (10) on the organizational commitment of the medical secretaries, the continuance commitment of the secretaries is higher than other commitment types, men's level of affective commitment is higher than that of women, on the other hand, it is found that there is no significant difference with regard to term of office, having knowledge about organizational commitment and age.

On the other hand it was seen that there was a significant difference for the relation between the marital status and the workers' level of affective commitment and normative commitment. Due to the these results hypothesis H3 was supported for both affective and normative commitment dimensions. You can see the same results in the study which was made by Gündoğan (8). It was seen that there was a significant difference between affective commitment and marital status.

In this study it was also found that there was a significant difference for the relation between the educational status and the workers' level of normative commitment. Because of this result hypothesis H4 was supported for both affective and normative commitment dimension. According to the results of this study there was a significant difference for the relation between the income and the workers' level of affective commitment and normative commitment. Due to the these results hypothesis H6 was supported for both affective and normative commitment dimensions. It was also seen that there was a significant diffrence for the relation between the terms of office in the involved organization and the workers' level of affective commitment and continuance commitment. Because of reaching these results at the end of the study hypothesis H8 was supported for both affective and continuance commitment dimensions. A study by Gündoğan (8), there was a parallel relation between affective commitment and age and total terms of office of the workers and there is a decrease in their affective commitment as the education level increases.

Considering the importance of human health for health sector, it is stressed that error risks may be minimized with a personnel with high organizational commitment who feels belonging to the organization he works for. Therefore, it is thought that in health sector, adopting the attempts of other sectors to increase organizational commitment would contribute substantially.

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Analysis and effective implementation of mobile based tele-alert system for enhancing remote health-care scenario

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Abstract

Cardiac arrest is one of the leading causes for sudden death. The chance of occurrence of severe myocardial problem increases after the first attack. Detecting the one set of cardiac malfunctioning is ever challenging. This paper deals with the enhancement of the Tele-Health system by providing continuous mobility to both the patient and doctor thereby improving the psychological well being. It is accomplished by detecting the abnormal changes in Heart rate as well as Electrocardiography (ECG) of the patient in prior and gives a self - alert ring to the patient and also sending an alert Short Messaging Service (SMS) to the doctor through Global System for Mobile (GSM) Mobile phones thus gaining immediate medical attention and hence reducing the critical level of the patient.

Key words: Bio-medical Communication, Electrocardiography (ECG), Global System for Mobile (GSM), Heart Rate, Short Messaging Service (SMS), Telemetry and Wireless transmission.

1. Introduction

Law is an important public health tool that plays a critical role in reducing illness and premature death. Public health law examines the authority of the government at various jurisdictional levels to improve the health of the general population within societal limits and norms. Public health law typically has three major areas of practice: police power, Disease/Injury prevention and the law of population. According to the recent survey of WHO (World Health Organization), Myocardial malfunctioning is the major cause for all the sudden cardiac deaths all over the world. There is about 5 lakhs number of deaths in India every year and in millions in world wide. For the past two decades, the proportion of men and women has undiagnosed high cholesterol of range from 42.4% to 61.9% in males. In England the proportion was from the range of 53% to 75.1% and in females the proportion dropped from 30.4%. In United States, for males the rate fell gradually from 33% and in females it fell from 25.2%. In India, most of them have suffered by cardiovascular disease (CVD) due to hypertension, high cholesterol, smoking and other high risk factors. In the recent survey, 60% of software engineers (below the age of 30) have high blood pressure that will also lead to myocardial infarction.

In 2011 survey, it tells that lack of diet (obesity) is the major cause for the cardiac disorders. The adult age groups are largely affected with this. Among children 2 to 19 years of age, 31.9% are over weighted and obese. For >= 20 years of age, 67.37% are over weighted and obese from the total population. From the year 2005 to 2008, the Data from the National Health and Nutrition Examination Survey (NHANES) indicate that 33.5% of US adults are greater than or equal to 20 years of age have hypertension. The prevalence of hypertension is nearly equal between men and women. African American adults have among the highest rates of hypertension in the world at 44%. Among hypertensive adults, 80% are aware of their condition, 71% are using antihypertensive medication, and only 48% of those aware that they have hypertension have their condition controlled. For 4 decades of progress, in 2008 the Americans are greater than 18 years of age, 23.1% of men and 18.3% of women continued to be cigarette smokers. In 2009, 19.5% of students use tobacco. The rate of death increases every year due to the modern life style. The myocardial infarction happens due to large stress, strain, increased fat, increased chemical content in the body, blockages in the blo-

od vessels, obesity etc. So the only way to increase the life of the victim is to detect the myocardial infraction early so that the patient will be given immediate medical attention as soon as possible. Our aim is to design a module that detects the heart block in advance (especially to sense the painless heart attack) and enhances the mobility of the doctor as well as the patient thereby leaping a step forward in the healthcare industry.

2. Existing system

Using the pervasive technology, [4] it is possible to collect the user symptoms and one set of heart attack by analyzing ECG recordings. Three different models are proposed to detect the pathological degeneration. They are cell model, heart model, chest model [8]. This model cannot be finished yet because it requires lots of unknown parameters. Monitoring the cardiovascular patient is not a valuable practice to prevent further risks. Thus the early detection is needed. The mentioned paper performs the task of monitoring the ECG like detection and alarm generation for tachycardia, bradycardia, acute myocardial infarction and ventricular fibrillation. Below mentioned paper proposed that ECG can be analysis and then communications with a mobile phone [10]. This paper proposed the model to analysis the electrocardiography using the advancement in the wireless technology. Holter is the device used to detect the malfunctioning [11]. In this paper, the standalone fetal ECG monitors based on polynomial classifiers method. It displays fetal ECG and in addition, it can calculate the fetal heart rate [13]. These kinds of problems can be overcome by this proposed system (i.e) No need for centralized server and continuous monitoring is possible.

3. System model and methodology

We propose the design and development of a module that enhances the mobility of the doctor and the patient thereby leaping a step forward in the healthcare industry. We identify the deviations in cardiac beats of the patient in prior and send an alert SMS to the doctor through GSM Modem (Mobile phones) thereby taking necessary preliminary measures gaining immediate health care and hence reducing the critical level of the patient as in Figure 1.

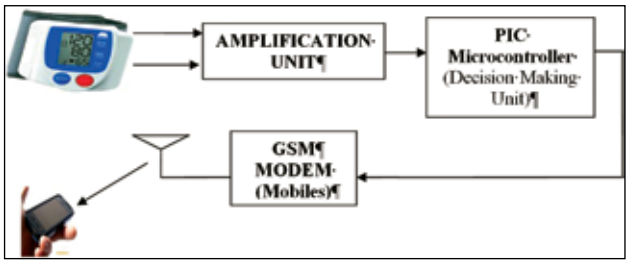

Figure 1. Block diagram of Proposed Tele-Health System

Even though the ECG is take-out by using high technical ECG/IR sensor, to obtain a noise-free signal is impossible. The noise added to the ECG is unavoidable but the signal with noise cannot be used for further processing. If we have processed noisy signal for abnormality detection, it can be leads to more number of false detection. That's why, we should extract the original (noise-free) signal from the noise affected signal. We discuss a process to get the noise limited signal and make it suite for further processing as Shown in the Figure 2.

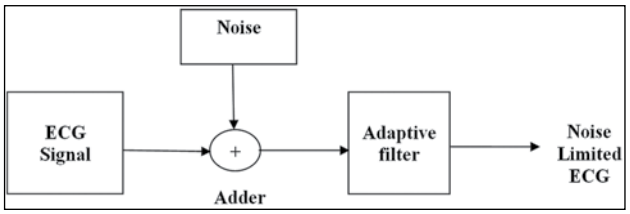

Figure 2. Block Description to remove the noises from ECG signal

3.1 ECG Signal

The Electrocardiogram (ECG) signal is generated due to the contraction and expansion of the heart. It represents the electrical activity of the heart muscle and it is obtained by using the electrodes placed on the surface of the patient's body. One cycle of ECG waveform consist of four components. They are P-, QRS, T- and U- wave components. But we are considering the QRS complex alone, because the QRS Complex will be the cause for severe heart block.

3.2 Types of Noises in ECG

ECG wave can be obtained by using high efficient sensors. It is impossible to remove the noises completely from the ECG signal. If the noise level in ECG is increased then it will leads to high false

abnormal detection about the patient's health. Hence we should remove noises by using filters as much as possible. Some of the types of noises are EMG wave noise, power line interference, room temperature, 60 Hz artifact, baseline fluctuation. It is possible to detect the heart beat of the unborn child non-invasive by using the prenatal monitoring. Maternal ECG can make it very difficult to perceive the fetal ECG since it is a low amplitude signal. The maternal ECG has been eliminated by using adaptive filter.

Table 1. Types of Noises in ECG and its Description

Types of Noises	Description
Thermal noise	It arises from random electron motion and characterized by a uniform distribution of energy over the frequency spectrum
Impulse noise	It is a non-continuous series of irregular pulses or noise "spikes" of short duration
Shot noise	It consist of unavoidable random statistical fluctuations of the electric current in an electrical conductor
Burst noise	It consists of sudden step-like transitions between two or more levels
Avalanche noise	The noise produced when a junction diode is operated at the onset of avalanche breakdown
Cross talk	It refers to unwanted coupling between signal paths

3.3 Adaptive Filter

The ECG signal has affected by different types of noise. For removing these types of noise, we have to choose adaptive filter because any type of noise can be eliminate by using this filter and also it can be adaptable for the nature of noise. So, mostly the noises in the ECG signals are effectively removed by the adaptive filter. In the adaptive filter, we have two methods to remove the noise. They are:

(1) With reference input
(2) Without reference input.

In the first method, the primary input and ECG signal with artifact, while the reference inputs are accelerometer and a bias.

$$X(n) = [B, A_x(n), A_y(n), A_z(n)] \quad (1)$$

The element of reference input was set to a constant value B, which was set to 1. The co-efficient of filters are

$$F=[f_0, f_1, f_2, f_3] \quad (2)$$

Then the filter output is

$$Y=XF^T \quad (3)$$

The filter error can be found that the difference between the primary input and filter output. By taking adaptive transformation, we have to eliminate noise from contaminated ECG signal to get the noise-limited signal for the further preprocessing and post processing.

3.4 Patient Unit

This unit includes heart beat and Blood pressure acquisition circuit that comprises of a wrist type Sensor which is used for picking up the bioelectric potentials caused by heart muscle and also the systolic and diastolic blood pressure followed by an LM358 amplifier. Since the signal level is too weak for processing and fixing threshold level, we need to strengthen the amplitude using LM358 amplifier circuit followed by a micro controller with a threshold set by the medical expert.

3.5 Heart Rate & Blood Pressure Sensor

Blood pressure sensing unit comprising: a microprocessor module; a screen module, wherein the screen comprises at least two displays visualizing measurement readings of systolic pressure, diastolic pressure and pulse rate in numeric figures and graphical plot. The method comprises of encircling a wrist type blood pressure meter to a person's wrist whose blood pressure and heart rate is to be measured; pressing a start button on the wrist-type blood pressure meter and then measuring the blood pressure and heart rate of the person with a blood pressure measuring module and a ECG leads module, wherein the blood pressure measuring module and the ECG leads module is connected to the processor module. It provides an easy way to measure and monitor blood pressure

and heart beat rate. The design of this unit is very simple and also it has salient features like easy handling, resilient nature. Functioning of this unit allows individuals to supervise the heartbeat during work out and exercises.

4. Results and discussion

4.1 Simulation Results Using LabVIEW

Figure 3 shows that we have to recover the original ECG signal from the noisy signal. There are various kinds of noises which are explained as in Table.1. By using ECG simulator, an ECG signal sample is mixed with noises as shown in Figure 2. After that, contaminated noisy signal is undergone adaptive transformation (wavelet) to get the noise-limited signal. Then we have to take inverse transformation to recover the original signal in inverse true mode and the noise signal in the inverse false mode. From this we have observed that the feasibility of the recovering the original ECG signal from the contaminated signal by using adaptive filter.

Estimation of Heart rate from the ECG Signal is shown in the Figure 3. The adaptive filtered ECG signal is shown in the Figure 4 and it observed that we have added and test the 60 Hz noise signal because it is the mostly arising noise in the real time ECG signal. Then the same adaptive transformation and inverse transformation can be taken to recover the original signal.

Figure 4. LabVIEW Design for extracting Heart Rate from the ECG signal

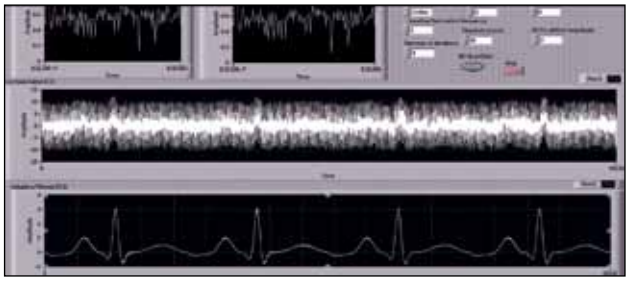

Figure 5. 60 Hz Noise Removal from ECG Signal using adaptive filter

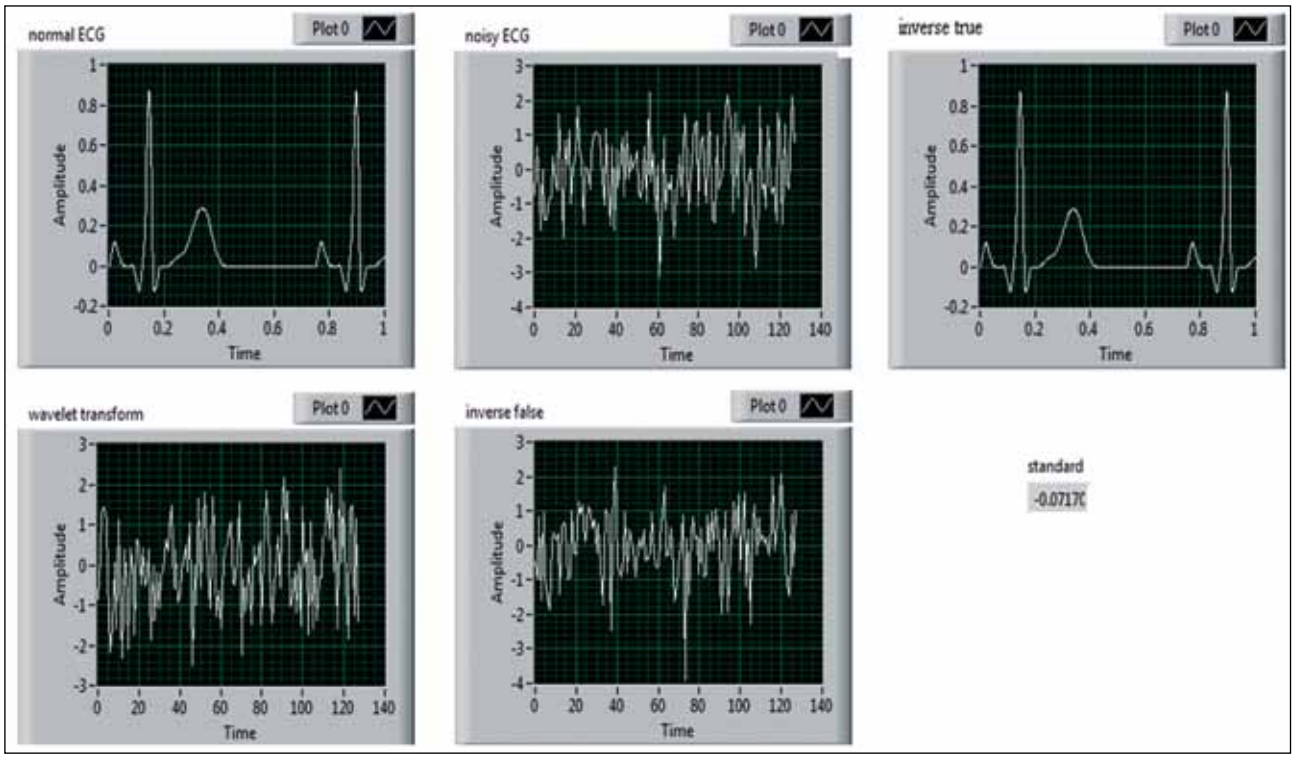

Figure 3. Feasibility study for Noise Removal from ECG using LabVIEW

4.2 Numerical Analysis

If the analysis of the ECG signal is need to be done for 'N' number of users, and then the LabVIEW is not an optimal way. For this we use LABCHART, the procedure is same as that of the LABVIEW.

The mean and standard deviation were calculated for the 'N' users. ECG samples from various patients were taken and pulse mean, ECG mean and heart rate sampling rate were calculated using Lab chart 6.1. Also we have calculated the mean, maximum value and heart block range using Lab chart as a software simulation tool and the corresponding results are shown in Figure 6.

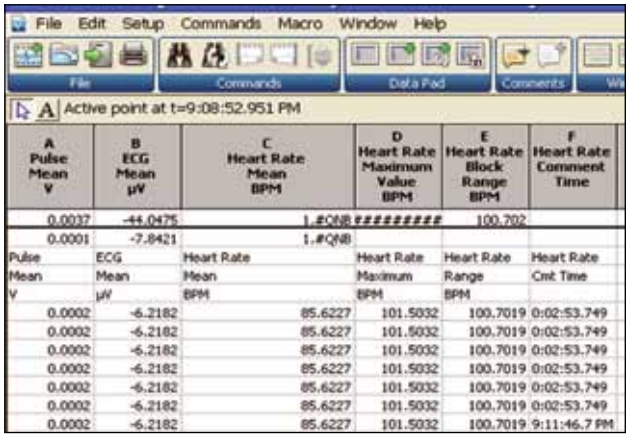

Figure 6. Labchart Analysis of ECG Mean, Standard Deviation for 'N' Patients

ECG samples from various rabbits were taken and hence pulse mean, ECG mean, heart rate and sampling rate were calculated using Labchart 6.1. Statistical results obtained are shown in the Figure 7.

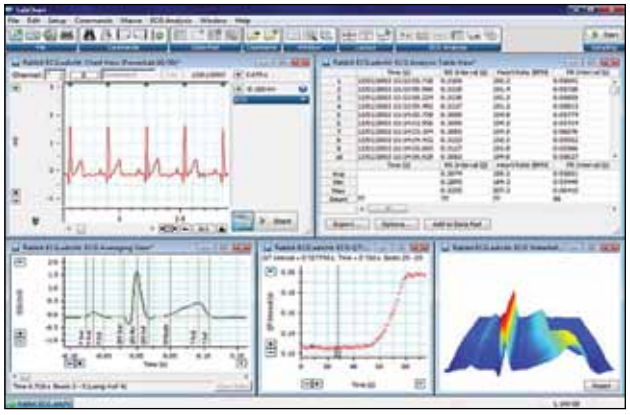

Figure 7. Labchart Rabbit ECG Analysis to Compute Heart Rate and PR Interval

Table 1. shows that the measurement of ECG from different patients. From that those who are having normal and abnormal ECG can be noted as number of cases and percentage. In the abnormal ECG, we have different kinds such as tachycardia (higher than normal rate), bradycardia (lesser than normal rate), depression of ST segment and inversion of T wave.

Table 2. Statistics of Cardiac Patients with Normal and Abnormal ECG

ECG Changes	No. of Cases	%
Normal ECG	75	62
Abnormal ECG		
Sinus Tachycardia	29	24
Depression of ST segment and inversion of T wave in lead II, III and avF	9	7.4
Sinus Bradycardia	8	6.6

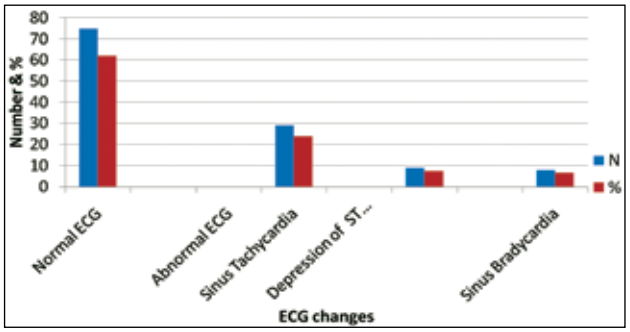

Figure 8. Statistical Plot for Table 2

Table 3. Various ECG Interpretations for 'N' Patients in Rural Areas

Findings	Number	%
Rhythm:		
C Sinus	85	91
C Atrial fibrillation/flutter	6	6
C junctional	2	2
LVH	46	49
Left atrial abnormality	15	16
Left bundle branch block	11	12
Right bundle branch block	4	4
Ischaemia/infarct	29	31

From the table 4, it is observed that the abnormal Cardiac patients may differ from each other while doing various actions and we have noted the state of the ECG should be abnormal while doing various actions. From this, we have also noted the P-value additionally.

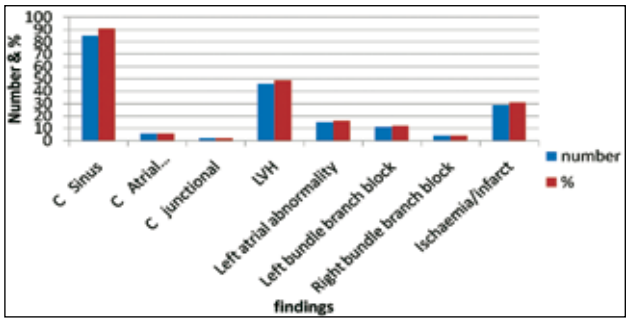

Figure 9. Statistical Plot for Table 3

Table 4. Measurement of Abnormal ECG for Various human activities

Variables	Abnormal ECG		P-Value
	Yes N(%) N=25	No N(%) N=209	
Onset:			
Acute	25(100)	144(69.2)	0.01
Gradual	0(0)	65(30.8)	
Frequency:			
Frequent	23(91.7)	130(61.9)	0.04
Infrequent	2(8.3)	79(38.1)	
Prolonged standing	0(0)	5(2.6)	0.6
Emotion	3(12.5)	25(11.9)	0.6
Early exercise	7(29.2)	58(27.4)	0.5
Others	8(34.8)	53(27.6)	0.3
Dizziness	0(0)	9(3.8)	0.4
Palpitation	5(20.8)	19(9.3)	0.09
Nausea	4(16)	17(8.1)	0.8
Sweating	0(0)	9(4.7)	0.4
Murmur	3(12.5)	16(7.8)	0.3

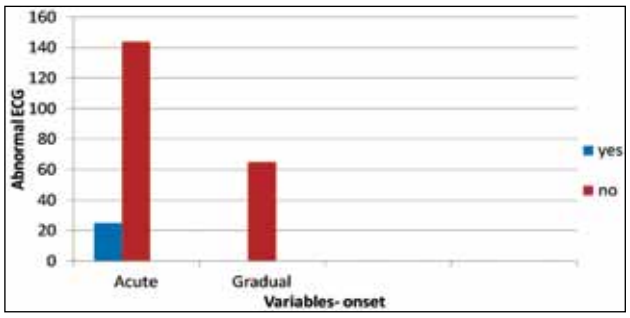

Figure 10. Statistical Plot for Table 4

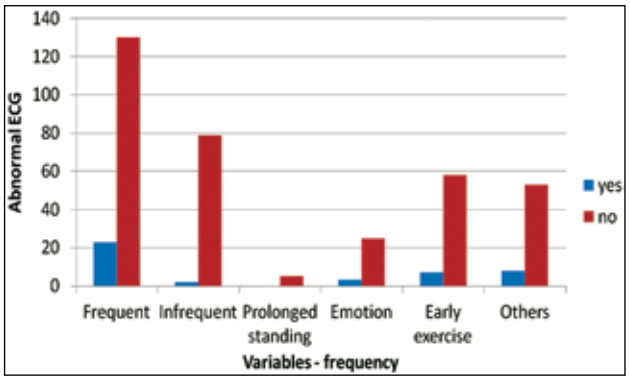

Figure 11. Statistical Plot for Table 4

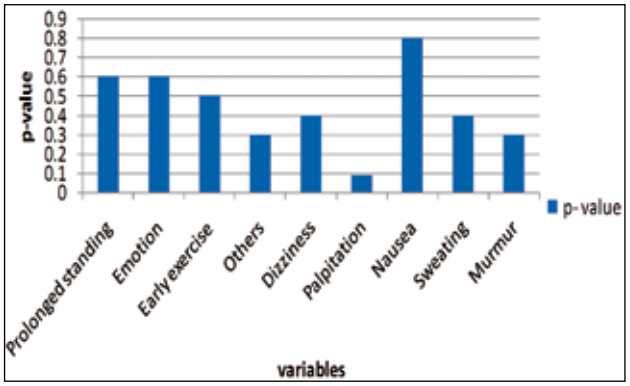

Figure 12. Statistical Plot for Table 4

Figure 13. shows the statistical result shows that the ECG findings for the different number of persons and its percentage. From this, we infer that the left ventricular hypertrophy should be higher when compared with others as in Table 5.

Table 5. Abnormal ECG Findings from myocardial Actions

Findings	N	%
Left ventricular Hypertrophy	65	91.5
Left Axis Deviation	44	17.0
Left Atrial Enlargement	30	42.3
Sinus Tachycardia	14	19.7
Complete Bundle Branch Block	11	15.5
Left Bundle Branch Block	7	9.9
Right Bundle Branch Block	4	5.6
Right Atrial Enlargement	8	11.3
Biatrial Atrial Enlargement	5	7.0
Atrial Fibrillation	5	7.0
Ventricular Premature beats	4	5.6
Sinus Bradycardia	2	2.8

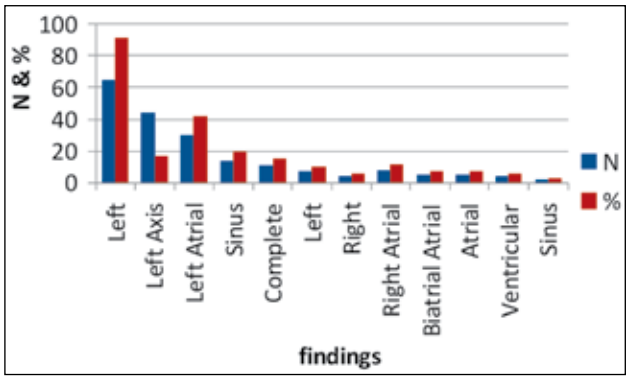

Figure 13. Statistical Plot for Table 5

Conclusion

A new wireless cardiac Tele-health system for heart rate variability analysis has been presented. The proposed work focuses on design and implementation of an ultra low power wearable device that acquires patient vital parameters, causing minimal discomfort and allowing high mobility. The proposed system could be used as a forewarning system for monitoring during normal activity or physical exercises. The most important value of this developed Mobile Tele-health system lies in the detection of heart rate of the patients who are located in the remote areas or in travel and are not in a position to report to the doctor for immediate treatment, An alert SMS can be transmitted using the GSM technology to the doctors and advises can be sought for saving the life of the patient. The proposed module enables the heart patient to be on the move globally carrying out his day to day work. Its fault tolerance limit was found to be around ±4%. In clinical application, we find that it can detect difference between cardiovascular patients and normal persons. These study results have great significance in researching, preventing, finding epidemics in cardiovascular system for our country.

Acknowledgement

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The oral health status and periodontal risk factors of 6-to-17-year-old children and adolescents - Cross-sectional study

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Abstract

The World Health Organization (WHO) recommends epidemiological studies for planning dental services to collect information about oral disease, oral health, and treatment needs of population. The periodontal and dental examinations were made on 4534 children (2018 males and 2516 females) by using CPI and DMFT indices. Information concerning with parent's demographic status was obtained through a survey questionnaires. According to CPI scores; 5.1% of males and 8.9% of females had healthy periodontium. Of the entire group; 70.0% of males and 67.8% of females had bleeding on probing (score 1) and the highest percentages were obtained for 8-year-old males (88.2%) and 7-year-old females (90.8%), respectively. Mean DMFT scores were 2.66±3.0 for males and 2.30±2.8 for females, respectively. For the entire group; the most affected CPI sextants were lower anterior for both gender (males 19.4%, females 17.8%). Multiple binary logistic regression analysis showed that the parents educational level, frequency of tooth brushing, anxiety, preventive dental visits and sleep duration were significant risk indicators for periodontal disease. This study clearly indicated that effective oral health prevention strategies need to be implemented to improve the oral health of school-children in Turkey.

Key words: Oral health, gingival conditions, children and adolescence, epidemiology, risk factors

Introduction

Oral health is very important in young children and adolescents to prevent the periodontal disease in populations in later ages. There are many factors affecting the oral health, and no one single factor could be claimed to represent oral health-related quality of life (1). Although, gender, age, dental attendance and socio-economic variables were all relevant, it was only when multi-dimensional measures were used that oral health could be conceptualized (2). Gingival bleeding and the presence of dental calculus in children and adolescents have been an issue almost in every country especially in the rural areas.

Only a few studies have determined the oral hygiene status of the children in Turkey. Bozkurt and Kiran (3), assessed the oral health status and the interest in oral hygiene of only 12-16-year-old adolescents living in an orphanage and in the families. In the orphan group, they determined that the mean values of periodontal condition scores that meant poor oral hygiene were higher than the control group and the orphans had low degree of the interest in oral hygiene (3). Altun et al.(4), evaluated 4186 patients aged between 6 to 11 years who were admitted to the Center of Dental Sciences of Military Medical Academy in the year 2002. They reported that the prevalence of caries in the samples was 71.2%, and 9.2% of the cases had codes 1 and 2 of CPI, indicating gingival inflammation. Saracoglu et al., investigated the effect of social status on caries and periodontal disease prevalence among a group of dental students and reported that the correlation

between caries incidence and social and cultural status was significant (5). Preventive dentistry services has been practiced in Turkiye since 1930 and it focused mainly on 6 - 17 years old children. The idea of supporting oral health in children stem from the idea that the majority of the general health behaviors as tooth brushing, dietary control, smoking which will be carried to the later periods of life are acquired in childhood. In this period, children are affected from the speech or behaviors of their families, teachers or health professionals (7-9).

In this context, we aimed to evaluate the oral health status of children and adolescents both using CPI and DMFT.

Methods

Study design

Data were obtained from a cross-sectional screening study; DAMTCA II (Determination of Anthropometric Measurements in Turkish Children and Adolescents) between October 2007–April 2008. The study was conducted in the central Anatolian city of Turkiye (Kayseri), which has more than 1 200 000 inhabitants. Totally, 4534 children and adolescents (2018 males and 2516 females) aged between 6 and 17 years were selected randomly from 16 schools (6 primary, 10 high school) among 699 schools in Kayseri. In keeping with the socio-economic level of the population, state and private schools in the city centre and surrounding districts were included in the study. Children with known systemic or local disorders who had previously used any medication which might interfere development, and who had not erupted the first molar at the age of 6, and who refused to participate the study were excluded.

This study was approved by institutional review board of Erciyes University. Parents' written consent was obtained prior to the study, and the procedures followed were in accordance with those outlined by the Declaration of Helsinki. Permission to conduct the study was obtained from the Ministry of Education, Ministry of Health, and Local Governorship.

Sampling technique

In the current study, a stratified multistage probability sampling design was used. The sampling design of the study was a two-stage probability sampling. The first stage was the random selection of state and private schools that represented the city centre and districts by the stratified sampling method according to low, medium and high socio-economic levels. The second stage was the simple random sampling of children and adolescents based on ages. We assigned the schools randomly from the list of schools which were grouped according to socioeconomic level by the local educational authorities. An equal number of schools in each socioeconomic level, and the same age group of students (proportionally from grade 1 to grade 12) were randomly selected.

The chronological age was calculated as the decimal age by subtracting the observation date from the birth date. Each year elapsed from their birthday was noted as one age (e.g. 6 indicate 6.00-6.99 years, etc.). A socio-demographic survey was given to all participants or parents and they were evaluated.

Dental examination

The parameters used to measure oral health status were CPI and DMFT. The data were recorded into five categories according to CPI scores as follows: score 0 = healthy; score 1 = bleeding on gentle probing; score 2 = calculus; score 3 = shallow pockets of 4 or 5 mm, and score 4 = deep pockets of 6 mm or more. Only one tooth with the highest CPI scores was recorded as the CPI score for each sextant. The highest sextant score was recorded as the CPI score of the children/adolescent.

The sum of decayed, missing and filled teeth in the deciduous dentition (dmft) and sum of decayed, missing and filled teeth in the permanent dentition (DMFT) indices were used to assess oral health outcomes. The indices include a record of the presence/absence of all teeth including presumptive cause of tooth loss and are a cumulative measure of caries experience. Both measures (dmft and DMFT) were used for children aged 6–11 years because in such age-groups children have a mixed dentition which includes both primary and permanent teeth. Permanent teeth usually start erupting about the age of 6. The DMFT was used for adolescents aged between 12-17 years.

The oral examinations were in accordance with WHO criteria (10), and undertaken by two specialist dentists. Examinations were conducted by using

dental mouth-mirrors. Teeth were examined without drying in natural lights. A WHO-621 Trinity probe was used and calibrated to give a constant probing force of 20–25 g as recommended. The probe has a 0.5-mm diameter ball tip, which enhances detection of subgingival calculus or overhanging restorative margins and limits false readings from over-measurement of probing depths. It also has a color-coded band extending 3.5 to 5.5mm from the tip, which facilitates rapid interpretation of probing depths. The WHO probe was gently inserted into the gingival pocket, and the depth of penetration was read against the color-coded band. The dentition was divided into six parts (sextants) for assessment of periodontal conditions. The sextants were numbered from the maxillary right sextant, proceeding in a clockwise manner and finishing in the mandibular right. Each tooth were examined by gently "walking the probe" around the tooth, uniformly passing the probe around the gingival sulcus and for each sextant, only the highest score was recorded. All fully erupted teeth, except third molars and retained roots, were examined.

All of the inter-observer correlation coefficients and the test and re-test reliability of measurements were determined.

Questionnaire

The survey was based on a questionnaire sent home prior to evaluation and collection of anthropometric data from participating children and adolescents. The questionnaire consisted of three sections. A general section concerned self-reported family data such as place of residence (province center/town center/village), self-report of socio-economic status (poor/middle income/wealthy) and a parent's section concerning the level of education, employment status of both mother and father. Finally, the child's section included average time spend on media (computer /TV) and sleep duration.

Statistical Analysis

Differences in the DMFT scores between males and females were examined using the student's t-test. In order to determine the association between CPI scores within each age and gender, Chi-square test was performed. Univariate and multiple binary logistic regression analyses (adjusted for age), were used to determine the risk factors to influence DMFT and CPI scores. DMFT was coded as 0 versus 1, and CPI was coded as yes and no (bleeding-yes versus non-bleeding-no). Cohen's Kappa analyses was used to measure the intra- and inter-examiner reliability. The Kappa statistics were applied to measure the level of agreement in duplicate assessments of the status of each tooth. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 13.0 (SPSS Inc., Chicago, Illinois, USA) for Windows. Two-tailed p-values of <0.05 were considered to be significant.

Results

All of the inter-observer correlation coefficients were ≥ 0.91; and coefficients of variability were 4% and 3%, for the test and re-test reliability respectively. The inter- and intra-examiner Kappa scores for assessment of the reliability were high with all values greater than 0.75. A total of 192 children (2.8 %) were excluded from the study due to rejecting the participate and/or having chronic or developmental disorders.

The extent of periodontal condition of the students using CPI scores and DMFT indices by different ages (6-17 years) was shown in Table 1. According to CPI scores; totally, 5.1% of males and 8.9% of females had healthy periodontium (score 0). Of the entire group; 70.0% of males and 67.8% of females had bleeding on probing (score 1) and the highest percentages were obtained for 8-year-old males (88.2%) and 7-year-old females (90.8%), respectively. Of the entire group; 24.8% of males and 23.3% of females had calculus (score 2) and the highest percentages were obtained for 17-year-old males (47.7%) and 17-year-old females (47.1%), respectively. The calculus percentages increased with the increment in age. The pockets of the 4-5 mm in depth (score 3) were present in only 3 males (0.09 %) and 1 female (0.03%), no children/adolescent exhibited deep pockets with more than 6mm in depth (score 4).

According to DMFT scores for the entire group, mean scores were 2.66±3.0 for males and 2.30±2.8 for females, respectively. The highest DMFT scores pointed out 7-year-old males (4.9±3.5) and 8-year-old females (4.9±3.1) (Table 1).

We did not make any discrimination between primary and permanent teeth because the primary aim of our study was to provide information about

Table 1. The extent of periodontal condition of the students using CPI scores and DMFT indices by different ages (6–17 years)

Age (y)	Sample size (n)		CPI Scores										DMFT	
			Score 0 (Healthy)		Score 1 (Bleeding)		Score 2 (Calculus)		Score 3 (pocket 4-5 mm)		Score 4 (pocket ≥6 mm)			
	Male	Female	Male n(%)	Female n(%)	Male n(%)	Female n(%)	Male n(%)	Female n(%)	Male n(%)	Female n(%)	Male n(%)	Female n(%)	Male Mean±SD	Female Mean±SD
6	130	142	16(12.3)	20(14.1)	107(82.3)	116(81.7)	7(5.4)	6(4.2)	0(0)	0(0)	0(0)	0(0)	4.7±3.9	4.8±3.9
7	183	184	15(8.2)	14(7.6)	157(85.8)	167(90.8)	10(5.5)	3(1.6)	1(0.5)	0(0)	0(0)	0(0)	4.9±3.5	4.5±3.4
8	195	201	9(4.6)	14(7.0)	172(88.2)	179(89.1)	14(7.2)	8(4.0)	0(0)	0(0)	0(0)	0(0)	4.7±3.0	4.9±3.1
9	163	169	12(7.4)	9(5.3)	140(85.9)	151(89.3)	11(6.7)	9(5.3)	0(0)	0(0)	0(0)	0(0)	4.5±3.2	3.3±2.6*
10	188	203	12(6.4)	22(10.8)	149(79.3)	163(80.3)	27(14.4)	18(8.9)	0(0)	0(0)	0(0)	0(0)	2.6±2.5	2.1±2.2*
11	176	144	13(7.4)	13(9.0)	135(76.7)	111(77.1)	28(15.9)	20(13.9)	0(0)	0(0)	0(0)	0(0)	2.0±2.0	1.5±1.8*
12	131	173	3(2.3)	10(5.8)	87(66.4)	116(67.1)	41(31.3)	47(27.2)	0(0)	0(0)	0(0)	0(0)	1.4±1.9	1.2±2.2
13	149	156	4(2.7)	8(4.6)	85(57.0)	114(65.9)	60(40.3)	51(29.5)	0(0)	0(0)	0(0)	0(0)	0.9±1.4	1.3±1.8*
14#	160	398	4(2.5)	22(14.1)	99(61.9)	91(58.3)	57(35.6)	43(27.6)	0(0)	0(0)	0(0)	0(0)	1.3±1.9	1.6±2.3
15#	232	435	6(2.6)	38(9.5)	125(53.9)	223(56.0)	101(43.5)	136(34.2)	0(0)	1(0.3)	0(0)	0(0)	1.4±2.1	1.5±2.3
16#	225	138	6(2.7)	43(9.9)	114(50.7)	212(48.7)	104(46.2)	180(41.4)	1(0.4)	0(0)	0(0)	0(0)	1.6±2.3	1.4±2.3
17	86	138	2(2.3)	10(7.2)	42(48.8)	63(45.7)	41(47.7)	65(47.1)	1(1.2)	0(0)	0(0)	0(0)	1.6±2.2	1.2±1.9
Total	2018	2516	102 (5.1)	223(8.9)	1412 (70.0)	1706(67.8)	501 (24.8)	586(23.3)	3 (0.009)	1(0.3)	0(0)	0(0)	2.66±3.0	2.3±2.8*

*Chi-square test and *Student's t-test; p<0.05, SD; standard deviation*

the need of therapy for dental disorders not to discriminate the need of therapy for primary and permanent teeth.

The average of the most frequently affected CPI sextants according to age and gender were shown in Table 2. In 6-year-old group; the most affected CPI sextants (score 2) were left upper posterior (3.1%) and lower anterior (3.1%) for males, while right (2.1%) and left upper posterior (2.1%) for females, respectively. In the 7-year-old group; the most affected CPI sextants were right upper posterior (3.8%) for males, whereas lower anterior (1.1%) for females, respectively. In the 8-year-old group: the most affected CPI sextants were lower anterior (4.6%) for males, whereas left upper posterior (2.0%) for females, respectively. In the 9-year-old group; the most affected CPI sextants were lower anterior (males 4.9%, females 3.0%), respectively. In the 10-year-old group; the most affected CPI sextants were lower anterior (males 6.4%, females 4.4%), respectively. In the 11-year-old group; the most affected CPI sextants were lower anterior (8.5%) for males, whereas left upper posterior (10.4%) for females, respectively. In the 12-year-old group; the most affected CPI sextants were left upper posterior (20.6%) for males, whereas lower anterior (13.9%) for females, respectively. In the 13-year-old group; the most affected CPI sextants were lower anterior (males 28.2 %, females 15.0%) and left upper posterior (females 15.0%), respectively. In the 14-17-year-old groups; the most affected CPI sextants were lower anterior (14-year-old group; males 30.0%, females 23.1%) and (15-year-old group; males 35.8%, females 29.1%), (16-year-old group; males 42.2%, females 36.1%) and (17-year-old group; males 41.9%, females 42.8%), respectively. For the entire group; the most affected CPI sextants were lower anterior for both gender (males 19.4%, females 17.8%).

The univariate multiple binary logistic regression analysis related to epidemiological variables were demonstrated in Table 3a. DMFT index and CPI among males residing in town center was statistically significant versus the ones residing in province center. CPI scores for maternal education of males who had education for 9-11 years was statistically significant. CPI scores for paternal education of males who were educated for 12 years and above was statistically significant. Maternal employment

Table 2. The average of the most frequently affected CPI sextants according to age and gender

Age (y)		CPI sextants																	
		Right upper posterior			Upper anterior			Left upper posterior			Right lower posterior			Lower anterior			Left lower posterior		
		0 n(%)	1 n(%)	2 n(%)	0 n(%)	1 n(%)	2 n(%)	0 n(%)	1 n(%)	2 n(%)	0 n(%)	1 n(%)	2 n(%)	0 n(%)	1 n(%)	2 n(%)	0 n(%)	1 n(%)	2 n(%)
6	Male	16(12.3)	112(86.2)	2(1.5)	23(17.7)	107(82.3)	0(0)	16(12.3)	110(84.6)	4(3.1)	19(14.6)	111(85.4)	0(0)	22(16.9)	104(80.0)	4(3.1)	20(15.4)	110(84.6)	0(0)
	Female	25(17.6)	114(80.3)	3(2.1)	34(23.9)	108(76.1)	0(0)	26(18.3)	113(79.6)	3(2.1)	26(18.3)	116(81.7)	0(0)	36(25.4)	104(73.2)	2(1.4)	29(20.4)	113(79.6)	0(0)
7	Male	18(9.8)	158(86.3)	7(3.8)	24(13.1)	159(86.9)	0(0)	17(9.3)	163(89.1)	2(1.1)	17(9.3)	166(90.7)	0(0)	21(11.5)	159(86.9)	3(1.6)	18(9.8)	165(90.2)	0(0)
	Female	16(8.7)	168(91.3)	0(0)	18(9.8)	166(90.2)	0(0)	16(8.7)	167(90.8)	1(0.5)	19(10.3)	165(89.7)	0(0)	21(11.4)	161(87.5)	2(1.1)	19(10.3)	165(89.7)	0(0)
8	Male	12(6.2)	179(91.8)	4(2.1)	14(7.2)	181(92.8)	0(0)	10(5.1)	181(92.8)	4(2.1)	12(6.2)	182(93.3)	1(0.5)	12(6.2)	174(89.2)	9(4.6)	11(5.6)	184(94.4)	0(0)
	Female	16(8)	183(91)	2(1.0)	21(10.4)	180(89.6)	0(0)	15(7.5)	182(90.5)	4(2.0)	15(7.5)	185(92.0)	1(0.5)	19(9.5)	180(89.6)	2(1.0)	15(7.5)	186(92.5)	0(0)
9	Male	14(8.6)	147(90.2)	2(1.2)	14(8.6)	149(91.4)	0(0)	12(7.4)	149(91.4)	2(1.2)	13(8.0)	149(91.4)	1(0.6)	13(8.0)	142(87.1)	8(4.9)	12(7.4)	149(91.4)	2(1.2)
	Female	9(5.3)	156(92.3)	4(2.4)	16(9.5)	153(90.5)	0(0)	9(5.3)	157(92.9)	3(1.8)	12(7.1)	157(92.9)	0(0)	10(5.9)	154(91.1)	5(3.0)	11(6.5)	156(92.3)	2(1.2)
10	Male	18(9.6)	160(85.1)	10(5.3)	28(14.9)	160(85.1)	0(0)	18(9.6)	159(84.6)	11(5.9)	17(9.0)	170(90.4)	1(0.5)	19(10.1)	157(83.5)	12(6.4)	15(8.0)	170(90.4)	3(1.6)
	Female	26(12.8)	173(85.2)	4(2.0)	36(17.7)	167(82.3)	0(0)	23(12.8)	171(84.2)	6(3.0)	29(14.3)	174(85.7)	0(0)	35(17.2)	159(78.3)	9(4.4)	27(13.3)	176(86.7)	0(0)
11	Male	14(8.0)	149(84.7)	13(7.4)	19(10.8)	157(89.2)	0(0)	15(8.5)	150(85.2)	11(6.3)	15(8.5)	158(89.8)	3(1.7)	19(10.8)	142(80.7)	15(8.5)	15(8.5)	161(91.5)	0(0)
	Female	16(11.1)	116(80.6)	12(8.3)	24(16.7)	118(81.9)	2(1.4)	18(12.5)	111(77.1)	15(10.4)	17(11.8)	127(88.2)	0(0)	21(14.6)	113(78.5)	10(6.9)	19(13.2)	124(86.1)	1(0.7)
12	Male	6(4.6)	102(77.9)	23(17.6)	9(6.9)	120(91.6)	2(1.5)	5(3.8)	99(75.6)	27(20.6)	6(4.6)	122(93.1)	3(2.3)	11(8.4)	105(80.2)	15(11.5)	6(4.6)	125(95.4)	0(0)
	Female	17(9.8)	133(76.9)	23(13.3)	21(12.1)	150(86.7)	2(1.2)	16(9.2)	133(76.9)	21(13.9)	18(10.4)	154(89.0)	1(0.6)	20(11.6)	129(74.6)	24(13.9)	20(11.6)	151(87.3)	2(1.2)
13	Male	10(6.7)	112(75.2)	27(18.1)	12(8.1)	134(89.9)	3(2.0)	13(8.7)	105(70.5)	31(20.8)	11(7.4)	137(91.9)	1(0.7)	7(4.7)	100(67.1)	42(28.2)	10(6.7)	136(91.3)	3(2.0)
	Female	11(6.4)	141(81.5)	21(12.1)	32(18.5)	141(81.5)	0(0)	12(6.9)	135(78)	26(15.0)	15(8.7)	155(89.6)	3(1.7)	25(14.5)	122(70.5)	26(15.0)	18(10.4)	152(87.9)	3(1.7)
14	Male	5(3.1)	128(80.0)	27(16.9)	7(4.4)	141(88.1)	12(7.5)	4(2.5)	131(81.9)	25(15.6)	5(3.1)	146(91.3)	9(5.6)	8(5.0)	104(65.0)	48(30.0)	5(3.1)	143(89.4)	12(7.5)
	Female	25(16)	112(71.8)	19(12.2)	27(17.3)	121(77.6)	8(5.1)	23(14.7)	112(71.8)	21(13.5)	25(16.0)	125(80.1)	6(3.8)	25(16.0)	95(60.9)	36(23.1)	26(16.7)	123(78.8)	7(4.5)
15	Male	6(2.6)	183(78.9)	42(18.1)	6(2.6)	216(93.1)	10(4.3)	6(2.6)	188(81.0)	38(16.4)	6(2.6)	220(94.8)	6(2.6)	6(2.6)	143(61.6)	83(35.8)	6(2.6)	219(94.4)	7(3.0)
	Female	42(10.6)	303(76.1)	52(13.1)	57(14.3)	322(80.9)	19(4.8)	41(10.3)	305(76.6)	52(13.1)	42(10.6)	334(83.9)	22(5.5)	52(13.1)	230(57.8)	116(29.1)	43(10.8)	331(83.2)	24(6.0)
16	Male	6(2.7)	165(73.3)	54(24)	8(3.6)	201(89.3)	16(7.1)	6(2.7)	167(74.2)	52(23.1)	6(2.7)	203(90.2)	16(7.1)	8(3.6)	121(53.8)	95(42.2)	6(2.7)	201(89.3)	18(8.0)
	Female	47(10.8)	312(71.7)	76(17.5)	54(12.4)	352(80.9)	29(6.7)	49(11.3)	305(70.1)	81(18.6)	47(10.8)	360(82.8)	28(6.4)	52(12.0)	226(52)	157(36.1)	47(10.8)	351(80.7)	37(8.5)
17	Male	2(2.3)	61(70.9)	23(26.7)	2(2.3)	82(95.3)	2(2.3)	2(2.3)	62(72.1)	22(25.6)	2(2.3)	82(95.3)	2(2.3)	3(3.5)	46(53.5)	36(41.9)	2(2.3)	81(94.2)	3(3.5)
	Female	11(8.0)	99(71.7)	28(20.3)	13(9.4)	112(81.2)	13(9.4)	11(8.0)	102(73.9)	25(18.1)	11(8.0)	110(79.7)	17(12.3)	16(11.6)	63(45.7)	59(42.8)	13(9.4)	106(76.8)	19(13.8)
Total	Male	127(6.3)	1657(82.1)	234(11.6)	166(8.2)	1807(89.5)	45(2.2)	124(6.1)	1664(82.5)	230(11.4)	129(6.4)	1846(91.5)	43(2.3)	149(7.4)	1497(74.2)	372(19.4)	126(6.2)	1844(91.4)	48(2.4)
	Female	261(6.3)	2010(79.9)	244(9.3)	353(14.0)	2090(83.1)	73(2.9)	262(10.4)	1993(79.2)	261(10.4)	276(11.0)	2162(85.9)	78(3.1)	332(13.2)	1736(69)	448(17.8)	287(11.4)	2134(84.8)	95(3.8)

was a non-significant predictor for DMFT and CPI. According to self report socio-economic status, solely good socio-economic status for males was significant for CPI. Sleep duration was a significant predictor for DMFT (both gender) and CPI (solely in males). According to media consumption, only computer use significantly predicted CPI, in males.

The univariate binary logistic regression analysis related to dental indices were shown in Table 3b. For DMFT and CPI, occasionally and never tooth brushing were significant predictors only for males. Dental visit frequency (yearly) below and above 1 significantly predicted DMFT for both gender. Performing dental control and dental cleaning significantly predicted DMFT for both gender. No dental cleaning and dental control significantly predicted CPI for both gender. Experiencing dental pain significantly predicted DMFT for both gender and CPI merely in females. Having gum bleeding significantly predicted DMFT for both gender. Being anxious according to dental Anxiety Score (DAS) evaluation significantly predicted DMFT, merely in males.

Table 3c demonstrated multiple binary logistic regression analysis (hierarchical backward elimination procedure) related to epidemiological variables and dental indices. Yearly dental visit frequency above and below 1 significantly predicted DMFT for both gender. Sleep duration significantly predicted DMFT in both gender and CPI merely in males. Experiencing dental pain significantly predicted DMFT in both gender. Having gum bleeding significantly predicted DMFT only in males. Being anxious according to Dental Anxiety Score (DAS) evaluation, significantly predicted DMFT only in males. Not changing toothbrush significantly predicted DMFT merely in females. Residing in town center and village significantly predicted CPI for

Table 3a. Univariate binary logistic regression analysis related to epidemiological indices

Univariate binary logistic regression	**DMFT**		**CPI**	
Variables [Number of Males-Females]	**Males OR (CI)**	**Females OR (CI)**	**Males OR (CI)**	**Females OR (CI)**
Place of residence				
Province center* [1027-1352]	1.00	1.00	1.00	1.00
Town center [926-1079]	**0.76 (0.63-0.91)**	0.86 (0.73-1.01)	**0.51 (0.33-0.80)**	0.77 (0.58-1.03)
Village [65-85]	0.96 (0.56 - 1.64)	0.94 (0.60 - 1.47)	**0.11 (0.06 - 0.21)**	**0.23 (0.14 - 0.39)**
Maternal education (year)				
≤8* [1501-1977]	1.00	1.00	1.00	1.00
9-11 [321-345]	1.16 (0.89 - 1.49)	1.16 (0.91 - 1.91)	**2.44 (1.17 - 5.08)**	1.11 (0.73 - 1.68)
≥12 [196-194]	1.21 (0.88 - 1.16)	1.19 (0.88 - 1.62)	1.97 (0.85 - 4.57)	0.90 (0.55 - 1.48)
Paternal education (year)				
≤8* [1187-1527]	1.00	1.00	1.00	1.00
9-11 [480-578]	1.22 (0.97 - 1.53)	1.21 (0.99 - 1.48)	1.37 (0.83 - 2.26)	1.14 (0.81 - 1.61)
≥12 [351-411]	0.99 (0.77 - 1.27)	1.08 (0.86 - 1.35)	**1.94 (1.01 - 3.70)**	1.05 (0.72 – 1.54)
Maternal employment				
Housewife* [1774-2231]	1.00	1.00	1.00	1.00
Have a job [244-285]	1.09 (0.82 - 1.44)	1.08 (0.84 - 1.40)	2.26 (0.98 - 5.24)	1.25 (0.78 - 1.99)
Socio-economic status (self-reported)				
Poor* [308-365]	1.00	1.00	1.00	1.00
Moderate [1299-1652]	0.99 (0.77 - 1.29)	0.92 (0.73 - 1.17)	1.55 (0.96 - 2.59)	1.12 (0.75 - 1.66)
Good [411-499]	1.18 (0.86 - 1.62)	0.98 (0.74 - 1.29)	**3.07 (1.48 - 6.38)**	0.80 (0.51 - 1.26)
Sleep duration (hour)	**1.23 (1.14 - 1.32)**	**1.26 (1.18 - 1.35)**	**0.84 (0.71 – 0.98)**	1.01 (0.90 – 1.12)
Media consumption				
Computer (hour)	1.00 (0.96 - 1.04)	1.02 (0.98 - 1.06)	**1.15 (1.01 – 1.31)**	1.05 (0.98– 1.12)
TV (hour)	1.02 (0.96 - 1.09)	0.95 (0.89 - 1.00)	0.92 (0.81 – 1.05)	1.25 (0.93- 1.13)

**Reference values, Odds ratio (OR) and 95% confidence interval (CI) adjusted for age. Bold items refer to statistical significance.*

Table 3b. Univariate binary logistic regression analysis related to dental indices

Univariate binary logistic regression	DMFT		CPI	
Variables	**Males OR (CI)**	**Females OR (CI)**	**Males OR (CI)**	**Females OR (CI)**
Dental care with toothbrush				
No * [173-130]	1.00	1.00	1.00	1.00
Yes [1845-2386]	0.91 (0.65 - 1.26)	0.71 (0.49 - 1.04)	1.17 (0.58 - 2.29)	1.37 (0.78 - 2.38)
Dental care with miswak				
No* [1784-2323]	1.00	1.00	1.00	1.00
Yes [234-193]	0.93 (0.70 - 1.23)	0.93 (0.69 - 1.26)	1.22 (0.63 - 2.37)	1.01 (0.60 - 1.69)
Dental care with gargle				
No* [1894-2354]	1.00	1.00	1.00	1.00
Yes [124-162]	0.82 (0.56 - 1.19)	1.00 (0.72 - 1.39)	3.40 (0.83 - 13.95)	1.12 (0.63 - 2.01)
Dental care with floss				
No* [1941-2391]	1.00	1.00	1.00	1.00
Yes [77-125]	0.82 (0.51 - 1.30)	0.95 (0.66 - 1.38)	2.04 (0.49 - 8.42)	0. 76 (0.43 - 1.35)
Toothbrushing frequency				
Regularly (daily)* [1039-1389]	1.00	1.00	1.00	1.00
Occasionally [906-1048]	**1.23 (1.02 - 1.48)**	1.01 (0.86 - 1.19)	0.91 (0.60 - 1.37)	1.09 (0.82 - 1.45)
Never [73-79]	0.82 (0.50 - 1.32)	1.17 (0.73 - 1.88)	**0.39 (0.18 - 0.87)**	1.24 (0.53 - 2.89)
Toothbrush change				
Yes* [334-269]	1.00	1.00	1.00	1.00
No [1684-2247]	1.28 (0.99 - 1.65)	**1.35 (1.03 - 1.76)**	1.41(0.87 - 2.30)	0.91 (0.57 - 1.44)
Toothbrush change frequency (month)	0.99 (0.95 - 1.02)	0.98 (0.95 - 1.01)	0.96 (0.89 – 1.04)	1.02 (0.96 – 1.08)
Dental visit frequency (yearly)				
Never* [973-1228]	1.00	1.00	1.00	1.00
Below 1[675-825]	**1.63 (1.32 - 2.00)**	**1.97 (1.64 - 2.36)**	1.49 (0.94 - 2.37)	1.03 (0.76 - 1.40)
Above 1[370-463]	**2.18 (1.67 - 2.86)**	**2.93 (2.31 - 3.72)**	1.53 (0.86 - 2.73)	1.20 (0.81 - 1.78)
Dental control				
No (not performed)* [494-575]	1.00	1.00	1.00	1.00
Yes (performed) [1524-1941]	**1.43 (1.14 - 1.78)**	**1.60 (1.31 - 1.95)**	1.26 (0.77 - 2.01)	0.83 (0.60 - 1.14)
Dental cleaning				
Yes* [148-164]	1.00	1.00	1.00	1.00
No [1870-2352]	**1.83 (1.23 - 2.71)**	**2.38 (1.63 - 3.47)**	1.24 (0.61 – 2.51)	0.80 (0.44 – 1.47)
Dental pain				
No* [1327-1571]	1.00	1.00	1.00	1.00
Yes [691-945]	**2.21 (1.80 - 2.72)**	**2.50 (2.09 - 2.98)**	1.26 (0.82 – 1.96)	**1.38 (1.03 – 1.86)**
Gum bleeding				
No* [1930-2386]	**1.00**	**1.00**	1.00	1.00
Yes [88-130]	**2.43 (1.41 - 4.22)**	**1.70 (1.15 - 2.52)**	1.53 (0.48 – 4.93)	1.18 (0.61 – 2.28)
Dental anxiety score (DAS) evaluation				
No anxiety* [1558-1680]	**1.00**	1.00	1.00	1.00
Anxious [338-684]	**1.42 (1. 09 - 1.84)**	1.04 (0.86 - 1.25)	1.01 (0.58 - 1.75)	0.82 (0.60 - 1.10)

**Reference values, Odds ratio (OR) and 95% confidence interval (CI) adjusted for age. Bold items refer to statistical significance.*

both gender. Moderate and good socio-economic status (self-reported) significantly predicted CPI only in males. Never tooth brushing significantly predicted CPI, merely in males.

Discussion

We believe our study is unique in the following ways: being the most comprehensive study consisting of a wide sample size (n=4534) and a wide age range (6-to-17-years).

Table 3c. Multiple binary logistic regression (hierarchical backward elimination procedure) analysis related to epidemiological variables and dental indices

Multiple binary logistic regression (hierarchical backward elimination procedure)	DMFT		CPI	
Variables	**Males OR (CI)**	**Females OR (CI)**	**Males OR (CI)**	**Females OR (CI)**
Dental visit frequency (year)				
Never*	1.00	1.00	-	-
Below 1	**1.49 (1.18 – 1.88)**	**1.63 (1.33 – 1.99)**	-	-
Above 1	**1.92 (1.42 - 2.59)**	**2.31 (1.77 - 3.01)**	-	-
Sleep duration	**1.22 (1.12 - 1.32)**	**1.26 (1.18 - 1.36)**	**0.82 (0.70 – 0.96)**	
Dental pain				
No*	1.00	1.00	-	-
Yes	**1.90 (1.50 - 2.40)**	**2.02 (1.67 - 2.47)**	-	-
Gum bleeding				
No*	1.00	-	-	-
Yes	**2.12 (1.1 - 4.06)**	-	-	-
Dental anxiety score (DAS) evaluation				
No anxiety*	1.00	-	-	-
Anxious	**1.44 (1.09 - 1.90)**	-	-	-
Toothbrush change				
Yes*	-	1.00	-	-
No	-	**1.46 (1.07 - 1.99)**	-	-
Place of residence				
Province center*	-	-	1.00	1.00
Town center	-	-	**0.54 (0.34-0.87)**	**0.51 (0.33 - 0.79)**
Village	-	-	**0.12 (0.06 - 0.25)**	**0.11 (0.06 - 0.21)**
Socio-economic status (self-reported)				
Poor*	-	-	1.00	-
Moderate	-	-	**1.78 (1.07 - 2.98)**	-
Good	-	-	**3.25 (1.49 - 7.05)**	-
Toothbrushing frequency				
Regularly (daily)*	-	-	1.00	-
Occasionally	-	-	**0.79 (0.50 - 1.37)**	-
Never	-	-	**0.33 (0.14 - 0.78)**	-

**Reference values, odds ratio (OR) and 95% confidence interval (CI) adjusted for age. Bold items refer to statistical significance.*

Several studies on the assessment of CPI and DMFT prevalence have been reported for different populations (3-6), (11-23). Those results indicated dissimilarities and rapid changes in the pattern of dental status and periodontal disease around the world (11). However, only few studies have determined the oral hygiene, gingival status and dental caries in Turkish children (3-6). None of these studies were related to children living in Central Anatolia. In the event of Universal Primary Education these findings are a good representation of the school children in Turkey.

Due to variations in the number of the students from one school to another and from one classroom to another, a cluster random sample considering with each classroom as a sampling unit was used as suggested by Hamasa and Albashaireh (11). Hence, in an attempt to select equal number of boys and girls in the current study sample; nearly 55% of the sample was consisted of girls.

Few data are available in the current literature on gingival conditions of Turkish children aged between 6 and 17 years. The present study reported a high level of gingival bleeding and calculus in

Turkish children living in Central Anatolia; only 5.1 % of males and 8.9% of females was periodontally healthy (CPI score=0), indicating the need for improvement in self-care oral hygiene for the majority the population. The maximum CPI score in Central Anatolia was significantly higher than that in Jordanian (11), Italian (12), and Portuguese children (13). Great variations in the results of periodontal condition in different geographical locations are evident, which could be attributed to regional differences, nutritional habits, and different attitudes towards dental health (11). Our consideration about the high CPI scores in Turkish population is poor brushing habits.

The high scores for unhealthy periodontal conditions of this population may be partially explained by the examination method. Suggested by many authors, the CPI measure should be performed either on the 6 sites defined by WHO (mesial, midline and distal on both vestibular and lingual/palatal surfaces), or all around the tooth (14). The CPI scores in the present research determined by the examination all around the teeth. Benigeri et al. (15), reported that if probing is done from all around the tooth, the percentage of bleeding (score 1) or 6mm or deeper periodontal pocket (score 4) is nearly 2.5 times higher when probing on two sites. Not using a WHO periodontal probe may have led to under-report of the marginal gingivitis (16). Similar to our present findings, Tiromwe et al. (17), reported a prevalence of treatment needs over 80% in all age groups by using WHO probe.

Periodontal condition was also studied in a random sample of 700 Mexican school children aged between 11 and 17 years and statistically significant difference between males and females was reported in that study (18). These findings are in accordance with reports from other geographic regions. In a review that investigated periodontal diseases in Central and South America confirms the belief that gingivitis is wide spread and slightly more severe in males than in females. Contrary to these findings; Katz et al. (19), determined, more bleeding, calculus and shallow pockets in females than males. This gender difference is in accordance with our results from similar studies from all around the world, but its clinical significance is questionable. The gender differences among school-children with regard to plaque and gingival scores may be related to the pattern of personal oral hygiene, hormonal changes during puberty and grooming effect at these ages (20).

In a Turkish population Altun et al.(4), found the prevalence of caries in the entire population was 71.2%. Similarly, Bodur et al. (6), reported the prevalence of caries as respectively 80% and 82.5%, among 11-12 (n=209) and 14-15 years (n=96) children. We determined that 47.8% of school-children were caries-free, while approximately 10% of them had missing or filled teeth. In the present study, we did not assume initial lesions or decalcifications as carries. Therefore, the prevalence of caries-free children and adolescents was higher than the previous reports. The present study showed significantly lower DMFT scores among school-children in Central Anatolia. Such dramatically decrease for lower caries experience might be due to examined sample size, methodological differences and widespread use of fluoridated toothpastes.

Similar to Wong et al. (21), the DT (decay total) was the major component of the DMFT score of the children in this population, while FT (filling total) was the major component among the children in Hong Kong. The rationale for this difference is probably the better accessibility of dental services in Hong Kong, which provides all school-children basic dental care services.

Samson et al.(23), determined there was a significant difference in DMFT scores by age but not by gender. In the current study, gender comparisons according to DMFT scores indicated that the scores in males were statistically higher than females. This significant high level DMFT index score of male subjects were in accordance with the poor periodontal conditions of the present population.

The increase in people's socio-economic status, educational level, and dental awareness during the second half of the last century is believed to have played a part in subjects' oral health status (7). Gjermo et al. (24), reported that gingivitis was seen with a slight tendency towards higher prevalence in low socio-economic groups. The participants who self-reported their monthly income as good had worse CPI scores than the ones who self-reported moderate and fair. This situation refers to the increase in socio-economic status as a risk factor for periodontal disease.

Jurgensen et al. (8), who took the number of bleeding teeth as a dependent variable in the regression analyses, reported a 2.25-fold increased risk for the participants residing in rural areas.

In the current study, however, showed a decreased periodontal disease risk for the participants residing in town (0.51) and village (0.11). Access to and consumption of intermediate meals and food fads might be the reason. The high prevalence of gum bleeding among the male children and adolescents who self-reported their monthly income as good reflected sugars-chocolate-potato chips as plaque-forming foods which induces a suitable environment for bacterial proliferation and makes it a changeable risk factor for periodontal problem (CPI=1) by personal hygiene.

The current problem for the participants whose scores were CPI=1, was only hygiene motivation and personal oral care reflects the importance of oral health education of children and adolescents.

Conclusion

In a Turkish school-children population living in Central Anatolia, about 47.8% of the sample were caries-free. However, only 7.2% of the study group had healthy periodontium with no bleeding.

It is important to conduct education programs for 6-17 year old children on the importance of oral hygiene.

Further implementation of school-based oral health promotion and instigation of preventive strategies are urgently needed in Turkiye.

The Turkish government and Ministry of Health should design a preventive program to reduce the prevalence of gingivitis, in the addition to providing adequate oral health services for the affected children and adolescents.

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Correlation between the H. pylori density and urease activity in comparison to host's histopathological disorders

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Abstract

Background/aims: Urease, a virulence factor in *Helicobacter pylori*, is a potent chemoattractant and putative adhesion factor. Relationships between diversity of this protein in both activity and expression levels, and pathological conditions in patients with different gastric diseases are not so unclear.

Methods: Total of 87 Iranian patients who visited the endoscopy unit for dyspeptic symptoms were included in this study to investigate any possible relationship between *H. pylori* urease activity in different rates of colonization. All the isolates were identified as *H. pylori* by biochemical and molecular tests.

Results: Histopathological and culture results showed an infection rate of 56% (49/89) for *H. pylori.* Disease conditions were varied among the patient from chronic to active chronic gastritis. 14(54%) and 12(46%) of the patients with severe active chronic gastritis showed marked and mild density of *H. pylori*, respectively. High activity (<2h) of urease test on biopsy samples was observed in 22(45%) samples.

Conclusion: The results showed some putative associations between the colonization rates of *H. pylori* and severe (but not moderate) active chronic gastritis and also between infiltration of plasma cells in the lamina propria and high activity of urease in the biopsy samples (P<0.05). Differences of urease activity among the isolates in patients with different disease outcomes at constant colonization rate propose their possible roles in severity of the disease. More details studies are needed to found these relationships.

Key words: *H. pylori,* urease, pathological finding, gastritis

Introduction

Helicobacter pylori is a major bacterial species known to colonize the human stomach (1). In most cases, *H. pylori* infection causes an asymptomatic chronic gastric inflammation, but can also cause severe gastroduodenal diseases, including chronic atrophic gastritis, peptic ulcer, and gastric adenocarcinoma (2). Variation in host factors and their responses to the colonized *H. pylori* at mucosal surfaces are significantly related to clinical outcomes (3). Eradication rate of *H. pylori* is a function of bacterial genomic entity, antimicrobial susceptibility, host immune response, underlying diseases and pathological complaints.

H. pylori surface proteins are chemotactic and can activate humoral and cellular immune responses (4). Release of chemotactic proteins (e.g. urease) from *H. pylori* is related to pathological events in gastric tissue (4). Infiltration of immune cells into the gastric mucosa in response to these proteins is indirectly associated with the pathological disorders (5). Urease is one of the identified factors involved in the pathogenesis of *H. pylori*. The enzyme is the most abundant autologous protein that can be adsorbed on the bacterial surface (6). This enzyme decreases the acidity of stomach, the *H. pylori*'s microenvironment, by production of ammonia and carbonate from urea (7, 8). It is a potent chemoattractant and can act as an adhesion factor for this bacterium to promote its colonization at gastric tissue (9). Polymorphisms of urease gene among different isolates of Helicobacter have been established (10). However, it is yet unclear that these differences have any effect on enzyme activity, expression levels, or the bacterial colonization rates. These diversities also can lead to different clinical and pathological disorders in

direct or indirect manners. Studying relationships between the activity of urease and pathological disorders in patients' gastric tissues at different stages of disease will help us to better understand these involvements. The aim of this study was to assess any possible relationships between *H. pylori* urease activity in different rates of colonization in compare to their host pathological features, including polymorphonuclear infiltration, stromal and intraepithelial lymphocyte infiltration

Materials and Methods

Subjects

A cross-sectional study was performed between January 2011 and July 2011. Total of 87 Iranian patients who visited the endoscopy unit of Taleghani Hospital for their dyspeptic symptoms were included in this study. Patients, who had received non-steroidal anti-inflammatory drugs, steroids, or proton pump inhibitors within 3 months, antibiotics within 1 month or any previous treatments for *H. pylori* infection, were excluded. Clinical data regarding current medical conditions, past medical history, and family history of peptic ulcer/gastric cancer was collected from each patient. Patient demographics, including age, sex, and ethnicity were also recorded. Gastrointestinal symptoms were evaluated using the questionnaires including dyspeptic symptoms. This study was approved by the Ethical Committee of Research Center for Gastroenterology and Liver Disease, Shahid Beheshti University of medical sciences. All patients provided written informed consent.

Evaluation of H. pylori infection

Endoscopy was performed by standard procedures after an overnight fast. *H. pylori* infection was evaluated by histological study and specific PCR on biopsy DNA samples. Two biopsy specimens from the suspected sites were obtained for each of the pathological and microbiological studies. For pathological analysis one of the biopsy samples were immediately fixed in 10% buffered formalin. Sections were stained with hematoxylin and eosin for regular histological examination and Giemsa for detection of *H. pylori*. Histological severity of gastritis was graded using the criteria as described in the updated Sydney classification system (11).

Suspensions of homogenized biopsy samples were cultured on specific media for *H. pylori* , Brucella agar supplemented with 10% (v/v) fetal calf serum, 7% horse blood and selective supplement mixture (vancomycin 2.0 mg, polymyxin 0.05 mg, trimethoprim 1.0 mg) (Merck) and 4mg/l amphotericin B. The cultured plates were incubated at 37°C for three-five days in a microaerobic atmosphere (5% O_2, 10% CO_2, 85% N_2) in a CO_2 incubator (Innova-Co 170; New Brunswick Scientific, Edison, NJ, USA). The organisms were initially identified as *H. pylori* by modified Gram staining, colony morphology, and positive results oxidase, catalase and urease reactions.. The genomic DNA was extracted using the QIAamp tissue DNA extraction kit (QIAGEN, Hilden, Germany) from the biopsies, according to the manufacturer's instructions.

The presence of *H. pylori* was further confirmed by PCR using specific primer pairs. (Forward 5′ GGATAAGCTTTTAGGGGTGTTAGGGG-3′ and reverse 5′ GCTTACTTTCTAACACTAACGCGC-3′) (12). The PCR was performed in a final volume of 25 µl containing 10 X PCR buffer, 500 nM of each primer, 2 mM MgCl2; 200 µM each deoxyribonucleotide triphosphate (dNTP), 1.5 U Taq DNA polymerase, and 200 ng DNA sample. PCR was performed in a thermocycler (AG 22331; Eppendorf, Hamburg, Germany) under the following conditions: initial denaturation for 5 min at 94°C followed by 30 cycles of 93°C for 1 min, 58°C for 30 s and 72°C for 1 min. After a final extension at 72°C for 10 min, the PCR products were examined by electrophoresis on 1.2% agarose contained gels according to standard procedures (13).

Detection of urease activity

To investigate diversity of the enzyme activity among biopsy samples and the bacterial isolates, direct rapid urease test were done according to the described method by Blaser et al (14). The medium contained constant concentration of urea and phenol red as an indicator. According to the time of reaction, the activity of enzyme was scored as high (<2h), moderate (2-10h) and low (>10h) in the case of biopsy samples. For in vitro activity of the enzyme, we evaluated the urease activity for each *H. pylori* isolate at concentrations of 1.5×10^2 to 1.5×10^8 CFU/ml over a 15 minute time scale. Changes in absorbance rates at OD620 were re-

corded by ELISA reader for each isolate; the enzyme activity was defined as ΔOD/min/CFU.

Statistical analysis

Statistical analyses were conducted by SPSS version 18 (SPSS, Chicago, IL, USA). Multivariate and univariate logistic regression was performed to investigate the relation between *H. pylori* status and variables. P values <0.05 were considered as statistically significant

Results

Out of 49 *H. pylori*-positive subjects, 34 (69.5%) were female and 15 (30.5%) were male (mean age, 46.04 years). Table 1 shows the multivariate analysis of factors for dyspeptic patients in relation to histological *H. pylori* infection grade. Substantial numbers (28%) of the patients aged between 30 and 39 years. Among the patients, 30 patients (11 in men and 19 in women) had a mild density of *H. pylori* and 19 (4 in men and 15 in women) had a marked density (grade 1 of 3) (Table 1). Of the 49 investigated patients, 10 were found to have positive family members with gastroduodenal diseases (gastric cancers and/or gastroduodenal ulcers). Regarding the marital status, 39(79.6%) were married, 6(12.2%) were singles and 2(4.1%) were divorced and widowed (Table1). There was not statistically relationship between marital status and density of *H. pylori*.

The prevalence of severe active chronic gastritis and moderate active chronic gastritis was detected in 53% (26) and 20.5% (10), respectively. 14(54%) and 12(46%) of the patients with severe active chronic gastritis showed marked and mild density of *H. pylori*, respectively. Interestingly, in 8(80%) of patients with moderate active chronic gastritis, mild *H. pylori* density was observed. Only 2(20%) patients with moderate active chronic gastritis showed marked *H. pylori* density. There was association between colonization of *H. pylori* and severe active chronic gastritis on the basis of pathological findings (P<0.05, Table 2).

High activity (<2h) of direct rapid urease test on biopsy samples was observed in 22(45%) samples, which among them 13(50%) samples were belonged to severe active chronic gastritis. In vivo activity of urease on biopsy samples in comparison to density of *H. pylori* was shown in Table 3.

Table 1. Multivariate analysis of factors for dyspeptic patients in H. pylori-positive subjects

Sex	Number (%)	H. pylori Mild	Severe
Female	34 (69.4%)	19(56%)	15(44%)
Male	15(30.6%)	11(73%)	4(27%)
Age			
10-19	3(6%)	1(33%)	2(67%)
20-29	3(6%)	2(67%)	1(33%)
30-39	14(28.6%)	10(71.5%)	4(28.5%)
40-49	8(16.3%)	5(62.5%)	3(37.5%)
50-59	10(20.4%)	5(50%)	5(50%)
60-69	8(16.3%)	4(50%)	4(50%)
70-79	2(4%)	2(100%)	0(0%)
80-89	1(2%)	1(100%)	0(0%)
Education status			
Illiterate	3(6%)	2(67%)	1(33%)
Primary school	7(141%)	4(57%)	3(43%)
high school	6(12%)	5(83%)	1(17%)
Diploma	16(33%)	10(62.5%)	6(37.5%)
AD	2(4%)	1(50%)	1(50%)
BS	11(22.5%)	6(54.5%)	5(45.5%)
MS	3(6%)	1(33%)	2(67%)
PhD	1(2%)	1(100%)	0(0%)
Total	49(100%)	30(61%)	19(39%)
Ethnicity			
Fars	31(63.3%)	16(52%)	15(48%)
Kord	1(2.0%)	1(100%)	0(0%)
Lor	3(6%)	3(100%)	0(0%)
Mazandarani	7(14.3%)	5(71.5%)	2(28.5%)
Turk	7(14.3%)	5(71.5%)	2(28.5%)
Drug used in past month			
Antibiotic	4(8%)	4(100%)	
Antiacid	11(22.4%)	9(82%)	2(22%)
Cigarette smoking			
Nonsmoker	40 (81.6%)	23(57.5%)	17(42.5%)
Smoker	9 (18.4%)	6(86%)	1(14%)
Marital status			
Married	39(79.6%)	25(64%)	14(36%)
Widowed	2(4.1%)	1(50%)	1(50%)
Divorced	2(4.1%)	1(50%)	1(50%)
Single	6(12.2%)	3(50%)	3(50%)
Familial history			
GI cancer	5(10.2)	3(60%)	2(40%)
Peptic ulcer	5(10.2)	3(60%)	2(40%)
NO	39(79.6)	26(67%)	13(33%)

Table 2. Relationship pathology findings with H. pylori colonization

Urease activity (hr)				*H. pylori* colonization Grade		Pathology findings
Low Activity	Moderate Activity	High Activity	Negative Activity	Marked	Mild	
						Gastritis
6(23%)	4(15.4%)	13(50%)	3(11.5%)	14(54%)	12(46%)	Severe active chronic gastritis
2(20%)	4(40%)	3(30%)	1(10%)	2(20%)	8(80%)	Moderate active chronic gastritis
0(0%)	1(50%)	1(50%)	0(0%)	1(50%)	1(50%)	Mild active chronic gastritis
0(0%)	1(33%)	2(67%)	0(0%)	1(33%)	2(67%)	Severe chronic gastritis
3(37.5%)	2(25%)	3(37.5%)	0(0%)	1(12.5%)	7(87.5%)	Moderate chronic gastritis
0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	Mild chronic gastritis
11(23.5%)	12(25.5%)	22(47%)	2(4%)	18(38%)	29(62%)	Plasma cell Infiltration Lamina
1(9%)	2(18%)	8(73%)	0(0%)	6(54.5%)	5(45.5%)	PMN Lamina
0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	1(100%)	Erosinophil Lamina
6(19.5%)	6(19.5%)	17(55%)	2(6.5%)	13(42%)	18(58%)	Lymphoid Aggregation Lamina Propria
8(20.5%)	10(25.5%)	19(49%)	2(5%)	17(43.5%)	22(56.5%)	Neutrophilic Activity
0(0%)	2(67%)	1(33%)	0(0%)	2(67%)	1(33%)	Intestinal Metaplasia
0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	Hyperplasia
0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	Glandul Architecture Abnormal
0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	Dysplasia
0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	Goblet cell depletion
0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	Adenocarcinoma

Table 3. Urease activity in biopsy samples and H. pylori grading according to histopatological identification

Urease activity	*H. pylori*		
	Mild	Severe	Total
High Activity	11(50.0%)	11(50%)	22(100%)
Moderate Activity	8(66.7%)	4(33%)	12(100%)
Low Activity	10(90.9)	1(9%)	11(100%)
Negative	1(25.0%)	3(75%)	4(100%)

All the samples with high enzyme activity showed plasma cell infiltrates in the lamina propria (Table 2); infiltration of plasma cells in the lamina propria was associated with high activity of urease ($P<0.05$, Table 2).

Among patients (10/20.5%) with positive familiar history of gastroduodenal diseases, 4(40%) of patients had severe active chronic gastritis, 9 (90%) patients showed plasma cell infiltrates, and 5(50%) patients showed lymphoid aggregation in the lamina propria. In 4(80%) of patients with familiar history of GI cancer and 2(40%) with peptic ulcer, high activity of direct rapid urease test were detected. In vitro urease activity results showed diversity of the activity among these isolates in three categories (Figure 1). Associations between the bacterial load and urease activity in biopsy samples have been shown in Table 4. The activities were in ranges from 0.015 to 0.035 U/CFU (Figure 2).

Table 4. Comparative results for urease activity according to in situ and in vitro studies

Samples	*H. pylori* load	In situ urease activity (hr)	In vitro urease activity (U/CFU)***
164	Marked	5h*	0.021
232	Mild	10h	0.038
236	Marked	10h	0.017
81	Mild	10h	0.024
30	Mild	10 min**	0.026
4	Marked	10 min	0.034
80	Mild	20 min	0.017
237	Mild	2h	0.036
247	Mild	24h	0.015
235	Mild	24h	0.022

** h: hours, **min: minute, ***U: unit, CFU: colony-forming unit*

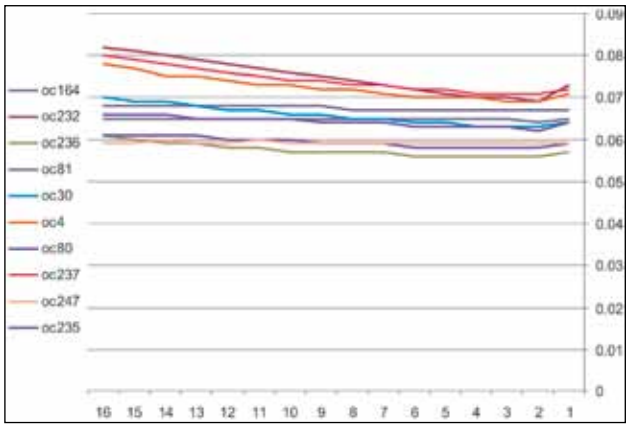

Figure 1. Urease activity according to the time on H. pylori single colonies

Discussion

In *H. pylori*, each strain contains many strain-specific sequence diversities within coding and regulating regions of its genome. These variations collectively may develop different disease outcomes varying from inflammation, atrophy, ulceration, intestinal metaplasia, cancer, and MALT lymphoma (15).

H. pylori urease, as a diverse protein in its UreaB catalytic subunit (Figure 2), is an important enzyme that involves in surveillance of this bacterium in acidic environment of the stomach and

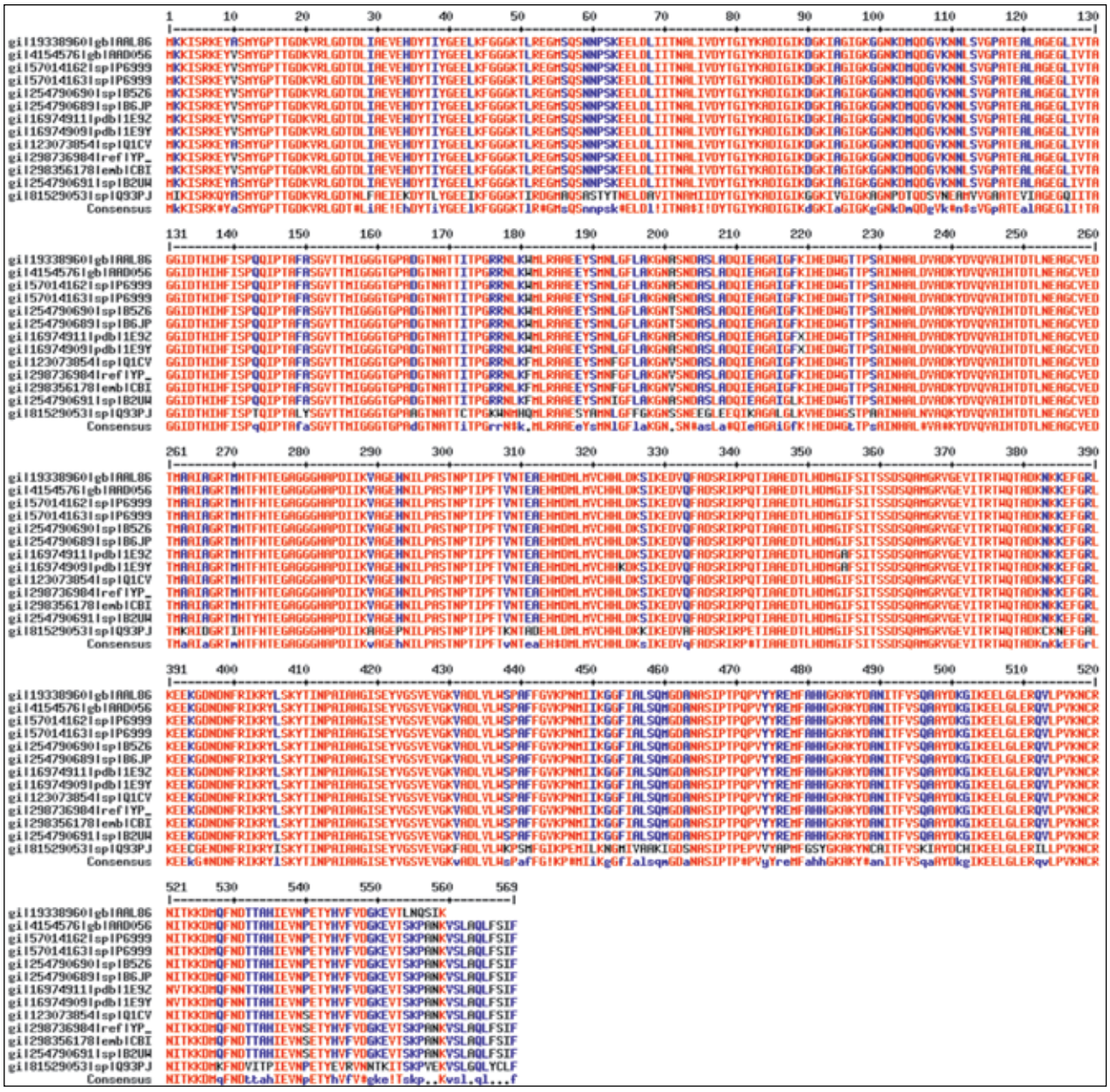

Figure 2. Sequence alignment of ureB among different H. pylori strains. Sequences diversities are shown by different colors

also promotion of inflammatory responses in this tissue, which provide required nutrients necessary for bacterial growth and invasion to deeper sites of the organ. (16). It has been reported that manipulation of urease in *H. pylori* can lead to reduced gastric disorders (17). There are not any studies considering possible correlation between amount of the bacterial urease activity and diseases outcomes in gastric tissue.

At present study common demographic data related to gastroduodenal diseases and patients lifestyles were used to find any association between host and the bacteria in disease development (Table 1,2). According to our results there were no relationship between different *H. pylori* density and demographic data including age/sex, education, marital status and gastroduodenal diseases. In some study it has been reported that *H. pylori* density can be related to low levels of sanitation, hygiene, and education (18, 19, 20). Density of *H. pylori* in individuals with a family history can increase risk for the development of gastroduodenal diseases. The relationship between density of *H. pylori* and family history can be due to presence of diversity of specific receptors and other host related factors involve in the bacterial colonization or pathogenesis between familial and non-familial members. Numeration of the bacterial load and comparison of their virulence behaviors (e.g. urease activity) will reveal these correlations. The difference for density of *H. pylori* was not significant between patients with familial history and other ones.

Diversity of the enzyme activity is a function of the bacterial load and sequence entity. In our study we did not observe any relationship between urease activity and *H. pylori* density according to pathological data. Urease as a diverse protein in active site can show various activity in different individuals, and it can be related to different activity of *H. pylori* and their related diseases. The enzyme mainly resides at bacterial cytoplasm, but it was shown that some of this enzyme is present at bacterial surface that can act as adhesions (21, 22). High activity (<2h) of this enzyme, at similar load of *H. pylori*, was observed in 50% of our samples from patients with severe active chronic gastritis. There was no relationship between this activity and the grading of gastritis (P>0.05). According to our in vitro and in vivo tests for detection of urease activity, different biopsy samples with similar colonization grade of *H. pylori* strains (mild and severe) had diverse enzymatic activity (10min- 24 hours). In vitro enzyme activity in constant concentration of *H. pylori* also showed the presence of this divergence. This difference was more significant in higher concentrations of bacteria (Figure 1). Comparison of in vitro and in situ assays for the enzyme activity among 10 isolates confirmed this accordance for three isolates (OC4, OC30 and OC237 [Table 4]) with the highest activities (<2h positive tests in the biopsy samples), three isolates (OC236, OC247, and OC235 [Table 4]) with the lowest activities (10-24 h positive tests in the biopsy samples), and two isolates (OC81 and OC164 with moderate activities (5-10 h positive tests in the biopsy samples). The enzymatic activity for in vitro results was not related to the colonization grades of these bacteria in biopsy samples. Comparison of pathological finding among the groups of isolates with different enzymatic activity also did not show an association.

In conclusion these findings suggest an association between the colonization rates of *H. pylori* and severe active chronic gastritis and also between infiltration of plasma cells in the lamina propria and high activity of urease in the biopsy samples. Comparison of in situ and in vitro results to confirm diversity of urease activities verified these differences among the isolates. There was not observed a probable relation between the increased activity of urease at similar load of bacteria and the severity of immunopathological disorders in these patients. Further studies are needed to determine associations between the expression rate and surface exposure levels of urease among different *H. pylori* isolates in patients with different pathological disorders.

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Traditional practices to women during pregnancy, birth and after birth and reasons

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Abstract

Objective: The purpuse of this article is to determine the traditional practices of women during pregnancy, birth and after-birth.

Methods: Research conducted retrospective and descriptive survey. Data were collected using a purposefully designed questionnaire. The data gathered from two village health clinics in Aydın-Çine and Mezitli-Mersin, Turkey. The research sample were composed 245 mothers (120 from Mezitli, 125 from Çine), all of whom had given birth to at least one live baby. The research sample were choosen randomly.

Results: The youngest child of mothers was between 0-3yrs. One hundred and ninety eight (81 %) had attended antenatal care, 235 (96%) had given birth in hospital. One hundred and seventy-six (71.8%) reported using traditional practices in pregnancy, the most frequently used being "aş yerme" (distinguished meal or food) (117, 47.0%). 98.37% of mother did not explain what these were. When needed, mothers preferred their mothers or mother-in-laws during pregnancy about care by 66.5%. One hundred and twenty-eight (52.2%) could not explain the rationale for some of the nutritional practices in pregnancy. The mothers reported seeking help with child care from doctors (185, 75.5%), midwives (154, 62.8%) and nurses (54, 22.0%). The mothers had also sought help from their own mothers or from their relatives. They preferred not to tell health professionals (137, 56%), the main reason being (94, 39.2%) that the professionals did not approve.

Conclusions: Whilst most of the traditional practices were not harmful leaving women in the care of their relatives may leave an open door for harmful traditional practices. Midwives, nurses, and doctors need to provide health education in a more sensitive way in order to meet the needs of pregnant and post-birth women and children. They should also consider providing health education to the whole family not just the childbearing woman.

Key words: Traditional practices; pregnancy; labour; postpartum periods,

Introduction

Women need to get help from their environment to be healthy during the processes of pregnancy, birth and post-birth. Medical personnel and women's close environment has important roles in this getting help process. Every woman need to get help from her environment in different levels according to her pregnancy and characteristics in the process about pregnancy. In an attempt to improve health following birth, antenatal care has been provided in Turkish village health clinics since 1961 (1,2). As a result of this surveillance, births continue to be given in more healthy environments. Yet, despite these efforts, survival rates of children are not as good as is desired in Turkey. The rate of child (24) and baby (17) deaths are still too high (2- 4) Whilst the quality of services affect these indicators of a society's health, the health statistics can also be affected by the culture of the society in which a woman lives. The health of the mother and baby may also be affected by traditional cultural practices. When health indicators are being assessed in Turkey, they are generally considered in the light of the availability of health services. According to the Turkish Demographic Health Survey, 2003 and 2008 (5,-7)) data, the ratio of obtaining antenatal care in Turkey ranges between 61 and 95% (3,6,7). Even if prospective mothers have attended for antenatal care if the prevailing cultural practices and beliefs do not accept health care it is possible that the health of the mother and baby can be adversely affected. Cultural differences may cause differences in health data in different regions of Turkey (5, 9, 10). For

example, Baby Death Rate (BDR) is 16-22 in the west, whereas this rate is 39-41 in the east. Generally, death rates are very similar in the south and west of Turkey. This can be demonstrated in the proportion of women receiving antenatal care (0. 91% in the west, 0. 85% in the south) and BDR 22 in the west, and 29, in the south). It is necessary to assess whether traditional cultural practices may be adversely affecting the mortality rates (5, 7).

In Turkey median marriage age is 22,8. Whilst In the south part of Turkey median marriage age is 22,8, in the east is 21,6. The rate of attending for antenatal care in Turkey is 92%. This antenatal care serving 89,5% from doctor and 2,5% from midwife/nurse. Birth had been in hospital 89.7%. Births have given at home 9.7% in Turkey. To help to birth 64.1% from doctor, 27,2% from Nurse / Midwife and 8,7% from traditional midwife (11).

It is necessary to know what kind of an effect culture has on health indicators being in a more desired level in the west and south of Turkey; because making attempts on time is also affected from environmental culture when there are problems of care, health and usage of health services. Health professionals should know how mothers and babies are affected by traditional practices and should organize their service provision to meet these needs.

The Aim of research

The purpose of this study was to discover how mothers who lived in Mezitli and Çine in Turkey were affected during pregnancy, birth and the puerperium by the culture in which they lived.

Methods

Characteristics of the research areas

Both areas have had significant immigration over the years. The climate is that of the Mediterranean, hot and dry in summer, and warm and rainy in winter. The most common occupations are agriculture and mid-level industry. One village clinic serves a population of 2000-2500 and the clinics serve according to the characteristics and needs of the population. Prospective mothers, pregnant women, postnatal women and babies are provided with specialist services. Aydın-Çine is in the west and Mersin-Mezitli in the south part of Turkey. Both are administrative districts within a city. Provision of health services is organised according to the population density. Mersin- Mezitli (Village Clinic no 2) served a population of 38260 and Aydın-Çine village clinic a population of 38320.

Study sample

As noted above the survey was undertaken in Aydın-Çine and Mersin-Mezitli. At the time the study was conducted there were 486 babies aged 0-1 years in Aydın-Çine and 479 in Mersin-Mezitli. We chosen the mother who have at least 0-1 aged babies For to remember very close past everything about their traditional practices "during pregnancy, birth and the puerperium by the culture in which they lived". The intention was to sample 25% of mothers who had a baby up to one year of age. Therefore, the sample size for Aydın-Çine was 125 mothers and 120 from Mersin-Mezitli. In practice, because of the mobility of the population within the areas, it was not possible to find specific mothers from their addresses. Therefore, the criteria for participation were that the women had given birth to at least one baby who was still alive and they were willing to take part in the study. The sample sizes were kept as above. Women were invited to participate in the study when they attended the village clinics for child immunisations or their children had developmental checks.

Data collection tool

A questionnaire was designed specifically for this study. It consisted of seven sections with questions on socio-demographic details, information on the number of children, information about health care in pregnancy and postpartum, traditional practices in pregnancy, labour and postpartum and if traditional practices were used, who influenced the women in their use. This instrument was developed from the personal experiences of the authors, experts in childbirth and child care and the literature (4, 5, 10-17). The questionnaire was pilot tested for comprehensibility and appropriateness with 10 mothers in each area. Following this the number of questions was reduced from 33 to 31.

Procedure

After the mothers and babies had been provided with their care in the village clinic the sampled

mothers were invited, by the researchers to participate in the study. The researcher introduced herself, explained the purpose of the research and informed the women that their personal details would be treated confidentially. women given written consent and verbal agreement to participate the research. If the women agreed to participate the questionnaire was administered to them face-to-face. Their responses were recorded on the questionnaire form and on average it took 15 minutes to complete (19).

Data analysis

Responses to the questions recorded on the questionnaire were coded and transferred into SPSS (Statistical Package for the Social Sciences) software (SPSS Inc., USA, version 10.0) and analysed through descriptive statistics. Results are presented as absolute figures and percentages (20 - 22).

Results

Sample characteristics

All mothers (245 mother) invited to participate agreed to do so. Those mother who are 120 from Mersin-Mezitli (48%) and 125 from Aydın- Çine (52%). The youngest child of 76% (N = 186) of the mothers was aged between 0-3 years. One hundred and seventy-one (69.8%) of the mothers were aged between 21-30 years, 168 (68.6%) had completed primary school and 208 (84.9%) were not unemployed for financial gain outside the home (Table 1). Two hundred and twenty (89.8%) of the families were nuclear. Forty-four (18.0%) families did not receive social security. Most of the women (118, 48.1%) had only one child (Table 1).

One hundred and ninety-eight (81%) women had received antenatal care from health professionals. This is comparable to the rest of country (11). Two hundred and thirty-five mothers (96%) had had their baby in hospital (Table 2). It is possible in Turkey to have care for labour and birth from a community midwife, but it is expensive. So it is possible that the remaining 4% of women only received care from traditional attendants. Not only does this show that there is a high level of acceptability of care from health professionals but that hospital birth facilities are accessible.

Table 1. Characteristics of Women Who Traditional Practices to themselves During Pregnancy, Birth and After-Birth (n=245)

Age (years)	n	%
15-20	22	9.0
21-30	171	69.8
31-40	46	18.7
41+	6	2.5
Education		
Non-literate	4	1.6
Literate (primary school)	168	68.6
High school and above	73	29.8
Occupation		
Unemployed	208	84.9
Working	37	15.1
Type of family		
Nuclear family	220	89.8
Extended family	25	10.2
Place of residence		
Mediterranean (south)	120	49.0
Aegean (west)	125	51.0
Social security		
Yes	201	82.0
No	44	18.0
Number of children		
1	118	48.1
2	96	39.2
3+	31	12.7

Whilst the rate of receiving professional care in pregnancy and for birth was high in these two areas, there was a significant reduction in the reported rates of professional help in feeding the baby in the hours and days after birth 58 (24%) from midwives, 68 (28%) from nurses, and 7 (3%) from doctors). Thus 56 (23%) women received help from relatives and 49 (20%) reported no professional assistance (Table 2).

When they needed help with child care after birth, 185 (75.5%) sought help from doctors, 154 (62.8%) from midwives and 54 (22%) from nurses (Table 2). When mothers could not get help with child care from health professionals, 85 (34.7%) obtained the needed help from their mothers or mothers in law. The mothers who did not seek help from health professionals reported that they preferred people who are not health experts because those they sought help from were close (123, 50.2%), because they were experienced (62, 25.3%) and because they trusted them (43, 17.5%) (Table 2).

One hundred and eight mothers (44%) stated that they did not report to the health professionals that they had received advice from their mothers or relatives (Table 2). Among the reasons for not telling the health professionals about this advice were that the health professionals did not give time to listen to their practices, did not approve of the practices or the mothers just avoided explaining their personal practices to the health professionals. Traditional practices used by the women in pregnancy, birth and postnatally The traditional practices are reported in two sections:

1) pregnancy,
2) birth and postnatally.

Traditional practices in pregnancy

One hundred and seventy-eight (71.8%) women reported traditional practices in pregnancy. However, 175 (98.37%) did not say what these practices were. Non response to this question continued with the questions about the first three months of pregnancy (153, 62.4%), the middle of pregnancy (189, 77.1%), the last period of pregnancy (165, 67.4%) and the period when "aches started" (194, 79.20%)

One hundred and sixty-three (66.5%) women reported that they preferred asking their own mothers or mothers- in-law about care when needed during pregnancy. They stated the reasons for this were that these were the people they saw most and the people whose experiences they trusted most. Sixty-two (25.3%) women had received care from their neighbours for the same reasons (Table 3).

When the mothers were unable to obtain help from health personnel, the topics they received help with from their relatives were feeding the baby (131, 53.5%), nutrition of the mother during pregnancy and after birth (95, 38.8%), activities of the mother during pregnancy and after birth (87, 34.7%), baby bath (43, 17.6%), sleep and rest (35, 14.3%), care at home during illnesses (27, 11%) and "other" topics (18 , 7.3%).

The most frequently reported traditional practices in pregnancy were "aş yerme" (food cravings) (n=115, 47%). Unfortunately not all the women explained what these were. Mother stated that about Aş yerme (food cravings) related believing 52 (21.11 %) mother; If mother don't eat this food Baby May be defective, and; If mother eat this

Table 2. Individuals mothers took help during pregnancy, after birth and child care (n=245)

	Yes		No	
	n	**%**	**n**	**%**
Situation mothers' going to controls before birth	**198**	**81.0**	**47**	**19.0**
Birth in hospital	235	96.0	10	4.0
Getting help in breastfeeding				
Midwife	58	24.0	187	76.0
Nurse	68	28.0	177	72.0
Doctor	7	3.0	238	97.0
Relatives	56	23.0	189	77.0
Herself	49	20.0	196	80.0
Experts given help in child care	**n**	**%**	**n**	**%**
Doctor	185	75,5	60	24.5
Midwife	154	62.8	91	37.2
Nurse	54	22.0	191	78.0
People given help when experts do not				
Her own mother/in-law	85	34.7	160	65.3
Sister	37	15.1	208	84.9
Neighbor	26	10.6	219	89.4
Reasons preferring people to get help when could not from experts				
Close to me	123	50.2	122	49.8
Experienced	62	25.3	183	74.7
Trustworthy	43	17.5	202	82.5
Telling traditional practices to professionals	108	44.0	137	56.0

food Baby look like this food (for example If mother eat strawberry / animal lung, baby have a stain on baby's body like strawberry/ animal lung). For this traditional reason; Pregnant woman to abtstain from touch/look animal giblets, and pregnant women have eat If they want to eat starwbery.

One of the most common traditional practices about the nutrition of the mother during pregnancy was "supplying the food the mother wants the same day." The reason why this was done was the fear that "the baby will be abnormal" or "there will be similar stains on the baby's body" if the food the mother wants is not supplied. Mothers also reported that it was believed that if they looked at offal, such as liver, that could "cause stains on the baby's body". A small number of women (n=5, 2%) allowed an old woman to massage their abdomens in pregnancy to ensure that the pregnancy remained healthy (Table 3).

Sixty-two (n=62, 25.3%) mothers also reported that there were traditional practices in the middle of pregnancy. These were: guessing the sex of the baby by looking at the shape of abdomen (n=35, 14.3%), placing a knife under the bed to protect the mother from evil spirits (n=15, 6.1%) and limiting the mother's movement (n=14, 5.7%). As is seen from these reported traditional practices they will not adversely affect the life of mother and baby.

When the question about regulation of nutrition in pregnancy was examined in detail, it can be seen that 128 (52.2%) mothers did not respond to this question, 149 (60.8%) did or tended to consume milk and dairy products, 46 (18.7%) avoided pastry (18.7%), 45 (18.4%) ate fruits and vegetables, 25 (10.2%) reported eating foods rich in iron, 23 (9.4%) did not distinguish any foods, 17 (6.9%) limited salt (6.9%) and 7 (2.9%) ate 'natural food'. Mothers reported that they tried to eat more healthful in pregnancy. The mothers appeared to have altered their diet so that it was healthy in pregnancy. This would suggest that the relatives whose advice was sought were giving correct advice about nutrition during pregnancy. However, it is of concern that just over half of the respondents did not answer this question.

The mothers have stated that they performed traditional practices in pregnancy and after birth with the intentions of having a healthy pregnancy (N=61, 24.9%) and an easy birth (N= 179, 73.1%) (Table 3). As these show that the mothers focus on health, they are thought of as positive desires and appear rationale.

In the latter third of pregnancy 72 (29.4%) mothers reported jogging and other exercise (Table 4). Other traditional practices, such as 'sliding soap from mother's skirt' (10.2%) and giving presents from skirt (6.1%) are not generally applied in these two geographical areas. The mothers reported that any practices that were performed were done so with the intention of making the birth easy (72, 29.4%). Preparing the environment where the mother and baby would live after birth was reported and this included preparing the house (82.0%), preparing baby clothes (59.2%) and the mother's clothes (38.0%), preparing the baby's room and the woman's bed for after childbirth (25.3%), and preparation of gifts for guests coming after the birth (24.9%) (Table 3).

Traditional practices in pregnancy and after birth

One hundred and forty-nine of the participants (60.8%) breast fed their babies within 30 - 60 minutes after birth, but 27 (15.1%) did not breast feed until 4- 24 hours after birth (Table 4). Not breast feeding the baby for 4-24 hours goes against World Health Organisation recommendations (22). According to this recommendations (Ten Fact on Berastfeeding) "breastfeeding should begin within an hour of birth and breastfeeding should be "on demand", as often as the child wants day and night" But Unfortunately this finding is similar to that of the Turkish Demographic Survey 2003(5). This research result showing that it is very late time to first breastfeeding.

Discussion

According to the Turkish Demographic Health Survey 2003 (5), the rate of attending for antenatal care in Turkey is 80.9%, but there are significant variations. In the Mediterranian region it is 84.9%, 87.8% in the Aegean but only 61.2% in the east. These differences can be affected by many different factors such as traditional practices and beliefs and the culture the prospective mother lives in (10). Cultural factors may affect decisions about health, using the available services and the health

Table 3. Traditional practices before and after birth and reasons

	Yes		No	
	n	%	n	%
Situation of traditional practice **in pregnancy**				
Yes	176	71.8	69	28.2
People taken help from about care in pregnancy				
Mother/in-law	163	66.5	82	33.5
Neighbors	62	25.3	183	74.7
Relatives	32	13.0	213	87.0
Did not take	32	13.0	213	87.0
Traditional practice **in pregnancy**	135	55.1	110	44.9
Craving for a certain food	115	47.0	130	53.0
Making an old woman massage on abdomen	5	2.0	240	98.0
Traditional practice**s in the middle of pregnancy**	62	25.3	183	74.7
Looking at the shape of mother	35	14.3	210	85.7
Placing a knife/ scissors under bed	15	6.1	230	93.9
Limiting mother's movement	14	5.7	231	94.3
Before birth				
Jogging exercising	72	29.4	173	70.6
Sliding soap from skirt	25	10.2	220	89.8
Giving gifts from skirt	15	6.1	230	93.9
Wearing amulet	8	3.3	237	96.7
Reasons of traditional practices				
For pregnancy to continue healthy	61	24.9	184	75.1
Traditional practices before birth	115	46.9	130	53.1
Reason of practice birth to be easy	179	73.1	66	26.9

Table 4. Traditional practices during and after birth

	Yes		No	
	n	%	n	%
During birth	72	29.4	173	70.6
For birth to be easy	72	29.4	173	70.6
Preparing the environment before birth	159	64.9	86	35.1
Preparing mother clothes	93	38.0	152	62.0
Preparing baby clothes	145	59.2	100	40.8
Preparing baby room and bed of woman after childbirth	62	25.3	183	74.7
Preparation of gifts for guests	61	24.9	184	75.1
Preparation of nutrition	201	82.0	44	18.0
Cleaning and preparing the house	201	82.0	44	18.0
First nutrition time of baby	240	98.0	5	2.0
Between 30mins-1 hour	149	60.8	96	39.2
Between 2-3 hours	51	20.8	194	79.2
Between 4-24 hours	37	15.1	208	84.9
Not being able to breastfeed because of health problems	2	0.8	243	99.2

of the mother and baby. As traditional practices may vary between countries in the world, they may also vary within a country and may have different results (10, 23).

Ninety-six per cent of the participants had given birth in hospital. This is considerably higher than the proportion for Turkey (78.2%) (10). Giving birth in hospital in the researched area is im-

portant about using health services and mothers' and babies' getting more professional help during and after birth. As mothers in the scope of research are living in districts, having better chances of reaching health services may increase the preference of hospital for birth.

In this study, 19% of the participants had not received any antenatal care (It can be related their social assurance. Because in research sample 44 (18.0%) women haven't got any social assurance. In Turkey, If they have'nt got any social assurance, they have to pay money every procedure. For example, If they have a baby in hospital, they have to pay money). This is similar to the proportion for the whole of Turkey (18.6%) (10). Besides these, births may be given at home in Turkey because of economical reasons (69.6%) (10). In this aspect, as very few of mothers (10, 4.0%) in Mezitli and Çine have given birth at home, conditions of economical and reaching to health institutions can be said to be better. In research sample 4.0 % (10 mother) prefer delivery at home. It can be releated, their preference next to environment traditional midwife. This traditional midwife midwife haven't want lot of money. They are sometimes don't take anything from family. Sometimes traditional midwife accept little money or little presents from family. And mother and traditional midwife to confide in each other. So in our research mother have got social (traditional) and economical reason for delivering at home.

Individuals mothers have received help from during pregnancy, birth and with child care

Although almost all (96%) of the participants had given birth in hospital, they reported that they did not receive enough help with breast feeding from midwives or nurses. They obtained help from their relatives (23%) or they breast fed their babies on their own (20%). Although the rates for antenatal care (81%) and giving birth in hospital are very high in these areas, it appears that provision of postnatal professional help is as high. There are four possible explanations for this. Firstly, either there are inadequate personnel in the postnatal areas or those that are there do not assist the mothers. Secondly, either the mother does not want to expose herself to newly met health staff or she does not know how to ask for help with breast feeding. Thirdly, mothers prefer to obtain help from the relatives and neighbours whom they trust. Finally, it is possible that there were no problems with the baby's health or with breast feeding.

Mothers have taken professional help about child care from doctors (75.5%), midwives (62.8%) and nurses. Yet, they have stated that when they could not get enough help from professionals, they get this from their own mothers/ in-laws (34.7%). For example; Mother in research example total 148 mother, 61.0% get help from Her own mother/in-law, sister and Neighbor (table 2) and. Total 137, 56.0% mother Telling traditional practices to professionals (table 2). In this getting help from grandmother for baby and mother care may be dangerously for baby and mother health (using wrong or risky traditional practices). In turkey there are many traditional practices, Geçgil stated liked that "Wrapping the baby's limbs tightly", "Salting or washing babies with salted water", "Feeding the baby butter and honey" (9).

Practices based on culture may always be in mind in the content of help get from grandmothers; because when mother asks what to do to grandmother, grandmothers who are not professional about care want the suitable experience to be applied to that situation, and mother who needs help may be accepting that without questioning because of being young or not having enough knowledge. Otherwise, grandmothers may later reject to help when mother and baby needs help by thinking "My daughter/in-law is questioning me", "She does not listen to me." As young mothers are always with them in life and as it is necessary for the continuity of family relations, they culturally feel forced to do what they say. So, it can be concluded that young mothers are going under the must of acting how it is said. In that way, the possibility of mothers' who are left to be taken care by grandmothers or relatives making traditional practices increases.

As is stated in the study made by Martı´nez (2008), treatments of the health personnel are not fully understood, they did not take any education about cultural practices, people apply traditional practices and traditional people and their knowledge instead of using health services in the conditions of traditional practices being denied and their not being evaluated as supplementary

in care and in the presence of processing which may cause embarrassment/shame (24). Same situation is thought to be effective in getting help from mothers/in-laws about breastfeeding and care.

Mothers' staying on their own or with relatives takes care in our research. Yet, mothers did not mention traditional practices about breastfeeding. Özsoy and Katabi (2008) determined in their research that traditional behaviors are increasing in Iran and Turkey during milking or breastfeeding process (2). Mothers' who just gave birth staying on their own or with relatives is thought to make a basis for traditional practices. For this reason, in baby-friend hospital practices (25, 26) and according to the aim of campaigns supporting breastfeeding mothers' milk, it is thought that mothers' being observed closely by their doctors, nurses or midwives in breastfeeding period and getting the help needed during breastfeeding is important. As stated before, as mothers prefer their mother/in-law after birth in baby care, they also prefer them in pregnancy period (66.5%). All these make up the types of help, social support and care showing that there are traditional practices. Mothers experiencing these period state that there are traditional practices in pregnancy by 71.8% but avoid to state what these are. The reason of this, as Martı´nez (2008) stated again, may be the idea of not being understood by those giving health service or traditional practices not being taken seriously (24).

When mothers did not take help from health experts, they need/tend to take help from their mothers/in-laws. These can be considered as missed opportunities about giving better health service (Table 1). ICN (International Council of Nurses) mentioned this point in detail in 2008 Nurses' Day theme and asked from the nurses to make the responsibilities they went under for society (27). In not being successful about health indicators' reaching the targets about mothers and babies in Turkey, it is thought that missed opportunities in giving health service are important.

Mothers continue their care by applying the suggestions of their relatives by 80%. It can be thought that in mothers' stating traditional application in a rate of 71.8%, their taking help from their relatives but not health personnel in health practices is effective; because the relatives of mother who have not taken any special education in care mostly appear during the help of mothers/in-laws about care in cultural transmission. The study of Özsoy and Katabi (2008) also supports this idea (2).

Traditional practices in pregnancy, birth and post-birth periods

While 71.8% of mothers mentioned the existence of traditional practices in pregnancy, only 55.1% explained what these are. Mothers mostly mentioned "craving for food" (47.0%) as a traditional behavior (Table 3). These are in order: providing the food the mother craves for right away (11.83%), eating dried foods for her stomach not to be upset (3.67%), not touching the liver (2.44%), not having haircut or wearing henna (0.81%). When taking into consideration that mothers do not explain traditional practices to experts by 56%, mothers did not explain traditional practices completely.

Mothers who explained the traditional application could openly state the behaviors that could be met positively by health personnel and approved by all society like craving for food (19.60%), jogging and exercising (16.33%). Having behaviours affecting health negatively except these is thought to exist as there is no other possibility of observing mothers except data collecting process.

In the research of houses of mothers made by Özsoy and Katabi (2008), it is determined that women in Iran and Turkey explained the contemporary and traditional practices they did in pre-pregnancy and pregnancy periods in detail (2). Among the reasons of mothers' not explaining the reasons of traditional practices may have resulted from the environment the data is collected.

Traditional practices that mothers stated to have applied are mostly about preparing and relieving mother for/from birth process. With this aim, it is stated by mothers that practices like jogging, exercising, sliding soap from her skirt, giving presents from her skirt and wearing amulet exist.

This situation shows that mothers need to be prepared for giving birth. Mothers want to know the developments that will happen to them and to babies during pregnancy. They are thought to apply people having life experience with that reason. The behavior of "sliding soap from her skirt" may be a behavior for relief by focusing on birth event, prospective mother's animating birth ideally, and being birth as easy as sliding soap from her skirt.

Mothers stated that regulations in nutrition during pregnancy is made with the aim of providing enough and balanced nutrition. This is also pleasing in showing that traditionalized nutrition arrangements about health are in good condition in researched areas.

Besides, the reason why 52.24% of mothers did not answer anything about nutrition in pregnancy could not be determined. Not knowing the economical conditions of mothers in research about nutrition may be not wanting to explain diet styles, being afraid of being misjudged by health personnel because of insufficiency of nutrition, being anxious about (not) explaining traditional behaviors (24).

In this research made in Mezitli and Çine, in coinciding traditional approaches in birth and after birth period so few, traditional approaches are thought to have reduced due to the law socializing health services in our country since 1961 (28), with continual observation of prospective mothers by midwives in the process of past 48 years and home visits. Because the existence of traditional methods as a result of cultural affections in pregnancy, birth and post-birth periods in Turkey is determined by various researches (2, 9, 10). İn addition about mother and baby care nurses and doctors have got inaduquate knowledge in their practices (29). It may be reason of mother and their relatives chosen culturally practices.

Conclusions

The experiences of women who are in touch with health personnel from pregnancy to birth but whose needs are not met about care and their needing the relatives show a misapplication in care services. For this reason, it is needed that more sensitive works are done by doctors, midwives and nurses to mothers who come to health institutions to take care services. More than half of mothers preferred not to say the traditional practices to health experts. Accordingly, as data about the mentioned traditional approaches are collected in a village clinic by nurses, it is thought that such researches need to be done with different techniques and in different environments. In the direction of the results gained, it is important that midwives and nurses are reachable to mothers after birth to give more meaningful help about care, sharing care experiences with mothers more, and creating a more secure communication environment in giving better care service. For this reason, planning the care services by taking characteristics that may increase getting service better may provide care services to be more successful. This carries great importance about the development of mother-baby health.

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Effectiveness of remifentanil for labor pain control: a systematic review and meta-analysis

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Abstract

Background: Many medical conditions restrict the use of neuraxial analgesia for labor pain control, and several options such as hypnosis, acupuncture, entonox and doula have limited efficacy. Intravenous remifentanil patient-controlled analgesia (PCA) is being considered as the potential alternative to epidural analgesia (EA) and assessed by several studies. The aim of this study was to systematically assess the effectiveness of intravenous remifentanil patient-controlled analgesia (PCA) for the relief of labor pain and the influence on maternal and infant outcomes.

Methods: Electric databases and clinical guidelines were searched. Two reviewers independently evaluated the relevance, inclusion and study quality, and extracted the data of randomized controlled trials in which i.v. remifentanil PCA were compared with any other analgesic treatment for labor pain in healthy parturients. Weighted mean differences and odds ratio were calculated and are reported with 95% confidence intervals.

Results: From 75 potentially relevant titles and abstracts, five studies, of variable methodological quality, were included. All included trials used i.v. remifentanil PCA technique and compared with different pain-alleviating means, examining analgesic efficacy from 30 min to over 11 h. Remifentanil provided superior analgesic effect than the comparison (weighted mean difference -1.85, 95% confidence interval -2.17 to -1.54), but produced negative influence on the infant outcomes (Odds Ratio 0.10, 95% confidence interval 0.03 to 0.42). Delivery methods and side effects were similar between remifentanil and the comparison.

Conclusions: Pooled assessment of remifentanil intervention seems an attractive strategy for controlling labor pain in health term parturients, but it is not supported by strong evidence. Current evidence suggests that it may produce effective analgesia by only a modest level.

Key words: Remifentanil; Labor pain; Labor analgesia; Systemic analgesia; Meta-analysis

Introduction

The use of epidural analgesia (EA) is recommended as an optimal means in labor pain control by the clinical guideline (1), whereas in some medical conditions including spinal abnormalities, bleeding tendency, infection, allergic to local anesthetics, maternal anxiety to EA procedure and lack of epidural puncture experience at some centres as well, the EA technique cannot be performed successfully, under which an alternative to EA is demanded. Several options such as hypnosis (2), acupuncture (3), entonox (4), doula (5), yoga (6) and transcutaneous electrical nerve stimulation (7) have been used for labor analgesia, but the analgesic efficacy of these methods is limited and inconsistent. Besides these, systemic administration of opioids has been considered as the potential offer to EA, and thus pethidine and fentanyl were used at early time. However, these two drugs were discarded for their high incidence of maternal and infant side effects and inadequate analgesia (8, 9). Therefore, how to conquer these drawbacks and realise optimal analgesia by one drug delivered systemically is searched and found that remifentanil is likely to be the option.

Remifentanil, a newest ultra-short acting mu opioid agonist, is a piperidine derivative with the

normal opioid configuration, but contains an ester linkage being susceptible to non-specific esterases and independent of hepatic and renal function (10), and has a context-sensitive half-time of 3 min, and quickly redistributed and metabolised in the fetus (11). Thus it is widely regarded as an ideal analgesic in systemic administration for labor alleviation due to its "easy come, easy go" characteristic (12, 13).

Generally, one major concern of i.v. administration of drugs during labor is the trans-placenta characteristic strongly associated with fetus status, especially the increase in the rate of intraplacental depression and postpartum resuscitation (14). Although remifentanil can pass through the blood-placenta barrier, its short half-life time and quick distribution and metabolism determine that remifentanil will not cumulate in fetuses. In addition, the clinical feasible property of maternal monitorings guarantees remifentanil's potential use. To date, several studies with respect to the i.v. remifentanil PCA in labor pain control have been done, whereas the actual effect of remifentanil is inconsistent because the sample size was small, and the interventional strategies were inconsistent each other (15-22). It is intriguing to clinical practice and further research to combine these studies together and analyze the role for remifentanil in labor analgesia.

Materials and Methods

Criteria for considering studies for this review

Randomized controlled trials were enrolled in this meta-analysis. Healthy term parturients, nulliparous or multiparous, requesting labor pain control were selected as the study subjects. The interventions were i.v. remifentanil PCA *vs.* other analgesic means. Continuous and dichotomous outcomes were analyzed in this study. The primary outcome of interest was the analgesic efficacy rated with a 0-10 cm visual analogue scale (VAS). Secondary outcomes considered were the delivery methods (cesarean or instrumental), the maternal side effects and infant outcomes associated with the treatment.

Search methods for identification of studies

The search carried out using the search terms "remifentanil", "labo(u)r", "labo(u)r pain", "analgesia", "labo(u)r analgesia", "patient-controlled analgesia" or "PCA". In the Medline and EMBase databases, randomized studies were identified by limiting these studies to "randomized controlled trial", "Multicentre study", "controlled clinical trial" or "clinical trial". The following databases were searched: Medline (1966-2012; http://www.ncbi.nlm.nih.gov/entrez/query.fcgi? DB = PubMed), EMBase (1988-2012; http://www.embase.com), and the Cochrane Central Register of Controlled Trials (http://www.mrw.interscience.wiley.com/cochrane/cochrane_clcentral_articles_fs.html, with the search carried out on January 20 2012). LILACS, CINAHL, ClinicalTrials.gov, China National Knowledge Infrastructure [CNKI], Chinese Biomedical Database [CBMdisc], China National Science & Technology Library [NSTL], WanFang Data were searched too. Corresponding authors were contacted to obtain additional information if necessary. We did not search the conference proceedings. Language of publication and non-publication were not reasons for exclusion.

Data collection and analysis

Information on patients, methods, interventions, outcomes, and side effects was extracted from the original reports on to specially designed forms by at least two independent reviewers (SX, XS and FW). Disagreements were resolved through discussion. Data were analyzed with Review Manager (RevMan) [Computer program]. Version 5.0. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2011.

Selection of studies

Studies met the following four criteria were included: study design (randomized controlled trial), study population (healthy term parturients), intervention (i.v. remifentanil PCA *vs.* control (non-remifentanil or non-epidural analgesia)), and availability of outcome data on analgesic efficacy, maternal and infant outcomes. Two independent reviewers (SX and XS) screened the titles and abstracts of eligible studies. Potentially relevant papers were obtained and two independent reviewers (XS and SX) reviewed the full manuscripts for possible inclusion. Disagreements were resolved by consensus.

Non-standard designs of studies such as crossover trials were excluded from the present review for its special and complicated demand of analyzes and the possibility of bias induction (23). In addi-

tion, we combined the remifentanil intervention groups of the study with multiple treatment groups to create a single pair-wise comparison (19) and then compared with the control one. In addition, if the comparison was remifentanil or epidural analgesia, we excluded them because such control group would make the conclusion unsuitable for explaining the potential role for remifentanil in labor analgesia. Besides, epidural analgesia itself has a superior effect on labor pain control then systematic analgesia (1), and then the study was precluded if the comparison was used epidurally.

Assessment of risk of bias in included studies

We assessed the internal validity of individual trials using Jadad's scale (23) by at least two reviewers independently (XS, SX and FW), which evaluates the reported randomization, blinding, and withdrawals in a clinical trial and assigns a score from 0 to 5, with higher scores indicating higher quality in the conduct or reporting of the trial. Studies were not excluded on the basis of methodological quality of trials, but this information was used in the sensitivity analysis.

Measures of treatment effect

Analgesic efficacy of i.v. remifentanil PCA and corresponding control intervention was rated with a 10-cm linear Visual Analogue Scale (VAS) system, and such scorings were treated as the continuous data analyzed with the mean and standard deviation (SD) presented as mean difference (MD) and 95% confidence interval (95% CI). Other measures including the delivery methods (cesarean or instrumental), side effects of drug delivery and infant outcomes were presented as the dichotomous variables and analyzed using odds ratio (OR) and 95% CI.

Dealing with missing data

In avoiding missing whole studies because they are never published, are published in obscure places, are rarely cited, or are inappropriately indexed in databases, we searched almost all-can-be-gotten electric databases comprehensively without limitation of the publication language. However the conference proceedings were not searched. Regarding the missing outcome, missing summary data of an outcome, and missing participants, we contacted the original investigators by mails to request these missing data, only if such action was failed, we did assumption about their relationships with the available data by treating them as if they were observed and all were poor outcomes, and then intention-to-treat (ITT) analyzes were performed, as appropriate.

Assessment of heterogeneity

The Chi-square test and I^2 statistic were used in the present review to measure the heterogeneity (0% to 40%: not be important; 30% to 60%: moderate heterogeneity; 50% to 90%: substantial heterogeneity; 75% to 100%: considerable heterogeneity) (24, 25). A P value of less than 0.10 is used to determine statistical significance.

Assessment of reporting biases

Although the rank correlation between standardized intervention effect and its standard error was recommended to measure the asymmetry of funnel plot as described elsewhere (26), given only five studies were included in the present review. Therefore, the assessment of reporting biases was performed, though, the data were not presented.

Data synthesis

We pooled and presented the results of studies using fixed-effect model. If the heterogeneity among trials was considerable, then the random-effect model would be used as the *post hoc* test of heterogeneity. For dichotomous variables we calculated individual and pooled statistics as Odds Ratio with 95% CIs. For continuous outcomes the mean differences reported from individual trials were calculated, and the weighted mean differences with associated 95% CIs were pooled. The Mantel-Haenszel method for dichotomous outcomes or the inverse variance method for continuous outcomes was used.

Subgroup analysis and investigation of heterogeneity

Subgroup analyzes were carried out to detect the heterogeneity, the primary outcome was stratified by different control interventions and in different participants (nulliparity *vs.* mixed parity), and the secondary outcomes were subgrouped according to different observational measures. We performed tests for heterogeneity using the Mantel-Haenszel or inverse variance methods.

Sensitivity analysis

Sensitivity analyzes were performed by repeating the primary analysis or meta-analysis with subgroup analyzes, alternative use of fixed-effect or random-effect model, and different selection of outcome presentation including ORs, risk ratios (RRs), risk differences (RDs), MDs or standardized mean difference (SMDs) for substituting alternative decisions or ranges of values for decisions about the analgesic efficacy of i.v. remifentanil PCA in labor pain control.

Results

Description of studies

Two reviewers determined independently the studies' inclusion or exclusion. The initial search for studies involving remifentanil treatment of labor pain control yielded 64 articles, of which 9 were potentially eligible on the basis of their title and abstract.

Included studies

Five studies that met the four inclusion criteria were analyzed (15-19). These studies were carried out in three countries (three from the United Kingdom, one from Israel and the United States of America, and one each from China) (Table 1). Total of 245 parturients aging from 18 to 40 years were studied: 132 parturients assigned to i.v. remifentanil PCA and 113 assigned to other analgesic treatments. Of the five studies, four studies used meperidine (pethidine) as the control group (15-18), and one used Doula support (19). Four studies enrolled mixed parity, and one study performed only in nulliparous women. Two studies investigated the singleton cephalic presentation, and three others were not clear. One study did not provide any eligibility criteria for participant's enrolment (16). The treatment was initialed at the cervix at least 3 cm or greater (Table 1).

The regimen of i.v. remifentanil PCA was of the bolus doses of 0.50 μg/kg in three studies, of which one used two intervention arms with or without basal infusion and combined as a single comparison, and three studies gave a 15 μg or 20 μg bolus dose of which one delivered remifentanil with a step-wise increase of 5 μg to a maximal limitation of 1500 μg/h, and one study gave initial bolus dose of 0.10 μg/kg that increased till to 0.9 μg/kg, and one study delivered a bolus of 0.25 μg/kg plus 0.025 μg/(kg min) background infusion. Of the included studies, two studies described that a loading dose of 20 μg was given, but others were not available about the loading dose information (Table 1).

The follow-up period after remifentanil PCA initialed was variable, ranging from 30 min to over 11 h. One study mentioned that the follow-up ceased till the delivery complete (19) and one to the end of the first stage of labor (18), and one study followed-up over 10 h (15) and other two studies observed merely 0.5-5 h (16, 17) (Table 1).

Excluded studies

Of the 75 articles examined, we excluded 24 studies as merely the review article, nine studies were case reports, and seven studies appeared as the editorial or editor's opinion, six studies was letters without original data, and five reports were correspondences, six study used epidural analgesia as the control, four studies without the comparison, two studies performed using animal, and one duplicated publication, one study designed with a crossover manner that is difficult to be analyzed for its special and complicated requirements of assessment, and one trial listed as ongoing in the ClinicalTrials.gov could not be found as published reports and therefore were not considered, two studies have been done only for finding an optimal dose of remifentanil without a control group provided, and two studies just had abstracts failed to get original data from the primary investigators by contacting with mails and thus excluded (Figure 1).

Risk of bias in included studies

The methodological quality of the studies assessed with Jadad's method was variable, with some having major drawbacks. The mean quality score was 3 out of a possible 5.

Allocation

Two of the five individually randomized studies reported methods of random allocation that had secure allocation concealment. The other three merely stated that allocations were concealed but gave no further details or did not report sufficient information or used insecure methods.

Table 1. Characteristics of included studies investigating the analgesic efficacy of Remifentanil in labour pain control, ordered by publication date

Reference (Country)	Design	No. of participants	Setting of investigators	Eligibility criteria	Population characteristics	Treatment	Comparison	Observation period of Analgesia (h)	Trial quality			
									Randomization described, appropriate	Blinding described, appropriate	Losses to follow-up described	Jadad score
Volikas 2001 (UK)	RCT	17	Department of Anaesthesia	ASA I/II; with no known obsteric complications; requesting pethidine analgesia	Healthy women; 23-34 years; 36–40 weeks gestation; 52.9-105.2kg in weight; mixed parity; initial cervical dilation of 3-6 cm	i.v. Remifentanil PCA, bolus of 0.5 μg/kg, lockout period of 2 min, no hourly maximum limit	i.v. Pethidine PCA, bolus of 10 mg, lockout period of 5 min, maximum limit of 100 mg/h	11 h	Yes, no	Yes, yes	No	3
Thurlow 2002 (UK)	RCT	36	Department of Anaesthesia	N/A	18-40 years; 38-42 weeks gestation; 50-100 kg in weight; mixed parity; initial cervical dilation of 3-5 cm	i.v. Remifentanil PCA, 20 μg loading dose, lockout period of 3 min, no background infusion	Meperidine 100 mg *i.m.*	Over 120min	Yes, yes	No, no	Yes	3
Blair 2005 (UK)	RCT	39	Department of Anaesthesia	ASA I/II; either before the onset of labor or in early labor before any analgesia	19-39 years; 57-105kg in weight; mixed parity; initial cervical dilation of 2-8 cm	i.v. Remifentanil PCA, bolus of 0.5 μg/kg, lockout period of 2 min, 1-ml bolus over 18 s	i.v. Pethidine PCA, bolus of 15 mg, lockout period of 10 min, 1-ml bolus over 18 s	35-330 min	Yes, no	Yes, no	Yes	3
Evron 2005 (Israel; USA)	RCT	88	Department of Anaesthesia; Outcomes Research™ Institute	ASA I/II; singleton cephalic presentation; requesting systemic analgesia	24-35 years; 60-95kg in weight; mixed parity; initial cervical dilation of 3-6 cm	i.v. Remifentanil PCA, 20 μg loading dose, lockout period of 3 min; The dose was increased every 15-20 min by 5-μg, to a maximal limit of 1500 μg/h. If any parturient had reached the limit, a single bolus 70 μg (0.93 μg/kg) used for inadequate analgesia	75 mg of meperidine in 100 ml of saline over 30 min (1 mg/kg in a single bolus). Another dose of 75 mg followed by 50 mg was administered, (maximum dose of 200 mg) for insufficient analgesia	Till the end of the first stage of labour	Yes, yes	Yes, yes	No	4
Jing 2007 (China)	RCT	65	Department of Anaesthesia	Full-term pregnant women; ASA I/II; singleton cephalic presentation; no oxytocin use; no obstetric complications	24-35 years; 38-42 weeks gestation; 59-90kg in weight; nulliparas	i.v. Remifentanil PCA, bolus of 0.5 μg/kg, lockout period of 3 min, with or without background infusion 0.05 μg/(kg min)	Doula support	Till delivery completed	Yes, no	No, no	No	1

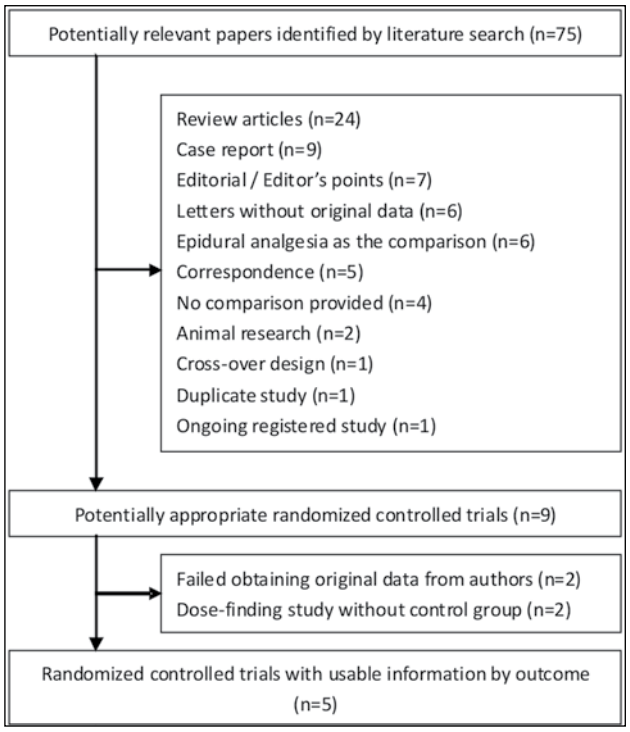

Figure 1. Flow of papers through review

Blinding

Although blinding of participants and staff delivering the interventions was generally difficult, three studies described the blinding methods with a secure way. One study achieved blinding of care providers but without detailed description of the allocation. The other two studies did not report the blindness of the care delivery and outcome assessment.

Incomplete outcome data

Four studies reported losses and exclusions of randomized participants by the end of follow-up. No intention-to-treat analysis was adhered to in all included studies.

Other potential sources of bias

In avoiding bias of study searching, various databases were retrieved. We did not search the conference proceedings, and did not contact any pharmaceutical entities and experts on remifentanil. In addition, failure of getting missing data from original investigators that were excluded was likely to produce biases regarding the actual analgesic effect of i.v. remifentanil PCA in the context of labor pain control.

Effects of interventions

Analgesic efficacy

Among those on remifentanil, compared with those assigned to different analgesic methods, i.v. remifentanil PCA appeared to display better analgesic efficacy than other comparisons, the mean difference of pain intensity scaled with linear VAS gauge was -2.85 (95% CI: -2.17 to -1.54). Among those assigned to meperidine (pethidine) as the control group in four studies (15-18), the analgesic efficacy of i.v. remifentanil PCA was better than the meperidine control, the mean difference was -1.84 (95% CI: -2.17 to -1.50). One study used Doula support as the control comparison (19), and the analgesic efficacy of remifentanil was superior than those assigned to Doula (Figure 2). We did not do analgesic analyses restricted to different follow-up periods due to complicated influence of different control interventions.

The green squares represent the effect estimates of remifentanil; the black lines represent the 95% confidence intervals associated with the effect estimates. The black diamonds represent the summary effect estimates for the overall effect (total).

Delivery methods

We pooled studies providing data of delivery methods. Data on cesarean delivery were available for four studies (15, 16, 18, 19). Among tho-

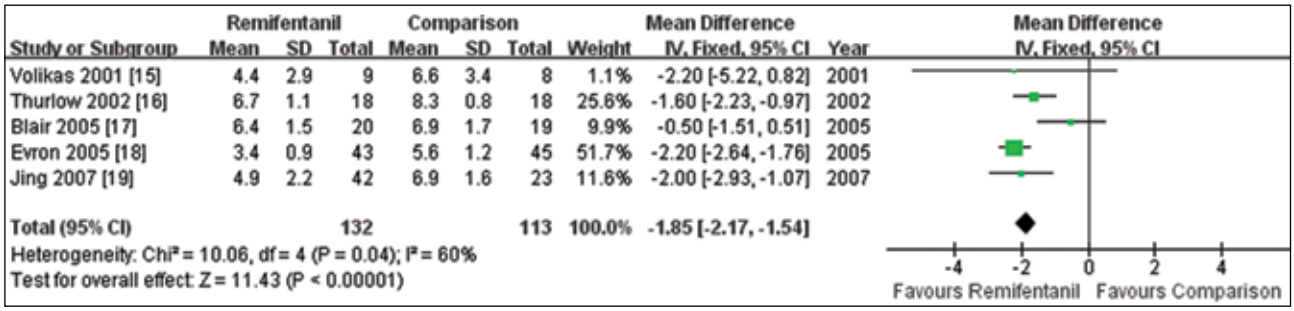

Figure 2. Meta-Analysis of pain intensity among those on remifentanil compared with controls

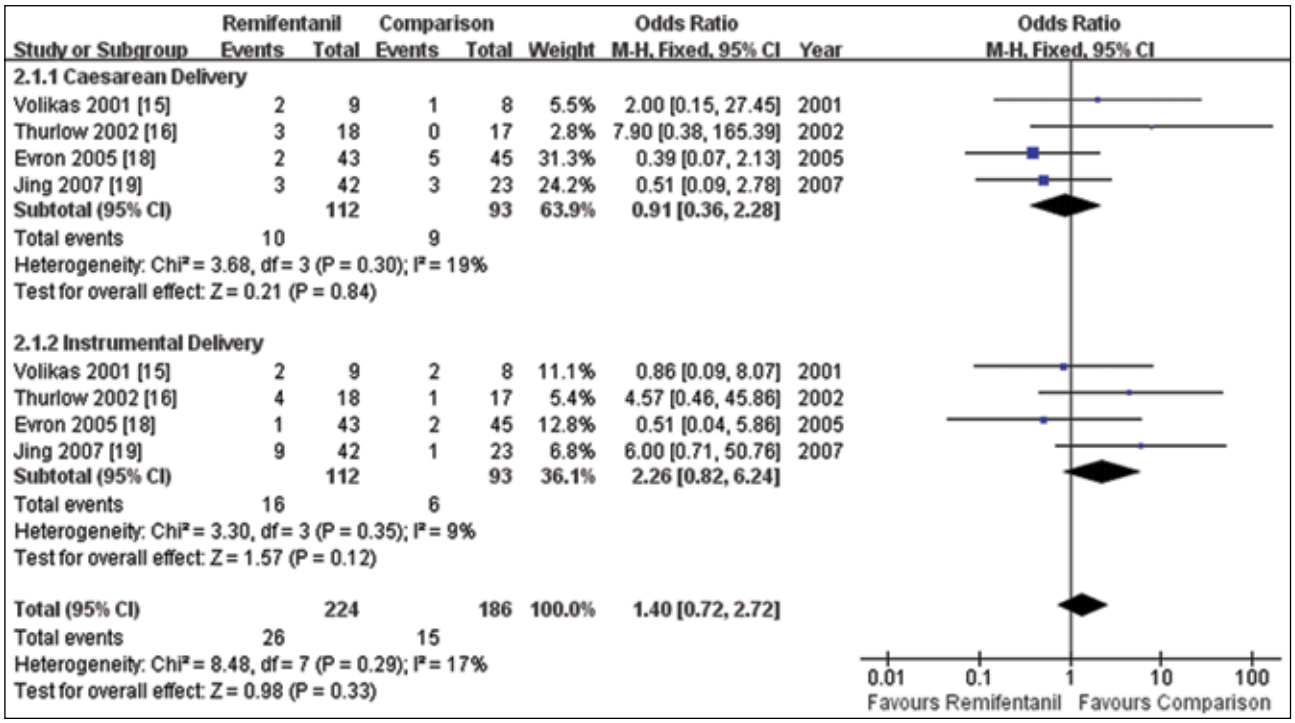

Figure 3. Meta-Analysis of delivery methods among those on remifentanil versus controls

se on i.v. remifentanil PCA, compared with those assigned to control comparisons, remifentanil did not reduced the odds of cesarean section of what they were in the control group (95% CI: 0.36 to 2.28). Data on instrumental delivery were available for four studies (15, 16, 18, 19). The odds of instrumental delivery in control comparisons was not reduced compared with the remifentanil treatment, the OR was 2.26 (95% CI: 0.82 to 6.24). After pooled the delivery methods together, the odds in remifentanil was not increased than those assigned to different controls, the OR was 1.40 (95% CI: 0.72 to 2.72). (Figure 3).

The blue squares represent the effect estimates of remifentanil; the black lines represent the 95% confidence intervals associated with the effect estimates. The black diamonds represent the summary effect estimates for the different subgroups (subtotal) and for the overall effect (total).

Side effects

Data on side effects were available from seven studies (15, 16, 18, 19). Side effects were reported in 27 out of 172 patients (15.7%) allocated to i.v. remifentanil PCA and in 17 out of 135 patients (12.6%) allocated to control. Nausea and vomiting were reported in 15 out of 112 parturients allocated to remifentanil (13.4%) and 15 out of 94 parturients allocated to control comparisons (15.9%), and the remifentanil treatment had less odds in reducing nausea and vomiting compared with the control, the OR was 0.84 (95% CI: 0.38 to 1.86). Itching was reported in five women out of 42 allocated to remifentanil (11.9%) and zero allocated to the control (19), and the remifentanil did not reduce the odds of itching versus the control, the OR was 6.89 (95% CI: 0.36 to 130.47). During the administration of remifentanil, supplemental oxygen was used when the saturation of oxygen (SaO_2) was less than 95%, i.e. the hypoxemia due to respiratory depression. In the study reported supplemental oxygen use (16), 7 out of 18 patients allocated to remifentanil (38.9%) and 2 out of 18 patients allocated to the control ones (11.1%) were given additional oxygen, and the remifentanil did not increased the odds of supplemental oxygen use than those in the control group, the OR was 5.09 (95% CI: 0.89 to 29.27). Overallly, i.v. remifentanil PCA had less odds in decreasing side effects compared with the control, the OR was 1.41 (95% CI: 0.73 to 2.73) (Figure 4).

The blue squares represent the effect estimates of remifentanil; the black lines represent the 95% confidence intervals associated with the effect estimates (a line with an arrow indicates that the confidence interval was greater than could be illustrated

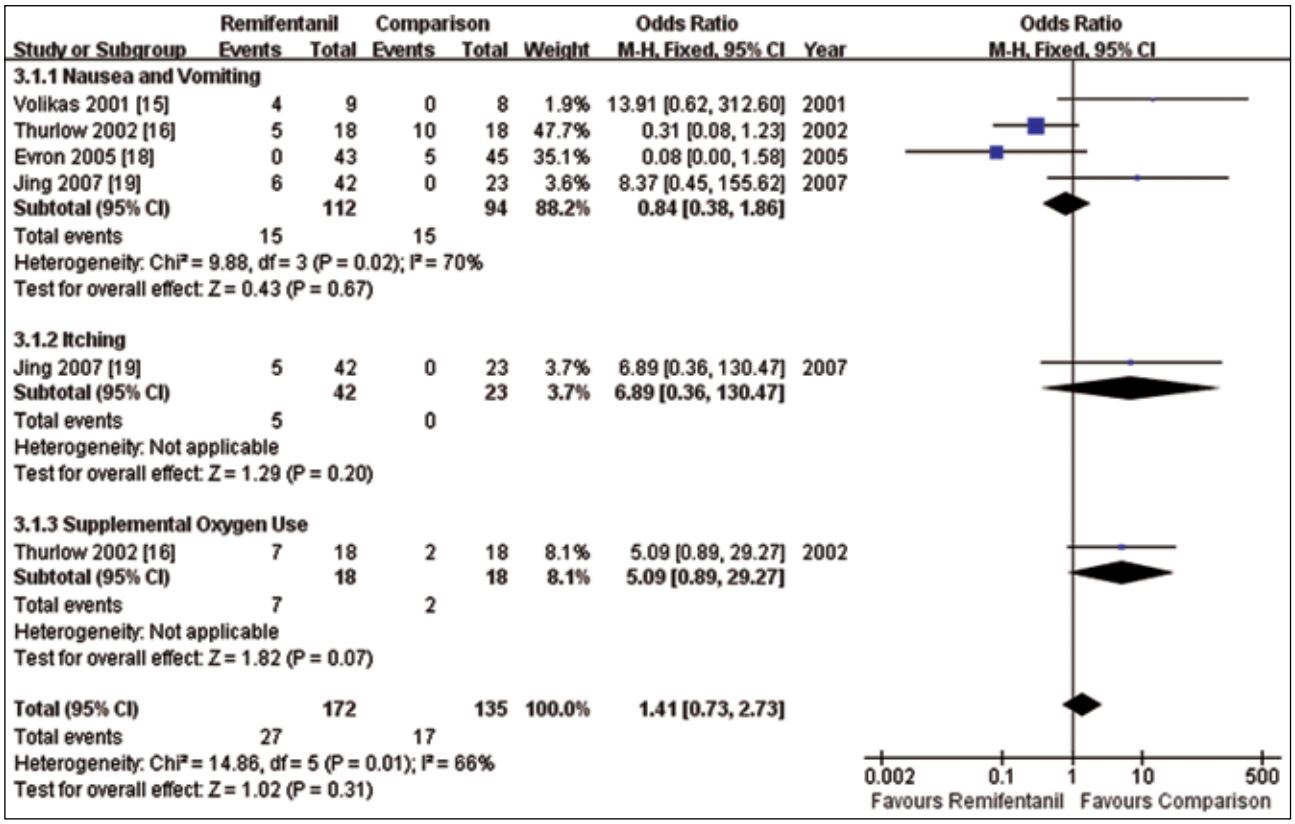

Figure 4. Meta-Analysis of maternal side effects among those on remifentanil versus controls

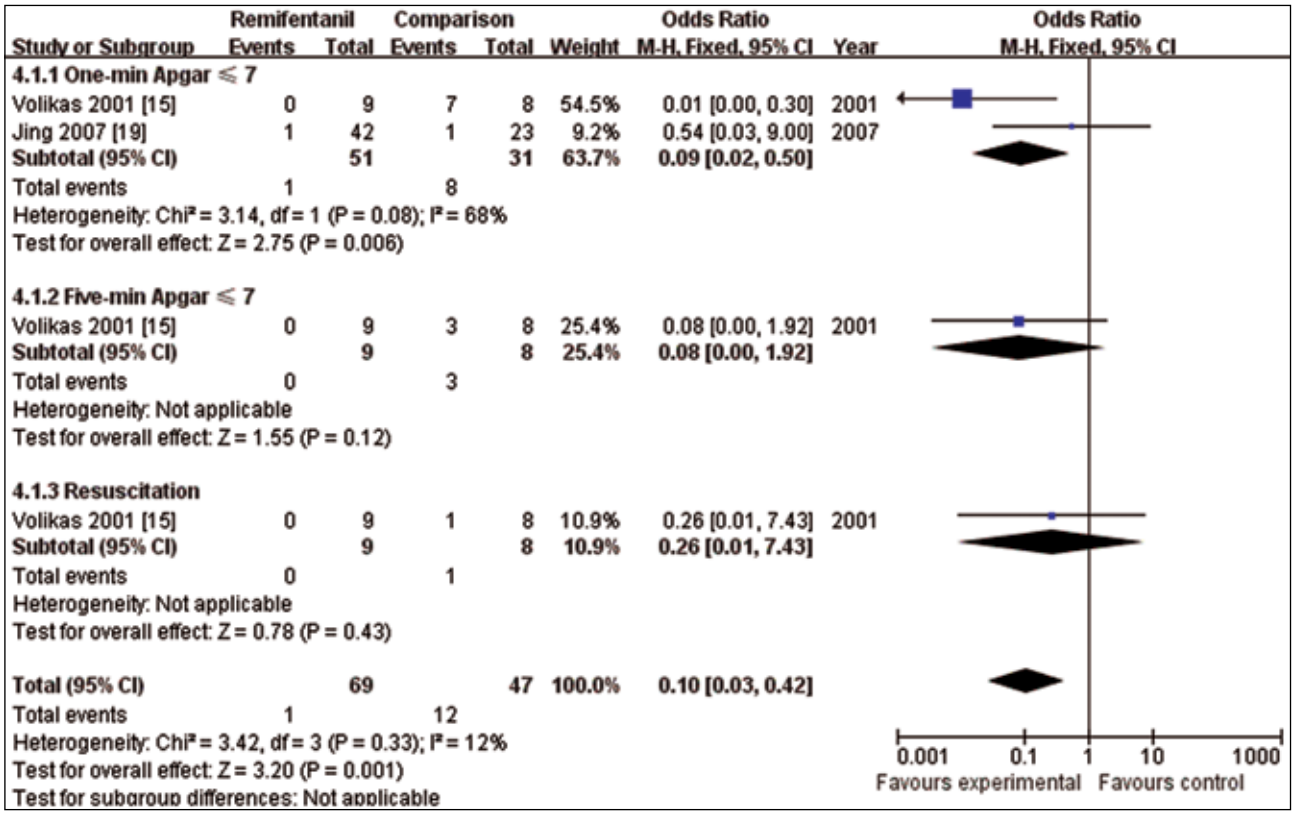

Figure 5. Meta-Analysis of infant outcomes among those on remifentanil versus controls

in the graph). The black diamonds represent the summary effect estimates for the different subgroups (subtotal) and for the overall effect (total).

Infant outcomes

Data on infant outcomes associated with drug administration were available for two studies (15, 19). One-min Apgar score ≤ 7 was reported in one out of 51 infants allocated to remifentanil (1.9%) and eight out of 31 infants allocated to the control (25.8%), and the remifentanil reduced the odds by 91% of what they were in the control group, the OR was 0.09 (95% CI: 0.02 to 0.50). Data of the incidence of five-min Apgar score ≤ 7 or the rate of resuscitation of infants have been reported in only one study (15). However, the overall meta-analysis of infant outcomes displayed that the remifentanil reduced the odds of still being in negative outcomes to 10% of what they would have been, the OR was 0.10 (95% CI: 0.03 to 0.42) (Figure 5).

The blue squares represent the effect estimates of remifentanil; the black lines represent the 95% confidence intervals associated with the effect estimates (a line with an arrow indicates that the confidence interval was greater than could be illustrated in the graph). The black diamonds represent the summary effect estimates for the different subgroups (subtotal) and for the overall effect (total).

Sensitivity analysis

There were not any important changes in the estimates when the analysis was restricted to studies on nulliparous or mixed-parous populations, or studies that used meperidine or Doula as the control groups, or studies that met all the indicators of methodological quality.

Considerable heterogeneity was found in the analyses of analgesic efficacy (I^2=60%), side effects (I^2=66%) and one-min Apgar score ≤ 7 (I^2=68%), which were explored using subgroup analyzes. Additionally, no changes in the overall estimates were found when using the random-effects method. When examining studies reporting analgesic efficacy overallly, the smallest *P*-value for tests of homogeneity was < 0.00001. Results from studies reporting differences in side effects were more disparate; the *P*-value for test of homogeneity was < 0.0001. Data reporting infants' one-min Apgar score ≤ 7 were examined and the *P*-value for test of homogeneity was 0.06. All these estimates were still statistically significant when using the random-effects method with the sub-analyses. We sub-analyzed the analgesic efficacy in the studies that meperidine was use as the control only, though substantial heterogeneity was found (x^2=9.95, df=3, *P*=0.02, I^2=70%), a better analgesia was displayed. This is consistent with the idea that remifentanil intervention may be more effective than meperidine but still needs testing in future studies.

Discussion

Summary of main results

The results of the five studies included in this systematic review showed that remifentanil appears to be effective in controlling labor pain when used intravenously with PCA technique. Compared with parturients performed other analgesic means, those who were randomized to remifentanil have a better analgesic efficacy without increasing the odds of cesarean and instrumental delivery and the maternal incidence of side effects, but the odds of infants' negative outcomes are much higher. For some outcomes the results were heterogeneous; investigation of these in subgroups analyzes showed no significant differences in analgesic effectiveness between remifentanil and meperidine or Doula and between populations only in nulliparity and unselected populations in mixed parity.

Overall completeness and applicability of evidence

While the present analysis suggests that benefits from this type of intervention of remifentanil is obvious as previously supposed, several aspects limiting the completeness of such conclusion should be acknowledged. This conclusion is mainly based on the analysis of the pain intensity ratings with the VAS system, which was the most commonly reported outcome. We were unable to synthesize and analyze data of the pain relief scoring and effective analgesic number of patients of which did not reported by the included studies. Therefore, it is possible that the VAS ratings of pain alone were not strong enough as the evidence to draw the above conclusion. More importantly future studies need to be done to show whether similar changes occurred

in the outcomes of the pain relief scoring and the effective analgesic number of patients. Furthermore, of the five included trials, no one study completely reported all outcomes analyzed in this review and no two studies used identical intervention strategy. Thus the individualized interventions in each study and the discrepant report of outcomes resulting in a lack of consistency in outcome measures, these are probably the critical factors restricting our ability to combine results across many trials and consequently influencing the correctness of the conclusion. So this review should be evaluated with the above limitations in mind.

Quality of the evidence

The overall quality of the evidence was not high. Most of the trials were small and many had methodological drawbacks leaving them open to bias, such as insecure allocation concealment, lack of blinding of outcome assessment and poor reporting. A major limitation of the existing evidence is the lack of data on reporting the number of patients with inadequate analgesia. This is usually the main factor affecting the distribution of the important outcome. Failure of analgesia is too popular to be ignored. Epidural labor analgesia had a rate of 5.3-19.7% of inadequate pain control (27), but none of the included studies reported the rate of inadequate analgesia with i.v. remifentanil PCA. Further trials are needed that record such important outcome to allow analysis of analgesic efficacy.

Potential biases in the review process

Although there was evidence of heterogeneity for some outcomes, we could not account for the observed heterogeneity in several subgroup analyzes. Despite this heterogeneity, both fixed-effects and random-effects summaries were consistent with beneficial effects of i.v. remifentanil PCA in the overall estimates. The heterogeneity suggests the size of the benefit varies by some other factors that we were not able to identify.

Methodological heterogeneity is also likely to have played a role in the observed statistical heterogeneity. Studies were carried out in several countries and differences between the populations or the experimental interventions or the control comparisons might have contributed to the heterogeneity. The variable risk of bias of the included studies may have result in variation in the estimates of treatment effect. In addition, different durations of follow-up may have led to heterogeneity of effect estimates. Two of the five studies reported follow-up period at least till the end of the delivery, and three with shorter durations. A reduction of heterogeneity was found in the longer-lasting trials after sub-analyses, but it was still substantial. However, in the shorter-duration studies, the heterogeneity was far more significant (I^2=95%). Finally, selection bias is always possible. To minimize the likelihood of such bias, two independent reviewers screened all abstracts and primary manuscripts by using standardized eligibility criteria.

Although side effects were reported in some studies, they mainly focused on nausea and vomiting, and only one study evaluated side effects in a relative all-around manner. In addition, randomized controlled studies may not be the best way to determine the incidence of side effects. Given healthy pregnant women were selected as the studying population, so those with obstetric complications were excluded from these trials, as thus remifentanil should probably not be used in that population. In addition, parturients with moderately/severely side effects during remifentanil administration might have been dropped out and resorted to EA instead. Therefore, caution should bear in mind when assessing the conclusion of this review.

Agreements and disagreements with other studies

Of the total included trials in the present review, the populations enrolled in each individual study were healthy parturients and they could be transferred to perform EA if remifentanil analgesia was inadequate. The primary purpose of this intervention was to clarify whether i.v. remifentanil PCA were alternative means when the performance of EA technique was limited by many medical conditions, thus healthy women were not representative populations for such consideration. Studies focused on those with EA contraindications are rare, whereas several case reports presented the successful administration of remifentanil in these populations. To date the available data showed that seven women with platelet abnormalities (28-30), five women with sepsis (29, 31), one woman with epidural refusal (29),

one woman with sacral agenesia (31), one woman with von Willebrand's disease (32), one woman with thrombocytopaenia and renal insufficiency (33), and one woman with multiple sclerosis (34) used i.v. remifentanil PCA successfully without obvious sequelae. It would be more efficient for drawing the conclusion of remifentanil administration if trials designed on this population, and if systematic reviews used such patients' data to allow more accurate and standardized handling of the data from the specialized parturients.

Implications for practice

Pooled assessment of remifentanil intervention seems an attractive strategy for controlling labor pain in health term parturients, but it is not supported by strong evidence. Current evidence suggests that it may produce effective analgesia by only a modest level. Evidence of its effects on other outcomes including the rating of pain relief, number of people with inadequate analgesia, and satisfaction with analgesia is insufficient. The costs of implementation of these interventions have not been extensively studied but as they are likely to be expensive, the cost effectiveness of this type of intervention is questionable. In nulliparous or multiparous women, the effect of remifentanil intervention may be distinct, so the selection of enrolled population needs weighing carefully.

Implications for research

Few large scale, high quality randomized controlled trials have yet been carried out. Studies are needed that are powered to detect clinically important effects on the pain intensity, rating of pain relief, number of people with inadequate analgesia, and satisfaction with analgesia, to resolve the uncertainty about the clinical effectiveness and cost effectiveness of this type of intervention. If these definitions and outcomes were used consistently across studies on labor pain control, studies would be more amenable to being summarized with meta-analysis technique. Further research is required to determine whether specific patient subgroups are more likely to benefit from this treatment. In order to enhance the rate at which evidence becomes available and is translated into clinical guidelines, future studies would clearly benefit from better coordination and cooperation between research groups.

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The effect of long interpregnancy interval on labor characteristics and pregnancy outcomes: A tertiary maternity hospital experience

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Abstract

Objective: We evaluated effect of long interpregnancy intervals (IPI) on the length of labor and perinatal outcomes.

Materials and methods: In this retrospective study, 249 women with uncomplicated vaginal delivery were divided into three groups (Nulliparous women was first group, multiparous women with IPI shorter than 3 years second group and women with IPI longer than 6 years the last group).

Results: Nulliparous women had longer total delivery time than multiparous women ($p< 0.01$). But admission to NICU ($p = 0.30$) and meconium stain rates ($p= 0.74$) were similar. Total delivery time meconium stain and NICU admission rates for multiparous women in short IPI group (<3 years) were similar to women with a longer IPI (> 6 years) . But more women in longer IPI group needed oxytocin augmention ($p=0.031$).

Conclusion: Multiparous women with prolonged IPI might be evaluated in the same way as women with shorter IPIs with favorable perinatal outcomes. But obstetrician should be more cautious with the potential risks of labor augmentation with oxytocin in this group of patients.

Key words: Multiparity, long interpregnancy interval, length of labor.

Introduction

Active phase of labor has been traditionally evaluated in three stages. The length of the first two stages and labor curves differ significantly for nulliparous and multiparous women. Moreover length of the first two stages of labor becomes shorter as parity increases [1-2]. In previous studies, short interpregnancy intervals (IPI) were reported to be associated with birth weight and preterm labor [3-6]. Also women with long intervals (> 59 months) between pregnancies had lower incidence of caesarean sections but had greater risk of premature rupture of membranes and greater risk of low birth weight [7]. But association between long IPI and characteristics of labor such as total length and pregnancy outcomes were not studied extensively [4, 8-9].

Our aim was to evaluate the effect of long IPIs on the length of labor and perinatal outcomes.

Materials and Methods

This retrospective study was carried out between january and march 2009 in Zekai Tahir Burak Maternity Hospital, a tertiary referral hospital. Two hundred forty nine patients with uncomplicated spontaneous vaginal delivery with at least 36 week gestation with a singleton vertex presentation were included. Patients with gestational or pregestational diabetes, hypertensive disorders, and thyroid related disorders were not included. Patients with regular contractions (at least 3 contractions in 10 minutes) with 3 cm cervical dilatation and 80 % effacement were included to make sure that woman was in the active phase of labor. Total delivery time was defined as time from first admission (3 cm cervical dilatation and 80 % effacement) to expulsion of fetus (active phase of first stage and second stage). Interpregnancy interval (IPI) was defined as the interval between the birth date of the index infant and begining of the index pregnancy (birth date of the preceding infant minus the index infant's gestational age) [10]. Patients with rupture of membranes on the first admission with pelvic examination criteria mentioned above were also included. Patients requiring induction of labor in first admission for

any reason (cervical ripening, postmaturation, oligohydramnios) without any contractions or women requiring forceps or vacuum device assisted deliveries and women with intrauterine fetal demise were all excluded.

Oxytocin was administered if cervical dilation did not change for two hours or fetal descend did not take place. Initial dosage was 6 mU/min and increased in 15 minute intervals to a maximum dose of 40 mU/min.

Each patient's data was retrieved from hospital records. Patients' age, gravida, parity, body mass index (BMI), time from the last delivery, gestational week of index pregnancy, total length of labor, need for augmentation with oxytocin, birth weight, meconium stain and neonatal intensive care unit (NICU) admission status were retrieved from patients' hospital records retrospectively.

We used similar methodology as described by Schiff [8]. They compared three groups of women; first group was nulliparous women, second group was women with a recently delivery and last group was women with longer IPI. Likewise, we classified women into three groups. Nulliparous woman was the first group. Multiparous women with IPI shorter than 3 years was second group, women with IPI longer than 6 years was the last group. Total length of labor, oxytocin administration rate, fetal meconium stain rate, and NICU admission rate of each group was compared. Our study was approved by local ethical commitee.

Statistical analysis was performed using with SPSS software, version 11.5 for Windows. Chi square and one-way analysis of variance was used to compare percentages and Student's *t* test was performed to compare continuous variables. P value was set as 0.05 to be the limit of statistical significance. Data are presented as means ± SD, unless otherwise indicated.

Results

One hundred twenty-six women out of 249 (50.6 %) were nulliparous and 123 (49.4 %) were multiparous. Multiparous women were older ($p<0.01$) and had more BMI scores than nulliparous women ($p<0.01$). Mean time from last delivery for multiparous women was 5.6±3.7 years. The birthweights of two groups were similar (p=0.078). The total delivery time for nulliparous women were longer than multiparous group ($p<0.01$). More multiparous woman needed oxytocin administration for augmentation of labor but not significantly (24.7 % vs 22.9 %, p=0.76). NICU admission (p=0.30) and meconium stain rates (p=0.74) for two groups were also comparable (Table 1).

Multiparous women were grouped into two; one group with shorter (< 3 years) and second group with longer IPI (> 6 years). Recently delivered multiparous women were younger than other group ($p < 0.001$). Total delivery time for first group (IPI <3 years) were shorter than second group but this was not statistically significant (p= 0.10). Meconium stain (p= 0.666) and NICU admission rate (p=0.86) were also similar. But the rate of oxytocin administration were higher for women with long IPI (29.8 vs 19.1 %, p=0.031) (Table 2).

Total length of labor for multiparous women with longer IPI (>6 years) was longer than nulliparous woman (p=0.001). But perinatal outcomes (NICU admission, meconium stain) were similar (p=0.661 and 0.301 respectively).

Discussion

It is well known that nulliparous women have a slower rate of progression than multiparous women. Number of previous deliveries is also associated with progression rate for multiparous women. In previous reports, short interpregnancy interval with respect to pregnancy outcomes was studied extensively but data on the effect of long interpregnancy interval on length of labor is lacking [4-5, 9].

In our study, as expected, total delivery time was longer in nulliparous women but that was not the main point of our study. Mean total length of labor for multiparous women with longer IPI were comparable to women with shorter IPI. But a higher percentage of women in longer IPI group received oxytocin. Augmentation rates for nulliparous and multiparous women were 24.7 and 22.9 %, respectively. In 2002 United States National Vital Statistics, 38 % of labors were reported as augmented. Also in United Kingdom, 4 to 37 % of labors were augmented in different individual labor units [11-12]. In study group of Orji, augmentation rate was 26 % [13]. Augmentation rate in our study was consistent with these data. There are studies reporting

Table 1. Demographic features, labor characteristics and perinatal outcomes of multiparous and nulliparous women

	Multiparous women (n=123)	Nulliparous women (n=126)	P
Gestational week (Weeks)	38.7 ± 1.6	38.5 ± 1.7	0.75
Age (years)	28.0 ± 4.8	21.8 ± 3.9	**< 0.01**
Parity	1.5 ± 0.7	0	-
Body mass index	29.0 ±4.3	27.0±3.2	**< 0.01**
Fetal weight (grams)	3273.3 ± 405.2	3136.7± 427.0	0.078
Total length of labor (minutes)	350.7 ± 109.1	429.7 ± 151.2	**< 0.01**
Oxytocin administration rate (%)	24.7	22. 9	0.76
Meconium staining rate (%)	4.2	3.2	0.74
NICU admission rate (%)	7.3	11.1	0.30
Time from last delivery (years)	5.6 ± 3.7	0	-

Table 2. Demographic features, labor characteristics and perinatal outcomes of multiparous women with 3 and 6 years interpregnacy intervals (IPI: interpregnancy interval)

	IPI <3 years (n= 58)	**IPI > 6 years** (n =65)	p
Gestational week (Weeks)	38.4 ± 1.9	38.5 ± 1.5	0.611
Age (years)	25.3 ± 4.0	30.4 ± 4.1	**< 0.001**
Parity	1.5 ± 0.8	1.5 ± 0.7	0.976
Body mass index	28.2 ± 4.2	29.6 ± 4.4	0.066
Fetal weight (grams)	3246.0 ± 403.7	3301.4 ± 407.8	0.452
Total length of labor (minutes)	333.5 ± 112.1	366.0 ± 104.9	0.10
Oxytocin administration rate (%)	19.1	29.8	**0.031**
Meconium staining rate (%)	5.2	3.1	0.666
NICU admission rate(%)	6.9	7.7	0.86
Time from last delivery (years)	2.2 ± 0.7	8.5 ± 2.5	-

anatomical changes in pelvic region after delivery [14]. Kelley in an anthropologic study defined different bony pelvic structural features for nulliparous and multiparous women [15]. Garagiola described widening of the pubic symphysis in immediate postpartum period demonstrated by magnetic resonance imaging [16]. Rustamova reported that width of symphysis increased during delivery [14]. These anatomical changes could last up to a certain time point after which elasticity of pelvic tissues vanishes. This could be mechanism for multiparous women with long IPI requiring higher rate of oxytocin augmentation.

The effect of a long IPI is poorly understood [10]. Zhu et al reported long-interpregnancy interval to be risk factor for preterm labor and low-birth weight (above 120 months, odds ratio 1.5 and 2.0 respectively) [6]. They suggested *"a physiologic regression hypothesis"*; in this hypothesis, immediately after delivery, mother gains an adaptation to a multiparous state. But this adaptation process diminishes gradually up to a point in which labor would be longer and more difficult similar to a nulliparous woman. In Zhu's study, women with IPI longer than 49 months had an increased risk for preterm labor and low birth weight [6, 11-12]. But in our study there was no difference for birth weight with respect to interpregnancy intervals. Also perinatal complications, meconium stain and NICU admission rate were small in all groups.

Schiff studied longer interpregnancy times (10–18 years) compared with multiparous women with a recent delivery in 1–4 years, they did not find any difference between groups regarding length of labor and oxytocin administration [8]. Brooks compared 94 multiparas with 10 years or more interpregnancy interval between pregnancies and 63 multiparous controls with shorter interpregnancy interval and there was no difference in length of labor between two groups. They concluded that

the concept of a "physiologic primigravida" in these cases should be abandoned [9]. Likewise, in our study, there was no difference for total length of labor between recently delivered women and longer IPI women.

In this study we evaluated length of labor and perinatal complications with respecct to different interpregnancy intervals. Previous reports in literature studied possible relations of IPI and perinatal outcomes but maternal characteristics were not evaluated. In conclusion, there was no difference with regard to length of labor between different IPIs. Also we did not observe any worsening in perinatal outcomes. Multiparous women with prolonged IPI might be evaluated in the same way as women with shorter IPIs. These women with longer IPI could be reassured for favorable perinatal outcome and similar labor characteristics and they do not need to be followed as high risk pregnancies. But obstetrician should be more cautious with the risk of labor augmentation in this group of patients.

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Review on Family Caregiving and Rehabilitation of Traumatic Brain Injury (TBI)

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Abstract

Worldwide, trauma, with traumatic brain injury (TBI) as the major contributor, is the leading cause of death for the under 45y old. In TBI, caregiving and rehabilitation are inseparable, yet no review has acknowledged this linkage. A literature search, especially using internet, for relevant articles, 1993-2010, was conducted using the following databases (EBSCOhost®, Ovid®, ProQuest®, Sage®, Science Direct®, SpringerLink®, Wiley-Blackwell®, JSTOR®) with the keywords: caregiver, traumatic brain injury, and rehabilitation. The role-functions, overwhelming demands and needs, and impacts and outcomes of TBI family-caregiving-rehabilitating on family-social-dynamics are focused in this review. Caregiving problems in developing countries are highlighted. Some aspects of interventions and methodologies, especially those related to researches, are reviewed.

Key words: Caregiving, traumatic brain injury, rehabilitation

Introduction

Worldwide, trauma is the leading cause of death for the under 45-years-old population (1-4) and by 2020 trauma due to motor vehicle accidents' (MVA) will be the third largest global-health-burden (5). Traumatic-brain-injury (TBI) is a leading cause of acquired-disability, morbidity, and mortality in children and adolescents (6). An estimated 5.3 million Americans suffer longterm TBI, mostly from MVA and falls (7). In USA, annually, paediatric TBI-incidence is 200-300 cases, and across-all-age-groups it is 558 person-years per 100, 000 population, respectively (8). Incidence per 100,000 of population at other countries are; Europe 235, Australia 206, U.K. 300, India 160, South Africa 316, and Taiwan 334 (5). Caregiving-rehabilitation costs are substantial (8, 9). Unfortunately, developing-countries' statistics are mostly unavailable. This "silent-epidemic" causes many neuropsychiatric-problems; yet scarce empirical-data obviate neuropsychiatric-treatment (10-12).

In Malaysia, a developing country, in 2007, among trauma-patients, MVA accounts for 70.1%, fall 8.3%, and others 21.6% of total numbers (13, 14). In Singapore, trauma ranked fifth causing death (6.7%), with TBI as the major contributor (15). TBI-survivors require rehabilitation (1, 16-19). TBI's-stroke's burden is high (20); with poignant disability's-consequences (21). Caregivers'(CG)-role is critical in healing (22); hence caregiving and rehabilitation are inseparable. Available literature separates caregiving and rehabilitation (23, 24), and except for Hassan et al. (2011), no review highlights developing-countries. This review will redress this situation. Many young mild-TBI-survivors returned to successful normal life (25, 26); hence this review focuses on the moderately and severely-injured survivors.

Caregiving-families'-resilience (26) which influences rehabilitation (27), is predicated on neuroplasticity (10, 28) i.e. neurological-rehabilitation (28-30). The brain adapts and repairs (10, 29); enabling functional-skills re-learning (31, 32). Families usually provide longterm-caregiving (26, 33-35), by adopting therapies and altered activities-of-daily-living practices (ADL) (36). With adjustment and adaptation due to self-identity-loss (25, 37, 38); dysexecutive-symptoms; disinhibition-impulsivity-perseveration; impairments-disabilities; and ADL-maintenance, TBI-caregiving is intensively demanding (30, 34, 37, 39, 40). Caregiving theories include; empathy-attachment (41), positive-family-

relationships (19, 20, 21), and mother-social-bonding (14, 42). Caregiving-coping (22) and distress-depression-managing components are central (43) to another model, the Caregiving-Self-Efficacy Construct-Model (44, 45). This model structures secured-caregiving practices which solicit compassion and altruistic-behaviour. Caregiving refers to behaviours complementing partner's-attachment or need-behaviour (41).

Disability challenges a family-system (9). Stroke-caregiving (44-48) is similar to TBI-caregiving (49-52); both are acquired-brain-injuries (ABI), with similar neurological-symptoms, and neuropsychological-functioning (53). ABI-caregivers' burden, quality-of-life, and mental-health were worse off than in dementia's (54). ABI-caregivers' experiences-impacts are similar (48, 52, 53, 55); in cognitive-rehabilitation (56); attention-memory-conversation (27, 57); and communication (58). Cognitive-rehabilitation compensates through residual-cognitive-deficits ("strategy-training") and not restorative-impaired-function ("restitution-training") (57). Caregivers'-commitments (26) can help to heal neurocognitive-impairments (28, 30) and cognitive-illusions; hence holistic-rehabilitation was proposed (30, 57, 59). Caregivers' burden increases with declining patients'-functional-status. Caregivers economic - and psychological-burdens (60) affect their wellbeing. We posit that caregivers need rehabilitation/healing from burdensome stresses (59, 61, 62), and other emotional-deficits (9). Compared with stroke's (47, 48, 54) and dementia's (63), fewer researches focused on TBI-caregivers (9). A proposed "holistic" cognitive-rehabilitation (57) omitted many therapies; music, games and info-entertainment media-television (64), enriched environment of language-arts-performance, visual-programmes (65), and religious-spiritual-dimensions (21, 66-69).

Caregivers' grief, distress, and depression predict poor rehabilitation-outcome (70). Caregivers' coping-methods, environmental-stressors, stress-appraisal, and social-support influenced patients' quality-of-life and health-outcomes (71-73). Spiritual-religious-community supports positively influenced TBI-patients'-health (66). Innovative-brain-healing (74) has been proposed, but it needs measureable caregiving-rehabilitation-prediction outcomes (54, 75-77). Family-caregivers need supports (78, 79) to manage caregiving. Satisfactions of diagnosis-prognosis-interventions (80) help caregivers-coping (22) . Caregivers' education-training (81) improves caregiving. Compared with cancer's- (82), and stroke's-caregivers (47), TBI-caregivers confront more deficits, needs, and stresses.

TBI-caregiving-phases comprise initial-shock; emotional-relief; emotional-psychological-quagmire (35, 36); and adaptation (22, 27, 83, 84). Fortunately the frontal-cortex-controlled executive-function healing enhances re-learning (64), following Blooms'-taxonomy-of-learning (85). Nevertheless, multi-discipline clinical-knowledge-practice (14) and researches (47) are needed to illuminate caregiving-rehabilitation process.

Current TBI-literature generally describes diagnosis, characteristics (86), afflictions, neurobehaviour (87), neuropsychiatry (11), aphasia (88), dysphagia (89, 90), communication-problems (58), unstable-emotional-state (alexithymia) (91), emotional-mental-problems and behaviour-disturbances (92, 93), fatigue, spasticity and impaired-information-processing, headache, somatic-cognitive-anxiety-symptoms (94-96), care-needs (78), and caregiving-rehabilitation (1-3, 25, 30, 35, 56, 57, 64, 77, 95-105). Consequently family-caregivers' problems and needs demand attention. Healing is predicated on pertinent constructs e.g. body-beliefs-system (106). Chronic-illness-disability's researches are grounded upon diverse models-views-frameworks (107). Survivors' and caregivers' adaptation enables caregiving-coping of demanding-tasks (14, 56, 66, 84, 104). Differential human-assistance-needs (34) signified different-TBI-rehabilitations. Thus neurocognitive-rehabilitation (30, 56, 99) essentially constitutes mind-healing/mending (108-110).

Our review comprises- first, the family dynamics; second, family-functioning and family-resiliency; third, social- and societal-aspects; fourth, impacts of caregiving on caregivers'-health; fifth, outcomes of caregiving; sixth, models; seventh, caregiving-rehabilitation; and eighth, future research.

Method

A literature search for relevant articles, 1993-2010, was conducted using the following databases (EBSCOhost®, Ovid®, ProQuest®, Sage®, Science Direct®, SpringerLink®, Wiley-Blackwell®,

JSTOR®) with the keywords: caregiver, traumatic brain injury, and rehabilitation. Internet publications included relevant theses and dissertations, statistics and government reports. Books especially on cognitive rehabilitation were also referred.

Family dynamics

Caregivers' families reconstruct TBI-survivors'-identities (25, 109), and rehabilitate functional-abilities and memory-impairments (49). In acute-stages, family-caregivers interact with and rely on health-professionals (110). Impairments structure changes in behaviour, mood, and inter-personal-relationships. Caregivers obligingly (41, 64, 69, 111-113) manage survivors' needs and problems (11, 22, 28, 30, 40). Such altered-life adapts to longterm-caregiving (52, 64, 103, 112, 114) with; misgivings, empowerment-resilience (26, 115), independent-coping (116, 117), and survival-coping (84-86).

Parents, usually mothers, caregive their children (14, 42, 75, 109, 118, 119), and are always mindful of their uncertain cognitive-status and social-future (120, 121). Adult family members usually complain more than their TBI-children. Whether spouse-caregiving stressed more (122-124) than parents-caregiving and children-caregiving is debatable. Caregiving-spouse's stress increases with the patient's-increasing-stabilisation, due to lessening-of-tolerance and decreasing-hope-of-recovery (52). However, improvements can occur continually (64, 123).

The stress, struggles, suffering (113, 124), and families'-burdening-psychosocial-changes affect entire families (125-127). Anger arises when TBI-parent behaves embarrassingly; hence children develop behavioral-emotional-relationship problems. They avoided disclosing parents'-impairments (126). TBI-association with God's-punishment (66) structures children's grief, social-isolation-abandonment, and fear-of family-disintegration-violence (127). Nevertheless in a family, siblings are known to caregive throughout their adulthood.

Family functioning and resiliency

Caregivers' stress and gender predict family-functioning (120); females had more-distress, and females'-roles-disruption lowers family-functioning. Impairments in social-communication and behaviour-disposition, contribute to caregiver-burden.

Caregiving needs of critically-ill-patients reflect ABI-caregivers' essential resource-support-needs (78, 79). In critical-care, TBI-caregivers demand information and getting-involved. Caregivers' woes (92, 128) are compounded in developing-countries (114). One-third of caregivers cease working. Costly medical-bills and dysfunctional-personal-professional-lives were common (129, 130). Hence financial strain affects family functioning, hence caregiving-rehabilitation.

Social and societal aspects

Moderate- and severely-injured TBI-survivor suffer severe social impairments; cognitive-communication (58), social-functioning (131, 132), and social-participation (133). Social-emotional differences across racial lines solicit differential caregiving and professional rehabilitation support (134). Augmentative-alternative communication can compensate for affective-communication (58), speech-impairments (135-137), and dysathria (137). Caregiving-social-networks, mostly non-existent in developing-countries, can moderate social-psychological-distress (9, 138). Many caregivers were on-their-own (64, 116, 117, 139), highly-committed (40, 109); and became adaptive-recluse (114). Organised and effective respite-care is non-existent in developing-countries (64, 116, 117).

Caregiver-family interventions in developed-countries include problem-solving training (140-142), education, counseling (143), networking, memory-enhancement (144), and other rehabilitation(108-110). In a developing-country, a caregivers'-wish-list highlights unmet-needs (114). A "how-to-caregive" list is useful.

Educational- (81) and other-social-interventions require outcome-assessments. Cognitive-rehabilitation improves psychosocial-functioning and community-integration (145). Cognitive-behaviour-treatment (CBT) heals caregivers' emotional-social-functioning to achieve perceived-self-efficacy (PSE) (43). Christianity-Judaism-Islam espouses caregiving as God's sanctioned-obligation (69, 146, 147), hence Divinity-sanctioned-healing (21, 111, 148) is therapeutic.

Impacts of caregiving on caregivers' health

Families' impact is overwhelming (39, 52, 113), depending-on caregivers'-characteristics and

mental-states (20); distress is common (124, 149). Family's initial survivor-celebration is followed by adjustment-adaptation (52). Strong family-belief-system develops resilience (26, 150-152).

Caregiver-overwhelming-problems (52) caused caregivers' decreasing-health-related-quality-of-life, lower-wellbeing (153), psychological-sexual-misalignment, and marital-instability (154-157). Post-traumatic-Stress-Disorder (PTSD) reduced family-satisfaction (76). Thus TBI transforms a family permanently (64, 112, 149).

Caregiving-Rehabilitation

Rehabilitation includes; physical; physiological, social, sensory-functional, cognitive-behavioural (39, 158); attention; memory (142, 144), empathy and theory-of-mind (ToM) (159, 160); neuropsychology (24), and executive-functioning (161). Rehabilitation-outcomes are unpredictable (76), measures need standardisation (162-164). No complete recovery from moderate-severe-injury is ever recorded (promising-drugs are tested (10).

Acute-care-intervention saves-lives, but caregiving-rehabilitation enhances-life (21). Caregivers should undergo training (81, 165) to empower survivors (166). Caregiving-rehabilitation is aimed to regain, maintain, enhance and restore life-functions (4, 167, 168) through individual-family-community interactions (96) with cognitive-behavioural interventions. Many caregiving-rehabilitation quantitative measures are needed (78, 168). Ecological-community-intervention, based on health-promotion-ecology-model (169, 170), may prove useful. Narratives (166) and life-coaching involving positive-psychology (88) proved beneficial. A serene-community-environment, e.g. rural-setting is therapeutic (170, 171), despite scarce facilities, thus soliciting more research (172, 173). Physical-rehabilitation enhances neurological-healing (30, 98, 173, 174).

Attention- and memory-rehabilitations produced positive results (175). A computer programme, Useful Field of View (UFOV), assesses and trains for visual-deficits (176, 177). Another programme, Visual Restitution Training (VRT), improved visions. Computer-assisted Cognitive-Rehabilitation (CACR) protocol improved cognition, behaviour, and memory (175, 178, 179). A computer-based cognitive-rehabilitation-teletherapy improves functional-outcomes (180). The Improvement in Memory with Plasticity-based Adaptive Cognitive Training (IMPACT) programme showed positive result (181). Personal-Digital-Assistant for Amnesics is now available (181, 182).

Future research

Every country should establish TBI-families-caregivers' registry-database (78). Social-communication-studies on caregivers-care-helpers'-partnership (182, 183), and caregivers' networking-support-system should be prioritised. Early management-diagnosis deserves more researches to predict outcome. Resilience-model (150) needs quantification, to differentiate emotional- and practical-burdens. Caregiving-rehabilitation need longterm-outcome-studies to map economic-support-resources (60).

Injured-members affect caregivers'-health (14, 124), research should demarcate shortterm-longterm-impacts. Caregivers' evaluation, of cross-disability-components (143), and caregiving-impact, should explore "broken-mind"-healing, using nature-ecotherapy-ecopsychology (173, 174). The brain-body-mind entity; mediates health-wellbeing. Religious-spiritual-therapy requires in-depth-studies. Music therapy (184) and herbal healing (185), need larger-longer studies.

Home-rehabilitation (64), and hospital-patient-care (186, 187) require quantification. Generic-measures e.g. the Family-Strain-Questionnaire (FSQ) (187) need global validation. Mind-mending (188) requires a dialectical-philosophy-frame to explain Cognitive-behaviour-therapy (CBT) and dialectical-behaviour-therapy (DBT) (188). Working-memory deficit (189) elicits memory-rehabilitation research.

Developing countries need more researches, especially translational (92, 190), on neuropsychological-rehabilitation (24), intervention-theories-practices (23, 24), caregiving-experience-narratives, and professional help-giving (143). Measures are needed for localised caregiver-burden (191), and caregiver-home-training-programmes (141). Due to multidimensional perspectives of caregiving, evaluation of caregiving responsibility should be wholistic. Parents'-caregiving-roles investigation is also required e.g. structuring-for-security (170), enhancing-attachment (192), enhancing-family-bonding (26), monitoring-positive-negative-coping, practi-

cing-neuro-psychosocial-therapy, and constructing-meaning-caregiving-experiences. Innovative strategies should be developed for (59) intensive-care-units (ICU) (193), quality-of-life instruments (194), caregivers'-abuse (168), caregivers'-loneliness-depression, respite-care, caregivers'-health-professionals partnership-programmes (including neuroscience-nursing (110)), mental-health (52), coping-stress evaluation, and the actual caregiving process (183, 195). Mental-state constructs e.g. hope, should form a core neuropsychological-research-theme (52, 196). Appropriate diagnostics, treatments (74), deficits-impairment-management, and pragmatic-prognostic-models should guide rehabilitation, similar to the USA TBI-model-systems. Caregivers and rehabilitation-professionals should share experiences, plan researches, develop and test caregiving-review tools and caregiving impacts e.g. COPE-index (50), to guide practice and policy development.

Caregiving and Social Policy

Family-oriented social policy on financial assistance, healthcare access, housing modification needs, and logistics and mobility facilitation, should be designed and implemented to help families in their caregiving role. In developed countries, social policies for family caregivers have been developed and implemented. The USA, for example, provides financial advances and assistance for family caregivers through Medicaid, Family and Medical Leave Act, and tax deductions for care expenses. Disability Living Allowance, direct payment, and Carer's Allowance are available in the UK to assist caregivers.

In Malaysia, an example of a developing country, existing policies and legalities addressed mainly the disabled persons, though with little focus on the family caregivers. There is no "carer's allowance" (available in UK and Australia), or Family Caregiver Support Programs (available in the USA). The "Persons with Disabilities Act 2008" is a specific piece of legislation for disabled persons in Malaysia, which emphasises protection and advocacy of the disabled. However, there is no public policy or legislation, which acknowledges, addresses or supports the service needs of families in their caregiving role. Federal government act provides tax deductions for medical expenses and care for ageing parents of up to RM5000. Apart from that, parents who are in the public service, are eligible to apply up to 90 days of half-paid leave to provide care or support to a family member who is gravely ill. Generally the Federal Department of Welfare provides RM300 of monthly financial assistance to every qualified disabled person. Nevertheless in terms of the rising cost of living, this meager sum is grossly insufficient. Some housing and transportation discounts are also made available to disabled persons in Malaysia. Overall, there are little or no available well-structured and well-known public programs for family caregivers.

Malaysia and many developing countries lagged behind many developed countries in the legislation of family caregivers. There is an urgent need for comprehensive social-health policies for caregivers in Malaysia and other developing countries, which address issues such as paid away-from-work caregiving-family and medical leave policies, meaningfully substantial tax relief policies, financial relief for family caregivers, health policies, and social support schemes for caregivers. Caregiving for TBI persons is a long-term care service. Thus, enactment of lifespan respite programs and long-term care policies should be initiated for TBI family caregivers. Policy to support family's caregiving role including respite and payment for family caregivers should be made available in Malaysia and other developing countries to assist TBI people and their caregivers.

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Masculine subjectivity as a challenge for men's health

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Abstract

Introduction: Men represent most of the prevalence of sexually transmitted and chronic degenerative diseases, but seek medical attention less than women. Concepts of masculinity are cited as the cause of this lower demand for men's health services.

Methods: Two databases were surveyed and 19 articles about male subjectivity and men's health were reviewed.

Results and Discussion: Concepts of virility, strength and invulnerability make men to believe themselves immune to certain diseases. Aggressive behaviors are influenced by manhood and represent risk. Prejudice also leads men to avoid medical attention.

Conclusion: Man is more exposed to risk behaviors and demand less for health care services, even when available and qualified, which damages the health of man and of those around him.

Key words: men's health, manhood, andrology, health promotion.

Introduction

The concept of Men's Health represents integration between attention, care and promotion of masculine health. It is a recent theme in Brazil and has gained importance, specially along the decade of 2000, through campaigns promoted by Brazilian Urology Society (SBU), more focused in specific pathologies, like prostate cancer and erectile dysfunction, and by Brazilian Ministry of Health (MS), broader and with the vision of public health[1].

Issues related to own masculine gender are often cited as cause of lower demand for men's health services. Are part of the masculine subjectivity concepts of virility, strength and invulnerability, leading a large portion of this population to believe themselves immune to certain diseases, seeing as unnecessary medical care or preventive therapy, in many times[2,3]. This fact is, alongside behavioral factors, responsible for the profile of morbidity and mortality expressed by male population. And, in the last analysis, it contributes to a shorter life expectancy by about four years, when compared to women[4].

In Brazil, specifically, the component of masculinity as a barrier to health care for men can be seen in the communities, where many patients refuse to make the digital rectal exam, which gives a great predictive value for prostate cancer, and even in the hospitals and clinics specialized in urology, when some patients decline to perform certain procedures because of the risk, even remote, of developing erectile dysfunction.

Studies about male health care typically explore this theme from punctual aspects such as sexuality and cardiovascular risk. There are only a few studies in the medical literature about how men view their health needs and, in a more detailed way, how the concepts of masculinity can affect men's health care. Our objective with this review is to analyze male subjectivity and its interferences in the men's health care in Brazil.

Methods

This literature review was performed in March, 2012. Two medical databases were surveyed: SciELO (Scientific Electronic Library Online) and VHL (Virtual Health Library) with the keywords "men's health", "male health", "public health", "manhood" and expressions with similar meaning in English. This search returned 25 articles in two languages (English and Portuguese), originally published from 1984 to 2011. From this total, six researches were discarded due to its data, specific for such region or population. The remaining 19 papers were reviewed by the authors.

In the analysis of such articles, we aimed do identify the main idea of the research, to understand the approach used by its authors and to make groups within these ideas according to its empiric categories and core concepts.

Results and discussion

Since 1970, when several American studies began to approach the subject of masculine health care, it is understood that the idea of traditional masculinity produces a deficit of health[2]. From the decade of 1990, this same debate included the singularity of what is "being healthy" and "being sick" for male population, aiming to redefine male health and to make to seek a more integral healthcare[5]. Publications of the World Health Organization (WHO), for example, are now focusing on the specificities of men's health and behavior of men in various stages of life[6].

The issue of male subjectivity is composed by a mix of historical, sociocultural and biological ideas. The relationship between men and the women, the other men and the world around them is governed by naturalistic models: the hegemonic domination of the masculine gender and the world view based on heterosexuality[7]. From these models, appear some presuppositions to influence male behavior, even with all the advances in communication and flexibility of concepts: the infallibility, virility and invulnerability that are supposed to be characteristic of the "macho".

In general, men face more severe and chronic health conditions than women. Consequently, men die more than women for most of the main death causes, Brazil and worldwide[8]. There is a relationship between the construction of masculinity and the commitment of men's health. Therefore, both the male subjectivity and its implications in the field of health should be viewed from the relational perspective of gender.

The main causes of morbidity and mortality for young men are related to their forms of socialization and their habits of life: violence and drugs, traffic accidents and alcohol abuse, etc[5]. Para homens em processo de envelhecimento, a abordagem deve ser voltada às doenças crônico-degenerativas e sua possível prevenção: cessação do tabagismo, exames preventivos periódicos, etc[6].

Male sexuality is often the main focus of most articles observed, either implicitly or explicitly. There is an understanding of male individuals as being infectious, due to the epidemiology of sexually transmitted diseases, which shows a male predominance in the prevalence of most of these pathologies[9,10]. This is due to the fact that men combine a high-risk sexual behavior and low level of protection. The surveys also show a tendency to non-monogamy, what fits into the context of virility[10,11].

The development of aggressive behavior by men, which is influenced by the parameters of virility, can make them a risk determinant[12,13]. So, they commit violence against a female partner and the sons, through abuse and paternity absent, against the other men, in the case of homicides and traffic accidents, or against themselves, through suicide, alcoholism and diseases of psychosomatic[14]. Likewise, because of the centrality that work occupies in the life of man and the traditional vision of the male role as being a provider, issues related to employment and income may affect the male well-being and lead to psychosomatic conditions, psychic illness or even suicide[15].

At least two of the researches relate that the reason of a lower demand for health services by men varies according to social class and education of the surveyed group, mantaining, however, the same core idea[6,16]. While men with less education say to be the man just "more rough, strong, aggressive", those of a higher social level report an alleged different physical condition, in which man would be more resistant to health problems because of hormonal differences.

The studies reviewed only expose subjectively the issue of prejudice about certain conditions or procedures. In the erectile dysfunction, for example, that beside of the obvious decrease of quality of life, may be indicative of an underlying cardiovascular disease, men suffer in silence and tend to try alternative treatments for a long time before seeking a specialized medical service, aiming to not demonstrate the fragility, for male subjectivity, that represents not maintaining an erection[17].

Prostate cancer, a typical disease of the population aging that represents one of the four most common cancers worldwide, depends on the digital rectal examination for its early diagnosis. This procedure, even with all the technological devel-

opment, is still considered an excellent method for population screening[18]. In Brazil, even nowadays, this preventive approach represents a taboo, being sought only later.

In addition to the risk behavior and the preconceptions, many men of all ages avoid seeking health services precisely because they know to be subject of a greater risk for developing diseases, and, because of this, also feel afraid of being diagnosed with serious health problems, allegedly incapacitating or incurable[19]. Paradoxically, in this situation is expressed the fragile face of male subjectivity.

Conclusion

Characters of masculine subjectivity lead men to be more exposed to risk behaviors and, trusting in a supposed male invulnerability and strength, to not seek healthcare services, even when easily available. This fact makes more difficult to establish a healthier lifestyle and preventive practices of health promotion. Such behavior, influenced by prejudices, compromises not only man's health, but the health of those who surround him, including his wife and closer relatives.

The idea of men's health, currently in vogue in Brazil, specially since last decade, through national campaigns for awareness and encouraging, have improved the masculine seek for health services. Therefore, we can expect for changes in the epidemiological profile, slighting differences between the genders regarding to health promotion.

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Neuman system model as a conceptual framework for community–based nurses when working with Fibromiyalgia patiens

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Abstract

In order to provide effective nursing, the nurse must be able to complete a comprehensive nursing assessment. The conceptual-theoretical system of knowledge-represented by models and theories- is a vehicle of professionalism. The Neuman Model sets expectations for nursing assessment that are both comprehensive and realistic in terms of nursing practice. The Neuman Model expectes that the nurse will view the clients as unique, a composite of physiological, psychological, socio culturel, and developmental factors. Therefore, the nurse must collect data about all of factors. In order to established the uniqueness of each client within a total system perspective. Furthermore, the source and strength of environmental stressors for the client must be determined in the intrapersonal (body system), interpersonal (relationships), and extrapersonal (distal environment) system. The nurse, before planning action, must determine the congruency of both the nurse and client perceptions of the client's health status and health goals. The Neuman System Model guidence nurses regarding Fibromiyalgia patients (FM). Enhancement of the nurse's knowledge of Fibromiyalgia will improve the nurse's ability to identify stressors and diminished sources of clients with Fibromiyalgia. Appropriate nursing interventions are designed based on an accurate assesment by the nurse.

This paper designed to the effective nursing management with fibromiyalgia patients, demonstrates of the Betty Neuman System Model to the care of these clients.

Key words: Community, Fibromiyalgia, Framework, Neuman.

Introductıon

There are large numbers of patients who suffer from a variety of painful conditions, many of which are chronic. The 1980s have been characterized by the acceptance of the significance of theories and models for nursing applied to practice (Fawcett 2000). A theory is a group of related concepts, that propose action that guide practice. A nursing theory is a set of concepts, definitions, relationships, and assumptions or propositions derived from nursing model from other disciplines and project a purposive, systematic view of phonomena by designing specific inter-relationships among concepts for the purposes of describing, explaining, predicting, and/or prescribing (Mease 2009, http://currentnursing.com/nursing theory).

The Neuman system model is wellnes model based on general system theory in which the client system is exposed to stressor from within or without the system. (Hardin & Moody, 2002).

Features of fıbromiyalgia

The prevalence of fibromyalgia was 2.0% for both sexes, 3.4% for women, and 0.5% for men (Wolfe et al, 2005). Fibromyalgia syndrome (FM) is a common chronic pain condition that affects at least 2% of the adult population. Prevalence rates in some regions have not been ascertained and may be influenced by differences in cultural norms regarding the definition and attribution of chronic pain states (Fan, 2004; Zinnuroğlu 2007). Chronic, widespread pain is the defining feature of FM, but patients may also exhibit a range of other symptoms, including sleep disturbance, fatigue, irritable bowel syndrome, headache, and mood disorders (Durmuş & Bölükbaşi, 2007). Although the etiology of FM is not completely understood, the syndrome is thought to arise from influencing factors such as stress, medical illness, and a variety of pain conditions in some, but not all patients, in conjunction with a variety of neurotransmitter and neuroendocrine disturbances (Zinnuroğlu 2007; Mease 2009) A

range of medical treatments, including antidepressants, opioids, nonsteroidal antiinflammatory drugs, sedatives, muscle relaxants, and antiepileptics, have been used to treat FM. Nonpharmaceutical treatment modalities, including exercise, physical therapy, massage, acupuncture, and cognitive behavioral therapy, can be helpful (Dönmez, 2002). Few of these approaches have been demonstrated to have clear-cut benefits in randomized controlled trials. However, there is now increased interest as more effective treatments are developed and our ability to accurately measure effect of treatment has improved. The multifaceted nature of FM suggests that multimodal individualized treatment programs may be necessary to achieve optimal outcomes in patients with this syndrome (Mease, 2009) The prevalence of the syndrome increased with age, with highest values attained between 60 and 79 years (>7.0 % in women) (Wolfe et al 2005). Demographic, psychological, dolorimetry, and symptom factors were associated with fibromyalgia. Fibromyalgia is common in the population, and occurs often in older persons. Characteristic features of fibromyalgia-pain threshold and symptoms-are similar in community and clinic populations, but overall severity, pain, and functional disability are more severe in the clinic population (Wolfe et al 2005). Clients with FM should ideally manage their own lives and should be co-creators with nurses and others of plans to help them maintain, regain, or attain optimum functioning. A nursing framework that is suitable for working with clients with FM must accommodate for the importance of perception and be compatible with the collaborative approach between the client and caregiver. A nursing framework which is not dependent on the medical model or the concept of illness is essential for working with FM client.

The fit of the Neuman model

The Betty Neuman System Model is ideally suited for guiding nursing practice in relation to the client with FM. The model's open-system characteristics, and its consideration of five major client variables accommodale the complexity and unpredictability of situations encountered by the FM client. The model's major focus on perception is exteremely helpful for dealing with various clients' feelings, attitudes and beliefs and that may affect the course of the disease and the appropriateness of management goals and modalities (Ume et al 2006). The tree levels of prevention in this model-primary, secondary, and tertiary- certainly fit the various settings in which the client may encounter a nurse (Neuman, 1989). The model's non reliance on the medical model or the concept of illness is another reason for its adoption in the case of a client with FM.

The following section presents a brief summary of the major concepts and assumptions of the model.

The Neuman system model

The Neuman's system model has two major components i.e. pain and reaction to pain The client in the Neuman's system model is viewed as an open system in which repeated cycles of input, process, out put and feed back constitute a dynamic organizational pattern. The client may be an individual, a group, a family, a community or an aggregate (Knight, 1990, George 2000). In the development towards growth and development open system continuously become more differentiated and elaborate or complex. As they become more complex, the internal conditions of regulation become more complex. Exchange with the environment are reciprocal, both the client and the environment may be affected either positively or negatively by the other (Knight, 1990).

The system may adjust to the environment to itself. The ideal is to achieve optimal stability. As an open system the client, the client system has propensity to seek or maintain a balance among the various factors, both with in and out side the system, that seek to disrupt it (Reed 2006). Neuman seeks these forces as stressors and views them as capable of having either positive or negative effects. Reaction to the stressors may be possible or actual with identifiable responses and symptom (Skalski et al, 2006).

Major concepts

1. Person varıables

The Neuman model is made up of the five person variables. Ideally, each of the person variables should be considered simultaneously and comprehensively (Neuman, 1995).

1. Physiological - refers of the physicochemical structure and function of the body.
2. Psychological - refers to mental processes and emotions.
3. Sociocultural - refers to relationships; and social/cultural expectations and activities.
4. Spiritual - refers to the influence of spiritual beliefs.
5. Developmental - refers to those processes related to development over the lifespan.

2. Central core

The system of the client can be portrayed figuratively (Figure 1) by a core of basic structure and energy resources surrounded by three hypoothetical concentric circles representing boundures (Neuman 1982).

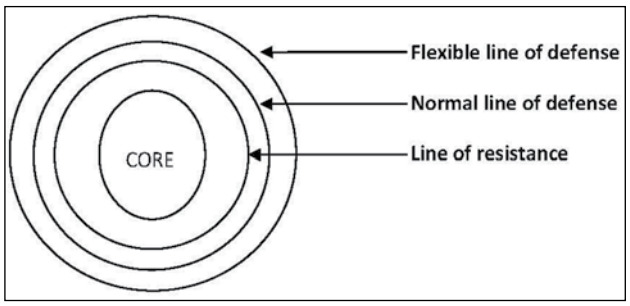

Figure 1. Central Core

The basic structure, or central core, is made up of the basic survival factors that are common to the species (Neuman, 1995) (Figure 1). These factors include: system variables, genetic features, and the strengths and weaknesses of the system parts. Examples of these may include: hair color, body temperature regulation ability, functioning of body systems homeostatically, cognitive ability, physical strength, and value systems. The person's system is an open system and therefore is dynamic and constantly changing and evolving. Stability, or homeostasis, occurs when the amount of energy that is available exceeds that being used by the system. A homeostatic body system is constantly in a dynamic process of input, output, feedback, and compensation, which leads to a state of balance (Alligood & Tomey, 2002).

3. Flexible lines of defense

The flexible line of defense is the outer barrier or cushion to the normal line of defense, the line of resistance, and the core structure (Figure 1). If the flexible line of defense fails to provide adequate protection to the normal line of defense, the lines of resistance become activated. The flexible line of defense acts as a cushion and is described as accordion-like as it expands away from or contracts closer to the normal line of defense. The flexible line of defense is dynamic and can be changed/altered in a relatively short period of time (Alligood & Tomey, 2002)

4. Normal lıne of defense

The normal line of defense represents system stability over time. It is considered to be the usual level of stability in the system. The normal line of defense can change over time in response to coping or responding to the environment. An example is skin, which is stable and fairly constant, but can thicken into a callus over time (Alligood & Tomey, 2002).

5. Lines of resistance

The lines of resistance protect the basic structure and become activated when environmental stressors invade the normal line of defense. Example: activation of the immune response after invasion of microorganisms. If the lines of resistance are effective, the system can reconstitute and if the lines of resistance are not effective, the resulting energy loss can result in death (Alligood & Tomey, 2002).

6. Reconstitution

Reconstitution is the increase in energy that occurs in relation to the degree of reaction to the stressor. Reconstitution begins at any point following initiation of treatment for invasion of stressors. Reconstitution may expand the normal line of defense beyond its previous level, stabilize the system at a lower level, or return it to the level that existed before the illness (Fawcett, 2005).

7. Stressors

The Neuman Systems Model looks at the impact of stressors on health and addresses stress and the reduction of stress (in the form of stressors). Stressors are capable of having either a positive

or negative effect on the client system. A stressor is any environmental force which can potentially affect the stability of the system: they may be:

- **Intrapersonal** - occur within person, e.g. emotions and feelings
- **Interpersonal** - occur between individuals, e.g. role expectations
- **Extra personal** - occur outside the individual, e.g. job or finance pressures

The person has a certain degree of reaction to any given stressor at any given time. The nature of the reaction depends in part on the strength of the lines of resistance and defense. By means of primary, secondary and tertiary interventions, the person (or the nurse) attempts to restore or maintain the stability of the system (Fawcett, 2005).

8. Prevention

As defined by Neuman's model, prevention is the primary nursing intervention. Prevention focuses on keeping stressors and the stress response from having a detrimental effect on the body (Fawcett, 2000).

- Primary: Primary prevention occurs before the system reacts to a stressor. On the one hand, it strengthens the person (primarily the flexible line of defense) to enable him to better deal with stressors, and on the other hand manipulates the environment to reduce or weaken stressors. Primary prevention includes health promotion and maintenance of wellness.
- Secondary: Secondary prevention occurs after the system reacts to a stressor and is provided in terms of existing systems. Secondary prevention focuses on preventing damage to the central core by strengthening the internal lines of resistance and/or removing the stressor.
- Tertiary: Tertiary prevention occurs after the system has been treated through secondary prevention strategies. Tertiary prevention offers support to the client and attempts to add energy to the system or reduce energy needed in order to facilitate reconstitution.

9. Conseptual framework

The conceptual framework used as a focus fort this study is Betty Neuman's model of nursing, focusing on the systems approach. She states, within the system approach is the potential for self determinative, creative and adjustive effects in relation to internal and a external environmental stressors imposed upon nursing and a tangible structure within which change can safely take place. Though some alteration in the conception of and approach, the reguisite structure allowing for flexibility exists for meeting the challenge of tomorrow's new nursing posture (Neuman 1989)

Neuman (1989) describes her model, " In terms of the four meta- pradigms of nursing: person, enviroment, health and nursing". (Figure 2). conceptualization of Neuman' s model.

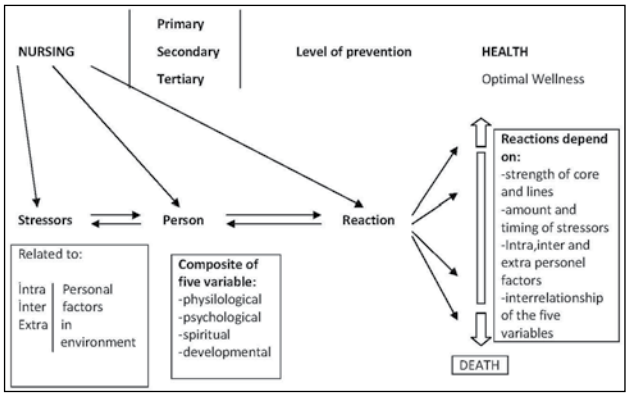

Figure 2. Conceptualization of Neuman's Model

Person: Neuman (1989) views the client (an individual or collective entity) as an open system. She states that, "The individual client is a dynamic composite of the interrelationship of five variables: physiological, sociocultural, spiritual and developmental" (p. 15). To meet personal neeeds, the client interacts with the environment and affects it and is affected by it. Each individual has characteristic or responses that fall within a common range and sets of strengths or specific responses that set him apart as unigue (Whetsell et al. 2010). The system of the client can be portrayed by a core of basic structure and energy resources surrounded by three hypothetical concentric circles representing boundaries (Figure 1).

The closest boundary, the lines of resistance, protects the core and consists of internal defensive processes such as the immune response and physiological homeostatic mechanisms. The next boundary is the normal line of defence, or dynamic eguilibrium which represents what the person has

become over time. It includes such aspects as intelligence, attitudes, problem solving and coping abilities. The outermost boundary is the flexible line of defense, a productive buffer for the normal line of defense. It has an accordion-like action which changes in a relatively short time depending on such factors as amount of sleep, level of nutrition, and the guality and guantity of stres (Knight, 1990).

In addition, Neuman (1989) states, "A person is constantly subjected to stressors from within his own system and from the enviroment which can cause diseguilibrium, situational or maturational crises, disease or death" Reaction to stressors is determined in part by natural and learned resistance which is manifested by the strength of the core and the various lines. Factors which inflience the reaction to stressos are intrapersonal, interpersonal or extrapersonal in nature. The guality and guantity of an individual's reaction to stressors is determined by the interrelationships of the five variables. Of critical importance is the person's perception of a stressor since it can affect the person's resistance and pesponce the stressor. The number, timing, and intensity of stressors also affect a person's resistance to a stressor (Neuman, 1989).

Enviroment: Neuman states that enviroment is " That viable arena which has relevance to the life span of an organism" (1989). She also views it as all factors affecting or affected by a person. Neuman contends that there is an internal and external enviroment, a point which confuses many, as she does not clearly delineate the boundaries between person and enviroment (Figure 2). Although not stating it explicitly, Neuman (1989) suggests that the enviroment is the source of stressors and rovides resources for managing these stressors. Stressors are such things as microorganisms, a ruptured aneurysm, radiation, excessive noise anda interpersonal conflict. Resources are entities such as a functionning immunological system, good coping skills, education, strong family support and a community health center. Stressors can be classified as either beneficial or noxious, depending on their nature, timing, degree and potential for either ultimate positive or negative change in the person. Neuman places more emphasis on stressors than any other aspect of the enviroment (Figure 2).

Health: Neuman (1989) states that health or wellness -she uses the terms synonymously- is the condition in which the flexible line of defense has prevented penetration of the normal line of defense and all parts and subparts are in harmony (steady -state) with the whole of the person. Optimum wllness occurs when all needs are met. Conversly, illness-or variance from wellness, as she terms it-is state of insuficiency or instability, a state in which disrupting needs are yet to be satisfied, and the normal line of fdefense is penetrated. Neuman implies, without explicity stating, that health, in the broad sense, is a continuum with wellness (and ultimately death) at the other end. Neuman (1989) uses the term reconstituting to describe the events which ocur following the impact of a stressor. In the process of reconstruction, a person can progress beyond his or her normal line of defense to a higher than usual state of wellness or below his or her usual state of wellness.

Nursing: Nursing is defined by Neuman as a " Unigue profession in that it is concerned with all variables affecting an individual's response to stres" (Tomey 2002; George 2002). The main concern of nursing is the total person and the goal of nursing is to maintain, regain, or attain client system stability. Because the nurses perceptions influence the care given, Neuman states that " The care giver's perceptual field must be assessed as well as the client's (Neuman, 1989).

Nursing Process: Neuman's process contains three basic parts: nursing diagnosis, nursing goals and nursing outcomes (Cross, 1985). Neuman stresses the importance of identifying client and caregiver at all stages of the process.

Neuman envisions a 3 stage nursing process:

1. **Nursing Diagnosis** - based of necessity in a thorough assessment, and with consideration given to five variables in three stressor areas.
2. **Nursing Goals** - these must be negotiated with the patient, and take account of patient's and nurse's perceptions of variance from wellness
3. **Nursing Outcomes** - considered in relation to five variables, and achieved through primary, secondary and tertiary interventions.

Levels of Prevention: Neuman (1989) believes that intervention can begin at any point at which the stressors is suspected, detected or identified. Based on the time frame associated with the stressors impact on the person, Neuman has developed three

levels of prevention. Primary prevention is selected when a stressor is suspected but no reaction has taken place. Intervention strategies include education, desensitization against risks, avoidance of hazards and strengthening resistance to risks. Secondary prevention is appropriate when a reaction to a stressor has already occurred. At this level, the caregiver prioritizes the client's needs and carries out actions aimed at stabilizing the system by conserving client energy or purposefully manipulating stressors or reaction to the secondary level of prevention have been instituted and some degree of reconstitution has occured. Tertiary level interventions include increasing motivation, modifying maladaptive behavior, orienting to reality, or reeducating.

Assessment: In order to provide effective nursing, the nurse must be able to complete a comprehensive nursing assessment. The Neuman Model sets expectations for nursing assessment that are both comprehensive and realistic in terms of nursing practive. The Neuman Model expects that the nurse will view the client as unigue, a composite of physiological, psychological, sociocultural and developmental factors (Cross, 1985). Therefore, the nurse must collect data about all of these in order to establish the unigueness of each client within a total system perspective. Furthermore, the source and strength of enviromental stressors for the client must be determined in the intrapersonal (body system), interpersonal (relationships) and extrapersonal (distal enviroment) systems. The nurse, before planning action, must determine the congruency of both the nurse and client perceptions of the client's health status and conserve client energy and suggest this can best be accomplished by utilizing the client's positive coping strategies and any resources avaible to the client. It follows that the nurse must become aware of these strategies and resources in her assessment (Neuman, 1989). Neuman makes the following ten basic assumptions:

1. Though each individual client or group as a client system is unigue, each system is a composite of common known factors of innate characteristic within a normal, given range of responses contained within a basic structure.
2. Many known, unknown and universal enviromental stressors exist. Each differs in its potential for disturbing a particular interrelationships of variables -Physiological, psychological, socioculturel, developmental and spiritual- at any point in time can affect the degree to which a client is protected by the flexible line of defense against possible reaction to a single stressor of a combination of stresssors.
3. Each individual client/client system, over time, has evolved a normal range of response to the enviroment that is referred to as a normal line of defense, or usual wellness/stability state.
4. When the cushioning, accordion like effect of the flexible line of defense is no longer capable of protecting the client against an enviromental stressors, the stressors break through the normal line of defense. The interrelationship of variables determine the nature and degree of the system reaction or possible reaction to the stressor.
5. The client, whether in a state of wellness or illness, is a dynamic composite of the interrelationship of variables. Wellness is on a continuum of avaible energy to support the system in its optimal state.
6. Implicit within each client system is a set of internal resistance factors known as lines of resistance, which function to stabilize and return the client to the usual wellness state or higher level of stability following an enviromental stressor reaction.
7. Primary prevention relates to general knowledge that is applied in client assessment and intervention in identification and reduction or mitigation of risk factors associated with enviromental stressors to prevent possible reaction.
8. Secondery prevention relates to symtomato-logy following a reaction to stressors, appropriate ranking of intervention priorites and treatment to reduce their noxious effects.
9. Tertiary prevention relates to the adjustive processes taking place as reconstitution begins and maintenance factors move the client back in a circular manner toward primary prevention.
10. The client is in dynamic constant energy Exchange with the enviroment (Neuman, 1989)

The Neuman Model can be used to guide community-based nurses in the assessment/inter-

vention process when working with FMS patiens. When a community- based nurse meets a patient, according to Neuman, the process begins with data collection (Figure 3).

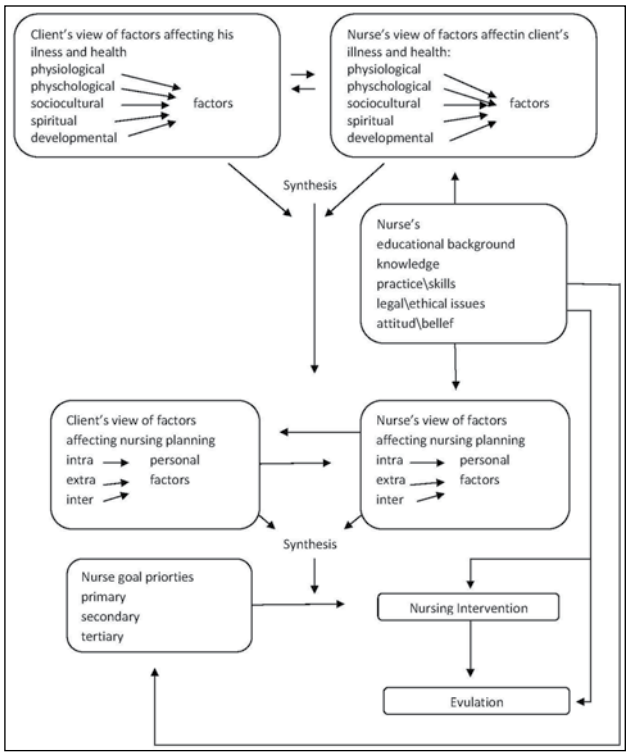

Figure 3. Assessment model for nursing process

The community-based nurse has to identify:

(1) Resource areas and problem areas for this disease such as sleep disturbance, fatigue, irritable bowel syndrome, headache,
(2) Life patterns such as stress, medical illness, and a variety of pain conditions, using antidepressants, loneless,
(3) Expectations such as ideas about self, others or community (Neuman, 1989).

The community-based nurse's role in the interview is primarily that of an active listener. The use of empathic skills and interpretation of verbal statements and nonverbal signals are focused on, in order to promote suitable process recall that could increase problem-solving effors throughout the dialogue. Toward the end of the interview, the nurse summarizes his or her understanding of the client's assessment. During this assessment, the nurse has to identify, classify and evaluate the interactions among five client variables (physiological, psychological, sociocultural, spiritual and developmental). At the same time, the nurse has to synthesize the five variables (physiological, psychological, sociocultural, spiritual and developmental). This assessment depends on the nurse's educational background, knowledge, practive/skills, legal/ethical issues and attitudes/beliefs. Also, the nurse has to identify the intra, inter and extra stressors for both the client and himself or herself. These factors can be educational background, knowledge, practive, attitudes about FMS for the nurse and shame anxiety, fear, denial, anger guilt, powerlessness, social isolation for the client. After that, the nurse develops actual or potential variances from wellness (nursing diagnosis). The nurse has to be supported to improve her knowledge about FM in order to reduce the possibility of negative stressors. This is primary prevention which acts as a protective buffer line. In Neuman's model, flexible lines of defense prevent possible reactions of stressors and support normal lines of defense against stressors. By using primary prevention skills, the nurse identifies the individual's risk behaviors associated with FM, detects signs and symptoms that may indicate the presence of FM, determines the need for health teaching to reduce the risk of acquiring FM and determines the need for secondary and/or tertiary levels of nursing care (Figure 3).

The nurse has to assess the degree of response to intra, extra and inter stressors to facilitate primary intervention. After symptoms have occured, the nurse, in collaboration with the client, then sets goals for intervention. According to Neuman, teaching is very important for the patient in secondary prevention (Neuman, 1989). Therefore, a nurse's knowledge, practice, attitudes and legal/ethical issues concerning FM patient are very important for patient treatment and teaching during secondary intervention. Tertiary prevention as intervention can begin at any point when some degree of system stability has occurred. This dynamic view of tertiary prevention tends to lead back, in circular fashion, toward primary prevention (Neuman, 1989). An example would be the avoidance of stressors known to be hazardous to the person. During this intervention, the nurse has to use motivation or behavior modification when working with the FM patient. This level of nursing activity is concerned with minimizing the residual disabilities that are the conseguenses of advancing FM diagnosed symptoms. The nurse uses

her education or reeducation level for orientation to this patient's treatment. The evaluation of the Neuman's assessment model for nurses working with FM must also consider the nurse's educational background, knowledge, attitudes and skills (Figure 3).

Analysis of outcomes of the nursing assessment indicate movement toward system balance and stability when intervention has been successful. The accurate assessment of the variables lead to plans for reconstitution which are occuring as the flexible lines of defense are stregthened, the normal line of defense is stabilized and the stressors are resolved.

This model is suitable for use in community base setting. Through its use, careful assessment and evaluation of patient's and the caregiver's perceptions of the various stressors and resources for coping should made and diagnoses and goals should be formulated. Interventions at the primary and secondary levels of prevention should be planned and implemented. In general these interventions should be aimed; to prevent further stressor invasions; to maintain or strengthen patient's resources; to educate patient's about new coping strategies; resources and information about patient disease; and to conserve patient energy. Finally, the outcomes of the plan should be evaluated and be found to be largely congruent with the expected outcomes.

In summary, the Neuman System Model guides community-based nurses regarding FM patient. Enhancement of the nurse's knowledge of FM will improve the nurse's anility to identify stressors and diminished resources of clients with FM. Appropriate nursing interventions are designed based on an accurate assessment by the nurse. Appropriate continuing education or treatment program can also be developed based upon the Neuman system model for FM patient.

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Prevalence of menstrual disorder and relation between it and anexity disorder: A cross sectional study

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Abstract

Introduction: the presence of menstrual disorder is very frequent complain in adolescence age. Our purpose of this study is to appoint, prevalence the menstrual disorder and relation between it and anexity disorder.

Method: This cross sectional study was done on 1200 girl's school that lived in city or suburb in north of ran. We selected our samples randomly. We collected data with questionnaire for evaluate menstrual disorder & zank questionnaire .Analysis of data was done by SPSS software and we used descriptive statistics, chi- test and in depended T test. Significant level of this study was 0.05.

Result: The prevalence of menstrual disorder in urban girls was 13/2% and in rural girls was 8.6%. According to chi- test we can say there is meaning full relation between menstrual disorder and location of life.(p=0.02)

Menorrhagiawas the common disorder and relation between oligomenorrhea (p=0.032), metrorrhagia (p=0.000), menorragia (p=0.009) was meaning full.

Conclusion: menstrual disorder is common in adolescence age and anxiety is effective on some kind of menstrual disorder.

Key word: adolescence, menstrual disturbance, anxiety.

Introduction

Puberty is the important event in women life; it can induce physiological & physical Evolution. Puberty in women appear with first vaginal bleeding or menarche. When production of estrogen and progesterone coming down, menstruation accrue, duration , interval & amount of bleeding is different among women but alteration from usual habit show the existence of a problem. Menstrual disorder classified according age of start, amount, duration, interval & symptom with menstruation.(1)

Adolescence girls don't have enormous gynecological pathology but menstrual disorder is common in this time.(2) the majored cause of this problem is immaturity of hypothalamic – pituitary –gondola axis. According to recent studies the prevalence of secondary amenorrhea is 2.6-8.5% and irregular menstruation is 11.3 – 26.7 %.(3)

Also many conditions such as: pregnancy, endocrine disorder , medical condition,… can end to menstrual disorder.(4) one of the common kinds of menstrual disorder among women in reproductive age is menorrhagia. Approximately 37% of school girls suffer menorrhagia. This Heavy bleeding can be end to iron deficiency and educational failure.(5)

In 70% of girls regular menses will be appeared 2 years after menarche. Usually un ovulation with menstrual disorder and hyperanderogenism symptoms assume as normal phenomenon in adolescence period and it can be permanent and end to anxiety disorder ,emotional & social & economical damages.(6)

Many studies were done about prevalence of menstrual disorder in early puberty and during 2 years of me nark. But a few of them considered the prevalence of menstrual disorder after 2 years of me nark and the relation between anxiety and all kind of this problem also similar study didn't perform in north of Iran. Therefore our purpose of this study is appointed the prevalence of menstrual disorder after 2 years of me nark and relation between it and anxiety disorder in north of Iran.

Method

This cross sectional study was done on 1200 girl's students. They were 14-17 years old and they lived in north of ran (rural & urban). We selected our samples with malty stage randomize cluster sampling method.after consulting with statistician; we selected 8 urban and rural randomly & selected high schools and students in each area randomly.

Our sampling lasted from April to June 2011.

According to our purpose we constructed a questionnaire. It contains demographic, menstrual information's, inclusion & exclusion criteria.

The content validity of this questionnaire appointed with deli method and the reliability of it appointed with test- re test. We used zank anxiety questionnaire for appointed degree of anxiety in these girls. This questionnaire was standard questionnaire. According to this questionnaire score 25-44: is normal, score 45-59: is mild to moderate anxiety, score 60-74: is severe anxiety and score above 75 is very severe. The inclusion criteria were single girl, age between 14-17 and the exclusion criteria were; 1- the girls who had systematic or chorionic disease such as: a diabetes, thyroid, kidney, heart, lung and liver disease. 2- Use of hormonal and non hormonal drugs.

This article extracted of a approval plan research in education & nurture research center in north of ran also it considered about ethic cases.

Analysis of data was done by spss software and we used descriptive and inferential statistics and chi- test and in depended T test. Significant level of this study was 0.05.

Result

Mean and standard deviation of me nark age in urban girls was 12/29±1/29 and 12/32±1/28 in rural girls. The lowest age of me nark in urban & rural girls was 9 years old and the highest age of me nark in rural girls were 15 & urban was 16 years old. According to in depended T test, there isn't any meaning full difference between mean of me nark age in rural and urban girls. (p=0/68)،

Mean and standard deviation the age of urban girls was 15/83±1/01 and in rural girls was 15/73±0/95. According to in depended T test there isn't any meaning full difference between mean age in rural and urban girls.(p=0/09)

About menstruation criteria:

- The interval of menses in almost of rural & urban girls was 21-35 days. Chi – square test showed that there wasn't any meaning full relation between the interval of menses and location of life.
- Duration of bleeding in urban girls was 6/15±1/39 and in rural girls was 6/12±1/41 days. According in depended t test , there was not any meaning full difference between the duration of bleeding and location of life. (p=0/78)
- A mount of bleeding in almost of rural and urban girls was normal .according to chi- square test there was no meaning full relation between amount of bleeding and location of life.(p=0/18)
- The prevalence of menstrual disorder in urban girls was 13/2% and in rural girls was 8.6%. According to chi- test we can say there is meaning full relation between menstrual disorder and location of life.(p=0.02)

According to table 1, the sequence of prevalence was: menorrhagia,oligomenorrhea,polymenorrhea, metroragia and amenorrhea. The lowest prevalence was hypo menorrhea. Also chi – square test showed that there was not any relation between menstrual disorder and location of life.

Table 1. Prevalence of menstrual disorder

Mensterual disorder	Rural girl		Urban girl		
	Number	Prevalence	Number	Prevalence	P value
Hypomenorrhea	1	2.9	8	7.6	0.32
Polymenorrhea	11	31.4	39	37.1	0.54
Oligomenorrhea	16	45.7	53	50.5	0.62
Amenorrhea	5	14.3	21	20.0	0.45
Metroragia	8	22.9	33	31.4	0.33
Menorragia	30	85.7	91	86.7	0.88

Almost of girls had 2 type of menstrual disorder. Chi – test showed there isn't any relation between the number of menstrual disorder and location of life. (p=0.70)

BMI of urban girl who had menstrual disorder, was 21.39 ± 4.01 and in rural girl was 21.50 ± 4.35. The lowest of BMI in urban girl was 14.88 and in rural girl s were 11.38. The highest of BMI in urban girl was 40.57, rural girl was 34.67. Also chi – test showed that there was no meaningfull relation between BMI and location of life in girls who had menstrual disorder. (p=0.89)

On the other hand, BMI of urban girl who hadn't menstrual disorder, was 21.50 ± 4.35 and in rural girl was 22.70 ± 4.53. The lowest of BMI in urban girl was 15.22 and in rural girls were 11.38. The highest of BMI in urban girl was 34.67, rural girl was 42. Also chi – test showed that there was meaning full relation between BMI and location of life in girls who had not menstrual disorder. (p=0.000)

According chi-test relation between dysmenorrheal and location of life was not meaning full in girl who had menstrual disorder (p=0.35) or had not (p=0.61).

Chi- test showed that relation between educational situation and location of life was meaning full in girls had (p=0.000) or had not (p=0.000) menstrual disorder.

According table (2):

- Almost of urban girls who had menstrual disorder, didn't t have anxiety disorder, but rural girls had mild and sever stress. Also chi- square test showed that meaning full relation between anxiety and location of life.(p=0.002)
- The almost of healthy girls had no anxiety disorder and there ware meaning full relation between anxiety disorder and location of life in these girls.(p=0.000)
- Relation between anxiety and hypo menorrhea (p=0.159), poly menorrhea (p=0.091), amenorrhea (0.461) was not meaning full.
- But the relation between oligomenorrhea (p=0.032), metrorrhagia (p=0.000), menorrhagia (p=0.009) was meaning full.

Discussion

Adolescences have nourmouse physical & psychological changes. There isn't serious gynecological pathology in this period but menstrual disturbances are common. The major cause of this problem is anovulatory cycle. (2) Many studies showed the relation between anovulatory cycle and endometrial & breast cancer. The cause of this risk is exposure to high level of estrogen also some kinds of menstrual disorder can end to infertility. (1)

The prevalence of menstrual disorder in urban girls (13.2%) was higher than rural girls (8.6%). Menorrhagia was the common kind of menstrual disorder and hypomenorrhea had the lowest prevalence in urban & rural.

The prevalence that reported in ran during 2 years after me nark was 45.9% & the common kind of disorder was oligomenorhea and menometrohagia was the rare type of disorder.(6) Shahgheibi claimed 43.25% of 17-18 years girls had menstrual disorder.(7) Sanyal (2008) said more than 50% of girls in early, middle and late adolescence experience this disorder and the irregularity will decrease with increase of age.(8) A similar study was done in Turkey (2000), showed 26.7% of girls had irregular period after 2 years of me nark and 62.2% of them had at least one irregular bleeding in their lives.(9) In James s study, the most common bleeding disorder was heavy menstrual bleeding.(10) Bleeding problem in this years is usually without any organic and gynecological pathology but in some cases

Table 2. Anxiety in rural & urban student who have menstrual disorder

	Rural student		Urban student	
Anexity disorder	Number	percent	number	Percent
Normal	10	28.6	64	61.0
Mild to moderate	14	40.0	28	26.7
Sever	11	31.4	13	12.4
Total	35	100	105	100
P vale	0.002			

coagulation factors deficiencies including von will brand disease and quality- quantity abnormalities of platelets are common reason.(11,12,13)

In this study, rural girls who had menstrual disorder, had mild or sever stress. Also the relation between oligomenorhea, metrorragia, menorragia was meaning full. According to Demir s study 15.8% of girls experienced irregular menses during school examination and anxiety situations.(9) also another studies just mentioned the relation anxiety and menstrual disorder (1, 14, 15), but any of them didn't say any relation between anexity and the kinds of menstrual disorder.

When menstrual disorder permanent after 3 years of me nark, diagnostic evaluation and Treatment dysfunctional uterine bleeding shout be start. (16) in this study we find the girls who suffer menstrual disorder after 3 years of me nark, it was better, we invited them in gynecologic clinic and diagnose the major cause that end to menstrual disorder.

Conclusion

The prevalence of menstrual disorder in north of Iran is lower that another area. Only the relation between oligomenorhea, metrorrhagia and menorrhagia were meaning full with menstrual disorder.

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High antimicrobial resistance and isolated pathogens in outpatient elderly population with urinary tract symptom

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Abstract

Background: In this study, antibiotic sensitivities and uropathogens isolated from elderly outpatients to have least one urinary tract symptom were evaluated.

Methods: The yielded bacteria of 344 urine samples were evaluated. Isolated pathogens were identified with classical methods and authomatized systems. Antibiotic susceptibilities were done by disc diffusion method. If need, authomatize system was used.

Results: The ages of the patients were from 60 to 92, and mean age was 73.02. The male/female ratio was 147/197. The most common isolated 3 pathogens were Escherichia coli (80.52 %), Coagulase negative staphylococcus, and Enterococcus spp. In this study, the sensitivities to the antibiotics of E. coli were 59.92 %, 70.30 %, 64.98, 63.78, 86.44 % and 90.48 % for amoxicillin-clavulanate, cefuroxime-axetil, trimethoprim-sulphamethoxazole, ciprofloxacine, ceftizoxime and nitrofrontein, respectively. The sensitivities of amoxicillin-clavulanate, cefuroxime-axetil, trimethoprim-sulphamethoxazole, ciprofloxacine, ceftizoxime and nitrofrontein for male and female were 55.17-66.12,54.08-78.12, 50.00-73.29, 55.04-69.70, 76.00-91.56 and 80.00-91.71, respectively. The susceptibility rates of amikacin, gentamycin and ceftriaxone were 90.16 %, 78.94 % and 81.99 % as 89.21, 70.64 and 66.67 in male patients and 90.30, 70.64 and 88.52 in female patients.

Conclusion: In the elderly outpatients, E.coli was the most common pathogen in the urine. The resistant rates in our region are higher from reported in literature. Nitrofrontein and amikacine can be started empirically for both gender. However, cefuroxime, ceftriaxone, ceftizoxime, cephazoline, and gentamycine for the female patients can be used empirically. We think that the male elderly patients should be treated with hospitalized.

Key Words: Antibiotics, geriatrics, infection, urinary tract

Introduction

Urinary tract infections (UTIs) are one of the most common infectious diseases in the elderly population[1]. Urinary tract symptoms (UTSs) including acute dysuria, new or worsening urgency, new urinary incontinence, frequency of urine, costovertebral angle tenderness, suprapubic pain, frank hematuria are help for the differential diagnosis of UTIs from asymptomatic bacteriuria[2]. However, many older individuals have chronic UTSs[3]. In contrast, some elderly patients with UTIs may be to no have UTSs and urinary tract findings4.

The symptoms and findings for UTIs in elderly individuals are not clear, and a test for display tissue invasion of bacteria is absent. Because of these situations, case definitions for UTIs in elderly are difficult. For these reasons, if UTIs is thought for an older person, it should be full clinically evaluated[4] and closely monitored[5].

Many studies have shown that E. coli is the most common isolated pathogen from urinary tract of all patients with UTIs. Otherwise, Enterococcus spp, Klebsiella spp, and Proteus spp in uncomplicated cases and Proteus spp, Klebsiella spp, Enterobacter spp, Pseudomonas spp, and Enterococcus spp in complicated cases have been isolated[6-9]. Unfortunately, many studies have been done in the general population and have been no

specific for the elderly population. Also, elderly population have been excluded from some studies[2]. We think that there is a need to studies related to urinary tract infections in elderly.

In the study, we aimed that evaluation of antibiotic susceptibilities and isolated pathogens in the elderly population with UTIs, including male and female in over 60 years old, no live in a nursing home and no hospitalization and to have least one of UTSs, only one microorganism yielded in urine. According to our knowledge, this study has been firstly reported in the literature.

Materials and methods

This study was performed retrospectively in urine samples sent from clinics of internal medicine, infectious disease, emergency medicine and urology to the microbiology laboratory of AIBU from january 2006 to december 2010. The study was approved by the Ethical Committee of Abant Izzet Baysal University.

We included 344 urine samples sent from the patients as male and female in over 60 years old, no live in a nursing home and no hospitalization and to have least one of UTSs, only one microorganism yielded in urine. In these patients, antibiotic susceptibilities and isolated pathogens in urine were evaluated. Repeated culture results in last one month at the same patient were excluded from the study. The first result in repeated bacteria yielded was included in the study.

All the urinary samples were passaged into Sheep-Blood and Eosin-Methylen Blue agars and evaluated in the end of 24 sd hours. Only one yielded bacteria specie in 104 cfu /ml and over were identified with Gram stain, classical techniques, and automatic analyzer as VITEK-2. Antibiotic sensitivity tests were done by Kirby Bauer disc diffusion technique according to criteria of Clinical and Laboratory Standards Institute. The sensitivity tests of the some stains were repeated by automatic analyzer as VITEK-2.

Results

In this study, yielded bacteria of 344 urine samples sent from the patients including 196 from urology, 73 from internal medicine, 50 from the emergency room and 25 from infectious diseases were evaluated.

The ages of the patients were from 60 to 92 and the, mean age was 73.02. The male/female ratio was 147/197.

Gram positive bacteria in 11.92 % and gram negative bacteria in 86.63 % of 344 urine samples yielded. The yielded microorganisms of the patients were E.coli in 277, coagulase negative staphylococcus (CNS) in 19, Enterococcus spp. in 12, Klebsiella pneumoniae in 11, Candida species in 5, Proteus mirabilis in 4, Proteus vulgaris in 2, Pseudomonas aeruginosa in 4, Staphylococcus aureus in 3, Streptococcus agalactiae in 2, Morganella morgani, Enterobacter aerogenes, Pseudomonas putida, Serratia marcescens and Citrobacter freundii in only one patient

In the evaluation of the yielded microorganism according to clinic, urine cultures sent from urology yielded E. Coli in 152, CNS in 14, Enterococcus spp. in 8, K. pneumoniae in 6, P. aeruginosa in 3, C. Albicans in 2, P. vulgaris in 2, P. mirabilis in 2, S. aureus in 2, Candida spp. in 1, E. aerogenes in 1, M. Morganii in 1, S. marcescens in 1 and S. agalactiae in 1.

In the patients of the emergency room, E. Coli in 40, Enterococcus spp. in 3, P. mirabilis in 2, C. Albicans in 1, K. pneumoniae in 1, CNS in 1, Pseudomonas spp. in 1 and S. aureus in 1 yielded.

In urines of the patients in internal medicine grew 62 E.coli, 3 CNS, 4 K. pneumoniae, 1 C. freundii, Enterococcus spp., P.putida and S. agalactiae.

23 E. Coli, only one CNS and C. Albicans grew in urine samples of the patients of infectious disease clinic.

In this study, the most common isolated pathogen was E.coli in the rate of 80.52 %. The sensitivities to the antibiotics of E. coli was 59.92 %, 70.30 %, 64.98, 63.78, 86.44 % and 90.48 % for amoxicillin-clavulanate (AMC), cefuroxime (CXM), trimethoprim-sulphamethoxazole (SXT), ciprofloxacine (CIP), ceftizoxime (CZX) and nitrofrontein (NTR).The rates of amikacin (AK), gentamycin (GN) and ceftriaxone (CRO) were 90.16 %, 78.94 % and 81.99 %.(Table 1).

For yielded pathogens from the patients in urology clinic, E. coli was the most common microorganism with 77.5 %, which included 54.87 % of all E.coli strains. The antibiotic susceptibility of E. coli was 65.79 %, 66.43, 59.83, 62.33, and

Table 1. The antibiotic sensitivities rates of yielded bacteria in the urinary samples

Antibiotics	All the patients (%)		The sent from Urology (%)	
	Gram negative bacteria	E. coli	Gram negative bacteria	E. coli
Nitrofurantoin	86.99	90.48	85.36	88.74
Cefuroxim	72.87	70.30	64.51	66.43
Ampicilline	28.12	28.47	26.99	28.00
Amikacine	89.89	90.16	96.62	90.30
SXT	64.28	64.98	58.01	59.83
Aztreonam	83.61	83.70	80.95	80.92
Ceftizoxim	85.43	86.44	83.66	85.11
Meropenem	99.61	99.58	99.35	99.28
Imipenem	99.00	99.63	99.40	99.35
Ceftazidime	80.95	81.22	77.54	78.22
Cefepim	81.81	85.66	80.98	81.08
Ceftriaxone	80.13	81.99	77.77	79.60
Cephazoline	68.00	70.40	63.63	65.79
Gentamicine	78.44	78.94	73.38	74.29
Ciprofloxacin	63.87	63.78	62.11	62.33
Amoxicilline-clavulonate	61.87	59.92	63.25	65.79

88.74 for AMC, CXM, SXT, CIP, and NTR. The sensitivity rates of AK, GN, CZX and CRO were 90.30, 74.29, 85.11, and 79.60.

In the study 6 of 12 Enterococcus spp. strains were resistance to penicillin and 39 % of all Staphylococcus strains were resistant for oxacillin. In the evaluation of yeasts, C. albicans in 4 and non-albicans in 1 yielded.

To evaluation according to gender, the ages of male patients were from 60 to 92. The male patients were from urology in 115, emergency room in 13, internal medicine in 10, and infectious diseases in 9. The most common isolated 5 pathogens in the male population were E. coli (70 %), CNS, Enterococcus spp., P.aeruginosa, K. pneumoniae. The ages of female patients were from 60 to 87. The female patients were from urology in 81, emergency room in 16, internal medicine in 63, and infectious diseases in 16. The most common isolated 5 pathogens in the female population were E. coli (80.80 %), K. pneumoniae, Enterococus spp., C. Albicans, and CNS. The antibiotic sensitivities of isolated pathogens from urinary samples in male and female patients were shown in Table 2.

Table 2. Antibiotic susceptibility rates of gram negative bacteria for male and female

Antibiotics	Gram negative bacteria	
	The male patients (%)	The female patients (%)
Nitrofurantoin	80.00	91.71
Cefuroxim	54.08	78.12
Ampicilline	19.64	50.86
Amikacine	89.21	90.30
SXT	50.00	73.29
Aztreonam	71.19	91.71
Ceftizoxim	76.00	91.56
Meropenem	98.99	99.36
Imipenem	98.30	99.45
Ceftazidime	64.28	91.56
Cefepim	72.80	92.90
Ceftriaxone	66.67	88.52
Cephazoline	48.70	79.89
Gentamicine	70.64	83.75
Ciprofloxacin	55.04	69.70
AMC	55.17	66.12

Discussion

In this study, the most common isolated pathogen from urine samples was 80.52 % E. coli. Otherwise, 5.52 % CNS, 3.49 % Enterococcus spp., and 3.20 % K. pneumoniae yielded in urine cultures. The sensiti-

vities to the antibiotics of E. coli were 59.92 %, 70.30 %, 64.98, 63.78, 86.44 % and 90.48 % for amoxicillin-clavulanate, cefuroxime-axetil, trimethoprim-sulphamethoxazole, ciprofloxacine, ceftizoxime and nitrofrontein, respectively. The sensitivities of amoxicillin-clavulanate, cefuroxime-axetil, trimethoprim-sulphamethoxazole, ciprofloxacine, ceftizoxime and nitrofrontein for male and female were 55.17-66.12,54.08-78.12, 50.00-73.29, 55.04-69.70, 76.00-91.56 and 80.00-91.71, respectively. The susceptibility rates of amikacin, gentamycin and ceftriaxone were 90.16 %, 78.94 % and 81.99 % as 89.21, 70.64 and 66.67 in male patients and 90.30, 70.64 and 88.52 in female patients. Penicilline resistance in enterococcus strains and oxacillin resistance in all staphylococcus were 50 % and 39 %.

UTIs may be classified as complicated and uncomplicated. UTIs in Female patients with functional and/or structural defect in the urinary tract and all male patients called as complicated UTIs. Because of excess of structural or functional disorders and low of the immune response in older individuals, all UTIs in older patients may be assessed as complicated[7]. In these reasons, the present our study may be evaluated antibiotic sensitivities and isolated pathogens in the patients with complicated UTIs.

The most common isolated microorganism in the patient with UTIs is E. coli, which causes in the rate of 55.3 %- 67.7 %. Klebsiella spp. is second most common pathogen with 9 % [10-12]. In an our UTIs study performed in the general population, the patients were divided into three groups as <18, 18-50 and > 50 for age. Over 59 ages were evaluated 248 patients. In this age groups, mean age was 66.2 and male/female ratio was 1/1.1. the most common isolated microorganism was E. coli to be same the other age groups. Klebsiella spp., Enterococcus spp., Proteus spp., Enterobacter spp, P.aeruginosa and S. aureus were the other isolated pathogens. There were no statistically significant difference for Klebisella spp., S. aureus, Enterococcus spp., Enterobacter spp., CNS and P.aeruginosa among three age groups[10]. In our presented study, E. coli was the most common pathogen with %80.52 Thesecond and third most common pathogens were CNS and Enterococus spp. Klebsiella pneumoniae was fourth most common pathogen. Also, proteus pseudomonas and candida strains were isolated, to.

2003 ECO-SENS reported including 16 Europe countries and Canada reported as 2.3 % CIP resistance in UTI. pathogens. The most high quinolone resistant was shown in Spain and Portugal in the rate of 19.3 %[9, 13, 14]. CIP resistant in Turkey have been reported 5-20 % and cipro has been preferred firstly for treatment of UTI[9,15]. Cipro resistant in GSBL producing strains has been reported 70 %[16]. In our presented study, cipro resistant in all the gram negative pathogens was found 30.36 %, which is highly from reported in the literature.

Sxt resistance for E. coli in USA have been reported in 10-20 %, and now SXT is one of choice in the first line treatment. However, this rate is 50 % in Turkey and SXT should be not chosen in Turkey[9, 13, 15, 17, 18]. SXT resistance in GSBL producing E. coli strains is higher of 70 %. ([16])

Recently, Yildirim et al[10] reported that antibiotic sensitivity rates in 50 age over patients for E. Coli were 65 %, 63.7 %, 70.9 % and 73.1 % in the oral antibiotics as SXT, AMC, cephaclor and CIP. The susceptibility profiles for E.coli, Klebsiella spp., Proteus spp., and Enterobacter spp. of these 4 antibiotics were lesser in younger adult when compared with older adults. Especially, the sensitivity rates of these 4 antibiotics in Klebsiella spp. were lesser of 50 %. Also, AMC, cephaclor and CIP sensitivities for Enterobacter spp. were lesser of 20 %. When intravenous antibiotics for E.coli were evaluated, the sensitivity rates of CRO, ceftazidime (CAZ), imipenem (I), piperacillin, AK and GN were 81.4 %, 87.7 %, 99.2 %, 78.8 %, 94.4 % and 85.6 %. These rates were lesser in compared with younger adults in older adults. Unfortunately, the sensitivity of CRO, CAZ, piperacillin and AK for Klebsiella spp was lesser of 60 %. In younger adults, the susceptibility for just PIP of these 4 antibiotics was lesser of 80 %, for the other 3 was higher of 80 %. In our presented study, susceptibility rates of AMC, CXM, SXT, CIP and NTR for all E. Coli strains were 59.92 %, 70.30 %, 64.98 %, 63.78 % and 90.48. The sensitivity rates for CRO, CAZ, cefepim, GN and AK were 81.99 %, 81.22 %, 85.66 %, 78.94 % and 90.16.

European guide suggested that fosfomycin trometamol and NTR can be used empirically as first line treatment. If SXT resistance is lower of 20 %, it can be used for UTI[19]. In USA guide, SXT as first line therapy and trimetoprim and ofloxacine as an alternative therapy were suggested. Also, USA gu-

ide suggested that if trimetoprim or SXT resistance are higher of 20 %, quinolones can not be used empirically. However, fosfomycine and NTR can be used empirically to prevent of antibiotic resistance[20]. These guides are not specific for the elderly population and are associated with all adult population. The empiric antibiotic treatments suggested in these guides are not appropriate for Turkey, especially for the elderly population in our region as Bolu. Because, the resistance rations in the elderly population with UTI in our region were found higher of 30 % for SXT, CIP, CXM and AMC, which should not used empirically in the elderly population.

For prevent of gastroenteritis associated with antibiotic and no developed of resistant strains, narrow spectrum antibiotics until resulting in urinary culture in the elderly population should be given empirically[21,22]. However, regional antibiotic sensitivity profile should be known for started of appropriate antibiotic. As a result, because of increased antibiotic resistance rations in our region, broad spectrum antibiotics should be chosen for empiric antibiotic treatment in the elderly population with lower tract infections, especially for male patients. NTR, amikacine can be started empirically for both gender. However, cefuroxime, ceftriaxone, ceftizoxime, cephazoline, and gentamycine for the female patients can be used empirically. We think that the male elderly patients should be treated with hospitalized.

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Low RPS14 gene expression is accompanied by p53-independent apoptosis in MDS patients with 5q- aberrations

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Abstract

Aim: In this study, we evaluated ribosomal protein S14 (RPS14) and p53 gene expression and analyzed their correlation to investigate the role of the RPS14-MDM2-p53 pathway in hematopoietic cell apoptosis in myelodysplastic syndrome (MDS) patients with 5q- aberrations (isolated 5q-/5q- accompanied by other karyotypes).

Methods: Real-time quantitative PCR was used to detect the expression levels of the RPS14, MDM2 and TP53 genes in 18 MDS patients, including 7 with isolated del (5q) and 11 with del (5q) with other chromosomal abnormalities. Alkaline phosphatase-anti-alkaline phosphatase (APAAP) and terminal deoxynucleotidyI transferase dUTP nick-end labeling (TUNEL) were also performed on each sample to examine p53 expression and the level of bone marrow (BM) mononuclear cells (MNCs) apoptosis, respectively. Ten healthy controls were included in this study.

Results: Under-expression of RPS14 was seen in 15/18 patients (83.3%). Of these patients, 6/7 were isolated 5q-, and 9/11 were 5q- with other chromosomal abnormalities. RPS14 gene expression was negatively correlated with the proportion of 5q- clonal cells in BM MNCs, and there was a positive correlation between RPS14 gene expression and that of both MDM2 and p53. The expression of p53 was not correlated with the high apoptosis level of the BM cells in the patients with 5q-. Furthermore, APAAP and TUNEL results demonstrated that the apoptotic cells in the BM patients were p53 negative.

Conclusions: The RPS14 gene was underexpressed in MDS patients with 5q- aberrations, which did not result in p53-dependent apoptosis. A p53-independent pathway may contribute to increased apoptosis in 5q- MDS patients.

Key words: myelodysplastic syndromes, 5q-, RPS14, p53, apoptosis

1. Introduction

Myelodysplastic syndrome (MDS) is a heterogeneous group of clonal disorders of the hematopoietic precursor cells that is characterized by bone marrow (BM) dysplasia, ineffective hematopoiesis, peripheral blood cytopenias with a mono/multilineage and a high risk of evolution into acute myeloid leukemia (AML). Numerous researchers have reported that chromosomal abnormalities are found in about 50-60% of MDS patients [1-3]. Del (5q) is one of the most common cytogenetic abnormalities in western countries, comprising approximately 10-20% of the entire cohort, while the percentage is distinctly lower in China, where it is around 5% [4-7]. The mechanisms underlying this unique subtype of MDS have remained elusive due to the difficulty of identifying specific gene mutations or haploinsufficiencies. However, emerging evidence has given a strong indication that 5q- syndrome may be considered one of the ribosomopathies, due to the newly discovered role for ribosomal protein S14 (RPS14) in this disease. Indeed, microarray experiments with MDS patients with or without 5q- and subsequent gene functional studies of the commonly deleted region (CDR) *in vitro* have identified the RPS14 as a strong candidate gene for the pathogenesis of 5q- syndrome [8, 9]. This is also supported by recent reports of a novel 5q- syndrome mouse model and the return of RPS14 expression in 5q- MDS patients treated with lenalidomide [10, 11].

Some authors have reported that the expression insufficiency of RPS14, which is essential for the assembly of the 40s ribosomal subunit, may disrupt ribosome assembly and result in the accumulation

of immature ribosomal subunits in cells, which is called "ribosomal stress" [12, 13]. Ribosomal stress can trigger the binding of free ribosomal proteins to Mouse Double Minute 2 (MDM2), which is the key regulator of p53 [14]. P53 was then activated due to the inhibited degradation function of MDM2, leading to apoptosis and cell cycle arrest; this pathway is called the ribosomal protein-MDM2-p53 pathway [15-18]. Thus, it is possible that RPS14 haploinsufficiency can cause ribosomal stress and account for p53 activation in 5q- MDS patients.

Increased apoptosis of BM hematopoietic cells has been shown to be involved in the pathogenesis of ineffective hematopoiesis, which is one of the major pathogenetic changes in MDS (along with dysplasia). Barlow et al. presented 5q- mice with elevated p53 levels and increased levels of apoptosis in BM cells. Strong expression of p53 in the bone marrow of 5q- syndrome patients has also been reported by Pellagatti et al. [18], implying that the activation of p53 in MDS patients with 5q- is likely to play an important role in the course of excessive apoptosis [10]. However, there are some reports of low expression of p53 in 5q- patients, and a recent study of low-risk MDS patients with del (5q) demonstrated the high expression of p53 associated with disease transformation into AML [20]. To evaluate the role of RPS14 and p53 in apoptosis in MDS patients with 5q deletions, our study aimed to perform the following: 1) evaluate the expression of RPS14 and p53 in MDS patients with 5q deletions; 2) identify the correlation of RPS14 with the MDM2-p53 pathway and apoptosis in BM hematopoietic cells.

2. Patients and methods

2.1 Patients

Eighteen MDS patients (11 male, 7 female) with 5q- aberrations were included; 7 patients were isolated 5q-, and 11 patients were 5q- associated with other karyotypes. The median age of the patients was 68 years (32-81 years). At the time of this investigation, 9 patients had RCMD, 3 had RA, 2 had RAEB-1, 2 had RAEB-2, 1 pati-

Table 1. The general data and RPS14 expression of 18 MDS cases with 5q- abnormalities

No.	Sex	Age	Diagnosis	Blast (%)	Karyotype	5q- clonal cell proportion (%)	Blood counts			IPSS	RPS14 -(⊿-⊿CT)
							WBC (10^9/l)	HB (g/l)	Plt (10^9/l)		
1	M	65	RA	0.2	isolated 5q-	15	3.2	67	133	0	-0.41
2	F	74	RCMD	1.5	isolated 5q-	8	7.5	54	28	0.5	1.36
3	M	60	RCMD	0	isolated 5q-	10	4.4	71	27	0.5	-1.3
4	F	47	RCMD	1.0	isolated 5q-	100	2.7	84	21	0.5	-6.70
5	F	32	RCMD	4.0	isolated 5q-	92	1.8	94	73	0.5	-1.52
6	F	68	RCMD	4.8	isolated 5q-	53	4.4	70	200	0	-2.98
7	F	63	RAEB-1	7.0	isolated 5q-	95	3.3	78	144	0	-3.20
8	M	75	RCMD	1.5	5q- with other karyotypes	100	4.1	57	90	1.0	-1.73
9	M	64	RAEB-1	7.0	5q- with other karyotypes	100	3.7	72	197	1.0	-2.12
10	M	74	CMML	2.0	5q- with other karyotypes	69	4.1	91	78	1.0	-3.17
11	M	75	RA	2.5	5q- with other karyotypes	99	5.1	76	189	0.5	-5.41
12	M	73	RA	2.0	5q- with other karyotypes	33	5.2	70	575	1.0	-2.63
13	M	69	RCMD	3.0	5q- with other karyotypes	32	3.1	72	79	1.5	-3.17
14	F	81	RCMD	3.5	5q- with other karyotypes	10	4.9	65	142	1.0	0.51
15	F	81	RCMD	4.5	5q- with other karyotypes	21	1.5	66	27	1.5	-2.35
16	M	41	MDS-U	3.0	5q- with other karyotypes	4	6.3	71	49	1.5	0.81
17	M	79	RAEB-2	10.0	5q- with other karyotypes	100	1.9	73	30	3.0	-1.7
18	M	54	RAEB-2	13.5	5q- with other karyotypes	100	6.9	65	24	3.0	-2.80

Abbreviations: M, male; F, female; RA, refractory cytopenia; RCMD, refractory cytopenia with multilineage dysplasia; RAEB-1/2, refractory anemia with an excess of blasts (5-9% of blasts in RAEB-1 and 10-19% in RAEB-2); MDS-U, unclassifiable myelodysplastic syndromes; IPSS, International Prognostic Scoring System.

ent was classified as CMML, and 1 was classified as MDS-U according to the WHO classification [21]. The patients were subgrouped as either low-risk (including 3 low-risk patients and 10 INT-1 patients) or high-risk (including 3 INT-1 patients and 2 INT-2 patients), according to the International Prognostic Scoring System (IPSS) [21] (Table 1). Fluorescence *in situ* hybridization (FISH) was performed on each sample to detect the 5q- clonal cell percentage. Ten healthy controls were included in this study. Informed consent was obtained from all of the patients and the healthy donors.

2.2 Sample preparation

Five milliliters of BM were aspirated into a 10-ml syringe containing heparin. The mononuclear cells were purified using Histopaque (Sigma-Aldrich, Gillingham, UK) density gradient centrifugation. The cytospins were prepared with 1×10^5 mononuclear cells on each slide and stored at −20°C in aluminum foil.

2.3 Real-time quantitative polymerase chain reaction

Total RNA was isolated from the BM mononuclear cells according to the manufacturer's instructions (RNeasy Mini Kit, Qiagen, Germany). The RNA purity was verified on a formaldehyde-agarose gel and quantitated using spectrophotometry. First-strand cDNA synthesis was performed following the manufacturer's instructions (RevertAid First-Strand cDNA Synthesis Kit, Fermentas, Canada), and the cDNA was stored at −80°C. A LightCycler 1.2 (Roche, Mannheim, Germany) was used to detect and quantitate the RPS14, MDM2 and p53 mRNA levels. PCR was performed using the LightCycler-FastStart DNA Master SYBR Green I Kit (Roche) in a final volume of 10 μL with 0.5 μM of each primer, 4 mM $MgCl_2$, 2 μL of the supplied enzyme mix containing the reaction buffer, FastStart Taq DNA polymerase and double-stranded DNA-specific SYBR Green I dye to detect the PCR products. The PCR protocol was as follows: 30 s of preincubation at 95°C, 40 cycles of 15 s at 95°C, 30 s at 60/62°C and 30 s at 72°C. To test the specificity of the PCR, the reaction products underwent melting curve analysis with the LightCycler and conventional agarose gel electrophoresis to eliminate the possibility of the synthesis of nonspecific products. The primer sequences are listed in Table 2. The relative gene expression levels were calculated as the difference between the CT values of RPS14 and those of the housekeeping gene GAPDH as a control (ΔCT). For each individual MDS patient sample, the respective fold RPS14 expression was calculated with respect to the mean expression level of the 10 normal donors (Δ-ΔCT). The normal range of the RPS14 expression defined by mean value plus or minus two times of the standard deviation (Mean -2SD~Mean + 2SD).

2.4 Immunocytochemistry

Immunocytochemical detection was performed using the alkaline phosphatase-anti-alkaline phosphatase (APAAP) method to evaluate the expression of wild type (wt) p53. The mouse anti-human wt-p53 (eBioscience, Inc. San Diego, CA, USA) monoclonal antibody kit was purchased from Antibody Diagnostica, and the APAAP kit was purchased from Dako (Carpinteria, CA, USA). The cytospins stored at −20°C were used after being thawed at room temperature for 20

Table 2. A summary of the RT-PCR primer sequences, annealing times and product lengths

Gene	Primer sequence	Annealing time	Product length
RPS14	F: 5′-ATGTTGGCTGCCCAG-3' R: 5′-GGTCTTGGTCCTATT TCCTC-3′	62	99 bp
MDM2	F: 5′-GATGAAAGCCTGGCTCTGTGTGTA-3′ R: 5′-ATCCTGATCCAACCAATCACCTG-3′	60	138 bp
TP53	F: 5′-AGAGCTGAATGAGGCCTTGGAA-3′ R: 5'-GAGTCAGGCCCTTCTGTCTTGAAC-3'	60	150 bp
GAPDH	F: 5'-GCACCGTCAAGGCTGAGAAC-3' R: 5'-ATGGTGGTGAAGACGCCAGT-3'	60	142 bp

min and then fixed with FAB liquid (190 ml acetone, 190 ml methanol, and 20 ml formaldehyde) for 2 min. The samples were then incubated for 20 min in 10% fetal bovine serum (FBS), which was used as a blocking agent for nonspecific antigens. A mouse anti-human wt-p53 monoclonal antibody was added to the tested zones, and the preparations were incubated at room temperature for 2 h. Next, goat anti-mouse IgG (the secondary antibody) and mouse anti-goat IgG coupled to alkaline phosphatase (the tertiary antibody) were reacted with the tested cells at room temperature for 1 h. Finally, the cells were dyed with Fast Red for 30 min. The samples were washed thoroughly with 0.1 mol/l TBS after each of the steps described above. Samples that were not treated with the primary antibody were used as methodological negative controls for each batch of tested slides.

2.5 Apoptosis detection by terminal deoxynucleotidyl transferase (TdT)-mediated dUTP nick-end labeling (TUNEL)

Cells undergoing apoptosis were identified by TUNEL using the Fluorescein *In Situ* Cell Death Detection Kit (Roche Diagnostics, Germany). The TUNEL assays were performed following wt-p53 immunocytochemical detection. The slides were washed three times with 1 M phosphate buffered saline (PBS), and the cells were then permeabilized with 0.1% Triton X-100 for 2 min on ice. After being washed three times, the slides were incubated in the presence of the TUNEL reaction mixture at 37°C for 60 min in the dark. Finally, the slides were washed thoroughly with PBS and distilled water. The results were analyzed using a fluorescence workstation (Leica, DFC350, FX). The slides were observed under a natural light filter to visualize the wt-p53-positive cells, which appeared to have pink or red signal. The slides were then observed under a fluorescence filter to visualize the TUNEL-positive cells with green fluorescent nuclei. Double-positive cells could be detected by combining the natural light and fluorescent filters. Two hundred cells were analyzed on each slide.

2.6 Statistical methods

Statistical analysis was performed using the Statistical Package of Social Sciences (SPSS 10.0; SPSS Inc., Chicago, IL, USA). A Pearson correlation analysis and the Mann–Whitney U-test were applied to estimate the correlations and compare the mean values of the groups. P values of <0.05 were considered to be statistically significant.

3. Results

3.1 RPS14 mRNA expression is down-regulated in patients with 5q-

Contrary to the normal controls, 15/18 (83.3%) of the patients with 5q- showed lower RPS14 expression levels in their BM hematopoietic cells. Of the patients, 6/7 were isolated 5q-, and 9/11 were 5q- associated with other karyotypes. The RPS14 expression levels ($2^{-\Delta CT}$) of the patients with 5q- and the controls were $(0.81\pm0.3)\times10^{-3}$ and $(3.8\pm0.5)\times10^{-3}$ (p=0.045), respectively; the RPS14 expression level in the patient group was -1.75 times (1.36 to -6.70) that of the normal controls. This difference was statistically significant (p=0.045). The expression level of RPS14 was negatively correlated with the clonal cell percentage in the BM (r=-0.49, p=0.039).

3.2 RPS14 is positively correlated with MDM2 and p53 expression

To investigate the correlation of RPS14 with the MDM2-p53 pathway, we examined the expression of MDM2 and p53 by RT-PCR. As shown in Figure 1A and B, RPS14 expression was positively correlated with both MDM2 and p53. (The r^2 values were 0.61 and 0.58, respectively; the p values were 0.0003 and 0.0006, respectively) The expression level of MDM2 in the patients with 5q- was $(0.9\pm0.2)\times10^{-2}$, which is significantly lower than that of the normal controls ($(3.0\pm1.9)\times10^{-2}$, p=0.038). We also detected the down-regulation of p53 relative to the control group. The levels of these were $(1.4\pm0.4)\times10^{-2}$ and $(2.7\pm0.8)\times10^{-2}$, respectively (p=0.036). Additionally, p53 and MDM2 showed a significant positive correlation, as shown in Figure 1C (r^2=0.82, p<0.0001).

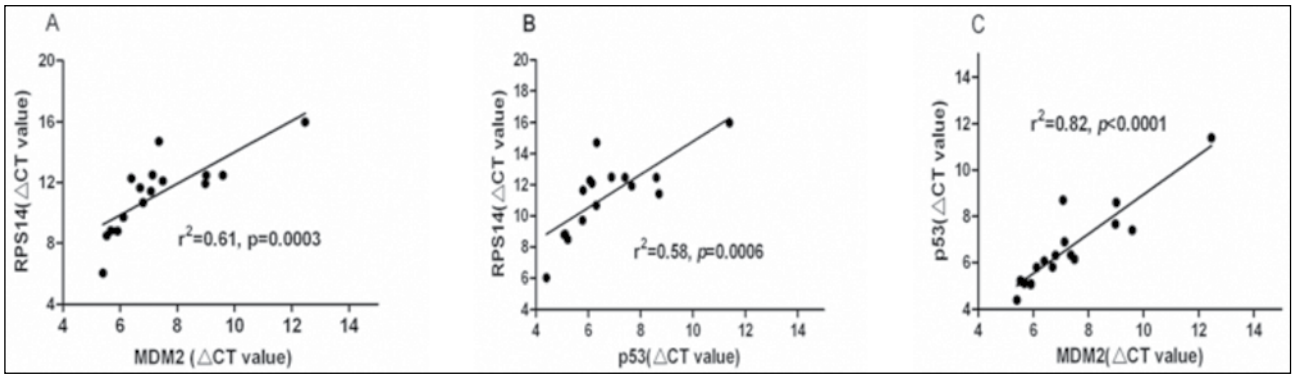

Figure 1. The correlation of RPS14 mRNA expression with p53 and MDM2 in 5q- MDS patients

Figure 1A shows that RPS14 expression is significantly correlated with MDM2 expression (r^2=0.61, p= 0.0003). Similarly,

Figure 1B shows that RPS14 expression is significantly correlated with p53 expression (r^2=0.58, p=0.0006).

Figure 1C shows that p53 expression also is positively correlated with MDM2 expression (r^2=0.82, p<0.0001).

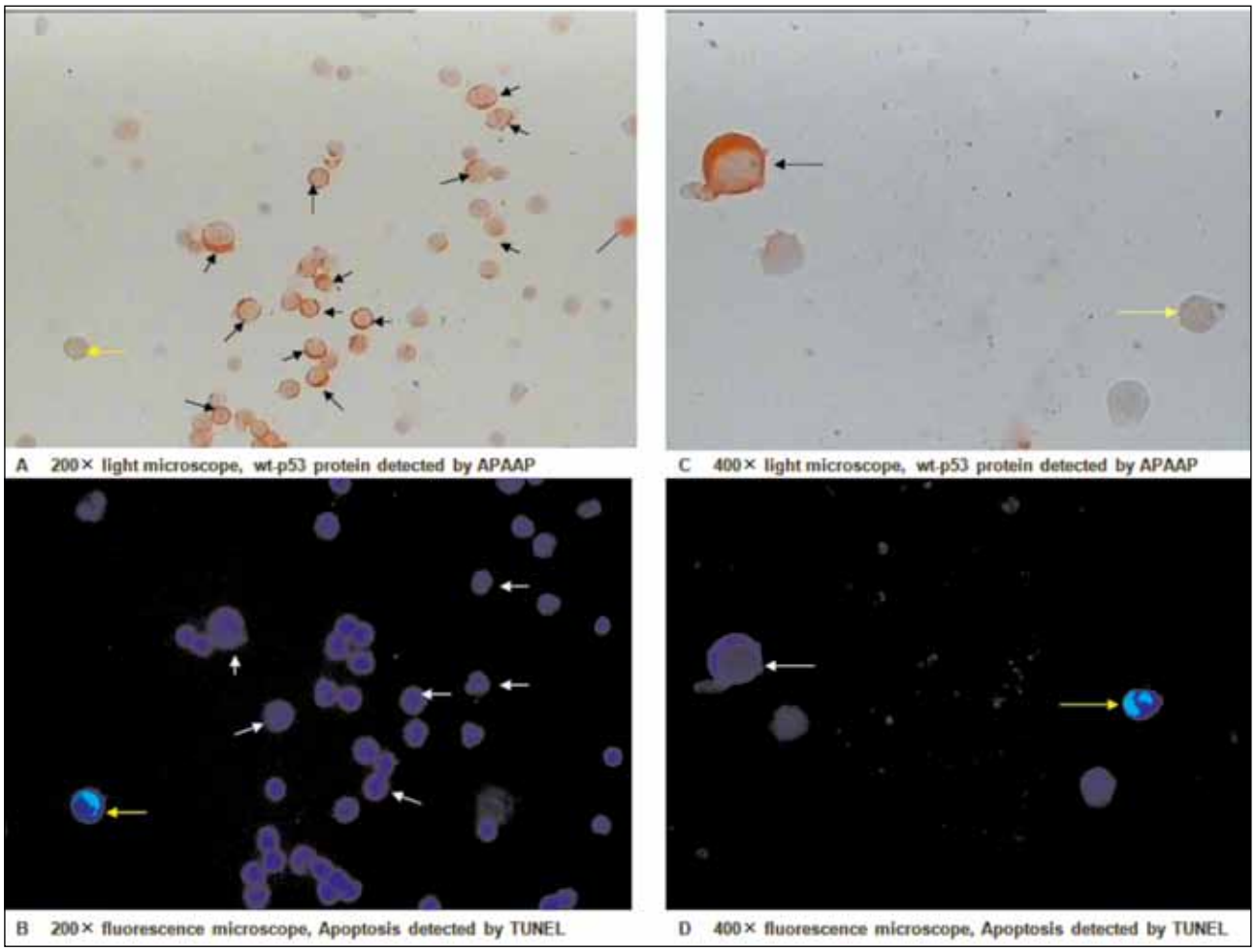

Figure 2. P53 expression and cell apoptosis are simultaneously detected in bone marrow cytospins from del (5q) patients by APAAP and TUNEL, respectively. P53-positive cells (the red signal indicated by the black arrows in panels A and C) were not indicative of apoptosis (the white arrow in panels B and D) but were p53-negative (the yellow and white arrows in panels A and C).

3.3 Increased apoptosis in BM hematopoietic cells

The apoptosis index of the BM hematopoietic cells in the 5q- patients (11.9±1.9%) was markedly higher than in the normal controls (2.1±0.3%, t=3.06, $p<0.05$). Only 1 (RAEB-1, no. 7 in Table 1) out of the 18 patients showed a normal apoptosis index in her BM hematopoietic cells, which transformed into AML 2 months after the diagnosis even though the initial disease was actively treated. The apoptotic index of the BM hematopoietic cells was not correlated with the p53 expression level.

3.4 P53-negative apoptosis of BM cells in patients with 5q-

P53 expression and apoptosis were simultaneously measured in each sample via APAAP and TUNEL on BM cytospins. The p53-positive cells detected by APAAP did not present as TUNEL-positive, and the apoptotic cells (TUNEL-positive) did not display p53 signals (Figure 2).

4. Discussion

The deficiency of the crucial region (5q31-32) of the long arm of chromosome 5 is the CDR of 5q- syndrome patients [22, 23]. RPS14 is a promising candidate gene for 5q- patient mapping within the CDR [8，23]. Ebert et al. demonstrated that the haploinsufficiency of RPS14 could lead to erythrocytic dysplasia and apoptosis by using an RNA interference screen of the 40 candidate genes within the CDR [9]. Our results (the mRNA levels of 5q-/5q- with other karyotypes) revealed low expression of RPS14 compared to that of the normal controls, especially for the patients who presented with higher clonal numbers of 5q-. This agrees with the results from Ebert et al. and a recent study by Dutt et al. [9,24]. However, 3 patients did not exhibit low expression of RPS14 in our study, which may be explained by the low clonal number of 5q- (see Table 1, patient nos. 2, 14 and 16).

The TUNEL results provided evidence for increased hematopoietic cell apoptosis in the patients with 5q- aberrations compared to the normal controls. Excessive apoptosis of hematopoietic precursors and their progeny has been shown to at least partially contribute to ineffective hematopoiesis, including MDS with 5q- [25-28]. Although the mechanisms underlying the increased hematopoietic cell apoptosis in the 5q- patients are still being defined, recent studies have suggested that RPS14 haploinsufficiency can lead to dysplasia and apoptosis through the RPS14-MDM2-p53 pathway, as delineated above [15-19, 28]. In this study, MDM2 and p53 were down-regulated in the 5q- patients compared to the normal controls, as shown by RT-PCR, and they showed a strong positive correlation with one another. In addition, RPS14 showed a positive correlation with both MDM2 and p53 expression, as quantified in Figure 1C, which suggests a potential role for the RPS14-MDM2-p53 pathway in 5q- patients. Indeed, there is growing interest in this pathway for 5q- MDS, and two novel mouse models have provided evidence for the involvement of RPS14 in the dysregulation of the p53 pathway as a key factor in 5q- syndrome [9, 10].

As shown in our previous study, it is feasible to perform TUNEL and APAAP simultaneously on the same cell smear [30]. Intriguingly, by combining the TUNEL and APAAP assays that were used to evaluate the correlation between p53 and apoptosis in individual cell, we showed for the first time (to the best of our knowledge) that the p53-positive cells were not TUNEL-positive (indicative of apoptosis), while the apoptotic cells (TUNEL-positive) did not display p53 signals (figure 2). Besides, p53 expression has been suggested to be up-regulated in patients with RPS14 deficiencies based on the results from Barlow [10], although the opposite was true in our study. Our paradoxical finding of p53 disassociation and increased apoptosis in 5q- MDS patients is inconsistent with previous studies, suggesting that the complexity of the apoptotic mechanisms and the possible functional alterations or genetic events of p53 in MDS patients with 5q- should be reconsidered.

P53 has been identified as a critical tumor suppressor gene that is responsible for regulating apoptosis [19, 31]. The 5q- mouse model showed elevated p53 and increased apoptosis in its bone marrow cells, suggesting that p53 contributes to the pathophysiology of the 5q- phenotype [10]. The strong expression of p53 in the bone marrow

of 5q- syndrome patients has also been reported by Pellagatti et al. [19]. However, in our results, p53 was under-expressed in the 5q- patients as demonstrated by both RT-PCR and APAAP. This did not correlate with increased hematopoietic cell apoptosis. Hidekachi et al. also reported the down-regulation of p53 in the low-risk group of MDS patients with increased BM hematopoietic cell apoptosis, and high p53 expression is associated with resistance to apoptosis and AML transformation in the high-risk group [32]. Also, it is possible that TP53 mutations, which occur in about 20% of low-risk MDS patients with 5q-, can impair the activity of wild-type p53, as indicated by Michaiovitz et al., and result in the resistance of hematopoietic cells to apoptosis [19, 33]. Furthermore, as has been mentioned, the low expression of RPS14 in 5q- patients may induce ribosomal stress and block MDM2-mediated p53 degradation. Thus, the accumulation of the p53 protein may eventually reduce MDM2 levels and subsequent p53 transcription through a negative feedback loop.

Further studies are required to confirm the RPS14-MDM2-p53 pathway as the primary mechanism of the pathogenesis and involvement of p53 mutations and their roles in apoptosis in 5q- MDS patients. We also believe that other apoptosis promoters and pathways respond to increased apoptosis in MDS patients with 5q-. All of these should be included in further investigations.

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Quantitative comparison of mobility and gross motor function in Brazilian children with cerebral palsy

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Abstract

Background: Cerebral palsy (CP) presents changes in posture and movement as a core characteristic, which requires therapeutic monitoring during the habilitation or rehabilitation of children. Besides clinical treatment, it is fundamental that professionals use systems of evaluation to quantify the difficulties presented to the individual and assist in the organization of a therapeutic program. The aim of this study was to quantitatively verify the performance of children with spastic diparesia type CP.

Methods: The Pediatric Evaluation of Disability Inventory (PEDI) and Gross Motor Function Classification System (GMFM) tests were used and classification made through the GMFCS in the assessment of 7 patients with CP, 4 females and 3 males, average age of 9 years old.

Results: According to GMFCS scales, 17% (n=1) were level II and 83% (n=6) were level III. The PEDI test and 88 GMFM items were used in the area of mobility. We observed that there was high correlation between mobility and gross motor function with Pearson's correlation coefficient =0.929) showing the likely impact of these areas in the functional skills and the quality of life of these patients.

Conclusion: We suggest the impact of the limitation of the areas in functional skills and quality of life of these patients.

Key words: Cerebral Palsy; Activities of daily living; Mobility Limitation.

Introduction

Improvement in Medicine is a very important issue to be discussed nowadays [1-8]. Cerebral palsy (CP) is as a permanent group of disorders in the development of posture and movement that cause limitations in activities and are attributed to non-progressive disorders that occur in the fetal brain in development or in infancy [9-11]. Individuals with CP present complex motor alterations, with primary deficits of abnormal muscle tone affecting posture and voluntary movement, alteration of balance and coordination, decrease of force, and loss of selective motor control with secondary problems of contractures and bone deformities [11, 12].

Neurological evaluation objectives aim to: (a) establish whether there are disturbances in movement and consequent performance of activities, (b) define the causes of the disorder, (c) determine the consequences and future state, and (d) detect whether alterations have occurred over time to allow the most appropriate interventions and proposed effective treatment [13-15].

As a consequence, there are different possibilities to assess an individual with neurological changes. Herndon [16] describes more than 150 rating scales with different goals that include behavioral, daily activities, cognitive, fine and general motor development, quality of life, sensorimotor, etc. Among the existing assessments which are likely to be used in CP, the two most cited in the literature are the Gross Motor Function Measure (GMFM) [17, 18] and the Pediatric Evaluation of Disability Inventory (PEDI) [19, 20], which are instruments used to measure the level

of functionality of children with CP [11]. Moreover, they are important instruments to quantify the benefits obtained during treatment, informing the rehabilitation professional of the effectiveness of the treatment program, in addition to quantify the improvements achieved by the patient.

The GMFM is an objective instrument that allows therapists to assess the gross motor function of a child, observing the way in which the child performs a series of motor skills [21]. It is also used by various authors to assess motor outcome or in comparison to other assessment instruments [9]. Although the GMFM is not validated in Brazil, it has been abundantly used since its creation in the assessment of children with CP in diverse situations [22], in addition to having been applied in some studies of children with Down syndrome, and less frequently in children with other deficiencies [21].

The PEDI is an assessment instrument cross-culturally adapted and validated in Brazil by Mancini [23], by means of a thorough process consisting of three steps: (a) translation of the scoring form, (b) cross-cultural adaptation of the parts of the test, and (c) development to Brazilian sociocultural characteristics [23]. The test aims to provide a detailed description of the child's functional performance, predicting future performance and documenting changes in functional performance [23] It is designed to be used in children with different incapacitating conditions and should be administered to the child's caregiver who will report the skills in certain functional activities within areas of self-care, mobility and social function in the two categories of child´s functional skills and caregiver assistance [11].

Due to the wide use of the two assessments, studies have emerged targeting the verification of existing correlation between the two tests [24-27]. However, a search of the literature does not find a comparison of the two assessment systems in the Brazilian population. The development of research verifying correlation between the two assessments in Brazil will surely provide greater knowledge for professionals of CP and enable a better description of the motor characteristics of patients. Thus, we aimed to verify the performance of CP children in the GMFM and PEDI.

Method

For this study, seven children (three girls and four boys) aged between 4 and 14 years old who received care at the physiotherapy clinic of the University Center of United Metropolitan Faculties (São Paulo, Brazil) were evaluated according to the criteria of diagnosis of CP (we opted to assess only diparetic spastic patients for responding adequately to verbal command), and classification in levels II and III, both sexes, according to the Gross Motor Function Classification System (GMFCS), a scale to classify children with CP. Exclusion criteria included cognitive deficit able to interfere in the examination, important visual or auditory deficit, and other deficiencies which are not included in CP.

Instruments

The children were assessed by GMFM, which consists of a standardized observation instrument for measuring changes in gross motor function. This test contains a sequence of 88 items with descriptions of movements grouped into five dimensions: (a) lying and rolling (17 items); (b) sitting (20 items); (c) crawling and kneeling (14 items); (d) standing (13 items); and (e) walking, running and jumping (24 items). Each item is assigned a score, as outlined by criterion, from a 4-point scoring system: 0=does not initiate the movement; 1=initiates the movement (< 10% task); 2=partially completes the movement (10% to < 100%); 3=completes the movement. At the end of the assessment, the points obtained by the child in each dimension are added (raw score) and converted into a percentage in relation to the maximum score of each dimension [9].

Assessment was also made through PEDI, which consists of a structured interview conducted with the caregiver, who is able to document the functional performance of children in daily living activities. This test contains three dimensions: self-care, mobility and social function. The scale of self-care covers feeding, personal hygiene, use of the toilet, dressing and sphincter control. The functional items of mobility inform of transfers, locomotion in external and internal environment, and the use of stairs. The dimension of social function reflects questions relating to communication, problem solving, and interaction with colleagues, among others. All the dimensions are structured in three parts, whereby

the first refers to functional performance in daily activities, the second part concerns the level of assistance that the caregiver provides to the child in carrying out daily tasks and the third part assesses the frequency of adaptation used by child. For this study, we carried out a comparison between the GMFM in the mobility area part of functional abilities of the child, for this being the area of PEDI that assesses gross motor function.

For classification of the functional performance of the child, the Gross Motor Function Classification System (GMFCS) scale was used, developed by Palisano et al. [28] and translated and adapted to the Brazilian culture by Hiratuka et al. [29] and used in different studies with CP [30-32]. The GMFCS aims to classify children with CP on five levels according to motor function, which are: (a) level I - the child presents independent ambulation without restriction in external environments; (b) level II - demonstrates minimal difficulty to run and jump; (c) level III - requires an assistive mobility device to walk; (d) level IV - able to be independent with the use of a wheelchair; and (e) level V - has severely limited mobility, even with assistance.

This study was approved by the research ethics committee of the University of São Paulo (enrollment number: CAAE-0001.0.254.186-08). The person/party responsible was informed, agreed with the purpose of research and signed an informed consent form. The GMFCS, followed by the GMFM, was applied to each child and the responsible person/party responded to the items of mobility of the PEDI. The GMFCS level classification was made through direct observation of the characteristics of the child. The GMFM test was applied with observation of the children in the performance of the 88 items proposed in 5 dimensions. Evaluations were carried out in the Neuropediatric Sector of the physiotherapy clinic at the University Center of United Metropolitan Faculties (São Paulo, Brazil)

The PEDI questionnaire was applied in an interview with the child's caregiver, who was able to relate the typical performance of the child in their home environment and community. We emphasize again that only the 59 mobility items were used in the category of functional skills in this study. For each of the items of these areas, a score of 1 was assigned if the child was able to perform the activity and 0 if the child could not perform the task.

Statistical analysis

After the data are obtained, a comparison was made between the tests by a conversion from values in percentage of capacity (0-100). The data are presented individually by mean and standard deviation. The correlation between the GMFM and PEDI was conducted by Pearson correlation coefficient. Correlation was considered poor when $r < 0.55$; moderate when $r = 0.55 - 0.64$; *good* when $r = 0.65 - 0.76$; and excellent when $r > 0.77$. We used the statistical package SPSS software program (version 11.5. for Windows). We considered significance when the probability of a Type I error was less than 5% ($p < 0.05$).

Results

To facilitate understanding of the results, we opted to present representative tables. Table 1 presents the characterization of children participating in the study.

Table 1. Characterization of the population studied

N	7
Age (years)	9 ± 2
Gender (M / F)	4(57%) / 3(43%)
GMFCS (II / III)	1(17%) / 6(83%)

According to Table 2, we noted that higher values regarding GMFM were observed in one of the 10 years old child. On the other hand, with respect to the PEDI, the other ten years old child presented the highest values.

Table 2. Individual results of GMFM and PEDI according to children's age

Patient	Age (years)	GMFM	PEDI
1	8	56%	57.62%
2	12	51.51%	42.37%
3	10	46.76%	33.88%
4	10	68.93%	72.88%
5	9	53.78%	40.50%
6	8	64.39%	62.71%

Table 3 presents the correlation of GMFM and PEDI, which displays strong and significant correlation between the two forms of evaluation.

Table 3. Mean GMFM and PEDI scoring and Pearson correlation coefficient between GMFM and PEDI

GMFM (%)	PEDI (%)	Pearson correlation coefficient
56.66 ± 7.58	52.51 ± 13.93	r=0.929; (p=0.002)

Discussion

This study was undertaken to verify that there is correlation between the results obtained in the evaluation of gross motor function and mobility in patients with spastic diparesia, measured respectively by GMFM and PEDI.

Strong positive correlation was observed between the results obtained in the two assessments (Pearson's correlation coefficient: r=0.929; p=0.002), which means that patients who present higher values in one system of assessment also present in the other.

In addition to this study, several studies have used the PEDI and GMFM jointly with the functional classification offered by GMFCS [33-36]. Some of the selected studies have used the GMFM-66 [34-36] developed as a model for analysis of GMFM items in an effort to improve the interpretation, agility, and facilitate the clinical use of the test. This model helped identify 66 of 88 items that form a one-dimensional hierarchy scale, with good psychometric property and ease of interpretation of the data obtained [21].

Han et al. [11] compared the performance of 115 Chinese children with CP using the GMFM-66 and the mobility domain of the PEDI. The assessments were conducted before and after 4, 8, 12, 16 and 28 weeks of interventions, presenting excellent correlation between evaluations, with Pearson correlation coefficient values between 0.83 and 0.90.

McCarthy et al. [36] found excellent correlation (r = 0.91) between the GMFM and the PEDI in the mobility domain, assessing 120 children with CP and different motor dysfunctions (hemiparesis, diparesis and quadriparesis). The authors obtained means of the PEDI in the mobility domain and the GMFM (57.2 and 61.8, respectively) with values proximate to those found in our study (52.51 and 56.6).

Holsbeeke et al. [34] assessed 85 children with CP, comparing the GMFM-66 with the PEDI in the areas of social function (0.92 coefficient) and in the area of mobility (0.84 coefficient). Cury et al. [25] also showed a strong correlation between the tests, performing both in 35 children with CP, three months after the administration of botulinum toxin (r = 0.81) and six months later (r = 0.92).

Wright et al. [35] compared 35 children with CP, two and six months after the application of botulinum toxin and found a good correlation between the GMFM-66 and the PEDI in the area of social function in the domains of mobility and self-care (r=0.89 and r=0.76 respectively) and in the area of caregiver assistance, also in the domains of mobility and self-care (r=0.83 and r=0.70, respectively).

Chagas et al. [34] classified 30 children with CP through the GMFCS and the Manual Abilities Classification System (MACS), which was developed to categorize the manual function of children with CP [24], and were divided into three groups (mild, moderate and severe) according to their classification in each of these systems. Gross motor function was documented by the GMFM-66 test and functional skills and caregiver´s assistance in self-care and mobility by the PEDI test. The results obtained from the tests GMFM-66 and PEDI by groups, conforming to the two functional classifications, were not similar. These results can be explained by the fact that these two tests (MACS and GMFCS) measure constructs with distinct characteristics. However, they used all areas of the PEDI and children of different motor dysfunctions and topographical distribution, while in the present study we utilized only the mobility domain of the PEDI.

In essence, the strong correlation between GMFM and the domain mobility of the PEDI obtained from the results of this study is supported by the studies presented above and may lead to the alternating clinical use of these instruments, depending on the choice of the professional and necessity of the patient [33-36].

However, it is important to remember that the GMFM is a test administered with direct observation of the patient, using specific support material and developed to quantify the gross motor function of children. The PEDI may be used in an assessment in less time and less specific, but more broadly, on the level of functionality of the child in different environments. Thus, it is likely that the information of functionality provided by the two instruments is complementary rather than redundant [24].

Rosenbaum et al. [10], noting the need to rethink the concepts of assessment and classification of CP, published a report in 2006 that is based both on the scientific advances in neurobiology and medical imaging and on the perception of the need to assess the extent of functional limitation of these patients. The researchers suggest the use of the GMFCS and GMFM scales, among others, to perform this assessment.

According to Han et al. [11], the GMFM quantifies what the child can do in a standardized environment (capacity) and is applied and scored by a therapist trained in its use. The child should perform the skill or task to be assessed exactly in the manner prescribed in order to earn points towards for a final classification. The PEDI measures the performance of the child who is referred by the caregiver or individual who has full knowledge of the capabilities of the child. Han et al. [11] goes on to describe that by focusing on physical therapy, the child's interaction with the environment, is of paramount importance and the child´s ability to perform specific tasks and use motor skills under various conditions provides important information of functional capacity.

An additional concern of the use of the PEDI, in which the result is dependent on the responses from the parents or guardian, is that parents may be more likely to overestimate the child who has developmental delay and feel that their child's progress is more advanced than it actually is. This could pose a problem if the child's motor skills are being assessed to determine eligibility for services [11]. Sorsdahl et al. [37] conducted a study using the PEDI with parents of children with CP and verified that when answering the questions of the PEDI for the first time, the parents present uncertainties with respect to their children's ability to accomplish tasks.It was also shown that after participation in a group with information about motor resources and needs assistance for the child, the parents were more accurate in reporting the function of their children in the home environment. The authors argue that an improvement in PEDI scoring after a period of intervention may be due not only by a change in the child´s function, but also by better knowledge and ability of observation of the parents.

However, the significantly high degree of correlation between the GMFM and the PEDI in the domain of mobility demonstrates that the report of functional abilities of children by caregivers is equivalent with the assessment of motor function of professionals [11] and all studies cited show the GMFM and the PEDI as supplementary measuring instruments for children with CP.

Limitations of this study include the number of individuals assessed well below those found in other studies along with the formation of a heterogeneous group considering the motor characteristics under the GMFCS. It would be important to conduct other studies with a larger number of participants.

Despite these limitations, this study reinforces the importance of the role of the physiotherapist in conjunction with other professionals of the multidisciplinary team in the assessment and treatment of these patients, improving functionality and quality of life despite motor limitations.

In conclusion, the data show strong correlation between mobility and gross motor function in diparetic spastic patients, suggesting the impact of the limitation of the areas in functional skills and quality of life of these patients.

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Seroprevalence among Turkish pregnant women

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Abstract

Aim of the study: The aim of this study was to detect the seroprevalences of pregnant women who applied for pregnancy follow up.

Methods: This retrospective study was carried out on 1537 pregnant women. Once the sera were separated, ELISA was used to detect seropositivity. Also, the relation between seropositivity and age based groups were assessed.

Results: The mean age of participants was 28.87 ± 4.542 (19–47). The percentages of seropositivity of IgG antibody for Toxoplasma gondii and Rubella and Cytomegalovirus are 31.5%, 90% and 73.3% respectively. The percentages of seropositivity of IgM antibody for Toxoplasma gondii and Rubella and Cytomegalovirus are 2.0%, 0.6% and 3.7% respectively. The percentages of seropositivity of Hepatitis-B virus surface antigen and antibody against Hepatitis-B virus surface antigen, Hepatitis-C virus antibody and Human Immunodeficiency Virus antibody are 2.3%, 24.9%, 0.2% and 0.%, respectively. There is statistically significant difference between the increasing age and the seropositivity to only Hepatitis-B virus surface antigen antibody. The significant difference is observed after 31 years-old or above (p=0.008).

Conclusion: Acording to our study, the continuance of the screening of seroprevalance of Hepatitis-B and Hepatitis-B vaccination programme is only proper for the pregnant women who are followed up in our hospital.

Key words: cytomegalovirus, hepatitis-B virus, human immunodeficiency virus, rubella, toxoplasmosis.

Introduction

TORCH infections include infections associated with *T*oxoplasma, *O*ther organisms (Parvovirus, Epstein-Barr virus, human immunodeficiency virus, varicella, herpesviruses 6 and 8, syphilis, enteroviruses), *R*ubella, *C*ytomegalovirus (CMV), and *H*epatitis. The common charecteristic of the infections above is that they can cause fetal intrauterine infection (1). Intrauterine infections are responsible from 2–3% of all congenital anomalies (2). The screening test for TORCH infections is not routine in pregnancy all around the world (3, 4). This has two important reason. First one is that seropositivity is only high in certain ares. Second one is the high cost values. For example, only half of the population in United Kingdom has been screened whereas all population in France has been screened (4). In our country, either TORCH screening has not been performed or has been performed in non-standardized way (4, 5).

IgG and IgM positivity reveal an infection in early period of pregnancy. But they do not give exact information about when the infection occurred before the test. In such case avidity test can be planned to clarify whether infection occurred in the last 3 months (4). Avidity index is the ratio of standard IgG ELİSA absorption in serum to IgG ELİSA absorption in serum and can be calculated accordingly.

Infections caused by Hepatitis-B virus (HBV) and Hepatitis-C virus (HCV) are important health problem for both our country and the world. Also they lead one of the most important chronic viral infections. They are the most common reasons of both cirrhosis and hepatocellular carcinoma (6, 7). The ratio of vertical transmission of infection from mother who is infected by HBV to her baby is 40%-50% and the infection has very high ratios (90%) of becoming chronic illness (6, 7, 8). This can be prevented by immunotherapy if the carrier status of mother is known. Human immunedeficiency virus (HIV) was first reported in 1985 in Turkey and is a rare disease (7, 8).

Our aim is to display TORCH, HBV, HCV and HIV positivity among pregnant women who come from all around Turkey to our Military Hospital and to creat a map of Turkey in terms of these infections. In discussion section, Toxoplasma gondii, Rubella and Hepatit-B are focused on a bit more to make a contribution to national antenatal screening and follow up programmes.

Material and methods

The study protocol was approved by the local research ethics committee and informed consent was obtained from all participants. Between 1 January 2006 and 30 August 2009, 2032 pregnant women who were between 19 and 47 years-old and applied to outpatient clinic of İstanbul GATA Medical Faculty for routine pregnancy follow up were included in this study. Their serology test, namely IgM and IgG against Toxoplasma gondii, Rubella and Cytomegalovirus together with hepatitis-B virus surface antigen (HBsAg), antibody against hepatitis-B virus surface antigen (anti HBs), antibody against hepatitis-C virus, antibody against Human Immunedeficiency Virus were retrospectively evaluated. 1537 patients' records which include a part of the test results or the whole test results were reached. Tests were performed at Microbiology Laboratory of İstanbul GATA Medical Faculty by using Biomaster equipment and biotek kits and technique of microelisa. In case obtaining suspicious test result, the retest was performed three weeks later. However those retests' results were not included in the study. IgG avidity test was used in case of suspicious active infection. Primary infection time was accepted to be more than three months ago when avidity value was equal to or more than 0.8. It is less than 3 months when the value is equal to or less than 0.2. If the value was between 0.2 and 0.8, the test was accepted as suspicious and retest was recomended. The patients were categorized into 4 groups, namely ≤20 years old, 21–30 years old, 31–35 years old and >35 years old. The percentage of the infection positivity for each group was computed (Table 1). Statistical difference was evaluated among age based groups in terms of the percentage of determining infection agents.

Statistical analysis was performed using the Statistical Package for the Social Sciences for Windows 15.0 software (SPSS, Chicago, IL., USA). Descriptive statistics were given as frequency and percentage. Chi-square tests were used to compare categorical variables. Statistical significance was defined as $p < 0.05$.

Results

Mean age was 28.87 ± 4.542 (19–47) in group of 1537 patients. Patients' socioeconomic status were homogeneous. The numbers and percentages for IgG and IgM against Toxoplasma, Rubella and CMV in TORCH panel and HBsAg and anti HBs and antibody against Hepatitic-C and antibody against HIV were given in Table 1. The percentages of IgG seropositivities for Toxoplasma and Rubella and CMV were 31.5%, 90% ve 73.3%, respectively. The percentages of IgM seropositivities for Toxoplasma and Rubella and CMV were 2.0%, 0.6% ve 3.7%, respectively. The percentages of seropositivities for HBsAg, anti HbsAg, antibody against hepatitis-C and antibody against HIV were 2.3%, 24.9% ve 0.2%, and 0.0%, respectively. Seropositivity in age based groups and the related ratios were given in Table 2. The highest ratio for IgG were in the group of ≤20 years for Toxoplasma gondii and Rubella. But there was not such a difference in groups for CMV. Also there were no statistical difference among age based groups of the 3 infections in terms of the percentages of infection positivities. Regarding IgM, only the ratio of seropositivity of CMV IgM showed an increase over the age 30. Also there were no statistical difference among age based groups of the 3 infections in terms of the percentages of infection positivities. With regards to HBsAg, anti HBs, antibody against hepatit C and antibody against HIV, there was a statistical difference only in anti HBs group. In anti HBs group, the seropositivity only was statistically high in the group of over 31 years (p =0.008) (Table 2).

Discussion

The routine screening of the intrauterine infections some of which can cause fetal anomalies in pregnancy is a controversial issue. Also we have not had a national policy about this issue yet. TORCH is generally common in the world (1, 2, 4,

Table 1. Distribution of positive test results according to age groups

Tests		Age groups (n/total)								p *
		≤20		21-30		31-35		>35		
		n/total	%	n/total	%	n/total	%	n/total	%	
Anti-Toxoplasma	IgG	9/19	47.4%	237/794	29.8%	100/307	32.6%	39/102	38.2%	0.13
	IgM	0/20	0.%	17/749	2.3%	5/286	1.7%	1/95	1.1%	0.75
Anti-Rubella	IgG	18/19	94.7%	741/819	90.5%	279/313	89.1%	91/104	87.5%	0.64
	IgM	0/22	0.%	6/821	0.7%	2/313	0.6%	0/100	0.%	0.82
Anti-CMV	IgG	11/15	73.3%	342/465	73.5%	157/212	74.1%	43/62	73.3%	0.90
	IgM	0/15	0.%	12/434	2.8%	11/194	5.7%	3/60	5.0%	0.25
HBs Ag		0/24	0.%	22/873	2.5%	6/356	1.7%	4/119	3.4%	0.59
Anti-HBs		5/22	22.7%	172/787	21.9%	103/332	31%	29/98	29.6%	0.008†
Anti-HCV		1/34	2.9%	0/9	0.%	0/4	0.%	1/47	2.1%	0.82
Anti-HIV		0/20	0.%	0/672	0.%	2/279	0./%	0/89	0.%	0.13

† There is a significant difference between groups.

** p-values of the Chi-Square Tests and p was defined as < 0.05.*

Table 2. The rates of seropositivity in our study

Test	Positive (n)	%	Negative (n)	%	Toplam (n)
Anti-Toxoplasma IgG	385	31.5%	837	68.5%	1222
Anti-Toxoplasma IgM	23	2.0%	1127	98%	1150
Anti-Rubella IgG	1129	90%	126	10%	1255
Anti-Rubella IgM	8	0.6%	1248	99.4%	1256
Anti-CMV IgG	553	73.3%	201	26.7%	754
Anti-CMV IgM	26	3.7%	677	96.3%	703
HBs Ag	32	2.3%	1340	97.7%	1372
Anti-HBs	309	24.9%	930	75.1%	1239
Anti-HCV	2	0.2%	1058	99.8%	1060
Anti-HIV	0	0.%	1198	100%	1198

5). For example, the seroprevalence rates seen in Turkey are 95.9% (range 92.6–98.7%) for rubella, 94.9% (range 93.5–96.1%) for CMV, and 47.2% (range 30.7–69.5%) for toxoplasma (5, 9). Their importance is their potential to cause a fetal infection during pregnancy. From this point of view, the groups of women who are fertile ages and are seronegative constitute the groups who are under the risks in population. Therefore, seronegativity ratio in fertile women and the ratio of acut infection during pregnancy in a population should be identified to decide whether TORCH screening or screening of a part of TORCH is necessary during routine antenatal follow up. Additionally HBV and HCV which can become chronic disease and can cause cirrhosis or hepatocellular carcinoma are serious health problems in the population. Specially HBV is an infective agent that has the potential to be transferred to baby during or after delivery and to have high risk of becoming chronic illness (6, 7, 8). The most important nature of HBV infection is that it can be prevented by means of immunoproflaxis in prenatal period. To manage this it is very importanat that seropositivity should be known.

Toxoplasmosis is a parasitic infection which was first described in 1923 and caused by Toxoplasma gondii and can infect all mammalian (3). The disease is asymptomatic in 90% of cases who have health immune system (3, 4). Also congenital infection can be sometimes asymptomatic (10). But it should be remembered that blindness, epilepsy, psychomotor and mental retardation can develop in time (3, 4). Congenital infection incidences vary according to in which trimester that mother is infected. The percentages of it in first trimester, in second trimester and in third trimester are 10–25%, 30–54%, 60–65%, respectively (3, 4, 10). Although the risk of infection is higher in

later stages of pregnancy, fetus has greater risk to have anomalies when it get the infection in earlier stages of pregnancy. Seroconvertion in pregnancy necessitates amniocentesis in case of having no anomaly on ultrasonographic scan (4). If the result of PCR from PCR material is positive and pregnancy is wanted to be carry on by the family, then pyrimethamin and sulphonamide treatment can be started. But there is not enough evidence supporting that those treatment can prevent transmission of infection from mother to fetus (1, 3, 4, 10, 11).

It is known that one third of world's population has been infected by this parasite. The frequency of the infection varies in different countries and geographical areas because of the place of cats in population, environmental hygiene, diet and eating habits, climate (3, 4). For this reason, seropositivity ratios in every geographical area should be defined and the early diagnostic facilities can be improved where it is necessitated. The reported ratios of IgG seropositivity in different counties are between 3% and 87% while the reported ratios of IgM seropositivity is between 0.002% and 1.4% (3, 4, 11, 12). In our country the reported ratios of IgG seropositivity are between 19.17% and 75.8% while the reported ratios of IgM seropositivity fluctuate between 1.2 and 9.9% (5, 9). When details of these reports are read, the higher ratios are shown to be in east part of Turkey, in rural areas. However, the lower ratios are in west part of Turkey, in urban areas.

The most important problem about Toxoplasmosis in our country is the absence of national policy. For instance, in France or in Brazil or in Austria pregnant women are screened for seropositivity of Toxoplasmosis because the reported seropositivity is high, 50%–90% (3, 4). On the other hand, because of the lower reported seropositivity between 11% and 22% in United States of America or in Sweden or in Greece, the fact that only pregnant women who have ultrasonic abnormality are screened for the seropositivity is accepted as national policy (4).

American College of Obstetricians and Gynecologists (ACOG) (12), and Royal College of Obstetricians and Gynecologists (RCOG), and Centers for Disease Control and Prevention (CDC) (4) do not recommend the routine screening of toxoplasmosis in pregnancy. Also they stated that informing pregnant women about toxoplasmosis is helpful. In our country, screening of Toxoplasmosis is not among the routine test that Turkish Society of Perinatology recommends to be performed in pregnancy. This study is also important in terms of presentation of the most recent situation in our country. Toxoplasma IgG and IgM seropositivity were reported as 26.1%, and 0.6% respectively by another study which was performed in our hospital in between 2000 and 2005 (5). This is also consistent with our study (31.5% and 2.0%). As a result we recommend that only the pregnant women who have an anomaly in ultrasonographic scan should have serologic scan because of lower seropositivity and recommend informing the women who are pregnant or who plan to conceive about the ways how Toxoplasma gondii transmit.

Rubella is also known as the third disease. Rubella virus is a RNA virus which belongs to the family of Togaviridae. It is transmitted via airborne droplet emission from the upper respiratory tract of active cases. One of the main symptoms of rubella virus infection is the appearance of a rash all over the body starting from face. But only 50%–75% of cases show the classical clinical presentation (13). It is mostly seen in children but can be seen at any age and can cause serious fetal anomalies if it occurs during pregnancy (13). The percentage of infection of fetus especially in first 12 weeks of pregnancy is about 90% and risk of causing anomaly is very high (13). In such cases, amniocentesis or cordosentesis to diagnosis of infected fetus is mandatory (3, 4, 13).

Rubella can evoke life long both humoral and cellular immunization but also re-infection can be seen rarely. But it has not been shown that re-infection result in any harm to fetus during pregnancy (13). Both in Turkey and in the rest of the world the reported Rubella seropositivity vary between 92% and 98% (5, 9, 13). Rubella IgG and IgM positivity are 90%, and 0.6% in our study, respectively. This rates are also consistent with the previous study's results (92% and 0.6%) (5). Therefore we think that Rubella screening has no place in our population if the small number of seronegative women and national vaccination programme (since 2006) are taken into account. Even if the screening is desired this should be performed before pregnancy and vaccination should be offered to seronegative women.

Jaundice, hepatosplenomegaly, petechiae, chorioretinitis, deafness, labyrinthitis, cerebral calcifications and multiple organ involvement can be seen in babies affected by congenital cytomegalovirus infection (14). In all live births, CMV may be seen 0.5% to 1.0% (15). Fetal transmission rate after primary infection is 30–40% and the highest is be seen in the third trimester (5). Reinfection is possible, fetal transmission rate is 1% and more often than rubella's reinfection. Also reinfection can result in fetal infection (15). IgG seropositivity of CMV in literature is between 85% and 100% and its IgM serososittivity is reported to be at most 5.33% (15). In our country, the figures for these ratios are 84.3%–98.7% for IgG and 0.4%–9.2% for IgM (5, 9, 14). In the world, the reported ratios for CMV infections were 46.8%, 56.3%, 78%, 84% and 92.1% in France, Finland, Russia, Spain and Saudi Arabia, respectively (9). In our study, IgG seropositivity ratio for CMV was found to be 73.3%. Although this percentage is just under the reported figures it can still be considered as high. Furthermore IgM seropositivity of CMV is 3.7% in our study. These high seropositivity ratios lead us to think that it is not necessary to screen routinly CMV in pregnancy. HSV type 1 IgG positivity has been reported to reach 100% while HSV type 2 seroprevalence has been reported to be 1.11% (16). But, Maral et al reported much higher HSV-2 seroprevalence for the Turkish population than expected and previously reported in 2009 (17). In our study seroprevelances of HSV type 1 and HSV type 2 have not been carried out.

Distributions of Hepatitis-B and Hepatitis-C infections around the world show variations. According to WHO, 0.3% of the world population has HBV infection while 3% has HCV infection (6, 7). The regions can divided into three endemic area according to its prevalence, low (<2%), middle (%2–8), high (>8%). In our country anti HCV positivity prevalence is between 0.4% and 3.9% (5, 7, 8). In our study this ratio is 0.2% which is at low endemic region level. Under this circumstances we do not recommend routine screening. The studies about HBsAg positivity in our country reported the percentages as follows; 4.2% in Şanliurfa, 3.8% in Malatya, 2.06% in Ankara, 13.6% in Mersin, 9.6% in İstanbul, 3.6% in Diyarbakir and 1.54% in Van (5, 6, 7, 8, 18). For anti HBs, the ratios between 9.4%–46.17% have been reported (5, 6, 7, 8). HBV seropositivities of 18.5% in Brazil and 10.45% in Taiwan and 0.65% in France and 1.16 % in Greece have been reported in the literature (7).

If the cases in the study by Dündar et al are added to our cases, HBs Ag positivity and anti HBs Ag positivity become 2.3% (110/4875), and 18.5% (877/4742), respectively. Besides it is noticed in our study that there is a statistically significant difference between the increasing age and the seropositivity to Hepatitis-B virus surface antigen antibody, especially after the age of 31. Hence, active HBV infection rate has been declined significantly because of Health Ministry of Turkey's policy of the active vaccination with HBV in 1998. But seropositivity ratio is still at middle endemic level. For this reason it is a suitable approach in terms of public health that Hepatitis-B screening and the vaccination programme especially for pregnant and fertile women should be carried on. The policy of including the women who had HBV serogegativity during pregnancy into the vaccination programme after delivery can carry our country to the low endemic region's level in regards to HBV. In our country the prevalance of HIV is very near to 0.% (5, 7, 8). Madendağ et al reported 0.0045 (4/86930) anti HIV positivity (18) while Öner et al reported 1 anti HIV positivity (8). We have not identified any HIV seropositivity since 2000.

The reliability of laboratories should be checked regularly because clinical approaches are based on tests nowadays. Help can be requested sometimes from other laboratories which have proven reliability. Furthermore it should not be forgotten that most of the IgM kits in markets have serious specificity problem and have high false positive rate (6%) due to this specificity problem and PCR method has lower sensitivity than 83% (4, 13). So ultrasonografy should be considered in case of diagnostic workup of congenital infection.

In conclusion, it is more practical that infections are considered individually or geographical region they appear instead of grouping such as TORCH. This approach is based on the fact that each infection has different prevalence and some of them are in national vaccination programme. The present national vaccination policy is successful. Building up regional policies for every infec-

tion groups may save us from both acute infection and unnecessary expense. By looking at results of our study, we can recommend only HBV screening in routine pregnancy follow up in our hospital.

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Seasonal variations in the incidence of idiopathic lower extremity deep vein thrombosis on the territory of South Serbia

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Abstract

Background: The role of seasons as a predisposing factor for the development of deep vein thrombosis (DVT) varies and is word-wide unevenly distrubuted. The aim of the present study was to investigate seasonal variations in incidence of idiopatic deep vein thrombosis of the leg as well as the relationship between the season and location of the thrombus, age and gender on the territory of South Serbia.

Methods: During the two year period between May 2009 and April 2011, inclusive, 170 consecutive patients were diagnosed as having idiopathic lower extremity DVT at the Vascular surgery clinic "Clinical center of Niš", Serbia. Seasons were divided to cold (October- March) and warm (April- September) seasons.

Results: Different distributions of patients with lower extremity DVT per season and per months were found. During the cold season incidence of DVT showed a peak in January with a monthly incidence of 24 (14.12%) cases. During the cold and warm seasons the above-knee DVT was diagnosed more frequently than the below-knee DVT.

Conclusion: The results of present study demonstrated a seasonal pattern in the occurrence of idiopathic lower extremity DVT on the territory of South Serbia, which was more common during the cold season (October–March) with a peak in January. These findings could help investigators and clinicians understand the pathophysiology of DVT and also facilitate health care planning.

Key words: idiopathic lower extremity deep vein thrombosis, seasons, patients

Introduction

Seasonal variations in incidence and mortality for coronary artery diseases (1), cerebrovascular diseases (2), chronic obstructive pulmonary diseases (3) and deep vein thrombosis (4) have been demonstrated. This could be explained by an increasing risk of thrombosis due to seasonal variations of environmental risk factors, diet, exercise, plasma lipids and coagulation factors (1-4).

The role of seasons as a predisposing factor for the development of deep vein thrombosis varies and is word-wide unevenly distrubuted. For example, a study carried out in France showed an increase of hospitalizations in winter (5). A study carried out in Italy identified a significant rhythmic annual pattern, with a main peak in autumn (4), while the study carried out in the north of Spain found a rise in hospitalizations during the coldest months (6). No correlation between seasons and development of deep vein thrombosis was found in similar studies performed in Switzerland, Belgium and Taiwan (7-9). One of the main reasons for the controversial results might be the different climatic conditions in countries where the investigations were carried out.

There is no information about the season's distribution of deep vein thrombosis on the territory of South Serbia.

Therefore, the aim of the present study was to investigate seasonal variations in incidence of deep vein thrombosis (DVT) of the leg as well as the relationship between the season and location of the thrombus, and age and gender on the territory of South Serbia.

Methods

During the two year period between May 2009 and April 2011, inclusive, 170 consecutive patients were diagnosed as having idiopathic lower extremity DVT at the Vascular surgery clinic "Clinical center of Niš", Serbia. These were 84 (49.4%) females and 86 (50.6%) males of the average age 57.67±12.25 years in this retrospective study, identified through hand searching of the prospectively maintained Vascular surgery clinic patient registry.

The diagnosis of the lower extremity DVT was made according to the anamnestic data, clinical features, biochemical and duplex scanning. The extent of the thrombus was determined by duplex sonography in all the patients. Duplex criteria for venous thrombosis included the visualization of the thrombus in B mode, lack of compressibility, and characteristic changes in the Doppler flow signal (lack of phasic flow with respiration, lack of augmentation with compression of muscle or cessation of flow with Valsalva's manoeuvre) distal to the suspected site of thrombosis.

All patients with DVT were treated with low-molecular-weight heparin followed by transition to vitamin K antagonist warfarin and tight compression bandages. All mobile patients stayed mobile and were asked to walk.

The Serbian climate varies between a continental climate in the north, with cold winters, and hot, humid sumers with well distributed rainfall patterns, and more Adriatic climate in the south with hot dry summers and autumns and relatively cold winters with heavy inland snowfall. Therefore, seasons were divided to cold (October- March) and warm (April- September) seasons.

The patients were divided into subgroups by gender, average age and the location of the thrombus: above-knee DVT which included DVT of the thigh and pelvic veins and below-knee DVT which included patients with DVT in veins of the lower legs.

Seasonal variations in the patients with lower extremity DVT and the relationship between the location of the thrombus, average age and gender were analyzed and compared.

Also the relationship between the location of the thrombus with the average age and gender in the patients with lower extremity DVT was analyzed.

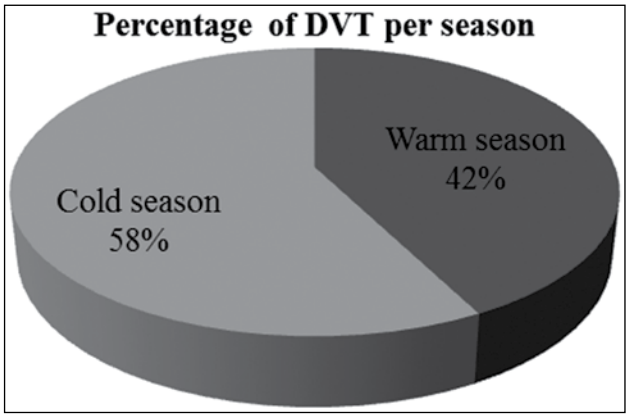
Exclusion criteria were the presence of malignancy, biological thrombophilia (e.g. factor V Leiden, deficiency of protein C or protein S, presence of ant phospholipid antibodies), surgery, injury and pregnancy or puerperium.

Statistical analysis

The data were analyzed by means of commercially available statistics software package (SPSS® for Windows, v. 9.0, Chicago, USA). To compare nonparametric data Shi square test for one sample was performed. To compare parametric data Student t test was performed. Results were presented as means ±/SD. A p value of ≤0.05 was considered as significant.

Results

Distributions of patients with lower extremity DVT per season are shown in Graph 1.



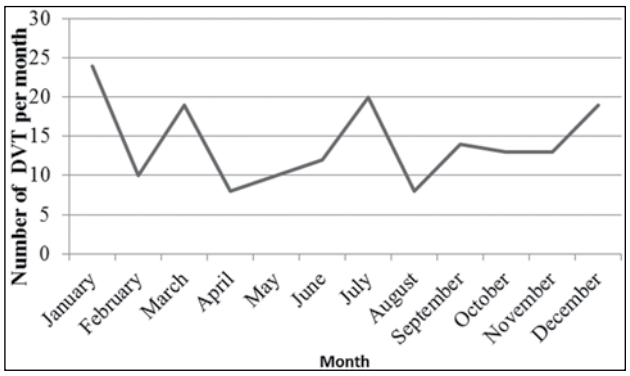
Graph 1. Distributions of patients with lower extremity DVT per season

Statistically significantly different distributions of patients with lower extremity DVT per season were found (Chi square =3.98 and p=0.046). There were 58% of the patients with lower extremity DVT during the cold season and 42% of the patients with lower extremity DVT during the warm season.

Distributions of patients with lower extremity DVT per months are shown in Graph 2.

Statistically significantly different distributions of the patients with lower extremity DVT per months were found (Chi square = 20.87 and p = 0.035). DVT occurred more often during the months of October–March (cold season) with 98 cases compared to the remaining of the year with 72

cases. During the cold season incidence of DVT showed a peak in January with a monthly incidence of 24 (14.12%) cases.



Graph 2. Distributions of patients with lower extremity DVT per month

The relationship between average age, gender and location of the thrombus with seasons in the patients with lower extremity DVT is shown in Table 1.

No statistically significant relationship between average age (p=0.175) and gender (p=0.442) with seasons in the patients with lower extremity DVT was found. Of 170 analyzed patients, 112 patients (65.9%) had above-knee DVT of the leg, while 58 patients (34.1%) had below-knee DVT. Regarding the occurrence of the location of the thrombus, we observed a significant difference between the cold and the warm seasons was observed. During the cold and warm seasons the above-knee DVT was diagnosed more frequently than the below-knee DVT. During the cold season 74 (75.5%) cases of above-knee DVT and 24 (24.5%) cases of below-knee DVT were diagnosed, while during the warm season 38 (52.8%) cases of the above-knee DVT and 34 (47.2%) cases of the below-knee DVT were diagnosed (p=0.003).

The relationship between average age and gender with location of the thrombus in the patients with lower extremity DVT is shown in Table 2.

No statistical significantly relationship between average age (p=0.500) and gender (p=0.196) with location of the thrombus in the patients with lower extremity DVT was found.

Discussion

The statistically significant different distributions of the patients with lower extremity DVT per seasons (Chi square =3.98 and p=0.046) and per month (Chi square = 20.87 and p = 0.035) was found. Present study demonstrated a seasonal pattern in the occurrence of DVT, which was more common during the cold season (October–March). These findings are in accordance with previous studies of Fink et al. (10) and Brown et al. (11) who reported that the frequency of DVT of the leg was significantly higher during the winter half of the year.

According to the valve cusp hypoxia hypothesis (VCHH), deep venous thrombosis is caused by sustained difficult venous blood flow. This leads to hypoxemia in the valve pockets; hypoxic

Table 1. Relationship between average age, gender and location of the thrombus with seasons in the patients with lower extremity DVT

Parameter	Total	Warm season	Cold Season	P
Age (years)	57.67±12.25	55.58±16.94	59.20±17.40	0.175
Gender				
Male	86 (50.6%)	39 (54.2%)	47 (48.0%)	0.442
Female	84 (49.4%)	33 (45.8%)	51 (52.0%)	
Location				
Above knee	112 (65.9%)	38 (52.8%)	74 (75.5%)	0.003
Below knee	58 (34.1%)	34 (47.2%)	24 (24.5%)	

Table 2. Relationship between average age and gender with location of the thrombus in the patients with lower extremity DVT

Parameter	Above knee	Below knee	*P*
Age (years)	58.30±17.62	56.45±16.59	0.500
Gender			
Male	61 (54.4%)	25 (43.1%)	0.196
Female	51 (45.6%)	33 (56.9%)	

injury to the inner endothelium of the cusp leaflets activates the elk-1/egr-1 pathway, leading to leukocyte and platelet swarming at the site of injury and, potentially, blood coagulation (12).

Acute infection increases the risk of venous thromboembolic disease (13). Also, infectious respiratory diseases are more common during winter. Infection increases plasma fibrinogen concentration, anticardiolipin antibodies and protein C level, leading to a hypercoagulable state (14-16). These coagulation abnormalities can promote DVT.

Masotti reported that there was a significant increase in cold months in C reactive protein (6.6 vs 4.3 mg/dL), D-dimer (1856 vs 1690ng/mL) and thrombocyte (251.5 vs 189.4 × 103/L) levels compared to hot months (17). Woodhouse et al. (18) showed that fibrinogen as well as F VIIc plasma values were greater in the winter than in the summer.

During a cold season cold-induced vasoconstriction, reduced physical activity producing hypercoagulability and reduction in blood flow in the lower limbs has been implicated. A cold exposure-induced change in erythrocytes and increase in plasma fibrinogen, which has been previously reported (19-20) , is usually associated with an increase in plasma viscosity. Changes in total leukocytes (increase in granulocytes and decrease in lymphocytes) indicate that cold exposure was responsible for initiating a mild inflammatory response (19,21) with potential increased plasma viscosity.

Low atmospheric pressure, high wind speed and high rainfall during the cold season were significantly associated with an increased risk of DVT. The effect was most strikingly demonstrated for atmospheric pressure, every 10 millibar decrease in pressure being associated with a 2.1% increase in relative risk of DVT (11).

During the cold season incidence of DVT showed a peak in January with a monthly incidence of 14.12% cases. These findings are in accordance with previous study of Dentali et al. (22). The strength of the study of Dentali et al. is that they conducted a systematic review and a meta-analysis of the literature. Seventeen studies for a total of about 35.000 patients with DVT were included with a conclusion that significantly higher risks were in winter and in January.

The relationship between average age (p=0.175) and gender (p=0.442) with seasons in the patients with lower extremity DVT was not found. These results are in accordance with the study of Dentali et al. (23).

Dentali et al. [23] also reported that seasonal variability in the incidence of DVT was independent with location of the thrombus (23). Fink et al. (10) showed that distal DVT of the leg was found to be more frequent during the winter halves of the year while proximal DVT were diagnosed more often during summer halves. The findings of present study were that during the cold and warm seasons the above-knee DVT was diagnosed more frequently than the below-knee DVT. During the cold season 75.5% cases of above-knee DVT and 24.5% cases of below-knee DVT were diagnosed, while during the warm seasons 52.8% cases of the above-knee DVT and 47.2% cases of the below-knee DVT were diagnosed (p=0.003).

The mechanism of seasonal variations in the occurrence of location of the thrombus in the leg is still not fully understood. It may be hypothesized that seasonal wardrobe had an influence in this phenomenon. Namely, during the cold season veins of below-knee are more protected from the effects of climatic factors. The light summer clothes allow more equal impact of climatic factors to the whole leg veins so the number of cases with above-knee DVT and below-knee DVT were not so different like during the cold season . In future it is necessary to examine the impact of secondary risk factors for DVT such as obesity, congestive cardiac failure and inflammatory bowel disease in explanation of this phenomenon.

The relationship between average age (p = 0.500) and gender (p =0.196) with location of the thrombus in the patients with lower extremity DVT was not found.

The major limitation of our study is the fact that it is retrospective. However, it should be noted that all data were registered prospectively. Also, certian number of patients with peroneal DVT can pass without major clinical sings of the existence of disease wich may affect on the number of the diagnosed patient with below-knee DVT.

Conclusion

The results of present study demonstrated a seasonal pattern in the occurrence of idiopathic

lower extremity DVT on the territory of South Serbia, which was more common during the cold season (October–March) with a peak in January. The above-knee DVT was diagnosed more frequently than the below-knee DVT during both, cold and warm seasons.

These findings could help investigators and clinicians understand the pathophysiology of DVT and also facilitate health care planning.

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Drug interactions with condom

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Abstract

Latex is a milky white, viscid, sticky sap secreted by nicked bark of tropical plants (*Hevea brasiliensis*, *Euphorbia esula etc.*). Anyway, natural latex is still used for making over 50000 of various products: from rubbers for space shuttles and surgical and other protecting medical gloves, to contraceptive devices.

Numerous chemical substances and drugs could impair latex function as a protective barrier. The most common substances getting in contact with latex are: products for personal hygiene, spermicides, drugs for vaginal infections therapy, urine acidifying drugs and lubricants for personal use. Therefore, sexual intercourse with latex mechanical protection is not recommended at least three days after the use of vaginal ovules, vaginal tablets or suppositories. Also, condoms and surgical gloves made of latex should not come in contact with mineral and plant oils, because it could diminish or disrupt their protective role.

Key words: drug interactions, latex, condom, medical gloves, safety

Introduction

Latex is a milky white, viscid, sticky sap secreted by nicked bark of tropical plants (*Hevea brasiliensis*, *Euphorbia esula etc.*). It coagulates in the air and forms globules used for production of rubber, gutta-percha, guayule, chicle and balata. The chemical structure of the elastic component of the latex is cis,1-4 isoprene and is associated with latex proteins with molecular masses ranging from 4 to 70 kDa [1]. Beside natural latex, synthetic latex produced by polystyrene and polyvinyl chloride polymerization, is more and more in use. Anyway, natural latex is still used for making over 50000 of various products: from the tyres for space shuttles and surgical and other protecting medical gloves, to contraceptive devices.

Condom is a thin and extremely flexible small cylinder made of latex (95% of the world condom production) or polyurethane, but it may also contain nonspermicide lubricants (such as dimethyl silicone), antioxidants, accelerators, emulsifiers, stabilizers, colourants and in some cases flavourings.

Safety of condoms

One of the premises common for all "safe sex" programs is the adequate use of condoms (male or female). In such way, it is possible to prevent unplanned pregnancy and transmission of sexually transmitted diseases (acquired immune deficiency syndrome, syphilis, gonorrhea, genital herpes, Chlamydia infections etc.). Each condom on sale was electronically tested for defects, including microscopic defects (holes) and thin wall surfaces. In Europe, male condom quality is regulated by ISO (International Standards Organization) standard 4074[2]. Beginning in the spring of 1987, Food and Drug Administration (FDA) undertook an expanded program to inspect latex condom manufacturers, repackagers, and importers to evaluate their quality control and testing procedures. In its testing of condoms, FDA uses a water-leak test in which a condom is filled with 300 mL of water and checked for leaks. The FDA has also adapted its inspection sampling criteria to conform with the American Society for Testing and Materials Standard D3492-83 for latex condoms. FDA criteria and the industry acceptable quality level for condoms specify that, in any given batch, the failure rate must not exceed four leaking condoms per thousand condoms[3]. Safety brought by correct use of condoms, is mostly based on mechanical protection provided by latex membrane. One of the advantages of this method is that it is cheap, safe and reversible. It is generally accepted that condoms enable secure protection from sexually transmitted diseases and that they prevent from unplanned pregnancy. However, there are nume-

rous data in literature indicating that condoms are not 100% safe. Condom breaking is registered in: 2.1% [4], 3.1% [5], 3.4% [6], 7% [7], and even 12.9%[8] of cases during vaginal use! It is supposed that condom breaking is the main reason for its contraceptive insufficiency (in approximately 2% of the couples permanently using condoms, per year)[9]. When used anally, frequency of breaking is 3% for anal condoms, and 9% for vaginal condoms [10].

Effects of drugs and chemical substances on latex barrier

A little known is the fact that numerous chemical substances and drugs may have deleterious effect on protective function of latex barrier. The most common substances getting in contact with latex are: products for personal hygiene, spermicides, drugs for vaginal infections therapy, urine acidifying drugs and lubricants for personal use. Any dermatological product used in genital region of any partner, may show impairing effect on latex, during sexual intercourse.

It has been known for harmful effects of mineral and plant oils on condoms since 1988 [11]. It is determined that baby oil, body lotion, petroleum jelly and corn oil cause decrease in condom resistance to extending, static dragging, burst pressure and burst volume [11], and that water-based lubricants do not impair condom's physical characteristics. As little as sixty seconds' are sufficient for mineral oil, common ingredient in hand lotions and other lubricants used during sexual intercourse, to damage commercial latex condoms and to decrease condom strength by almost 90% (measured as burst volume in the standard ISO Air Burst Test) [12]. Adding an oil-based lubricant resulted in statistically significant breakage rates for both new and aged condoms. But the differences were not statistically significant when compared to using of a water-based lubricant or no lubricant[13]. Latex damages developed in such manner, may enable passage of spermatozoa and microorganisms[12]. It is confirmed that there is no latex impairment even after five minutes of contact with glycerol (common ingredient in hand lotions and similar lubricants) or with fluid nonoxynol-9 (the most commonly used spermicide)[12].

There are just a few researches on drug interactions with latex [14-20]. For example, latex exposition to miconazole nitrate as a cream 20 mg/g (Gyno-Dactarin cream) does not affect condom's elongation. However, *in vitro* exposing latex to miconazole nitrate in doses 400 mg and 1200 mg (Gyno-Dactarin 3 and Gyno Dactarin 1) causes elongation of condom for 20% and decrease in burst pressure and burst volume by 35-44%[16]. It is suggested that contact between condom and baby oil for just 11 seconds leads to the lowering of mean burst time[18].

Even though 23 years have passed since it was acknowledged that mineral and plant oils have harmful effects on condoms [11], only a small number of health professional, i.e. a small proportion of population, is aware of this fact. The possible danger coming from this interaction is potentiated by data that commercial imidazole fungicides used for vaginal infection treatment, also cause latex damage. It is interesting that in the instructions for latex condoms use, and in the package insert for antifungal drugs for local application, there are no warnings for the possibility of this interaction which may have negative consequences (occurrence of unplanned pregnancy and transmission of sexually transmitted diseases: acquired immune deficiency syndrome, hepatitis B, C and D, syphilis, gonorrhea, chancroid, genital herpes, Chlamydia or Trichomonas infections, etc.).

Besides, integrity of latex membrane may also be impaired by direct exposure to sunlight, long-term exposition to high temperature (above 38^{o}C) and ozone presence in the air. It is suggested that exposition to ozone, i.e. air, causes notable damage to latex membrane already after 6-48 hours[20]. Condom can also be damaged relatively easy during transportation, handling and conserving. A condom is susceptible to deterioration in the presence of monsoons, smog and thunders with thunderbolts[21], as well as when exposed to sunlight, pressure and heat (including body warmth to which it is exposed when put into wallet or trousers pocket)[22]. Of course, condom can also be damaged immediately before use during contact with fingers: mechanically or chemically (traces of mineral or plant oil on fingers). This data clearly indicate a need for careful handling of condoms during transport and storage to protect them from accelerated deterioration which can lead to breakage during use.

Conclusion

Therefore, sexual intercourse with latex mechanical protection is not recommended at least three days after the use of vaginal globules, ovules, suppositories, vaginal tablets or creams. Also, it should be taken under concern that condoms and surgical gloves do not come in contact with mineral or plant oils, because it could diminish or disrupt their protective role. If it is not possible in present circumstances, it is recommended to use polyurethane condoms made of vinyl or nitrile rubber.

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Ethical dilemmas and moral distress in pharmacy: A qualitative study

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Abstract

Background: Ethics represents an important aspect in the work of all pharmacists. This study reports the first results of a national survey supported by the Pharmaceutical Chamber of Serbia to identify and analyze ethical concerns and dilemmas in pharmacy practice.

Aims and method: This paper explores: what community pharmacists experience as ethical dilemma which lids to moral distress and identification, analysis and classification of ethical dilemmas and moral distress. A qualitative approach using semi- structured interview was chosen. Interviews were conducted with a purposive sample (with regards to working experience, age, education , working location and employment status) of fourteen pharmacists from Northern Serbia.

Results: Pharmacists employed in community pharmacies are exposed to ethical issues and moral distress in their everyday work. Analysis of the transcripts of the interviews identified different ethical dilemmas and moral distress which could be classified into five main themes. Analysis of the data of main thems revealed the emergence of subthemes.

Conclusion: The results show the ethical dimension of moral distress. All ethical dilemmas and moral distress from the interviewees' statements may be classified into five categories. The research also raises questions about the effective education of pharmacists in the field of ethical issues.

Key words: Ethical dilemma, moral distress, community pharmacy

Introduction

Today's pharmacist's work is in the age of great technological, pharmaceutical and medical development, which carries with itself many ethical challenges. Since pharmacy is a value- and knowledge- based profession, ethics represents an important aspect in pharmacist's daily work.

Many times pharmacists are faced with difficult situations and have to decide what is the right and the wrong way to react. Many such situations which include a moral problem and a dilemma require not only professional decision-making, but also re-evaluating values, rights and responsibilities, and are thus a great source of distress to all pharmacists. Finding a solution which directly affects the rights and the well-being of other people is often easier in theory than in practice (1).

Beauchamp and Childress grouped together four principles that could be used in evaluating ethical aspects of professional-patient relationships (2). These principles have been widely employed in a variety of healthcare settings, which are: the principle of autonomy, the principle of non-maleficence, the principle of beneficence and the principle of justice (2).

According to Lowenthal, ethical dilemmas occur when there are disagreements on ethical behavior or application of ethical principles (3). Ethical dilemmas can occur between pharmacists and clients, pharmacists and physicians, among pharmacists, because the values, sense of justice and fairness of each party may differ (3). Reported dilemmas related to rule breaking, resource allocation, patient communication and teamwork (4).

In addition, working with people, especially the sick and those in need of help can be a source of conflict between the rights and obligations, when a pharmacist is forced to choose between obeying the law or fulfilling his or her ethical duty. Pharmaceutical practice is thereby performed in the intersection of ethical, professional and legal regulations (5).

Also, recent studies have shown that ethical dilemmas can be the cause of stress-related disorders in all health care professionals (6, 7). Stress

caused by ethical dilemmas can be defined as moral distress (8). A well-established definitinition of moral distress is that it „occurs when one knows the right thing to do, but institutional or other constraints make it difficult to pursue the desired course of action" (9). According to research from Sweden, revised definition of moral distress is: „Traditional negative stress symptoms that occur due to situations that involve ethical dimensions and where the health care provider feels she/he is not able to preserve all interests and values at stake" (8). Also, there are two aspects of moral distress: the seriousness of the situation causing moral distress and the frequency at which the problem occurs (10). Jameton brings another distinction, two types of moral distress have been identified: initial distress can be described as "the feelings of frustration, anger, and anxiety people experience when faced with institutional obstacles and conflict with others about values", whereas reactive distress is "the distress that people feel when they do not act upon their initial distress" (11).

Most researches were conducted on nurses (12, 13, 14). In contrast to this area of healthcare, relatively little is known about ethical issues in pharmacy and what pharmacists find ethically problematic in their work (15).

The aim of this qualitative research is to show what community pharmacists experience as ethical dilemma which are the cause of moral distress and identification, analysis and classification of ethical dilemmas and moral distress.

The research is a part of a national study which includes community pharamacists and which is supported by the Pharmaceuthical Chamber of Serbia.

Method

A qualitative approach using semi-structured interview method was chosen to collect and identify situations of ethical dilemmas and moral distress among pharmaciststs. The interviewer conducted interviews with fourteen pharmacists employed at local community pharmacies in Subotica district (Subotica Pharmacy is the second large state owned pharmacy chain in Vojvodina). The research was approved by the Ethics Committee of Subotica Pharmacy (*Approval of the Ethics Committee of the Subotica Pharmacy, No II-03/892, 23.03.2011)*. The participants constituted a representative sample with regards to their working experience, age, education (graduate pharmacist, pharmacy specialist or pharmacist undergoing specialization) and type of pharmacy and employment status. They were first contacted through an introductory letter after which they received a written request for participation. Prior to the interview, each pharmacist was contacted by telephone to arrange a face-to-face interview.

The duration of interviews was approximately forty minutes depending on the extent to which the interviewee was ready to communicate. The sample size was determined by theoretical saturation being reached when no further themes emerged from interviews (16). The study was conducted from March 2011. to Jun 2011. Anonymity was guaranteed to all participants and interviews were conducted by a researcher experienced in the conduct and analysis of interviews. The pharmacists consented to the interviews being recorded and all interviews were transcribed.

The transcripts were read independently by two members of the research team and analysed using the "the framework" technique. Key themes were identified and compared from each interviews (17, 18, 19). The participants consented that the extracts from these interviews could be used throughout the paper.

Results

The pharmacists described numerous situations dealing with ethical dilemmas which they consider a cause of moral distress. Not all pharmacists could equally well describe situations leading to moral distress. Some could easily identify several such situations, whereas others needed more help. All ethical dilemmas and moral distress were analised and categorised into five groups based on the interviewees' statements and from the point of view of the researchers: 1. Resourses; 2. Ethical concern relating to dispensing medicines; 3. Rules versus praxis; 4. Value conflict; 5. Communication. Analysis of the data of main thems revealed the emergence of subthemes (Table 1).

It should be noted that the described situations are interconnected and cannot be classified into

Table 1. Classification of ethical dilemmas and moral distress in pharmacy practice

General themes	Subordinated themes
Resourses	Lack of time/ staff Organizational structure and non-human resource
Ethical concern relating to dispensing medicines	Prescription-related problems Patients can't afford to buy their medication
Rules versus praxis	Voluntary violation of rules Forced to act according to regulations
Conflict of values	Patients causing co-worker conflict Conflicts with physicians Marketing in pharmacy practice/ commercial pressure Emergency hormonal contraception
Communication	The patient does not want to listen Inability of patients to comprehend information Loud and rude patients

only one of the groups. The following text contains interviewee's statements which allow identification, analysis and categorization of the ethical dilemmas which lead to moral distress in community pharmacists.

1. Resources

Some cases of ethical dilemma and moral distress can be traced to resources. The lack of resources is often the reason that pharmacists have to choose between customers and administrative and care-related tasks.

1.1 Lack of time/staff

Many ethical situations are the result of lack of time and staff, due to which the pharmacists have to prioritize. They feel that administrative tasks are a great problem in their everyday work and take up a lot of the time which could be dedicated to patients. Also, spending a lot of time on one patient's prescriptions means that others will have to wait longer. In some situations a patient standing in line has to wait for the pharmacist to finish giving telephone advice to another patient. That is when the pharmacist needs to be able to decide which patient is the priority.

Lack of time/staff - The patient versus administrative work

The participants cite the burden of having a lot of administrative tasks, and are generally of the opinion that decreasing the amount of administrative work would allow them to pay more attention to patients. The interviewed pharmacists reported:

- Dealing with prescriptions annoys me, because entering all the informations, for example, takes up valuable time. With an electronic system we could save a lot of time on paperwork and use it to give patients more advice.
- Administrative work should be done faster, there should be another way to speed up the process. For example, without prescriptions. And then maybe patients wouldn't have to stay in line for so long. That would solve other problems too.
- I would like to have less paperwork and concentrate more on patients. I would like to be able to talk to them and give them advice.

Lack of time/staff- Long lines in pharmacies

During the interviews the pharmacists said that having to deal with long lines in pharmacies unables them to give sufficient advice and spend more time talking to their patients. Pharmacists have been reported following:

- It bothers me that I have to do several things at once: answering the phone, working with patients, dealing with co- workers and everything else. That is a really big problem.
- I try to be calm as much as I can, but sometimes I have the feeling that I am talking to two people simultaneously.
- The lack of time bothers me a lot and it prevents me from devoting myself to patients who really need more time. Maybe at some point I failed to provide adequate service due to this lack of time.

1.2 Organizational structure and non-human resources

The organization in pharmacies often leads to moral distress because it violates patient integrity. Furthermore, the spatial organization often leaves patients standing too close to one another. Patients can hear the conversations between other patients and pharmacists and can get a glimpse of other people's therapy. Pharmacists describe the following situations:

- There isn't an adequate solution to the problem of patient privacy in pharmacies.
- The issue of privacy is a big problem. I think that discression must be guaranteed to all patients.
- There is no respect for the privacy of other people. Sometimes when I am talking to a patient another one would approach the counter and even join in.

2. Ethical concern relating to dispensing medicines

Dispensing prescription of medicine in pharmacies is another aspect of the pharmaceutical praxis which leads to numerous ethical dilemmas. Even though many consider it a routine job, it is founded on competence, law and ethics. The participating pharmacists described situations leading to moral distress.

2.1 Prescription-related problems

All participants cited unsuitably prescribed or incomplete prescriptions as a source of ethical dilemma. Due to these mistakes pharmacists are often unable to dispense a medicine that the patient is in need of, because dispensing it would have legal consequences. In situations such as these, pharmacists cannot act in the best interest of the patients. The participating pharmacists describe situations:

- It is very difficult when I have seriously ill patients from far-away places from Subotica, such as Bikovo and Zednik, and I refuse to give them the medicine even though I know that there is a patient at home who is in a lot of pain. I have that picture in my head of a patient dying from pain and me not giving him or her medicine. But there is really nothing else I can do.
- The patients perceive that as maltreatment. But basically it is not our fault, the mistake is not ours. I feel very sorry for these people. In the beginning I used to tell them that I will take care of the prescription, but after a while I realized I cannot help everybody.
- We are often exposed to moral distress caused by an administrative mistake. It often grows into a conflict with patients.

2.2 Patients can't afford to buy their medication

All pharmacists stated that the main reason for moral distress lies in the financial restrictions of their patients. The interviewees said that they come across patients who are unable to afford the necessary therapy several times in the course of one day. In some cases the patients even have a prescription, but are unable to afford to pay for participation. The informants reported situations:

- I feel awful when I see that patients cannot afford to pay their therapy. That is the most horrible thing I see in my everyday work.
- Although you empathize with these people there is really nothing else you can do. All you can do is empathize. What could you possibly say to them?
- For example, I felt really bad when a patient told me she hadn't used her asthma inhaler for a month, because the participation on that product is high, and she couldn't afford to pay it.

3. Rules versus praxis

The legal restrictions pharmacists have to obey are often the cause of ethical dilemma. The interviewees described situations in which a voluntary violation of rules causes less moral distress than conforming to the regulations. Pharmacists also described situations in which it is absolutely necessary for them to obey the rules.

3.1 Voluntary violation of rules

All of the below mentioned cases are examples of conflict between the regulations and the pharmacists' perception of what is in the best interest of the patient:

- If patients don't have a prescription and I see that they have a swollen tooth, I am willing to sell them antibiotics.
- Yes, in some cases I dispense medicines even if the patient does not have a medical card.

- When an old retired patient with only one prescription comes from a nearby village without his medical card, I just assume that he has his valid card at home and give him his medicine.
- It has happened. It's not a big deal and there is no harm done. It makes me feel better. Otherwise I would have to ask patients to come back another time and I just feel sorry for them, or I just think that there is no point in making them do that.
- Well, I always follow my instincts, I don't always abide the regulations… I think empathy exceeds the restrictions.

3.2 Forced to act according to regulations

In addition, the fact that health care funds dictate all activities explains why pharmacists have stated that obeying the law sometimes is the only possible solution. In such situations pharmacists must often do what they do not believe is right:

- The worst thing is that the physicians' reports are dated and they are usually valid for 6 months. But the Republic Institute for Health Care Insurance is not interested in whether the patient has had 6 or 4 boxes of a medicine, whether the patient has the necessary medicine or not – they are only interested in the date. Patients tell me "You have to give me the medicine" and I would gladly do it, but the Institute does not allow it.
- I do not give anxiolitics to patient without prescription.

4. Conflict of values

The health and well-being of patients should be the aim of all health care professionals. Failure to strive towards these things leads to conflicts of values.

4.1 Patients causing co-worker conflict

One of the topics discussed during the interview was ethical dilemma caused by co-worker disagreements over a patient, i.e. a conflict with colleagues you work with every day for the interest of a patient whose visit to the pharmacy is only brief. The participants report situations:

- There have been such cases. It's not that they thought that I was acting in an unethical way, it's just that they weren't ethically concerned.
- Yes, it has happened to me, particularly when I dispensed a medicine with an incomplete or incorrect prescription. My colleague told me: "Don't do that, because they will ask me to do it too, and if I refuse, they will say I'm rude." She is right, but I still can't it.
- Yes, there have been such cases. For example, I accepted an incomplete prescription and then I had to take care of it. On the other hand, I often refuse to give medicines without a medical card, which is the way it should be, but maybe my colleagues think that I should oblige the patients.

4.2 Conflicts with physicians

Pharmacists and physicians should work together in the best interest of their patients. The interviewees describe the following situations:

- Some find it harder to talk to the physician, some to the patient. In both cases, however, it all really depends on the person and its behavior.
- It bothers me that the communication between pharmacists and physicians is so poor.
- I am on good terms with the physicians working in the health center near the pharmacy I work in. However, when I have to call other physicians I never know how they will react.

4.3 Marketing in pharmacy practice/ commercial pressure

The statements of the pharmacists taking part in the research show ethical concerns relating to the sale of medicine. Disapproval of marketing and commercialization in pharmacy leads to potential financial losses. The interviewed pharmacists say that they try to find balance between profit and ethics:

- Well, it bothers me, but it is a necessity. And if you don't do any harm to anybody… Basically, it's part of the job.
- Our aim and purpose should always be humanity and I believe that the commercial aspect should not be more important.
- I think it's not ethical, that is why I don't like it and I don't like to do it. I mean, if somebody asks for a particular product I will offer it to them and tell them all there is to know about it, both its positive and negative sides. But I don't like to coerce patients into buying certain products.

4.4 Emergency hormonal contraception

The sale of emergency hormonal contraception is the source of great ethical concern for pharmacists. Although the interviewed pharmacists have different ethnical background, none of them mentioned religious reasons for their reluctance to sell such medicines, but rather said that their dilemma stemmed from the issues such as safety, frequency of use and value of life. The informants reported situations:

- My biggest problem is that it is advertised as a safe medicine, whereas it is not safe at all.
- It is difficult for me to decide. Such medicines are often used by young people. I am of the opinion that they use them too often and without consulting their physician beforehand.
- As far as emergency hormonal contraception is concerned, I am not sure whether I should be the one to decide when somebody should or should not use it.

5. Communication

Community pharmacists spend the majority of their professional work in direct contact with patients and in giving them advice about their medicines and therapy. However, the results show that it is not always easy to give a patient good advice.

5.1 The patient does not want to listen

The results show that patients sometimes do not want to hear about how their medicine should be used and why it is necessary for them to receive medication. We report the following statements:

- Not many patients are willing to listen to all there is to say about how to use a certain medicine.
- Patients often don't show any interest, they are in a hurry and say that they already know everything.
- They often refuse to listen to advice even when it is apparent that they are uncertain about how their medicine should be used

5.2 Inability of patients to comprehend information

The participating pharmacists describe situations when patients are unable to comprehend the advice given to them:

- My reaction to it is different, because it is of my free will that I offer the information. If somebody doesn't want to hear it, I can't make them listen to me. But it is a problem when I am willing to share the information and the patient is willing to hear me out, but we can't understand one another. It's really unfortunate, and I think it's a much bigger problem than when you have a patient who doesn't want to listen in the first place.
- I wrote everything down, I explained it to her, and I put it (insulin) into her hands so that she could try it out herself. And I am still under the impression that she did not understand me. I think that, even if she had stayed another fifteen minutes, she still wouldn't have understood it. I didn't know what to do, how to explain it to her.
- We explain it over and over again. Then we ask them again: "Do you understand?" Then we write it down. I usually take a piece of paper and write it down, if I see that that might help. But we should have more time for such things. You need to be patient with these people, because they don't do it out of spite.

5.3 Loud and rude patients

High level of professionalism when communicating with patients reflects mutual trust and consideration. Good communication leads to effective and rational therapy of each and every patient. This is not always the case, however, and pharmacists often find themselves in situations which put their communication skills to the test. These situations involve loud and rude patients, and often cause ethical dilemmas and moral distress. The pharmacists report the following situations with such patients:

- Some people are very loud and rude and even then you have to try to treat everybody equally.
- Some patients are rude, they enter the pharmacy aggressively, and their approach is aggressive. It puts us in a situation where we have to be more aggressive too. It is really distressing and disturbing.
- They make you have to defend yourself.

During the interview all participants reported that in their professional work they are subjected to numerous ethical difficulties and that following their studies they had no ethical education which would enable them to deal with such difficulties.

Discussion

The results of the study show that pharmacists are exposed to moral distress and many ethical dilemmas in their everyday practice. The cause of the dilemma and distress is rooted in the complexity of the health care system, and it involves working in a pharmacy and the conscience of pharmacists. Also, the reason for dilemma often lies in the lack of resources. The analysis has shown that this group of ethical problems has a distinct technical component. The research has shown that pharmacists are burdened with too many administrative tasks. There are other tasks that pharmacists have to complete in addition to working with patients and interviewed pharmacists say that the main aim of their work is to provide high-quality pharmaceutical care. They also mention that processing prescriptions takes up a lot of the time that could be dedicated to patients and administrative tasks decrease the quality of their service. A research conducted in Sweden also shows that health care professionals are overburdened with administrative tasks, and concerning the conflict between the time and work spent on patient in relation to time for administrative tasks, several of the informants express a form of what Jameton called reactive distress (20).

In addition, most interviewed pharmacists believe that the integrity of patient is often violated by other patients and that the cause of this can be found in the fact that most pharmacies do not provide a designated area for counseling services where patients could receive information without their patient integrity and confidentiality being violated. The spatial organization is such that a patient can hear the advice given to another patient (20).

Ethical dilemmas often occur as the result of the procedural nature of dispensing a medicine and, according to Jameton, they lead to a certain kind of initial distress (11). Furthermore, the pharmacists do not think that patients are the source of the problem, but rather blame the legal and procedural constraints. Dispensing a medicine based on an inaccurate or incomplete prescription is an ethical dilemma which requires the ability to choose between values such as patient welfare and obeying the existing legal procedures. Furthermore, all interviewees said that the financial constraints of their patients represent the main sources of moral distress, noting that the number of patients with financial problems is constantly increasing. It is their experience that patients with such problems are only interested in the financial aspect of the therapy, and pharmacists have a difficult job traying to educate them about the medicine, dosage, therapy, side-effects and the importance of compliance.

Asking oneself the question of what a pharmacist is to do in certain situations often involve the question of legality. Obeying the law and complying with the existing regulations is a moral obligation of all health care professionals. When conducting an ethical analysis current rules and regulations must also be taken into account. In many cases the law and the ethics coincide. However, the participants' statements show that this is not always the case. Many such situations have been described in this paper.

People act and make decisions based on their own moral values, which are sometimes not in accordance with the law. This causes moral distress. Synchronizing ethical criteria and regulations is a common ethical problem not only for pharmacists, but for other health care professionals as well.

The participants stated that voluntary law-breaking for the purpose of helping sick patient results in less moral distress than adhering to rules at all cost, as long as the violation does not cause harm to anyone. The participants were capable of clearly differentiating between ethics and regulations. However, the possibility of legal or disciplinary procedures is the one to determine their choice of action (21).

The most common source of moral distress is the conflict of values. Important reason for moral distress is the conflict of values and opinions of pharmacists and physicians. Disagreements about prescriptions and therapy happen on a daily basis. The pharmacists said that their focus is on the patients and their well-being. Consequently, all disagreements about prescriptions, therapies and opinions lead to ethical dilemmas and moral distress.

Pharmacists are exposed to ethical dilemma and moral distress when they have to choose between protecting a patient from the harmful effects of medicines and dispensing a medicine in accordance with the physician's prescription, and the communication between the two health care professionals is unsatisfactory. There are moral

reasons which justify for both choices. The ethical analysis of pharmaceutical care should begin with the description of moral obligations of pharmacists towards their patients. Also, the moral aspect and ethical complexity of pharmaceutical care show that pharmacists are ethically responsible to both the patients and the physicians, and the surrounding circumstances may help determine to whom the pharmacist is more responsible. Also, the safety of the patient must be the priority of all pharmacists, regardless of whether the mistake was theirs or an incompetent colleague's. Communication and cooperation among co-workers and with patients must be the absolute priority to those who are a part of the health care system.

Ethical dilemmas related to the sales of emergency hormonal contraception are mainly caused by the fact that, in case the pharmacist choses not to sell the patient the "day after" pill, it might lead to an abortion, not to mention the possible consequences of an unwanted pregnancy for both the parents and the child. The interviewees said that ethical dilemmas and moral distress are also caused by the fact that emergency contraception is used by very young females and that such medicines are advertised as safe to use. The results show that pharmacists consider it less of a problem when the use of such contraceptives is recommended by the physician. According to Cooper, the transfer of responsibility to another health care professional represents an ethically passive approach (22). However, the interviewees justify this approach by saying that in most cases emergency hormonal contraception is irrationally used (the medicine is registered as nonpresription medicine in Serbia.)

Approaching each patient/customer individually calls for an increased level of moral responsibility of pharmacists, meaning that professionalism and ethical standards of pharmacists play an exceedingly important role in pharmaceutical care. Providing high-quality pharmaceutical care depends on the pharmacists' communication skills, ethical standards and the ability to use their knowledge in practice.

The interviewees believe that patients who are for any reason incapable of comprehending the pharmacist's advice (old patients, uneducated patients, scared patients or patients experiencing stress after being diagnosed with a certain condition etc.) represent a far greater cause of moral distress than patients who for any reason do not want to listen to their pharmacist's advice.

The situations have been divided into five categories, but most of the situations cannot be classified into only one of the groups. For example, the inability to dispense a medicine due to an administrative error may belong to the *Rules versus praxis* category, because the patient has the prescription and is entitled to the medicine, but cannot be given one due to the rule which regulates the procedure of prescribing and dispensing a medicine.

In addition, the results show that none of the interviewees has had any ethical education following their graduation.

This research compiled the opinions of pharmacists from the Northern Serbia, but further research will incorporate pharmacists from other parts of the country as well.

Further research will also be aimed at creating a structured questionnaire and statistical analysis will be implemented which will allow for quantifying the level and incidence of ethical issues and moral distress in pharmacy. According to Savić (2009) "At the beginning of the XXI century we can see the creation of the new consensus what the new ethical principles are and which ethical standards should be implemented in modern scientific research." (23).

Conclusion

The results show the ethical dimension of moral distress. It is possible to classify the situations involving ethical dilemmas which lead to moral distress in five categories, but it must be noted that many of situations that are described could be assigned to more than one category.

The research has shown that the interviews gave the pharmacists their first opportunity to think about and discuss topics such as ethical dilemma and moral distress, as well as to talk about the moral challenges they have to face in their everyday work.

A pharmacist must be ethically competent and must have the knowledge and skills necessary to give advice and communicate with patients. It is the pharmacists' professional and ethical responsibility to listen to their patients carefully: to

assess their medical knowledge, their ability to understand how certain therapies are used, and the extent to which they understand the pharmacists' advice. All this is in danger of failing if the communication between the pharmacist and the patient is poor and pharmacists and physicians should work together in the best interest of their patients.

Enhancing the ethical competence of pharmacists means striving towards providing them with more training and increasing the quality of pharmaceutical care. To reduce ethical dilemmas and moral distress in pharmacies, effective education of pharmacists in the field of ethical issues and supporting structures must be provided.

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Social functioning and quality of life of disabled people

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Abstract

Introduction: Quality of life (QoL) is an individual's perception of his or her position in life in the context of the culture and value system where they live, and in relation to their goals, expectations, standards and concerns.

Aim: The aims of this study were to investigate the relationship between social functioning domain of QoL and gender, education level, employment and having life partner of disabled persons as well as to determine the association between social relationship domain and self-reported social activities.

Material and Methods: Poll survey was conducted using specialy created questionnaire for assesing quality of life of disabled persons. Sample of 227 adult persons with motor disability from the teritory of Province Vojvodina were comprised.

Results: The mean age of participants was 47 years (SD=15 years), 52.9% males and 47.1% females. The mean value of the Social functioning domain score (SF) was 72.0 (on scale 0-100) with SD=27.6. There were statistically significant differences between the mean SF of the participants regarding to sex (p=0.003) and education level (p<0.001), but there were no statistically significant differences between the mean SF of the participants regarding to employment (p=0.483) and having life partner (p=0.645). Mean SF of men were 76.8 which was significantly higher than woman (66.7). Mean SF were higest in participants with the higest education level - faculty (80.1), then in participants with high school (76.3) and elementary school (60.1). Participants estimate their social activities as satisfactory (31.7%), poor (31.3%) and very poor (28.6%). Only 2.6% of participants estimate their social activities as very good.

Conclusion: Disabled people with higher education level have a significantly higher mean value of SF. Men have a significant higher mean value of SF than woman.

Key words: disabled people, social functioning, quality of life

Introduction

Disability is part of the human condition. Almost everyone will be temporarily or permanently impaired at some point in life, and those who survive to old age will experience increasing difficulties in functioning. Most extended families have a disabled member, and many non-disabled people take responsibility for supporting and caring for their relatives and friends with disabilities (1).

Over a billion people are estimated to live with some form of disability. This corresponds to about 15% of the world's population. Between 110 million (2.2%) and 190 million (3.8%) people 15 years and older have significant difficulties in functioning. Furthermore, the rates of disability are increasing in part due to ageing populations and an increase in chronic health conditions (2, 3). According to World Health Organisation (WHO) disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure, an activity limitation is a difficulty encountered by an individual in executing a task or action, while a participation restriction is a problem experienced by an individual in involvement in life situations. Thus disability is a complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives (2). The Preamble to the United Nations Convention on the Rights of Person with Disabilities (CRPD) acknowledges that disability is "an evolving concept", but also stresses that "disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hin-

der their full and effective participation in society on an equal basis with others". Defining disability as an interaction means that "disability" is not an attribute of the person. Progress on improving social participation can be made by addressing the barriers which hinder persons with disabilities in their day to day lives (4).

The International Classification of Functioning, Disability and Health (ICF) contain a classification of environmental factors describing the world in which people with different levels of functioning must live and act. These factors can be either facilitators or barriers. Environmental factors include: products and technology, the natural and built environment, support and relationships, attitudes, and services, systems, and policies. The ICF also recognizes personal factors, such as motivation and self-esteem, which can influence how much a person participates in society (5).

The presence of any sort of physical disability in person can significantly influence their physical, mental and social development. The assessment of the effects of a disability on everyday life reflects on the functioning and wealth of a person on daily basis and in various segments of life, that actually represents the assessment of their quality of life. Studying the life quality with chronic conditions, such as disability, is of extreme significance as it enables the monitoring of adapting to the disability, functioning despite of it, and the general welfare and satisfaction with life, but also the monitoring of availability of health and social services, and finally respecting the human rights. The assessment of quality of life by people with disability is a precondition and the first step in the strategy of improving the quality of life of that population (recognizing the difficulties, preparing the action plans and implementing the most adequate possible activities for improving the quality of life) (6).

The World Health Organization defines quality of life (QoL) as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad concept affected in a complex way by a person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment." (7). WHO also defines QoL as "the perception of the individuals or groups that their needs are being satisfied and that they are not being denied opportunities to achieve happiness and fulfillment" (8).

Quality of life (QoL) is a uniquely personal issue, it is the subjective perception of how an individual feels about their health status and/or the non-medical aspects of their lives (9, 10).

As instrument for assessing the quality of life, questionnaires are used and created in such a manner to include the most significant health domains influencing of the quality of life.

The development of these instruments included a multidimensional and multicultural approach that suggested the assessment of physical, psychological, social relations, environmental and overall QoL and health satisfaction domains (11). The importance of the social funcioning for the QoL in disabled people has been identified and recognized for a long time. The structure of social relationships refers to the organization of ties among people and can be described under different aspects, such as the number of social relationships maintained or roles played by an individual, frequency of contacts with various members of a network, density, multiplicity and reciprocity of relationships among the members of a network, among others. The structure of social relationships consists of the network of formal relationships, those maintained as a result of positions and roles played in society (include professionals such as: physicians, dentists, teachers etc,) and informal social relationships, those considered to be more personally and affectively important, consist of all individuals (family, friends, neighbors, colleagues, community) and ties among individuals with whom a close family relations or affective involvement is kept (12). Some researchers have concluded that social support is a multidimensional social construct, describing different of social support types or categories that must be taken into account and that can have different effects on individuals' physical and mental health (13). Therefore, health and quality of life are hypothesized to be affected by social networks.

The aim of this study was to investigate the relationship between social functioning domain of QoL and gender, education level, employment and having life partner of disabled persons and to determine the association between social relationship domain and level of self-reported social activities.

Methods

The research was conducted on 227 adults with motoric disability in Vojvodina, who are registered in associations of people with disability (Association of people suffering from muscular dystrophy, of paraplegic and quadriplegic people, people with multiple sclerosis, cerebral paralysis, war veterans, students with disability and other NGO–s).

Especially created questionnaire was used to assess quality of life. Ethical approval was obtained from the Medical faculty of Novi Sad. A letter of introduction describing the study was given and written informed consent was obtained from all participants before they filled out the questionnaaire.

The data collected during the survey were checked for validity, then coded and entered into a specially created database. The questions were selected, four scales / domains (physical, emotional, social functioning and self assessment of health) were formed based on the correlation matrices, intercorrelation cofficient (ICC) and Crombach alpha values. For the purpose of this paper, the results in the domain of social functioning were analyzed. Mean value, median, standard deviation, minimum and maximum values and 95% of confidence interval was calculated for domain of social functioning. The values obtained in the field of social functioning were compared as per gender and marital status of the participants, using t-test, Mann-Whitney test, ANOVA method and Kruskal Valis test were used to compare the mean values in respect to level of education and employment status of the respondents. For all the tests, the levels of statistical significance (p) were provided. SPSS 14.0 program for Windows was used for the statistical processing of data.

Results

The study involved 227 adults with motoric disability in Vojvodina, 120 men (52.9%) and 107 women (47.1%). Average age of the participants was 47 years of age (SD= 15, Min=18, Max=79). The difference in the mean age between women (50.6) and men (43. 6) is statistically significant ($p<0.001$). The majority of the participants are married 44.1%, 33.0% are single, widows 13.7%, divorced 8.8% and 3.1% live with partners unmarried or have a steady relation. Out of participants who are married or have steady relation, 56.5% started their relation prior to the occurrence of handicap and 43.5% after the event. Most of the interviewees have children 57.3% (15.9% have one child, two 33.0% and three or more children have 8.4%).

Almost half participants (43.6%) live in the same household with their spouses, 29.1% live with parents, 18.5% are singles, 7.0% live with children and 1.8% with others. High school graduated 58.1% of the interviewees, 29.1% finished primary school and 12.8% had higher education. Most of the participants were retired (60.4%), 30.0% are unemployed and only 9.7% of the interviewees have a job. As for the interviewees who don't work, one quarter of them retired on the basis of old age (25.1%), 27.3% were early retired, 12.8% are looking for job, 11.5% is not looking for one, whereas 11.0% states they are not capable of working.

From every tenth employed person, half of them (53.6%) are full time employed, 46.4% are part time employed, and nine of them have employment adopted for disabled persons.

Acquired motor disability has almost three quarter of the interviewees (73.1%) and inherited was 26.9%. The cause of disability in the largest number of the interviewees were the injury (33.0%), then neurological conditions (26.0%), inborn condition (20.7%), serious rheumatic disease (13.7%), cerebrovascular insult (2.6%) and other (4%). As for the orthopedic tools, wheelchairs are used by 30.4% participants, stick 37.0%, walker is used by 3.1% and the orthoses for elevating feet 3.5%, whereas the rest of the interviewees state other (different orthopedic tools such as crutches, anti decubitus mattresses etc).

Psychometric analysis showed that in order to define the domain on social functioning (SF) from the questionnaire applied it was possible to include the following 3 questions:

- Q1 How many times in the course of last month did you socialize with other people, for instance visit friends or invite them to your home, go to the cinema, a restaurant, a sport match..
- Q2 How many of your friends did you see or talk to them on the phone during last week?
- Q3 Are you a member of any organization, NGO or Citizens Association?

During the last month more than three thirds of the participants (67.4%) socialized with other people three or more times, 22.2% one or two times, but every tenth person had no social contacts or went out to socialize with other people.

On the question how many times in the last month they associated with other people over half of the interviewees stated more than three times (57.3%), 10.1% of them said three times, two times 11.1%, once 11.1% and 10.4% of the interviewees answered that during last month they didn't spend time with friends.

On the question how many friends they saw or spoke on the phone within the past week, the largest number of interviewees (37.4%) stated with 10 and more friends, 17.2% contacted with 5-9 friends, 33.9% with 2-4 friends, 9.3% with one whereas 2.2% of the interviewees contacted no friends during the previous week.

Highest number of the interviewees (93%) has at least one special person who they trust, and they can adress with their personal problems, yet 7% do not have such a person.

On the question whether they are members of some organization or citizen association, 22.5% of the interviewees answered yes, out of which 51.1% stated that membership in associations provides them information, for 37.4% the reason is social contacts, 15.9% some other type of support, 7.5% said it was financial support, 7.9% said it was something else, and 16.3% considers that the membership brings them no benefits.

The highest correlation (r= 0.668) exist between frequency of socialization with other persons (Q1) and frequency of the phone contacts (Q2). The lowest correlation (r=0.221) is between Q1 and Q3 that is membership in some citizens associations (Table 1).

Table 1. Correlation between questions in the domain of social functioning

Question	Q 1	Q 2	Q 3
Q 1	1.000	0.668	0.221
Q 2	0.668	1.000	0.275
Q 3	0.221	0.275	1.000

The highest correlation coefficient between a certain question and the value of the whole domain is for the Q2 (r=0.679), and the lowest with Q 3 (r=0.268). Crombach alfa values in case of leaving out a specific question fluctuate in the range from 0.212 (Q 2) to 0.785 (Q 3) and deviating from the global value Crombach alfa coefficient for the whole domain (0.656) (Table 2). The value of ICC coefficient is 0.649 ($p<0.001$).

Table 2. Characteristics of the questions in the domain of social functioning

Question	Correlation between questions and the domain	Crombach α if the item is deleted
Q 1	0.647	0.307
Q 2	0.679	0.212
Q 3	0.268	0.785

To validate the created scale of social functioning, the comparison with the answers of the interviewees to the control question from the survey: "How would you assess your social activities (socializing with friends, maintaining contacts with family and others)" with the possible answers offered: very good, good, satisfactory, poor and extremely poor was performed. The variance analysis showed that the average values in the domain of SF statistically significantly differ ($p<0.001$) compared to the answers provided to the control question. The interviewees with the reply "extremely poor" to the control question have the average value for social functioning domain 22.2, and the ones with the answer "very good" to the control question have the average value for social functioning domain 88.0 (Table 3).

Table 3. Domain of social functioning in respect to the control question

"How would you describe your social functioning?"	N	Mean	SD	Min	Max
very poor	6	22.2	9.94	11.1	33.3
poor	13	37.6	27.4	11.1	88.8
satisfactory	72	69.3	25.7	11.1	100.0
good	71	70.7	25.7	22.2	100.0
very good	65	88.0	18.4	22.2	100.0
Total	227	72.0	27.6	11.1	100.0

The set of three questions stated for the scale of social functioning indicate the capacity of social interaction. The sum of all three questions forms the scale in the range from 0 to 100. The average value of SF domain for all the interviewees is 72.0

Table 4. Scale of social functioning

Features		N	Mean	SD	95% CI
Gender p= 0.003	Men	120	76.8	20.9	72.0 – 81.7
	Women	107	66.7	27.4	61.4 – 71.9
Education p< 0.001	Primary school	66	60.1	28.2	53.2 – 67.0
	High school	132	76.3	26.4	71.7 – 80.8
	Faculty	29	80.1	23.4	71.2 – 88.9
Partner p= 0.645	With	103	71.4	26.9	66.2 – 76.7
	Without	124	72.6	28.2	67.6 – 77.6
Income p= 0.483	Unemployed	68	73.8	29.1	66.8 – 80.9
	Employed	22	73.7	30.9	60.0 – 87.5
	Retired	137	70.9	26.4	66.4 – 75.3
TOTAL		**227**	**72.0**	**27.6**	**68.4 – 75.6**

(SD=27.6) with 95% CI in the range of 68.4 to 75.6. The results of the values in the domain of SF in regard to the various variables which could be important for this health domain, such as gender, education, presence of a partner (marital status) and income (employment) of the interviewees are presented (Table 4).

The mean value of SF domain for men is 76.8, and for women 66.7. The difference in regard to gender is statistically significant (p=0.003). The mean value of SF domain for the interviewees with finished primary school is 60.1, with high school 76.3, and for the interviewees with high and higher education 80.1. The difference in regard to the level of education is statistically significant (p<0.001) (Table 4). For the participants who have a partner the mean value of SF domain is 71.4 and for the participant who don't have a partner is 73.7. In respect to the presence of a partner the difference is not statistically significant (p=0.645). The average value of SF domain for the participants who are unemployed is 73.8, for the employed is 73.7, and for the retired ones 70.9. The difference in regard to the employment status is not statistically significant (p=0.482) (Table 4).

Discussion

The quality of life includes physical, mental and social aspect of health and is influenced by experience, beliefs and perception. Although the objective dimension of health is of extreme significance in determining the health condition, the personal evaluation and expectations transform the found objective conditions into the perceived life quality (14). Hence, the quality of life is expressed indirectly, by measuring the components of achieved physical capabilities, emotional and existentional health and the lack of one dimension increases the importance of the other and can efficiently compensate for the loss. Also, the relevance of certain components changes through life (15). Even back in 1976. Andrews thought that the life quality does not depend only on physical conditions, personal relations and social status, but also on how it is all assessed by a person himself as well as by others (16). The studies performed with the goal to determine the difference in assessing the personal health and life quality between people with special needs and healthy ones, aged 24 to 52 point to that. The average mark of the quality of life given by disabled people on scale from 0 to 10 was 8, and for healthy ones it is 8.3, which is not statistically significant difference (17).

Also 86% of spinal cord injured high-level quadriplegics rated their quality of life as average or better than average (18) and 60% of paraplegics reported feeling more positively about themselves since becoming disabled (19). Three-quarters of persons with spinal cord injuries rated their quality of life as good or excellent. Amount of paralysis made no difference, but people who used ventilators rated their quality of life higher than those not needing ventilators (20). The duration of disability was positively related with acceptance of disability in persons with spinal cord injury-related paralysis. Severity of disability was of no importance in accepting life with a disability (21).

However, the research exists in which peopel with disibility had statistically significant lower score from the ones with no disability, in all the sp-

heres of quality of life, which points to the fact, that they mark their quality of life significantly lower, compared to the people with no disability (6).

Non medical characteristics of human existence (such as family relations, social and socializing activities, spirituality, creativity, economic security, hopes, fears, disappointments, grief or joy) can in certain people create the feeling that they have an excellent quality of life despite the great physical handicap, or vice versa, a person can provide a low assessment of quality of life no matter that his health is excellent (22). In most cases people will not be happy just because they are physically and mentally healthy just because they are, and that fact by itself will not give a high mark of quality of life, but the loss of physical and mental health will lead to decreasing in quality of life, until some mechanisms to compensate the loss are found (23).

Social interaction is an important component of social well-being, because it is through personal interaction that individuals develop trust and supportive networks (24).

Our resarch results showed that, the mean value of the scale in the SF domain for all participants was 72.0. Men ($p=0.003$) and participants who had higher education ($p<0.001$) scored better, and the difference was statistically significant, whereas there was no statistically significant difference in regard to employment status. Similar results were obtained in the study of the quality of life of disabled people (390 persons with cerebral paralysis, muscular dystrophy, multiple sclerosis or paraplegia) in Serbia in 2010, at which occasion the quality of life was assessed by using a questionnaire from World Health Organization (WHOQOL-BREF). The mean score value for the social domain was at 61.2, although male disabled persons (60.5) reported a slightly lower score than women (62.1), but the differences weren't statistically significant. Also, it was proved that the interviewees with higher education showed statistically significant higher scores in physical, social and environment domains compared to the interviewees with no education or the ones who only finished primary school. That points to the fact that disabled people with higher education also have significantly better social and physical functioning, and obtain a better position in their surroundings that the disabled people who have less education. According to this researce people with cerebral paralysis mark their social functioning and the support significantly lower than people with no handicap, whereas people with paraplegia, multiple sclerosis and muscular dystrophy function similarly to people with no handicap (6).

Accepting the model which considers a human as one unique biological, psychological and social being will be common for the studies dealing with quality of life and also it will be to emphasize the complexity, in other words many aspects of life quality. Having in mind that the aforementioned dimensions do not reflect directly, it is obvious that the significance of each dimension and satisfaction with them varies from person to person. This implies that if a person is not satisfied with one area of life which is not so important for him or her, she or he can still have a good quality life in general. However, dissatisfaction with an aspect of great relevance for an individual will significantly contribute to lower quality of life in all.

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Physical exercise and its influence on evoked cognitive potentials in the female subjects

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Abstract

The aim of this study was to give better knowledge on the influence of physical activity at different levels on the amplitude and latency of P300 component of cognitive potentials in female athletes and non athletes. After registering cognitive event related potentials at rest participants underwent a controlled exercise on a cycle ergometer. Each exercise lasted for 10 minutes with succesive increase of intensity up to 60%, 75% and 90% of maximal heart rate. Immediately after finishing each bout of exercise, event related potentials were registered again. The results of our study implicate that acute bouts of exercise at different intensities make an impact on cognitive functions of female judo players compared with the group of healthy female students. In our study the effects of single bouts of exercise at different intensities seem to be positive on the amplitude of P300 componennt of ERP. Short duration medium intensity exercise corresponding to 60% and 75% HRmax facilitated cognitive processing in the CNS, whereas high-intensity exercise corresponding to 90% HRmax decreases cognitive functions. The findings in the group of female judokas are more prominent compared with the ones of the female student group for the mid-intensity loads (60% and 75% Hrmax) and this difference is statisticaly significant $p<0,05$. Further, our study showed that improvement in cognitive tasks performance can be achieved not only by aerobic but also anaerobic type of exercise since judo is highly anaerobic sport.

Key words: physical activity, P300, female students, female judo players

Introduction

In the sports of judo the competitors have to make their decisions fast and precise while at the same time performing maximal physical exertion (Thomas et al., 1989; Castarlenas and Planas, 1997; Drid et al., 2010). Many studies were conducted in order to bring to relation the physical and mental stress. Some of them suggest that physical activity did not have any influence on cognitive functions and tasks (Fleury et al., 1981; Lulofs et al., 1981), while the others have reported positive correlation (Paas and Adams, 1991; Tomporowski, 2003). There is also the third group that have presented data showing negative correlation between strenous exercise and cognition in athletes (Salmela and Doyle, 1986; Grego et al., 2004).

Auditive evoked potentials can be divided on auditive response of brain stem, evoked potentials of mid latency and potentials of second latency. The latest ones (second latency potentials) have early and late component which depictures different cognitive functions. It is proposed that early components (N1,P2 i N2 waves) represnts automatic stimuli processing. They are affected by early aspects of atention and orientation. P3 wave fall in the late waves and represent indicator of cognitive processing of the information and as the proof of the further information processing we are using slow and late waves which comes as the tasks become more difficult. As an indicator of how physical activity influence cognitive processes we have observed P3 wave. Amplitude of the P3 wave is conected with the level of atention toward specific task and latency of P3 wave represent the speed of conscious clasification of newly coming informations i.e. time to information evaluation.

Although there is increasing number of studies pointing out the importance of the physical activity on cognition and other brain functions there are still many significant questions to answer. For the purpose of every day living and professional

relationship to participants in sports and recreation we have to gain knowledge on how to design exercise protocols to optimize the cognition processes. Also, it is important to give scientific evidence on question when to start or what are the best intensities, duration and types of exercises (Brown et al., 2000). In rehabilitation protocols concerning non healthy population the question is wheter the specific types of exercises can slow down or even prevent neurodegenerative diseases.

The aim of this investigation was to bring to light the influence of different levels of physical exertion on evoked cognitive potentials in the group of top level serbian female judo players and the group of female students.

Methodology

Subjects

In the our research participated 24 healthy young females divided into two groups. The first group consisted of 14 female judo players (20.61±3.09years, 165.89±7.27cm, 61.11±8.60 kg, years of training 10.78±3.06years) and the second consisted of 10 female students (21.06±4.09years, 167.92±8.47cm, 63.43±9.54 kg).

The judo players have at least 18 hours of training weekly, 9 hours of specific judo training and the rest were other types of training. The student group had organized physical activities 3 times a week lasting for one hour each.

All subjects were in self – reported good health, free from medications affecting brain activity and had medical histories free from hearing and cardiovascular problems. Informed consent was obtained prior to inclusion in the study for all participants. Approval for this study was granted by the University ethics committee. Testing procedures were carried out at the Department of physiology, Medical faculty, Novi Sad, Serbia.

P300

In the standard two tone auditory oddball task tone pips (90dB) of 1 kHz (80%, common) and 2kHz (20%, rare) were presented binaurally at random intervals and in random order over headphones. Subjects were instructed to ignore the common low pitch tones and press a button with the dominant hand each time the rare high pitch tone occurred.

Measurements were carried out on an EMNG equipment Keypoint, Medtronic from Denmark. Brain electrical activity was recorded from an array of two midline electrodes (Fz and Cz) of the International 10-20 system referenced to linked ears. Electrode impedances were kept below 5 kΩ. Data were amplified with a gain of 30.000, bandpassed 1-100Hz and sampled for 1000ms epoch on each trial. Trials were administered until data from 60 target trials and approximately 200 non-target trials were collected. Only data from target trials were analyzed further.

Processing, which consisted of P300 identification and measurement was performed blind to experimental conditions. ERP waveforms were 15 Hz low pass filtered. The P300 peak was identified individually at each electrode site as the highest positivity within a 220-450 ms latency window, and the latency and amplitude of the P300 peak were measured. Alongside these parameters, false reactions, percentage of hits after target pitches and response time were also registered.

Experimental design

After registering cognitive event related potentials at rest participants underwent a controlled exercise on a cycle ergometer. Each exercise lasted for 10 minutes with succesive increase of intensity up to 60%, 75% and 90% of maximal heart rate (HRmax) and holding this level of intensity for six minutes. Pedaling cadence was set at 60 per minute. Immediately after finishing each bout of exercise, event related potentials were registered again. Between two successive bout a rest lasting for 20 minutes was given for active recovery of the subjects.

Statistical procedures

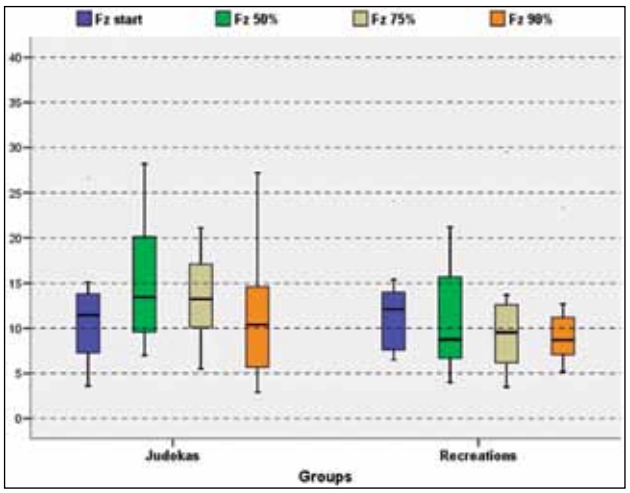
For all of the used variables basic descriptive statistics were calculated and normality of the distribution was tested via Kolmogorov-Smirnov test. The effects of the applied program was tested by method of General Linear Models with the use of model of Repeated Measures. Testing of the normality of the multivariance of distribution was performed via Mauchly's Test of Sphericity. Depending on the results of this test in the estimation of the effects of the program Huynh-Feldt correction was used. Inside the Repeated Measures analysis the effects of the program inside the groups were tested

(Within-Subjects effects) and also between the groups (Between-Subjects Effect) by calculating the F ratio and the significance was set at $p<0.05$. Finally the testing of differences between the specific levels of measuring for the analized sample of subjects in general and compared with the groups (Tests of Within-Subjects Contrasts).

Results

In the Table 1. are presented mid values of the evoked cognitive potentials measured in the group of top level judokas and the student group after the different levels of physical exertion.

Testing sphericity distribution of variables Fz using Mauchly's test showed no statistically significant deviation of repeated measurements of the distribution of multivariate normal distribution. Since the sphericity of the distribution determined by (the value of epsilon is high), testing the effect of variables Fz was done without the use of Huynh-Feldt correction. The effect of the difference between the level of measurement was statistically significant at the level of assessment of $p<0.05$. However, the effect of the development of new measurement and development as opposed to the analyzed groups did not show a statistically significant level. Also, no overall effect of the difference between the groups was not statistically significant.



Graph 1. Amplitude of parameter Fz for different levels of HRmax

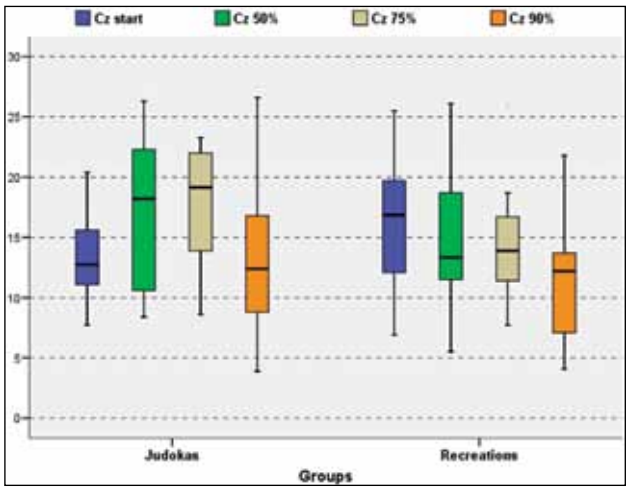
Testing the difference between individual-level variables measuring Fz, showed a statistically significant effect of the changes between the first and 2 level measurement, while the other levels the differences were not statistically significant. Differences in interaction groups showed no statistically signifi-

Table 1. Evoked cognitive potentials measured in the group of top level female judokas and female students

	Level of exertion		Judo	Students
			M(±SD)	M(±SD)
Fz (μV)	A	rest	11.11 (5.89)	12.16 (5.14)
	B	60% HR	14.90 (6.53)^{a,d}	12.84 (9.48)^{a,d}
	C	75% HR	13.37 (4.82)	11.02 (7.32)
	D	90% HR	11.67 (7.32)	9,95 (5.24)
Cz (μV)**	A	rest	13.23 (0.90)	16.28 (1.77)
	B	60% HR	17.19 (1.57)	15.16 (1.92)
	C	75% HR	17.21 (1.35)^{d}	14.59 (1.68)^{d}
	D	90% HR	12.77 (1.63)	11.83 (1.61)
F latency (msec)	A	rest	329.00 (7.78)^{x}	336.60 (10.08)
	B	60% HR	330.78 (4.25)^{d}	329.80 (11.51)^{d}
	C	75% HR	326.14 (6.35)^{d}	329.00 (11.56)^{d}
	D	90% HR	321.14 (6.35)	323.30 (5.09)
C latency (msec)	A	rest	329.07 (7.83)	336.30 (11.74)^{x}
	B	60% HR	330.07 (4.28)	329.20 (8.79)
	C	75% HR	326.14 (6.35)	331.10 (11.47)
	D	90% HR	321.00 (5.27)	325.70 (8.55)

Significantly ($p<0.05$) diferent from A testing^{a}, Significantly ($p<0.05$) diferent from D testing^{d}, Significantly ($p<0.01$) diferent between levels of exertion**, Significantly ($p<0.05$) diferent between groups^{x}

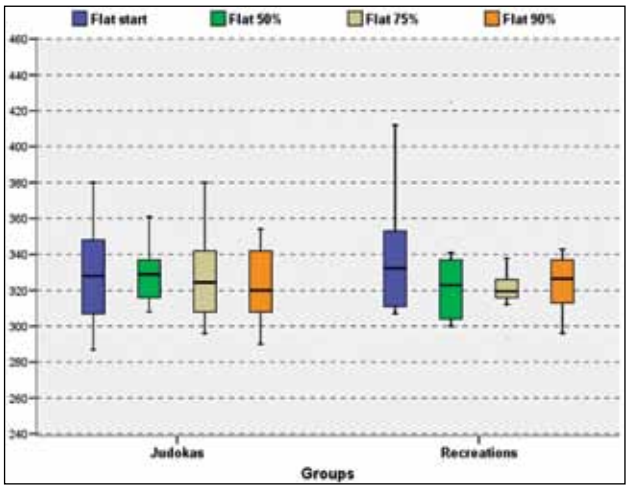
cant level. At the graph can be seen dynamic changes to the level of measurement in both groups, as well as differences between groups at certain levels. The position of the median and quartile values show the distribution of values within the measurement.



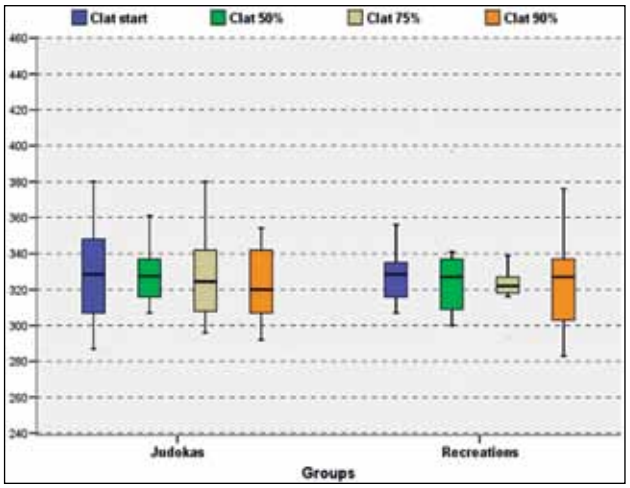
Graph 2. Amplitude of parameter Cz for different levels of HRmax

Testing sphericity distribution variables Cz, showed no statistically significant deviations from the multivariate normal distribution of repeated measurements, and test the effect of changes in variables Cz done without the use of Huynh-Feldt correction. The difference between the level of measurement was at statistically significant estimate of $p < 0.01$, while the effect on the Development of New measuremen ts was also statistically significant at the level of assessment of $p < 0.05$. The total effect of the difference between the groups was not statistically significant. Testing the difference between individual-level variables measuring Cz, showed a statistically significant effect of the changes between the third and 4 level measurement, while the other levels of contrast is not statistically significant.

Testing sphericity distribution variables F latency, showed a statistically significant departure from the multivariate normal distribution of repeated measurements. Testing of the effects of changes in the variables F latency was done applying the Huynh-Feldt correction. Having examined the effects of differences in the level of measurement for the variable total F latency, no significant differences were observed, as is the case for the significance of differences in all analyzed groups. Analysis of differences between trials showed the presence of statistically significant differences between the third and 4th trial for the variable F latency as a whole, while the difference between two groups and statistically significant difference between 1st and 2nd trial.



Graph 3. Latency of parameter Fz for different levels of HRmax



Graph 4. Latency of parameter Cz for different levels of HRmax

Testing sphericity distribution variable C latency also showed a statistically significant departure from the multivariate normal distribution of repeated measurements, and test the effect of changes in these variables are also done by applying the Huynh-Feldt correction. Analysis of differences between levels of measurement, showed no statistically significant differences between levels of measurement for the variable C latency, in whole and in groups in relation to the new measurements. There were no differences between individual-level measurements.

Discussion

The investigation of the effects of physical activity on cognitive health received little attention. In fact there are not too many studies using true experimental designs to improve our understnding of the mechanisms by which execise influences brain function and cognition. In recent meta – analysis study (Sibley and Etnier, 2003) was pointed that there is positive relation between physical activity and cognitive performance in school age children (4 -18 years of age) which proves that early phyisical activity is important for the improvement of cognitive health in years to come.

Neurophysiological studies were designed to give inlight to cognitive function and athletic performance. Event related potentials and its variation in individuals, especially P300 component, has been found to be sensitive to changes in different levels of physical exertion. (Polich and Lardon, 1997). It was founded that both amplitude and latency of P300 component are related to aerobic fitness in different age groups. This component seems to be generated by neural structures included in the cognitive processing. The results of this study indicate that larger amplitude and shorter latency of P300 wave are present in the subjects with high aerobic abilities compared with untrained ones.

The results of our study implicate that acute bouts of exercise at different intensities make an impact on cognitive functions of female judo players compared with the group of healthy female students. In our study the effects of single bouts of exercise at different intensities seem to be positive on the amplitude of P300 componennt of ERP. Short duration medium intensiti exercise corresponding to 60% and 75% HRmax facilitated cognitive processing in the CNS, whereas high-intensity exercise corresponding to 90% HRmax decreases cognitive functions. The findings in the group of female judokas are more prominent compared with the ones of the female student group for the mid-intensity load (60% and 75% Hrmax) and this difference is statisticaly significant $p<0.05$ (Graph 1., Graph 2.). It is interesting to notice that no statisticaly significant difference was found for the latency between the tested groups except for the F latency for the second trial (50%HRmax). It has to be mentioned that departure from the multivariate normal distribution of repeated measurements is much higher in the group of female students which indicate that trained subjects tend to produce more consistent cognitive result during physicaly demanding tasks. Similar finding can be found even in the same group of athletes (Franchini, 2005). Namely, this study presented the evidence that there are obvious differences between the top level athletes and the ones that are not in problem solving tasks.

Results of some laboratory research tried to connect cognitive capabilities to the level of physical effort (Chmura et al., 1998; Grego et al., 2004) and sports result (Drid et al., 2011). Similar relationship was presented by Brisswalter et al. who recorded reaction time performance at different imposed pedal rates performed at same power output. Best results were obtained at medium cadence (50 rpm) and worst at high speed cadence (80 rpm) (Delignieres et al., 1994; Brisswalter et al., 1997).

Our study design was planned to grade intensity of exercise in relation to subjects maximal pulse which should be more precise method of individual dosing level of physical exertion.

In our experiment exercise grading was assessed according to the participant`s maximal pulse which might lead to a more objective evaluation of the level a physical stress.

Positive relationship between exercise and ERP as neurophysiological measure of cognitive processing speed was reported (Polich and Lardon, 1997; Tomparovski, 2003). Polich and Lardon investigated the long term effects of physical activity on mental processes and demonstrated that young adult low-exercise subjects show smaller P300 amplitudes than high exercise subjects. They concluded that exceptional amounts of physical exercise can alter the P300 ERP component from simple auditory and visual stimuli, but these effects are most evident only with very high amounts of weekly aerobic exercise (Polich and Lardon, 1997).

The results of this investigation conducted in two groups of young healthy female individuals indicate that physical activity promote cognitive processes especially for the medium level of exertion measured through HRmax. Further, our study showed that improvement in cognitive tasks performance can be achieved not only by aerobic but also anaerobic type of exercise since judo is

highly anaerobic sport. Apart from the significant differences ($p<0,05$) in amplitude levels observed between experimental groups, the values of latency measured via recording P300 indicate that active female group (judo players) are more consistent in problem solving.

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Two different cut-off values for stress hyperglycemia in myocardial infarction

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Abstract

Objectives: Meta-analysis showed prognostic significance of high admission glycemia (stress hyperglycemia, SH) in acute myocardial infarction (AMI) patients and the study question was: should common practice of using one cut-off value for SH for all AMI patients (with and without known DM) continue, although it is not logical?

Subjects and Methods: This retrospective study included 500 randomly selected AMI patients' charts, who were hospitalized in the Department for Cardiovascular Diseases in Niš, during the period 2000–2005.

Results: In patients *with* known DM, ROC curve for cut-off value for SH and mortality showed area under the curve (AUC)=0.672 (95%CI: 0.459-0.849), P=0.037. The best cut-off value for SH is glycemia =18.0 mmol/L, with sensitivity 64% and specificity 75% for in-hospital mortality. In patients *without* known DM, ROC curve for cut-off value for SH and mortality showed AUC= 0.806 (95%CI: 0.677-0.936), P<0.001. The best cut-off value for SH was glycemia =8.55 mmol/L, with sensitivity 79% and specificity 87% for mortality. Accordingly, the cut-off value for SH was more than twice higher in our patients with known DM.

Conclusions: Two different cut-off values should be used for stress hyperglycemia in AMI patients: one for patients with known DM and the other for patients without known DM.

Key words: Cut-off value, stress hypergycemia, myocardial infarction

Introduction and objective

Acute myocardial infarction (AMI) is one of the most important causes of death worldwide. Hyperglycemia is common, frequently untreated, and strongly associated with adverse outcomes in patients hospitalized with acute coronary syndrome (ACS) [1]. SH has been important generally- in many diseases. Elevated blood sugar concentration in critically ill patients at admission, i.e. stress hyperglycemia (SH) has been known for **157** years, since Claude Bernard's observation [2].

SH has been described in many life-threatening diseases, e.g. apoplexy, sepsis, trauma, etc., including AMI.

SH has been important in AMI patients, too. The first sign of hyperglycemia in AMI came from an old report. Namely, an unusually high prevalence of glucosuria in patients without diabetes mellitus (DM) who have AMI was noted as far back as **1931** [3]. Elevated blood glucose and its potential link with adverse outcomes in patients with AMI has been the subject of intense study over more than **40** years [4].

Meta analysis shows that AMI patients *without DM* who had glucose concentrations ≥ 6.1–8.0 mmol/L had a 3.9-fold (95% CI 2·9–5·4) higher risk of death than patients *without DM* who had lower glucose concentrations [5]. Also, the Cooperative Cardiovascular Project, the largest study of this topic to date, that included 141 680 elderly AMI patients, demonstrated a significant 13% to 77% relative increase in 30-day mortality and a 7% to 46% relative increase in 1-year mortality depending on the degree of hyperglycemia. This higher risk of mortality persisted after controlling for higher burden of comorbidities and greater coronary artery disease (CAD) severity [5].

However, many methodological shortcomings have persisted which limit the use of SH for prognostication in AMI patients. For example, *the definition of stress hyperglycemia is intrinsically difficult* in patients with DM because the unstressed baseline concentration of glucose is not known [5].

Furthermore, the best way to use glucose measurements in AMI was not chosen. There have been many candidates: admission glycemia, fasting glucose level within 24 hours of hospitalization, lowest blood glucose reading during hospitalization, change between 24-hour and admission glucose levels, mean glucose level, time-averaged glucose level, hyperglycemia index, and patient day glucose level - in addition to hemoglobin A1c (HbA1c), which is of limited prognostic value in ACS [1,6]. Additionally, persistent hyperglycemia is also an independent predictor of outcome [7].

Time-averaged glucose during the first 48 hours of hospital stay may predict unfavorable short-term outcome better than admission hyperglycemia [7]. Thus, consensus has been missing yet on the best way to use glucose concentration for prognostication [1,8,9].

Among others, quite a practical question arises: should common practice of using one cut-off value for admission ("stress") hyperglycemia for all AMI patients (with and without known DM) continue, although it is not logical?

The objective of the paper is to study if the different cut-off values should be better for in-hospital mortality discrimination of AMI patients with versus without known (previously diagnosed) DM.

Subjects and methods

This retrospective study included 500 patients with AMI hospitalized in the Department for Cardiovascular Diseases in Clinical Centre and University of Niš, during the period 2000–2005. Diagnosis of AMI was made from clinical, ECG, echocardiography and laboratory findings (troponin, CK-MB). Patients' charts were selected randomly, without any a priori exclusion criterion.

The average age was 63.1±10.6 (SD) years and there was a slight male predominance (55.2%). The average troponin was 7.58±22.28 μg/l. The prevalence of important parameters was as follows: previous MI 44.7%; arterial hypertension 70.2%; cigarettes (active smoking) 59.5%; STEMI 53.0%; shock 3.6%. Haematocrit was 38.9±7.0%. DM was defined by endocrinologists according to current guidelines at the time of the study. There were 116 out of 500 patients with previously diagnosed (known) DM (23.2%). We analyzed stress hyperglycemia in subgroups with and without previously diagnosed (known) DM.

Statistics: SPSS 10.0 software was used in the analyses. Pearson's chi-squared and Fisher's exact tests were applied for comparison between discrete variables.

Receiver-operator characteristic (ROC) curves were done separately for patients who did and who did not carry a diagnosis of DM. The average values were expressed with ± standard deviation (SD). All P-values are two-tailed and were considered significant if below 0.05.

Results

1. Prevalence and mortality in AMI patients with vs without known DM

In 116 patients with previously known DM (i.e. 23.2% out of the total number of 500 AMI patients), the average glycemia at admission was **14.33** ± 6.35 mmol/L vs **6.96** ± 3.17 mmol/L in 384 patients (76.8%) without known DM ($p<0.001$). Thus, the average serum glucose value in patients with known DM was *twice higher* in comparison with patients without known DM. The in-hospital mortality was significantly higher in patients with known DM: 14/116 (12.07%) vs 19/384 (4.95%) in patients without previously diagnosed DM (Chi square=7.33, p=0.0068, odds ratio OR= 2.64 (1.20-5.74), risk ratio RR=2.44 (1.26-4.71).

2. Very high and high serum glucose concentrations distribution depending on the presence of the known DM

Very high glucose levels were more often seen in patients with known DM (e.g. among patients with glycemia ≥16 mmol/L, only 11.32% had not previous diagnosis of DM). On the other hand, this was not the case for ***high*** glucose concentrations: interestingly, among patients with glycemia ≥8 mmol/L, almost half patients (47.49%) were without known DM. (Figure 1)

3. In-hospital mortality of patients with and without known DM, depending on the admission serum glucose concentration

Figure 2 shows in-hospital mortality in both groups (with and without known DM), according to admission glycemia.

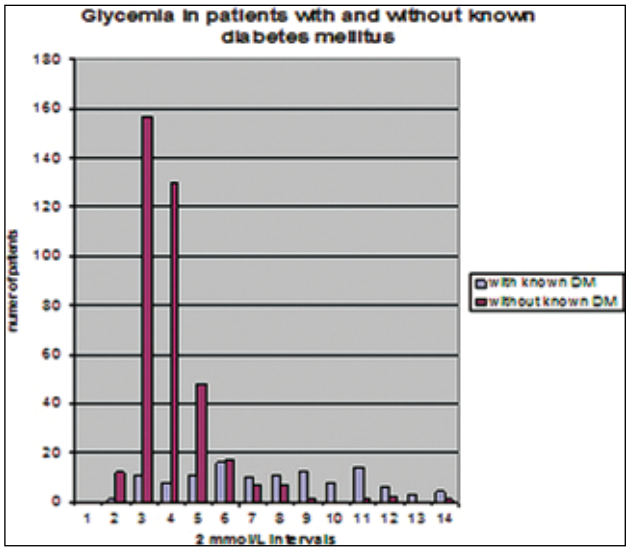

Figure 1. Glycemia in patients with and without known diabetes mellitus

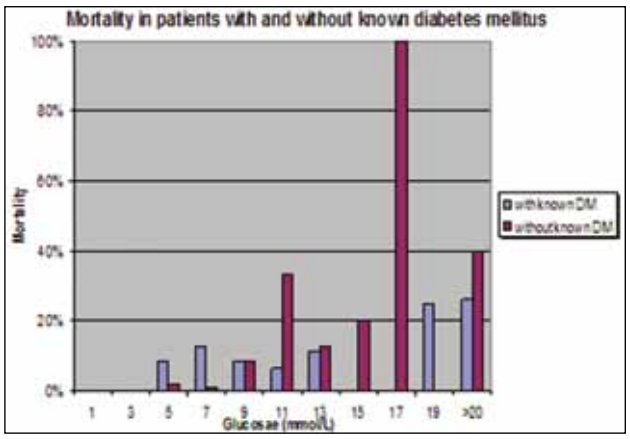

Figure 2. Mortality in patients with and without known diabetes mellitus

It is obvious from Figure 2 that with ***normal or slightly elevated*** glucose levels (e.g., 4-8 mmol/L), risk of dying in the hospital is higher in patients *with* previously known DM. For example, among patients with glycemia <9 mmol/L, the mortality in patients with known DM was 3/27 patients (11.1%) and without known DM 5/330 patients (1.5%), P=0.0406, but the numbers are small. Vice versa, with *higher* admission glucose levels, risk of dying in the hospital is higher in patients ***without*** previously known DM, e.g. among patients with glycemia ≥9 mmol/L, the mortality in patients without known DM was 14/53 patients (26.4%) and with known DM 11/88 patients (12.5%), Chi-square =4.39, P=0.0361.

Glycemia was of prognostic value for in-hospital mortality almost exponentially in patients without previously recognized DM: out of 299 patients with glycemia <8mmol/L 1.34% died, out of 85 patients with glycemia ≥8 mmol/L 17.65% died and out of 6 with glycemia ≥16 mmol/L 50.0% patients died. The rise in in-hospital mortality with advancing glucose concentrations is steeper for patients without vs with known DM (Figure 2).

4. Separate ROC curves for admission glucose level and in-hospital mortality for patients with and without known DM

In patients ***with*** known DM, ROC curve for cut-off value for SH and mortality showed area under the curve (**AUC**)=**0.672** (95%CI: 0.459-0.849), P=0.037. The best cut-off value for SH is glycemia =**18.0** mmol/L, with sensitivity 64% and specificity 75% for in-hospital mortality. In patients ***without*** known DM, ROC curve for cut-off value for SH and mortality showed **AUC=0.806** (95% CI: 0.677-0.936), P<0.001 (Figure 3). Caution should be exerted when using SH for in-hospital prognostication, because the ROC curve touches the referent line. The best cut-off value for SH was glycemia =**8.55** mmol/L, with sensitivity 79% and specificity 87% for mortality. From practical point of view, cut-off value of ≥8 mmol/L seems more appropriate.

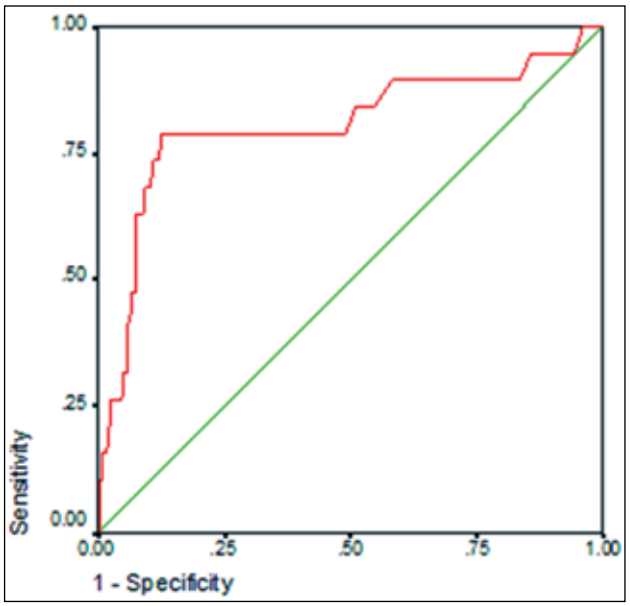

Figure 3. Receiver-operator characteristic [ROC) curve for cut-off value for SH and mortality

Thus, the cut-off values for SH are different for patients with and without previously diagnosed DM, being 18.0 mmol/L and 8.55 mmol/L, res-

pectively. The first one is more than twice as high as the second, which is a huge difference, and leaves little doubt about whether we should use one or two cut-offs.

If we use the same cut-off value (8 mmol/L) for all AMI patients, than sensitivity in patients with known DM would increase form 64% to 93%, but specificity would decrease from 75% to 18%, leading to worse accurity.

5. In-hospital mortality of patients with SH vs without SH in groups with and without known DM

Using ROC analysis, we found the best cut-off value for SH in AMI patients *with known DM* was 18 mmol/L. Patients with known DM with admission glycemia ≥18 mmol/L had significantly higher in-hospital mortality (9/35 patients, **25.71**%) in comparison with patients with known DM with admission glycemia <18 mmol/L (mortality 5/81 patients, **6.17%**), OR=3.91 (1.09-14.65) and RR=3.31 (1.18-9.28), Fisher exact two-tailed P=0.0338 (Figure 4).

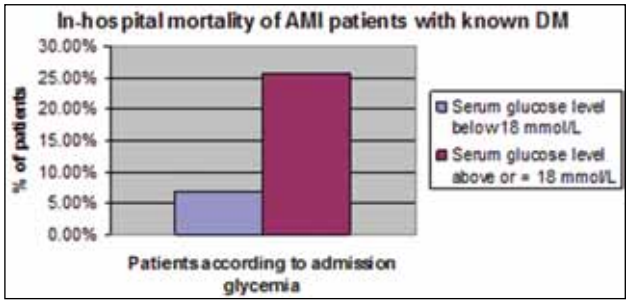

Figure 4. In-hospital mortality of AMI patients with known DM

Using ROC analysis, we found the best cut-off value for SH in AMI patients *without known DM* was 8.55 mmol/L, but we preferred to use 8.0 mmol/L, because of convenience and the results of numerous studies. Our patients without SH had significantly lower in-hospital mortality (4/299 patients, **1.34**%), as compared to patients with SH (mortality 15/85 patients, **17.65**%), OR=0.06 (0.02-0.21) and RR=0.08 (0.03-0.22), Fisher exact two-tailed P=0.0000001 (Figure 5).

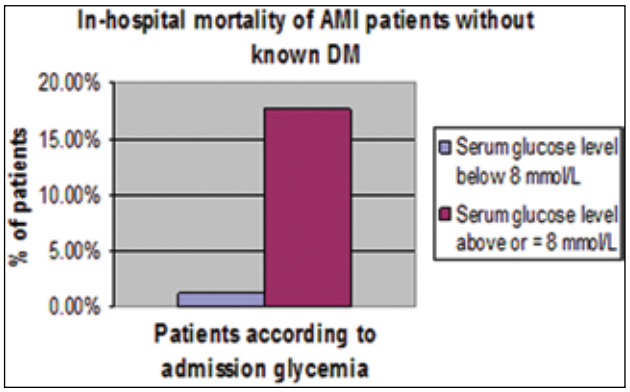

Figure 5. In-hospital mortality of AMI patients without known DM

Discussion

The important finding in our study of 500 AMI patients was: ROC curve -derived cut-off value for admission serum glucose concentrations ("stress" hyperglycemia) regarding in-hospital mortality was more than twice higher in patients with known DM (18.0 mmol/L) versus without known DM (8.55 mmol/L). Thus, we confirmed what is logical, but regularly forgotten: there should not be the single cut-off value for SH in all AMI patients.

Hyperglycemia in AMI may not be just an epiphenomenon of the stress response mediated by cortisol and noradrenaline [5], because the use of insulin to lower glucose concentrations decreases mortality in patients with DM who have AMI [10]. The prevalence of admission hyperglycemia in is high: it ranges from 25% to ≥50% of patients admitted with ACS [1]. SH was shown to work well as a prognosticator, despite (almost) all papers in last decade used **single cut-off value** as a threshold value for SH for all AMI patients analyzed [1,11,12,13,14,15].

One of the rare exceptions was the paper from **1989** by Sewdarsen et al, who used cut-off values of 8 mmol/L for patients without DM and 11 mmol/L for patients with DM [16]. Indeed, it does not seem logical to use the same cut-off value for SH in AMI patients with and without known (previously diagnosed) DM. Namely, known DM is for sure *pathologic* state, while the other patients were previously considered *healthy* -as far as glycoregulation is concerned. For instance, glycemia of 10 mmol/L is very high for previously euglycemic person, but not that rare in patients with DM. In additi-

on to common sense, there is a strong argument that different cut-off values for blood glucose should be used for SH in patients with known DM vs other AMI patients. As expected, the average glycemia is higher in patients with known DM versus other AMI patients, or there are more patients with DM among hyperglycemic ones [17,18].

Meta-analysis shows that for patients without previously diagnosed DM, cut-off value for SH was usually 8 mmol/L [5], as well as in many other studies [14,16,19,20] or ≥ 7.8 mmol/L, [21] or ≥ 7.77 [22], and it seems reasonable.

For patients with known DM the cut off was usually 10 mmol/L [5] and we founded 18 mmol/L, due to numerous methodologic reasons (definition of AMI, number of patients studied, less difference in mortality in patients with known DM in various glycemia ranges, etc).

Indeed, we need simple, widely available, easily and quickly to obtain prognosticators, especially for emergencies like AMI. SH seems to be promising candidate, but needs consensus and some improvements – as the one we suggested.

Limitations of the study: It is possible that not the same guidelines for the diagnosis of DM were used by endocrinologists during the whole 5 years period (guidelines have been changed). Also, it is possible that not all endocrinologists followed the same criteria for the DM diagnosis at the single point of time (time to adopt new guidelines for DM diagnosis might differ among endocrinologists). However, it does not seem likely that this might influence our results and conclusion substantially.

Conclusion

Two different cut-off values should be used for SH in AMI patients with and without known DM.

Acknowledgement

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Investigation of life quality in patients with implant-retained total lower denture

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Abstract

Introduction: In some cases, particularly in the elderly, the process of resorption after teeth extraction results in decrease of height and width of the alveolar ridge. Reduced supporting surface is inevitably associated with decreased retention and stability of the total lower denture. Most recently, application of titanium endosteal mini implants proved highly applicable in overcoming the unfavorable anatomical conditions, revealing very good results in a view of stability of total lower dentures.

The aim: The main goal of this research was to establish whether application of mini implant systems aimed at improving stability and retention of total lower dentures affects the quality of life of toothless patients.

Material and methods: The research is designed as a prospective clinical study conducted at the Clinic of Dentistry of Vojvodina, Faculty of Medicine Novi Sad. The investigation encompassed twenty patients ageing 63 to 76, both males and females. The criterions for inclusion of patients in the study were as following: total toothlessness of the lower jaw with pronounced resorptive changes in the alveolar ridge and narrow band of attached gingiva, as well as existing old lower denture. For each patient, new total lower acrylic denture was created according to standard prosthetic protocols. After making dentures, each patient received four mini dental implants with a *diameter* of *1.8 mm* and a *length* of 13 mm

Results: The obtained results strongly indicated absolute advantage of total dentures retained by mini implant systems according to all criteria investigated.

Discussion and conclusion: In toothless persons, especially in the elderly, application of mini implant systems provides an additional stability of mobile dentures, what makes their lives much more comfortable

Key words: mini dental implants, total lower denture, retention, quality of life

Introduction

Total lower denture does not only replace the missing teeth, it has to provide substitute for a range of supporting tissues diminished due to resorption process, to re-establish the original relations in jaw region, to support the surrounding soft tissues that had lost their natural support, and, also to be unobtrusive and discrete substitution of lost functions. (1) In some cases, especially in the elderly patients, resorptive changes after tooth extraction result in decrease of height and width of the alveolar ridge. Considering that supporting surface is reduced, decrease in retention and stability of total lower denture is suspected. Most recently, application of titanium endosteal mini implants proved highly applicable in overcoming the unfavorable anatomical conditions, revealing very good results in stability and retention of total lower dentures (2,3).

Mini implants belong to the group of endosteal, titanium, self-drilling, single-phase implants. They are similar to conventional implants, yet being smaller in size and made of titanium admixture (not pure commercial titanium). In most cases, their application is aimed at stabilization and retention of mobile prosthetic construction (4).

Initially, mini dental implants (MDI) were used mainly as a support for temporary prosthetic substitutes during osteointegration of conventional, full-size implants. It was generally considered that MDI could not endure masticatory forces on a denture retained with implants (5, 6). Some recent research revealed that MDI are well integrated into the bone structures of jawbones, and that this minimally invasive implantation method is highly successful and applicable for stabilizing and retention of mobile prosthetic works, particularly the total lower dentures (7, 8).

AIM

The aim of this research was to investigate whether application of mini dental implant systems for stabilizing and improving retention of the total lower denture affects the quality of life of toothless patients.

Material and methods

The research was designed as a prospective clinical study carried out at the Clinic for Dentistry of Vojvodina of the Faculty of Medicine Novi Sad. The research encompassed twenty patients of both sexes, aged between 63 and 76. The criterion for patients' inclusion in the research was total toothlessness of the lower jaw with pronounced resorptive changes in the alveolar ridge and narrow zone of attached gingiva, as well as existence of an old lower denture. Each patient received new full acrylic denture according to current prosthetic standards. After creating the dentures and obtaining the consent from an internist, placement of four mini implants, with a diameter of 1.8 mm and a length of 13 mm, was performed in all patients according to the established surgery protocol.

Stages of surgical protocol

1. Informing the patient about dental implant system
2. Anamnesis, clinical examination and RTG diagnostics
3. Establishing indications, selecting appropriate implants, determining the precise location for the implant
4. Obtaining patient's written consent for surgical procedure
5. Local anesthesia
6. Forming a bone bed in the jawbone to accommodate the dental implant applying a pilot drill directly through the gingiva and the bone - the drilling is performed to only *half* the *implant length* using (a physio-dispenser at drilling speed of around 1000 rpm). Four mini implants are placed in a lower jaw at the place of lower lateral incisors and lower primary premolars.
7. Extracting of mini implants from the sterile package and its gentle manual screwing via plastic cap (mini implants have a self drilling, i.e. self-cutting thread pattern)
8. Continuing of screwing using a special set containing three ratchet wrenches, each of them producing increased screwing force. In case of pronounced resistance, make a pause of about 20 seconds (because of horizontal force on bone trabeculae) to prevent compromising of bone circulation, and than carefully continue the procedure. Implant is screwed until polished part has reached the level of alveolar ridge.
9. Control RTG scan

After completed surgical treatment, prosthetic stage was performed including adjustment of the denture to the current condition, following the strictly defined sequence:

Prosthetic protocol

1. Covering the neck of the implant with silicone blockers to prevent the self-binding acrylic from flowing under the implant head
2. Positioning metal caps onto the inserted implants
3. Making a bed in the denture, which fits to metal caps
4. Mixing the self-binding acrylic and pouring it into the denture defects
5. Placing of denture by the use of liquid self-binding acrylic onto the metal caps and implants
6. After hardening of the acrylic, removing the denture off the implant, while metal caps remain in the denture body
7. Removing of excess acrylic, processing and polishing of the denture
8. Delivery of the denture to the patient

After completing the treatment, patients were scheduled for control examinations at two-week intervals during following two months. Three months after the treatment, the patients received questionnaires comprising four questions pertaining to denture comfort, retention, chewing ability and speaking function before and after placement of mini dental implants.

The answers were scored with grading scale 1, 2 and 3 points, whereas 1 = dissatisfied, 2 = acceptable and 3 = highly satisfied.

All answers reflected the strictly subjective sensation of patients. After data collection, statistical analysis was performed.

Results

After completed investigation, collection and analysis of the data, the following results were obtained:

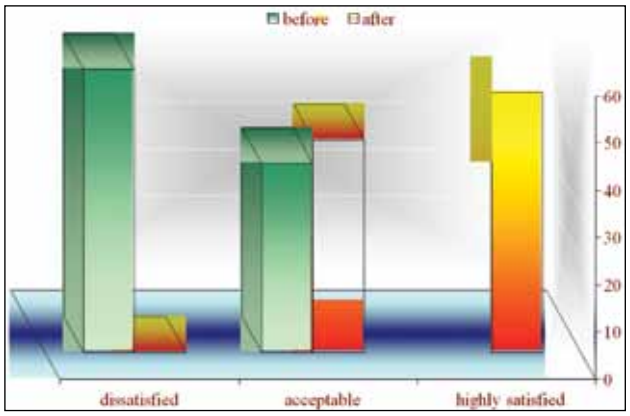

Chart 1. Graphic display of the obtained answers on denture comfort before and after implantation procedure

Analysis of answers to the question on denture comfort (Chart 1) revealed the following results: 60% of respondents stated that they were completely dissatisfied with the comfort of the old denture, whereas 40% evaluated the situation as acceptable. After placing the MDI and new full denture, 45% of respondents evaluated the condition as acceptable, and 55% as highly satisfied.

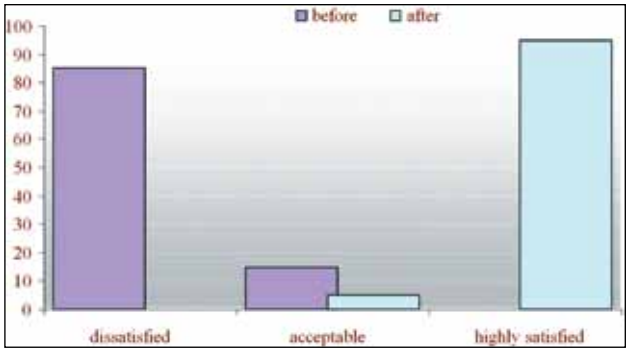

Chart 2. Graphic display of the obtained answers on denture retention before and after implantation procedure

Analysis of answers to the question on denture retention (Chart 2) revealed the following results: 85% respondents were previously completely dissatisfied with retention and stability of total lower denture, whereas 15% described the condition as acceptable. After placement of MDI and new full denture, 5% of respondents estimated their condition as acceptable, whilst 95% were highly satisfied with the retention of their new lower denture.

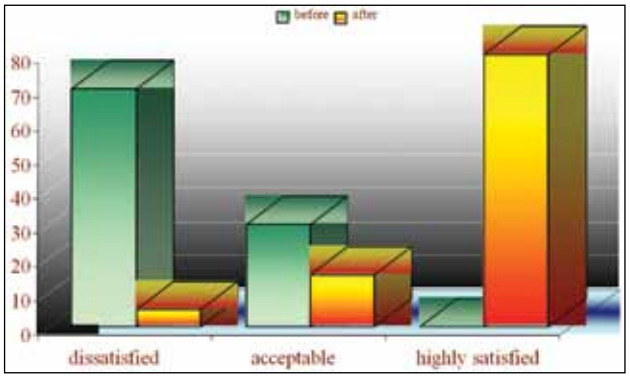

Chart 3. Graphic display of the obtained answers on chewing ability before and after implantation procedure

Analysis of answers to the question on denture retention (Chart 3) revealed the following results: 75% of respondents estimated their chewing ability with old full denture as completely dissatisfactory, and 15% as acceptable. After placing the MDI and new total denture, only 5% of patients were dissatisfied, 15% described the condition as acceptable, whereas 80% of respondents were highly satisfied with their chewing ability.

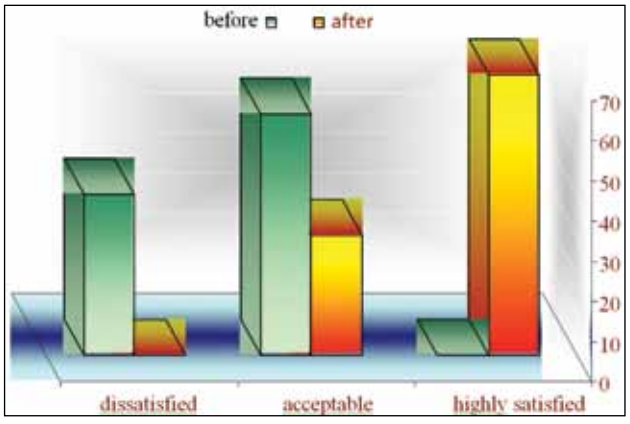

Chart 4. Graphic display of the obtained answers on speaking function before and after implantation procedure

Analysis of answers to the question on denture retention (Chart 4) revealed the following results:

40% of respondents described their speaking function with old denture as completely dissatisfying, and 60% as acceptable. After placement of the MDI and new total denture, 30% of respondents estimated the new condition as acceptable, whilst 70% of them were highly satisfied with their speaking function.

Table 1. Statistical significance of differences for the four investigated parameters

Roy	c	R	F	p	k.dsk
Denture comfort	.605	.759	51.722	.000	.012
Retention	.693	.962	468.667	.000	8.847
Chewing ability	.643	.841	91.545	.000	.092
Speaking function	.612	.775	57.000	.000	.047

Statistical analysis of the data (Table 1) indicated statistically significant differences in all investigated parameters. Comprehensive analysis revealed the greatest difference in terms of retention of the total lower denture before and after placement of MDI, strongly suggesting that denture retention with MDI is distinctively better. Somewhat less pronounced differences were found regarding improved chewing ability, speaking function, whilst the lowest difference value was obtained regarding denture comfort.

Table 2 reflects the pronounced homogeneity of given answers pertaining to the condition before and after placement of dental implants for all four investigated parameters. Before placement of MDI, general dissatisfaction with current dentures was evident in all respondents. After positioning of MDI and creation of new total lower denture an overall improvement in a view of fulfilling all requirements for a successful rehabilitation of dentoalveolar structures.

Discussion

The main goal of this research, designed as a clinical study, was to compare the quality of life, satisfaction with prosthetic substitute and chewing efficacy in patients with conventional full dentures with same parameters in same patients after placement of mini titanium implants. The implants were positioned into the interforaminal region of alveolar ridge of the lower jaw with an aim of improving stability and retention of total lower denture. Major and well-established problems posed by total dentures are retention, stability and chewing ability. Furthermore, patients with full dentures often face problem of self-confidence and psychosocial status (9).

Statistically significant difference in patients' answers before and after placement of MDI was established for all four items: comfort, retention, chewing ability and speaking function (Table 1).

Inability to properly chew different kinds of solid food is very frequent in most patients with full dentures (9). Oliveira and Frigerio reported high risk of undernutrition and development of digestive and cardiovascular system diseases in persons with full dentures (10). Our research revealed that patients with implant retained and stabilized total lower dentures exhibited significantly improved chewing function. Also, our patients did not report any problems associated with improperly masticated food.

Numerous authors, such as Award et al., investigated quality of life in patients with mini dental implants and their results are consistent or similar to those obtained in our research (11).

Conclusion

Te results obtained in our research indicated highly improved quality of life in patients rehabi-

Table 2. Characteristics and homogeneity of investigated parameters before and after implantation procedure

	before	after	dpr %
Retention	dissatisfied*	highly satisfied*	98.322
Chewing ability	dissatisfied *	highly satisfied*	1.022
Speaking function	dissatisfied *, acceptable*	highly satisfied*	.522
Denture comfort	dissatisfied *	highly satisfied*	.133
n/m	20/20	19/20	
%	100.00	95.00	

litated with total lower dentures retained with dental implants as compared to the previous therapy using conventional full dentures. High statistical significance was established in a view of comfort and retention of total lower denture stabilized with MDI in comparison with previously used dentures. All patients participating in this research reported surprising improvements in a view of chewing function and speaking ability after prosthesis stabilization with mini dental implants. All this strongly suggests that MDI are highly positive method, which should be indispensably applied in the everyday practice, taking into consideration valid surgical and prosthetic protocols. Thus, the *quality* of *life* of toothless patients will be improved *to a great extent*.

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Toxicity testing of prosthetic metacrylates

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Abstract

Introduction: Prosthetic methacrylates belong to the group of biomaterials due to their role of morphological and functional substituent in the oral cavity. Some toxic components of these materials may lead to adverse local and even systemic changes.

Aim: The purpose of this study was to examine the cytotoxicity of four different denture base metacrylic resins.

Materials and methods: The research included two heat-polymerized and two cold-polymerized denture base metacrylic resins. *HeLa* cells were cultured in different concentrations of prepared material samples' extracts. The extracts were obtained by incubation of material in nutritive medium in the period of one, three and five days. Cytotoxicity was tested by using the tetrazolium bromide reduction assay (MTT assay), as well as by cell counting and analysis of their morphological characteristics under invert microscope. The amount of residual monomer in the extracts of tested materials was determined by means of high pressure liquid chromatography (HPLC).

Results: The results pointed to a slight to moderate cytotoxic effect which the tested metacrylic resins had on viability and proliferation in cell culture. With the increment of metacrylic extract' concentration and duration of extraction period cytotoxicity significantly increased and phenotype changes were more prominent. Concentration of residual monomer in the extracts of tested metacrylates proportionally increases with the duration of extraction period.

Conclusion: Cold-polymerized metacrylic resins manifested higher cytotoxical effect than heat-polymerized metacrylic resins. For the sake of residual monomer decrease, it is recommended that new or repaired metacrylate denture be immersed in the body temperature water before use in the period of one to five days.

Key words: cytotoxicity, in vitro, residual monomer, metacrylic resins

Introduction

The number of denture wearers is rapidly increasing as the number of elderly people is continually growing[(1)]. Metacrylic resins have been used for producing the base of dentures since 1937[(2)]. What makes them irreplaceable in their indicated area are the following qualities: proper mechanical characteristics, small specific weight, transparency, easy processing and the possibility of repairing[(3,4)]. Despite the fact that the materials are biologically accepted, reactions can often be noticeable where metacrylate resins come in contact with oral mucosa[(5,6)]. Pathological changes are even more recognizable with patients whose mucous membrane has already been through some inflammatory process, infected or damaged by nutritional or medication factors[(7)]. The reaction of oral mucosa is most often connected to methyl methmetacrylate (MMA) which hasn't been completely polymerized (residual monomer-RM) [(8-10)]. Potentially toxic substances may include formaldehyde, benzoic acid, dibutyl phthalate and some other additional components of metacrylic resin[(11-13)]. Their amount varies from the type of metacrylic, the polymerization period and denture base thickness[(10,14)]. In spite of the manufacturers' assertions of the impossible toxic reactions, these substances are capable of departing the denture base and diffusing into saliva. This may cause a risk of chemical irritation of oral mucosa which is exposed to these substances' influence for a long period of time[(15)]. The highest level of potential toxic substances release is expected immediately after denture insertion in the oral cavity[(9)].

In the initial evaluation of dental materials' biocompatibility, *in vitro* tests of cytotoxicity are applied in most cases[(16)]. These tests include examinati-

on of materials' biological features on cell cultures (ISO 10993-5) [17]. The choice of cell lines depends on the material type and material preparation. As the potentially toxic substances are released from the metacrylic resins, their extracts are used for the toxic effect testing [15]. An important role in these *in vitro* examinations of cytotoxicity belongs to the test based on the reduction of the yellow tetrazolium salt under the influence of mitochondrial succinate dehydrogenasis (MTT assay).

In vitro experiments have advantages over studies on experimental animals. They can be reproduced under identical conditions, controlled by each parameter; they are performed in a relatively short period of time and with less expense [14,18].

The objective of the study was to examine the cytotoxicity of four different denture base metacrylic resins *in vitro*.

Materials and methods

Tested materials

Simgal (cold-polymerized) with 10ml/17g Polymer/monomer ratio (V/Wt) and Manufactured by Galenika (Serbia); Triplex Cold (cold- polymerized) with 10ml/13g (V/Wt) by Ivoclar Vivadent (Liechtenstein); Biocryl RN (heat-polymerized) with 10ml/22g (V/Wt) by Galenika (Serbia) and Triplex Hot (heat-polymerized) with 10ml/23.4g (V/Wt) ratio by Ivoclar Vivadent (Liechtenstein) were analysed. The materials examined and their manufactures and polymerization type are shown in table 1. Aluminum molds, 10 mm in diameter and 1 mm thick, were used for this purpose. These dimensions were chosen due to their ability to enable complete polymerization of metacrylic materials. At the same time, they represent the minimum denture base thickness.

Polymerization of cold-polymerized metacrylates was performed at the room temperature and lasted for 15 minutes without pressure. Heat -polymerized metacrylates were prepared in boiling water bath (GFS, Germany) for 30 minutes, after which molds gradually cool to room temperature.

Cell culture

The material was examined on permanent human cell line *HeLa S3* (American Type Culture Collection, Rockville, MD, USA). The cells were cultured in DMEM (Dulbecco's Modified Eagle's Minimal Essential Medium, PAA Laboratories GmbH) supplemented with l-glutamine, penicillin-streptomycin (100 IU/ml) (PAA Laboratories GmbH) and 10% of foetal bovine serum (FBS) (Gibco, UK). Each experiment with cells was done in the vertical aseptic chamber (Bioair Instruments, Italy). The cell culture was maintained in an incubator (Binder, USA) in a fully humidified atmosphere with 5% CO_2 at 37ºC.

Indirect contact test

For examining the cytotoxic effect, metacrylic extracts produced by incubation in cell medium in proportion of 0.1 g material / 1ml medium (ISO 10993-5: 1999) [17]. The extraction of the samples was performed in closed plastic vials in water bath at 37±1ºC for one, three and five days. The extracts' concentrations amounted to: 10%, 25%, 50% and 100%. The values of effective extracts' concentration were double diminished, because the extracts were being added to the same volume of the.

All extracts were sterilized by filtration through 0.2 μm filter.

The cells were placed in sterile tissue culture plates with 96 wells. In each individual well, 2 x 10^4 cells in 50 μl of medium were placed and 50 μl of four metacrylic resins' extracts were added, all of different concentrations. The control consisted of 2 x 10^4 cells in 100 μl of cell medium. The experiments for each material were done in a quadruplicate. The cells were incubated for 3 days in a fully humidified atmosphere with 5% CO_2 at 37ºC.

MTT assay

The medium was removed from the incubated cell cultures. Cells were washed with 100 μl of PBS (phosphate-buffered saline) and 10μl of MTT was added. After the four hours of incubation at 37ºC, the newly formed crystals of formazan were dissolved with 100 μl of isopropanol. Spectrophotometrical measuring of MTT reduction was performed at 540 nm in a microplate photometer for 96-well plates (Multiskan Ascent Nº354, Thermo Labsystems, Finland). Survival rates of the controls were set to represent 100% proliferation. The positive control wells consisted of untreated cell cultures. The results were presented as percentage cell viability and proliferation in relation to control.

The experiment was performed three times.

Statistical analysis of data was performed by analysis of variance (ANOVA) (statistical software program SPSS 15.0). Levels of $p<0.05$ were considered to be statistically significant. Cytotoxical differences were based on the type of material, duration of extraction period and extracts' concentration.

Cytotoxicity rate was based on cell viability and proliferation, relative to control, as: non-cytotoxic >90%, slightly cytotoxic 60-90%, moderately cytotoxic 30-59% and severely cytotoxic <30% of cell viability and proliferation [19].

Microscopic analysis of growth and morphology of cell culture

The growth of cells was also evaluated based on density and counting under invert microscope. (Observer Z1, Carl Zeiss, Germany). The cells in twelve fields were counted for each tested sample after three-day cell cultivation in different extract concentrations of tested materials. According to morphology cells were classified into adherent and non-adherent phenotypes. The cells that separated from the base were counted as dead.

Determination of RM in extracts of examined metacrylates

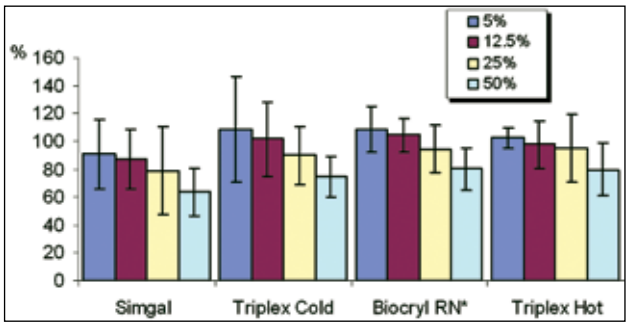
High Pressure Liquid Chromatography (HPLC) under high pressure was used for determination of potential toxic RM in 50% extracts of the tested metacrylates.

The device used was *Agilent 1100 Series* (SAD), with DAD detector and analytical column XDB ZORBAX CN 4.6 x 250 mm, 5µm. The mixture of acetonitrile and water 70/30 v/v was used as eluent. The flow of mobile phase was 1 cm^3/min. The used volume of sample injection was 10 µl. The column was thermostated at 25°C, and wave length was 205 nm of detection.

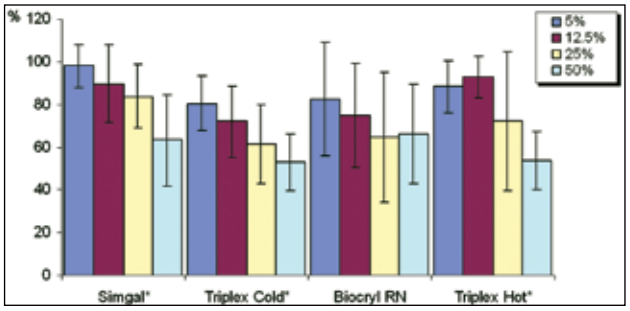
Calibration curve was made by means of series of standard MMAsolutions in concentration of 0.0192 to 1.228 mg/cm^3, whereby MMA with 99% clarity was used (retention time: Rt = 3.143 min, wave length of detection: $\lambda = 205$ nm) (Fluka, SAD).

Results

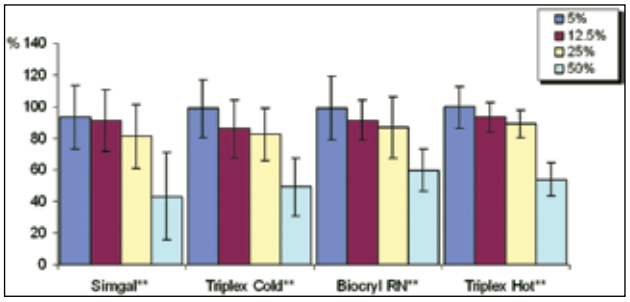
The viability and proliferation of cell culture in relation to the material type, length of extraction and its concentration is illustrated in Figure 1 to Figure 3.



*Statistical significance: *p<0.01*
Figure 1. Viability and proliferation of HeLa cells in relation of metacrylic type and extract's concentration after one day extraction period



*Statistical significance: *p<0.01*
Figure 2. Viability and proliferation of HeLa cells in relation of metacrylic type and extract's concentration after three days extraction period



*Statistical significance: **p<0.001*
Figure 3. Viability and proliferation of HeLa cells in relation of metacrylic type and extract's concentration after five days extraction period

The viability and proliferation of *HeLa* cells negatively correlates to the growth of metacrylate concentration and with the extraction period increase of samples in the medium this statistically significant correlation becomes more prominent. After five-day extraction it was noticed that all metacrylates had significant decrease of viability

and proliferation of *HeLa* cells with the increase of their concentration ($p<0.001$).

The obtained mean percentage values of reduced MTT for all tested concentrations in relation to different duration of extraction period showed greater decrease of cell proliferation and viability in case of cold-polymerized metacrylates.

The tested extracts of metacrylic materials showed mild to moderate toxic effect to cell culture.

The percentage of living cells in different concentrations of thre-day extracts of different materials relative to control is presented in Figure 4. The lowest cell viability of 89.5% was observed in the presence of Triplex Cold extracts at effective concentration of 12.5%. Similar degree of toxicity was achieved only at effective concentration of 50%.

In the low effective concentrations of material extracts (5%) cells show common epithelial one layer growth of polygonal and prismatic shape. In the cultures that grew at higher concentrations cells with dendrite extensions are very often noticed. These cells were elongated, fibropbast-alike and had one, two, or three extensions. The appearance of cells and their morphological changes are presented in Figures 5.

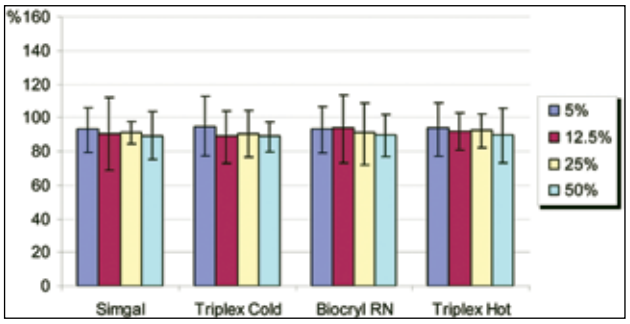


Figure 4. Living cells percentage in different concentrations of different material extracts in comparison with control.

Concentration of RM, calculated by means of HPLC in extracts of tested metacrylates in relation to material type and duration of extraction period is presented in Figure 6.

Discussion

Massive clinical usage of dental materials requires thorough examination of their biological features. Therefore, examination of metacrylic materials' cytotoxicity *in vitro* is an interesting scientific area. Due to these facts, permanent cell cultures

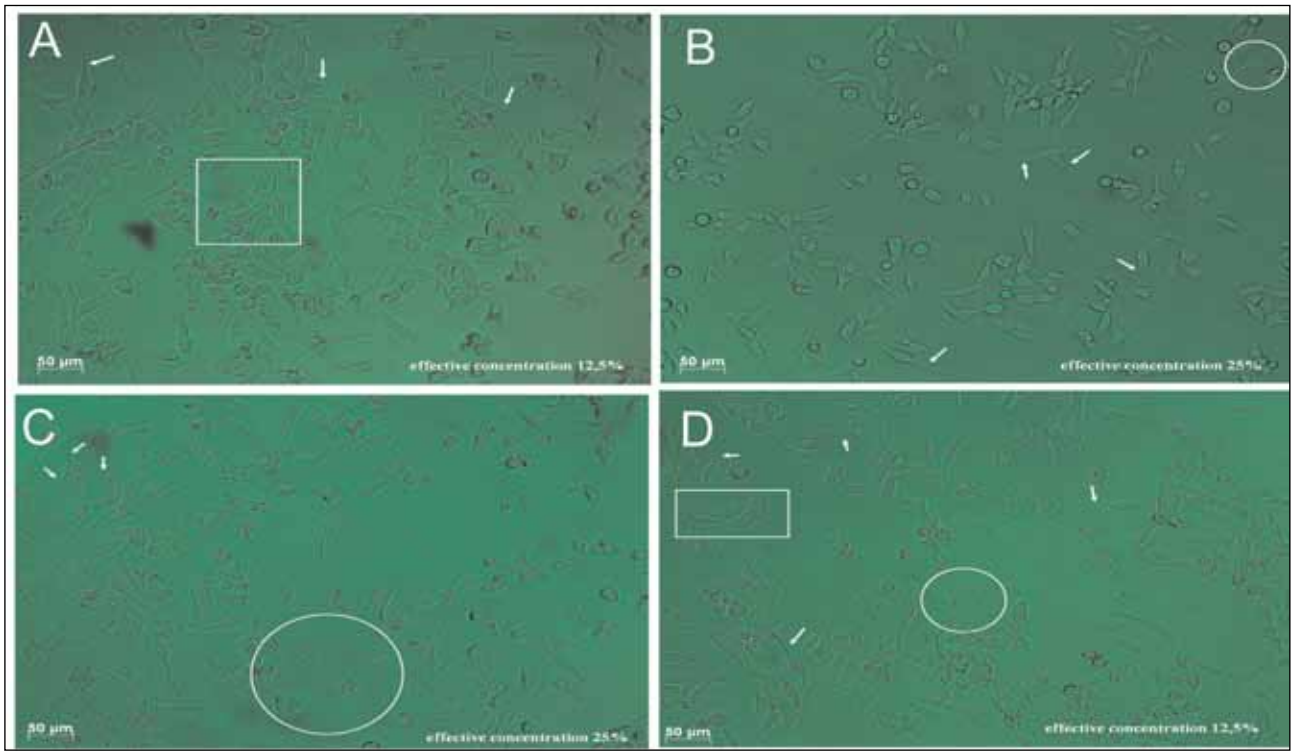


Figure 5. Phenotype and cell density changes of HeLa cells in different extracts
A) Simgal - increased occurrence of phyllopod sequences, B) Triplex Cold - increased occurrence of phyllopod sequences C) Triple Hot - larger number of stellate cells appears, D) Biocryl RN extracts- increased numbers of changed cells with dendrite extensions. (Magnified 40 x).

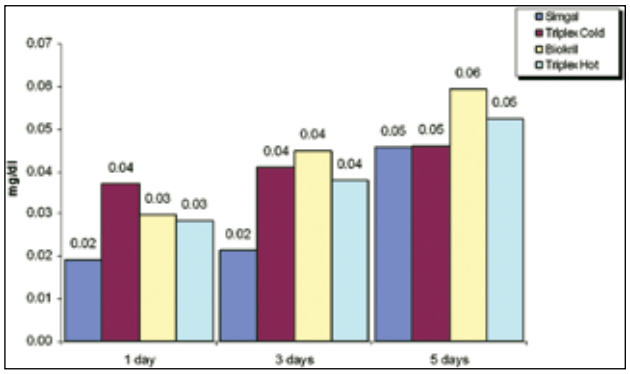


Figure 6. Concentration of RM in extracts of tested metacrylates in relation of extraction period

and biological testing systems are very important for several reasons: cells are easy to grow in a culture, there is no variability to be connected to different tissue donors, and there is a possibility of re-performing a test under identical conditions[18].

This study has been examining the effect of the denture base metacrylic resins on permanent *HeLa* cell line. This cell line was chosen on the ground of its similarity to epithelial cells of the oral mucosa. As the dentures are in contact with the mucous membrane of the oral cavity, the effects on examined cell culture are considered to be clinically relevant. Due to their extreme sensitivity, the possible chemical influence of the metacrylic resins upon the viability could be notified accurately[20].

The MTT assay is characterized by accumulation of blue formazan in the cell culture. This test was applied in the methodology of this study, meaning that a direct proportionality has been noticed between the number of the viable cells in culture and intensity of the blue colour. The use of MTT test was indicated in case of testing the material containing potential toxic substances soluble in physiologic solutions, which represents indirect and more widely used way of establishing their potential toxicity[21]. The extraction period lasted for one, three or five days aiming at considering the rhythm of release of potentially toxic substances from material into saliva.

The problem of relevant concentration of applied material arises in eastablishing correlation between existing conditions in the oral cavity and *in vitro* investigations[22]. Different concentrations of the obtained extracts were examined regarding heterogenous structure and different solubility of potentially toxic substances of tissue conditioners[23].

Toxic effect of the examined extracts of metacrylates was more prominent in the function of increasing concentration and duration of extraction. After five-day extraction period statistically significant growth decrease and viability of *HeLa* cells with the increase of extract concentration was noticed in all examined metacrylic extracts. Variations in the obtained results may be explained by heterogenous material structure and different velocity of release of toxic substances into surrounding structures, since inhibitory effect of some toxic substances of the examined ingredients may be dependant on extract concentrations.

The results of MTT test and cell counting under invert microscope pointed at a slight to moderate toxic effect of tested metacrylic resins' on cell culture. It is in accordance with with findings of Huang et al.[21]. Contrary to this, Jorge et al. didn't approve of metacrylic resin's cytotoxicity in the same conditions[13]. The findings of Tsuchiya et al., Cimpan et al. and Campancha et al. pointed to the cytotoxical effect despite not having used the same methodology[15, 22, 23]. Differences between the obtained results can be attributed to different chemical components of the metacrylic resins, to the different types of cell culture and to the difference of the tests themselves [23].

The extract concentration increase of the examined metacrylates leads to phenotype changes of *HeLa* cell culture relating to decrease of epithelial organization, appearance of dendrite extensions and subsequent transformation from polygonal into stellate cells.

It has been assumed that RM was one, if not the crucial, factor, which brought about the demonstration of the cytological effect. It is well-known in scientific literature that a certain amount of RM remains incorporated in a polymer after the polymerization reaction is completed. Then, it starts being continually released in saliva and it is most intensified several days after insertion of denture in the oral cavity[8,23]. As the extraction time of metacrylates in this study lasted for one, three and five days a certain amount of RM was released during that period and affected the growth of cell culture afterwards. The longer extraction period duration, the higher RM amount was in all extracts of the examined materials. On the other hand, their concentration in the metacrylate itself decreases

lowering potential toxicity of dentures. The obtained results are in correlation with the findings of other authors[12,19,21].

From the general stand of point, the least survival of cells is recognized with the cold-polymerized metacrylic resins' extracts. This result has been expected because of the fact that RM is being released from the samples of these resins in larger concentrations than with the heat-polymerized metacrylic resins [21,23-25]. This may be explained by more complete polymerization of heat-polymerized metacrylates taking place at the temperature close to the point of glass transition temperature. Reduced mobility of MMA molecules at the temperature of polymerization of cold-polymerized metacrylates (around 70 ºC) results in greater RM amount[26].

Nevertheless, allergic and immune reactions cannot be perceived during *in vitro* experiments[6]. To get a more complete picture of their biocompatibility, it is obligatory to do some specific *in vivo* experiments, which could be a topic of some further research. The overall results obtained from *in vitro* and *in vivo* experiments could be a step to improvement of the quality of examined materials.

Conclusion

1. Heat and cold-polymerized denture base metacrylates showed mild to moderate inhibitory effect to viability and growth of *HeLa* cells *in vitro* conditions. Cold-polymerized metacrylates were more toxic than heat-polymerized acrilates.
2. The increase of extract concentration of all examined metacrylates and extraction period viability and proliferation of *HeLa* cells significantly decresed, and phenotype changes were more prominent.
3. Concentration of residual monomer in extracts of examined metacrylates increased proportionally with the duration of extraction period. For the sake of residual monomer decrease, it is recommended that new or repaired metacrylate denture be immersed in water before use in the period of one to five days.

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Fat reduction without changing muscle mass of women as a result of exercising with weights

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Abstract

Introduction/Aim - Morphological characteristics of women are biologically conditioned, but they are also liable to influences of environment, lifestyle, social status, type of job, etc. Apart from these factors, there is another strong one which influences the morphological space of women and that is physical activity. The aim of this research was to establish whether the individuals will manage to lose the surplus of fat tissue and, at the same time, keep the muscle mass on the same level, and all that after three months of experimental treatment which included exercising with weights.

Methods – The research included 120 individuals, aged 20 to 24. The following items were measured: body height, body mass, skin folds and sizes. Fat tissue and muscle mass values were calculated by means of measured values of skin folds, size, body mass and height, and incorporated into a mathematical formula. The method of exercising which was used for this purpose was exercising with weights and stimulators.

The results indicated that the value of F – test was proved to be statistically significant for the variable of the percent of fat tissue (%F), whereas for the variable of percent of muscle mass (%M) the difference was not statistically significant and it was on the level of 0.05.

Conclusion – We can conclude that this kind of model of programmed body exercising of women brought to satisfactory results, in a sense of proportional reduction of fat tissue and total body mass, without increasing the muscle mass.

Key words: station method, weights and simulators, fat tissue

Introduction

As people go through the processes of growing up and developing, reaching maturity and getting old, there are some changes in their body composition, as well as anthropometric characteristics. The changes occurring throughout life are common for all people, but they can also be a consequence of genetic and environmental factors, as well as the habits which include healthy diet and exercising (Heymsfield, Lohman, Wang and Going, 2005).

Awareness of the significance of exercising and its positive influence on the total anthropological and health status has increased. The expansion of fitness and wellness clubs adds to that fact. Taking women into account, it can be concluded that they exercise more and more in order to achieve better psychophysical abilities. Aging and the consequences that come as a result of it can be 'postponed' to a great extent by improving motor and functional abilities, together with morphological characteristics, which is caused by applying adequate recreational contents (Mišigoj–Duraković, 2006). Morphological characteristics of women are biologically conditioned, but they are also susceptible to the influence of the environment, lifestyle, social status, type of work, etc. Apart from these factors, a very strong factor which influences the morphological space of women is physical activity. Taking part in sports-recreational exercises is becoming one of the crucial factors for forming and maintaining a strong, healthy woman (Sharkey and Gaskill, 2008).

The women's participation in labor power dramatically increases. Based on the protection of the body composition. It is reported that the women has a positive effect on the physical fitness without making any physical activities when they take place in the work life. The QoL is proportional to

participation in health promoting activity (sport, exercise, recreation etc.) and provided free time services (Arslan1, Savucu, Ceviz, 2011).

The period of late adolescence of women includes synchronization of motor and functional abilities, as well as the body composition, which starts at the age of 16 and ends when girls turn 21 (Obradović, 2008). Taking onto account the amount of individual components of body composition, there is a sexual dimorphism. Women have a significantly higher percent of adipose tissue in the total body composition than men. The ratio between adipose and non-adipose tissue changes throughout life. The distribution of hypodermic adipose tissue has a tendency of accumulating it in the central part of a body, or on an abdomen, as well as lower and higher limbs, especially after the age of 30.

Physiology offers a lot of research into the influence of hormones on body composition of a person. We are especially interested in sex hormones, in the first place the difference between male and female hormones and specific traits which refer to their influence on the adipose tissue and muscle mass.

Male sex hormone (testosterone) has anabolic effects and owing to its influence on the increase of the muscle mass, men are called "a stronger sex". As a consequence, testosterone is responsible for the difference between muscle mass of men and women, in favour of men. Male sex hormone increases (up to 30% more) basal metabolism in comparison to the female sex hormone (estrogen). Female basal metabolism is lower anyway, since they have a higher percent of adipose tissue than men. That difference is lost when body mass is measured without adipose tissue. The decrease of the percent of adipose tissue and increase of the percent of muscle mass caused by exercising accelerate the basal metabolism as well.

Most quantitative data refer to healthy young men, since they were the subject of almost all measurements. Still, the measurements performed on women show that they require the same basic physiological principles as men, taking into account the difference in quantitative values which cause the differences in the size and composition of bodies. Generally speaking, the majority of quantitative values of women, such as the power of muscles, ventilation of lungs and heart volume per minute are the parameters directly proportional with the muscle mass and they are between two thirds and three quarters of values measured for men. On the other hand, when measurements are performed under the same conditions, a female muscle can achieve almost the same maximal strength of contraction as a male muscle, that is between 3-4 kg/cm². Owing to that, the greatest number of differences among the characteristics of muscles can be found in higher percent of male muscles caused by endocrine differences. Hormonal differences between men and women are certainly responsible for the majority of, perhaps even all, differences in sport abilities. Testosterone, excreted by testicles, has a strong anabolic influence, which means that it causes deposition of proteins all over the body. Female sex hormones, estrogens, possibly also add to the occurrence of the differences between men and women when sports abilities are taken into account. However, their influence is not as strong as the one from testosterone. It is a well-known fact that estrogens increase the deposition of adipose tissues of women (Guyton, 1999).

Adaptation of the cardiovascular system to a standard work or the work of a certain intensity, in the physiology of sport, represents a criterion of cardiovascular capacity, and physical ability of an individual in a broader sense of the word (Radjo et al., 2011).

Men develop strength and increase muscle mass much faster and easier than women, but that is significantly influenced by the above mentioned factors. Because of that men have a more developed musculature than women.

Women have a concept of the area for exercising with weights, popularly called "a gym", as a male territory. They are also afraid of losing their femininity by getting an increased scope of muscles. In a nutshell, they are afraid of counter effects in comparison to the ones they expect to get by exercising. One of the reasons for that is certainly the lack of knowledge about the problem, as well as neglecting it. Exercising in a gym mainly aimed at male population and all program and types of trainings are adjusted to their needs. It is necessary to avoid the habit of giving women the training program made exclusively for men.

The aim of this research was to establish whether the individuals will manage to lose the surplus of fat tissue and, at the same time, keep the musc-

le mass on the same level, and all that after three months of experimental treatment which included exercising with weights.

Method

Subjects

The research included 120 women, aged between 20 and 24, who studied at the University of Novi Sad (The Faculty of Medicine, The Faculty of Law and the Faculty of Philosophy) and who, at the time, did not train or exercise in fitness clubs. The research started on a bigger sample, but only the results of the women who took regular exercises were taken into account. At the end of the program there were 40 women in the experimental group. The control group consisted of 40 women as well.

Measurements

Taking anthropometric measures into account, besides height and body mass, skin folds and sizes were also measured. Height was measured by the means of anthropometry, while decimal scales were used for measuring body mass. John-Bull caliper was used for measuring skin folds, while sizes were measured by using a measuring tape. In order to achieve a greater reliability, skin folds were measured three times. First, all skin folds were measured in a row, followed by two identical actions. The choice of body parts where skin folds were measured, as well as the procedure of measuring, was in accordance with IBP. The measuring took place in the Laboratory for Functional Diagnostics, at the Faculty of Medicine in Novi Sad, and the following anthropometric variables were used:

1. Height (H-cm)
2. Body mass (BM-g)
3. Size of skin folds on an upper arm (SSFUAl-cm)
4. Size of skin folds on a forearm (SSFFl-cm)
5. Size of skin folds on a thigh (SSFT-cm)
6. Size of skin folds on a lower leg (SSFLL-cm)
7. Size of skin folds on an abdomen (SSFA-cm)
8. Size of skin folds on a back (SSFBl-cm)
9. Size of an upper arm (SUA1-cm)
10. Size of a forearm (SF1-cm)
11. Size of a thigh (ST-cm)
12. Size of a lower leg (SLL-cm)

The method of measuring according to Matiegka is mostly reprimanded because of its age (it is over 80 years old), as well as the fact that the values were established on corpses, which did not represent a standardized sample. The research was done on female students who did not train, since in 1921 the methods and formulas for measuring were not calculated taking athletes into account. Regardless of all that, Matiegka still gives good results compared to other methods Kutáč and Gajda (2009). The values obtained by measuring skin folds, body mass and height were incorporated in the mathematical formula according to Matiegka (1921), taken from (Jović, Perunović and Radivojević, 1982), and modified by (Stojiljković, Mitić, Mandarić and Nešić, 2005).

First, we calculated the percent of muscle tissues (%M) in the total body mass, followed by measuring percent of adipose tissue (%F) in the total body mass. The first step also included establishing the absolute values of a muscle component (M), according to the formula:

$$M = r^2 \times H \times k_3$$

Where k_3 is a constant value (obtained empirically) 6.5, r is a mean value of a diameter which is calculated using the formula which includes the measured values of the size and skin folds for individual segments of a body.

$$r = \frac{SUA_1 + SLA_1 + ST + SLL}{25,12} - \frac{SSFUA_1 + SSFLA_1 + SSFT + SSFLL}{8}$$

The ratio between the absolute value of a muscle component (M) and body mass (BM) is used for calculating the relative value of a muscle tissue (%M): %M=(M x 100)/BM

The next step included measuring the relative mass of adipose tissue (%F) and specific mathematical formulas were expended by a new anthropometric dimension – body surface (BS) cm^2, as well as a mean value of measured skin folds d in centimeters and empirical constant value k3. The value of the mass of an adipose tissue F in grams was obtained as well.

$$d = \frac{SSFUA1 + SSFLA1 + SSFT + SSFLL + SSFA + SSFB}{6} x0,5$$

$$BP = 167,2x\sqrt{BMxH/1000}$$

BP = 167.2x
F= d x BP x k3
%F= Fx(100)/BM

Treatment

The experimental program lasted three months and it included exercising with weights and treadmills. The zone of burdening was set to the middle, which was obtained by determining the value of a "burden" for each exercise and examinee. During the first month of exercising every examinee was given the weight which was 30%-50% of her body mass. Weight was progressively increased during the whole experimental treatment and it referred to the increase of a "burden" for each individual exercise. The goal was to set the increase of weights in such a way that each examinee can do a certain number, without giving up.

Table 1. Twelve-week schedule of exercising

	Week 1	We 2	We 3	We 4	We 5	We 6	We 7	We 8	We 9	We 10	We 11	We 12
Mon	1	2	3	1	2	3	1	2	3	1	2	3
Wed	2	1	2	2	1	2	2	1	2	2	1	2
Fri	3	3	1	3	3	1	3	3	1	3	3	1

Table 2. Types of exercises according to muscle areas

Muscle area	Exercises	Series	Mon
1. Back	1.1 Deadlifts 1.2 Pull-machine 1.3 Back lat pulldowns	2-3 3-4 3-4	10-15 15-20 15-20
2. Arms	2.1 Pushdown 2.2 Preacher curls 2.3 Triceps extensions	3-4 3-4 3-4	15-20 15-20 15-20
3. Shoulders	3.1 Front raises 3.2 Lateral raises 3.3 Beck pres	3-4 3-4 3-4	15-20 15-20 15-20
4. Abdomen	4.1 Leg raises 4.1 Sit-ups 4.2 Roman chair side bends 4.2 Crunches 4.3 Bench sit-ups 4.3 Crunches up-down	3-4 3-4 3-4 3-4 3-4 3-4	10-15 15-20 15-20 10-15 10-15 15-20
5. Chest	5.1 Dumbbell press 5.2 Bench press 5.3 Incline press	2-3 2-3 2-3	15-20 15-20 15-20
6. Thighs	Machine 6.1 Leg curl 6.1 Leg curl 6.2 Abductions 6.2 Adductions 6.3 Angled leg pres 6.3 Half-cower	 3-4 3-4 3-4 3-4 3-4 3-4	 20-30 20-30 20-30 20-30 20-30 20-30
7. Gluteus	7.1 Cower 7.2 Hip-extension 7.3 Lunges	3-4 3-4 3-4	15-20 15-20 15-20
8. Lower legs	8.1 Step 8.2 Seated barbell calf raises 8.3 Standing calf raises	3-4 2-3 2-3	20-25 15-20 10-15

The schedule of exercises was determined in accordance with the following procedure: since there are 8 types of muscle areas numbered from 1 to 8 (e.g. 1 Back) (table 3), each of them requires specific exercises (1.1 *Deadlifts*, 1.2 *Pull-machine*, 1.3 *Back lat pulldowns*). The first number determines which muscle area it is aimed at (1) and the second a type of exercise (1,2,3). Each training included all muscle areas from 1 to 8, the only thing that varied was a type of exercises. The exercises were changed by simple changing the second number (e.g on Monday all areas from 1 to 8 with the second number 1; on Wednesday all areas from 1 to 8 with the second number 2; on Friday all areas from 1 to 8 with the second number 3), so there is a combination of numbers which guarantees the diversity of training. The line of numbers continues by the following order:

During the third week of exercising, Mr Goran Vasić MA, a specialist of sports medicine, gave students a lecture about healthy diet. The aim of this lecture was to introduce the women to the basic principles of taking food during physical exercising. That was a way of influencing eating habits of examinees in a direct way.

Statistics

The first part of the analysis included calculating basic statistic parameters of central tendency and the distribution of data from the initial and final measurements of both groups of examinees which were the subject of examination. In the second part, research hypotheses were examined by establishing the differences between the initial and final state of both experimental and control group. In order to perform the analysis of the effects of this experimental treatment in all examined variables, multivariate analysis of covariance (MANKOVA) was used during longitudinal transformation processes. This analysis neutralizes the differences in the initial measurement and gives an objective evaluation of real differences in the final measurement. Univariate analysis of covariance (ANKOVA) established the value F- the test for every individual applied variable at the level of significance 0.05. A statistical package for data processing SPSS 15.0 was used for performing all analyses.

Results

Tables 3 and 4 show a distribution of results for the experimental and control groups obtained in the initial and final measurements. There are small differences between those two groups in the initial measurement. The final measurement showed more significant differences in the obtained results, which was established by further analyses.

During the final measurement it was established that there is a statistically significant difference between the experimental and control group in the field of the variables of the percent of muscular tissue (%M) and the percent of adipose tissue (%F). This method gives a realistic view of the differences which are present, taking into account that it annuls the differences from the first measuring by including them in the analysis as a covariance.

Table 3. The distribution of results of experimental group in the initial and final measuring.

Experimental		M (±SD)		Min	Max
Percent of adipose tissue (%F)	**I**	20.88	(5.68)	8.50	32.30
	F	18.92	(5.35)	6.50	22.91
Percent of muscle mass (%M)	**I**	30.90	(3.39)	24.87	41.88
	F	30.26	(3.51)	22.91	41.43

Legend: M-arithmetic mean, SD- standard deviation, MIN-minimal values, MAX maximal values.

Table 4. The distribution of results of the control group in the initial and final measuring.

Control		M (±SD)		Min	Max
percent of adipose tissue (%F)	**I**	19.49	(4.25)	10.90	28.10
	F	19.71	(4.15)	12.00	28.00
Percent of muscle mass (%M)	**I**	32.62	(3.88)	22.60	39.84
	F	30.17	(4.02)	18.74	37.93

Legend: M-arithmetic mean, SD- standard deviation, MIN-minimal values, MAX maximal values.

Table 5. Analysis of differences in the final measurement

Variables	Group	Mean	F	Sig.
Percent of adipose tissue (%F)	**E**	18.92	95.98	.00
	K	19.71		
Percent of muscle mass (%M)	**E**	30.26	9.55	.78
	K	30.17		
Wilks' lambda = ,21		F = 40.72		Sig. = .00

Univariate analysis of covariance established that the value of the F-test is statistically significant for the variable percent of adipose tissue (%F), while it is not statistically significant for the variable percent of muscle mass (%M) where its level of significance is 0.05.

Discussion and conclusions

The data from the research done do not support the theory of the mechanism of a back circuit between physical activity and the level of fat in a body and suggest that a spontaneous physical activity is not a homeostatic component of the mechanism of energy regulation. The research has shown that overweight people are hypoactive. Experiments suggest that hypo activity is more probably a consequence of being overweight than a genetically predetermined characteristic. A large number of surveys have shown that exercising temporarily decreases hunger and increases the feeling of being full. Spending a lot of energy during this process causes short-term repression of appetite, while in the long term it shows the absence of the compensation of lost calories. This phenomenon can be very useful for the people who want to decrease the amount of adipose tissue by exercising.

Analyzing the obtained arithmetic means (percent of adipose tissue and muscle mass) and the comparison of the past reference values Mišigoj–Duraković (2007); Pavlica, Bozić-Krstić and Rakić (2010) it can be concluded that the examinees do not belong to the category of usual values. The result of the variable percent of adipose tissue in the final measurement was significantly lower for the experimental group in comparison to the control one. Percent of adipose tissue in the experimental group decreased, which means that the percent of this tissue in the total body weight decreased as well. Percent of muscle mass showed no statistically significant changes in the final measurement between the experimental and control groups. In the case of physically active women, there is a higher level of maintaining the muscle mass at the same level (Sternfeld et al. 2004); (Kyle et al. 2006). The obtained results show that there has been a transformation of the measured values during the period of three months. Using weights and treadmills for doing exercises decreased adipose tissue, without increasing the mass of muscles. So, what happened to the muscles which were active for three months? Is it possible that there was no change in them?

The answers can be found in the earlier published research Čokorilo and Mikalački (2008) done on the same subjects. In this research Dinamometer "Dyno Concept 2" was used to test strong endurance. It increased in the area of arms and shoulders, as well as legs in the final measurement.

This type of exercises required the treatment of all muscle areas during each training. Burdening varied from 45% to 70% from the maximum (maximum means the largest burdening which a person can deal with doing a certain movement and is achieved by a single repetition). It depended on their initial ability (which was established by a dinamometer) and the type of every individual exercise. In order to avoid doing the exercises always in the same order and keep a good systematic rhythm, there was a new sequence of doing them, which enabled a diversity of trainings. The program can also be applied in a much longer time interval following the same principle. This system also allows modifications with other exercises, which depends on work out machines that are at disposal, all in accordance with the abilities and categories of the people doing exercises.

Nassis and Geldas (2003) did a research which included 441 healthy women, aged 18-69, with the purpose of describing the changes in body composition and establishing the connection between the accumulated physical activity (established by

the means a questionnaire) and body composition. They showed statistically significant differences in the body mass index, percent of adipose tissue and the ratio between waist and hips.

Brock & Legg (1997) examined the influence of trainings performed by the British army on the body fitness of female recruits, as well as their strength. The research included 73 women aged between 17 and 23. The program of exercising lasted for six weeks and the testing took place before and after. Body mass, size and skin folds were measured with the purpose of estimating non-adipose tissues and percent of body fat. What was established was a significant increase of body weight 0,61 kg or 1% (r<.05), body mass without fat 1,5 kg or 2,4% (r<.001) and a significant reduction of body mass, 3,3% (r<.001). The main advantage of our research was the decrease of body mass, not just the adipose tissue, which was the case in this research. The percent of non-adipose mass was decreased as well, which indicates that the value of muscle tissue became higher. Contrary to this, we have already mentioned that women avoid doing this type of exercises because of their fear of increasing the amount of muscles.

Tremblay, Despres, Leblanc, Craig, Ferris, Stephens & Bouchard (1990) examined the influence of exercises on physical activity, body mass and fat distribution for 1366 women and 1257 men. Generally speaking, the research showed that the examinees who used strong exercises (activities) on regular basis, have fewer skin folds than the ones who do not exercise according to the same program.

Sillanpä et al. (2009) followed the changes in body composition, physical ability and metabolic health during the training of strength and/or endurance which lasted for 21 weeks. Women aged 39-64 were randomly selected and divided in 4 groups: training of strength, combined training of strength and endurance, training of endurance and the control group. The changes in the amount of adipose tissues were not significantly different among the groups, but a significant decrease of adipose tissues was notified in the group which went through the training of endurance (-5.9%) and the group which went through a combined training of strength (-4.8%).

Gudalupe- Grau et al. (2009) used the sample consisting of 23 women and 43 men aged 23.9+-, all students at the Faculty of Sport and Physical Education to analyze the answer to the training of strength, combined with the elements of plyometric training, which lasted 9 weeks. The main goal of the research was to establish whether there is a sexual dimorphism in bone density, but it also followed the changes in body composition and shape of the mentioned groups of examinees, as well as the control group. The authors concluded that apart from the increase of the indicators relevant for the evaluation of bone density, there was also the increase of muscle mass, but without decreasing the percent of hypodermic adipose tissue.

According to this research it can be concluded that the method of programmed exercising offered satisfactory results for women, in the sense of decreasing percent of adipose tissue and the total body mass, without increasing muscle mass. This type of doing exercises with weights can certainly offer women better physical appearance and good shape, without losing their femininity.

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Anxiety and depression of patients with chronic obstructive pulmonary disease - modern approach

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Abstract

Researchers suggest that insomnia, anxiety and depression have negative effect on respiratory symptomatology and that early detection of symptoms helps the quality of life of patients.

Aim: Examine the correlation of anxiety and depression, determined by the questionnaire "Anxiety and Depression Scale" (HAD), using the "SF-36" general health questionnaire and the questionnaire of quality of life of patients with chronic obstructive pulmonary disease (COPD) and asthma, with lung function parameters. Define a model for more efficient detection of symptoms, using statistical methods.

Method: 152 patients were included, aged, on average, 39.1± 12.8 and 48% were women. All subjects answered the questionnaire and *pulmonary function testing* was conducted for them. A model that mathematically describes the relationship between the questionnaire score and lung function parameters was defined using multifactor, nonlinear regression.

Result: The average level of anxiety and depression was 26.3 ± 5.3. The result (score) of the questionnaire was used as a predictor of anxiety, depression, general health status and specificity and individuality of patients. The mean score was 49 ± 4.5 (moderately weighted quality of life). The total score was in negative correlation with lung function parameters.

Conclusion: Anxiety and depression correlate with the lung function parameters. Usage of the questionnaire provides insight into the current condition of patients. Using the mathematical model it is possible to obtain the total score of the questionnaire based on lung function parameters, and therefore the rapid assessment of the condition of patients.

Key words: COPD, anxiety, depression, lung function parameters.

Introduction

Chronic obstructive pulmonary disease (COPD) is a progressive and irreversible loss of lung function with the decline in Forced Expiratory Volume (FEV1) of 7-33ml per year, loss of breath, chronic cough and sputum production.[13] The diagnosis of asthma is often made in first years of life, with the occurrence of bronchial hyperactivity and loss of breath.[2]

Successful treatment of obstructive pulmonary disease requires the cooperation of psyche and body. It is achieved through the neurovegetative and endocrine-immune system.[3,8]

During the examination of patients with COPD and asthma, psychiatrists and clinical psychologists should consider the following: possible psychiatric source for lung problems, existing psychiatric problem due to therapy of these patients, increased emotional instability with worsening of lung function, psychiatric problem (e.g. delirium) due to treatment of primary disease.[6,11]

Psychosomatic imbalance connects psychiatry with other branches of medicine. It is believed that the psychiatric deterioration causes asthma attack by: increasing resistance in airways, constricting airways, joint occurrence with panic and depression.[11]

Insomnia reduces the patient's proprioceptive capacities of airways and changes day-night rhythm of airways resistance. Parasympathetic activation enhances respiratory reactivity and constriction.[11]

In this research, we examined the connection between insomnia, anxiety and depression in patients with COPD and asthma with specific lung function parameters. As the primary instrument for carrying out the experiment we used the questionnaire "Level of Hospital Anxiety and Depression" (HAD). We also applied the general questionnaire "SF-36", as well as a specific *quality of life questionnaire* "Saint George" (SGRQ), with chronic obstructive pulmonary disease, in order to achieve

greater precision and reliability in the assessment of correlation of general subjective condition of patient with lung function parameters.

AIM of research

Prove the correlation of insomnia, depression and anxiety on the occurrence of dyspnea and obstruction of upper airways.

Demonstrate mutual dependence of lung function parameters and subjective condition of patient and show the same by mathematical equation (model).

Work method

The study included 152 subjects (76 subjects in experimental and 76 in control group) with COPD and asthma. While carrying out the necessary examinations (spirometry, chest radiography, blood gas analysis), the patients were filling in questionnaires:

1) SF-36 short form, containing 36 questions, showing the general condition of patient through: physical condition, general health, vitality, social functioning, emotions, mental health, activity and pain.
2) SGRQ questionnaire, containing 76 items in three domains (symptoms, activity, impact) and showing the level of quality of life of patients. Its results are given in range from 0 (entirely satisfactory quality of life) to 100 (maximally reduced quality of life).
3) HAD questionnaire shows the emotional state of patient, the degree of anxiety and depression. It contains 10 items for which the subject states the extent to which the items refer to him/her. Mild (0 - 10), moderate (10 - 25) and severe (25 - 40) degree of anxiety and depression are determined based on the total result.

Considering that some questions from these three questionnaires were repeated, and that some questions were adjusted to the socio-demographic structure of patients who live in the central region of Montenegro, a modified questionnaire, adapted to this research, was made.

Tests of lung function, using the examination method of curve "flow-volume", were carried out at the Center for Pulmonary Disease, Podgorica. A device, type FLOWSCREEN VERSION 2.10d, was used, where the patients were in a sitting position in order to achieve the correct position of diaphragm. During testing, the following lung function parameters were determined:

1. Vital Capacity (VC) expressed in liters and in percentage;
2. Forced Expiratory Volume in one second (FEV1), expressed in percentages;
3. Peak Expiratory Flow (PEF), expressed in percentages.

Statistic software DATA FIT 9-version 2008 was used for statistical data analysis, with which the significance test of correlation of lung function parameters and recently modified questionnaire, as well as the degree of correlation of SGRQ scale with SF 36 and HAD scale, was done. Multifactor nonlinear regression analysis was done to define the model that would mathematically express general physical condition, quality of life and emotional state of patients with COPD based on lung function parameters, Free statistic software (V 1.1.23-r7) -part *Cronbach's alpha* (V.1.01) was used to verify consistency (internal validity) of the modified questionnaire structure.

Results

Age of subjects was, on average, 39.1 ± 12.8 years. The percentage of women was 48.3%. Of the total number of subjects, 30.6% stated that they had contact with a psychiatrist, and even 68% stated that they had used psychotropic drugs.

Verifying internal consistency of the modified questionnaire using *Cronbach's alpha coefficient* resulted in high value of *coefficients* (Table 1) at the total level and for some parts related to SGRQ, SF 36 and HAD scales ($0 \leq Ch.\alpha \leq 1$).

Psychiatric heredity was positive in 14.7% of patients. On anxiety and depression scale, the average intensity among patients was severe (26.3 ± 5.3). The most significant predictor of insomnia, anxiety, depression, general health status and specificity of patients was the total result (score) of all three questionnaires. Its mean value for all subjects was 49 ± 4.5, therefore the moderately weighted quality of life.

Table 1. "Cronbach's alpha" coefficient for questionnaires

Cronbach's Alpha Statistic				
	Cronbach's Alpha	**Std. Alpha**	**G6 (smc)**	**Average R**
TOTAL	0.8944	1	1	1
Modified Questionnaire	0.95	1	1	1
SG Scale	0.7674	1	1	1
SF 36 Scale	0.8204	1	1	1
HAD Scale	0.8697	1	1	1

The correlation of the aggregate value of the modified questionnaire and lung function parameters was separately: a) -0.73 (SCORE - PEF) b) -0.88 (SCORE - FEV1) c) -0.71 (SCORE - VC).

Correlation ratio between PEF and FEV1 was 0.88, while the ratio between PEF and VC was 0.77. Correlation ratio between parameters FEV1 and VC was 0.68.

The results of multifactor nonlinear regression analysis gave the model defined by the following equation:

$$SCORE = e^{0,11821 \cdot VC + 0,11276 \cdot PEF - 0,122666 \cdot FEV1 + 4,66} \quad \text{..... (1)}$$

SCORE - total result of questionnaires

VC, PEF, FEV1 - lung function parameters

The value of the regression coefficient R^2=0.93289 indicates high reliability of the model ($0 \leq R^2 \leq 1$, p=0.05), which has been proved by verification on the control group where the deviation has ranged from 0.3% to 6.5%. The deviation can be considered satisfactory, and the model acceptable in the particular case.

Discussion

Mean value of insomnia, anxiety and depression in the observed sample of patients with COPD and asthma is higher than for average population. The level of anxiety and depression has been moderate to severe, which is in accordance with previous studies.[12]

Suggestions of scientists that depression has a negative impact on respiratory symptomatology have been confirmed by this study.

Shame and insecurity, insomnia, the most common symptoms of depression, are a risk factor for deterioration of primary disease.[11] Increased values of the modified questionnaire indicate deterioration of primary disease. Improved values of lung function parameters (PEF, FEV1 and VC) are followed by the decrease of the total score of the questionnaire or subjective general condition of patient.

The literature states that more than 30% of people with asthma have panic attacks and agoraphobia. Rapid breathing, a common symptom of anxiety and panic fear, is the trigger for the deterioration of lung disease. The occurrence mechanism is related to the increased activity of brain cells that respond to the level of arterial carbon dioxide (CO2).[11] Approximately 17% of patients are not able to detect changes in airway resistance. However, measurements of individual patients, with frequent loss of breath, show a decline in FEV1. Patients with variable FEV1 (more than 54% have variability in FEV1 on a daily basis) have a particularly limited perception of the increase of respiratory resistance.[11] Statistical analysis (*Cronbach's alpha coefficient*) confirms the internal validity of the modified questionnaire used in the research.

Usage of statistical methods can simplify and facilitate the work in the part regarding conclusions on the existence of anxiety and depression of COPD and asthma patients, based on measured lung function parameters. The developed mathematical model in this research corresponds to the reliability of 95%, which is more than enough to conclude whether it is necessary to engage a psychiatrist or clinical psychologist. Development of mathematical model based on a large number of samples, with regard to socio demographic characteristics, would contribute to more efficient detection of anxiety and depression.

Conclusion

Usage of the modified questionnaire in clinical practice provides an easier access to the current condition of patients with COPD and asthma. Namely, increased values of questionnaire scores (approximately 45) show a reasonable suspicion of anxiety, depression of a certain intensity and decline in values of PEF, FEV1 and VC. It is necessary to integrate measures to detect anxiety and depression in

the assessment of patients, either by questionnaire or by applying a mathematical model, developed based on a larger sample, with adequately defined socio-demographic characteristics.

We propose cooperation and teamwork of the chosen doctor, specialist psychiatrist, clinical psychologist and *pulmonary disease specialist* to achieving better diagnostic and therapeutic regime of patients.

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Hydroxyapatite activation analysis using X-ray diffraction, FT-IR spectroscopy and SEM

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Abstract

Hydroxyapatite (HAp) can be used as a bone substitute or as a pulp capping material in dentistry. As a bioactive material it binds to live tissue, inducing biological response. HAp with undersized particles, as well as high crystalline content might have very low biological activity. Treating of bioactive materials by various methods changes their characteristics. Surrounding condition, such as saliva presence, could influence the bioactivity of HAp. Aim of the study was to determine the bioactivation - structural, morphological and chemical changes of HAp, induced by artificial saliva using XRD, FT-IR and SEM. Ten HAp samples (crystallographicaly pure phase), each of 0.5 g, were exposed to artificial saliva for 35 days (i.e. activated) and observed. At regular intervals of 7 days XRD, FT-IR spectra and SEM micrographs were obtained from the samples. XRD of an untreated HAp sample showed cristaline structure. After the exposition to the artificial saliva it showed the amorphisation – bioactivation. The amorphisation progressed in time. Combined XRD and FT-IR showed changes in concentration of Ca an P ions in HAp, as well as the ions interchange with the surrounding solution. SEM analysis of untreated HAp showed small crystal particles of the initial powder. After 35-day treatment the material structure was changed to a sponge-like structure, with a lot of unoccupied space. By combining the methods of XRD, FT-IR and SEM bioactivation of HAp with artificial saliva was detected and determined.

Key words: hydroxyapatite, SEM, XRD, FT-IR.

1. Introduction

Spectroscopic techniques, like ultraviolet-visible (UV-VIS), infrared (IR), X-ray diffraction (XRD) and Fourier-transform infrared (FT-IR), as well as scanning electron microscopy (SEM) are attractive analytical methods commonly used in materials science, for bio-materials and biological tissues [1–12]. The methods are non-contact, non-destructive, each having its own advantages and their combined usage provides the wide-area information (from X to IR) on the sample composition and structure.

Bioactive materials bind to live tissue, inducing biological response. They strengthen soft dentine at the application site and induce the formation of the barrier of solid dental tissue without major destruction of the pulp tissue below. Hydroxyapatite (HAp, chemical formula: $Ca_{10}(PO_4)_6(OH)_2$) is the inorganic matrix of bone tissue which crystallizes in the hexagonal crystal lattice. Among many bioactive materials in dentistry, it can be used as bone substitute or as a pulp capping material [1–4]. Treating of bioactive materials by various methods, like laser-material interaction [13–15], changes their characteristics. Moreover, surrounding condition, such as saliva presence, could influence the bioactivity of HAp.

HAp can be synthetized in three different ways: as powder, beads or porous blocks. It has to be noted, that mentioned products differ in biological activity, depending on the particle size, as well as crystalline structure of the material [2, 3]. HAp with undersized particles, as well as high crystalline content might have very low biological activity. The basis for material application in biological systems is its biocompatibility [16]. Being the main constituent of a bone tissue, and of high biocompatibility, HAp is suitable for the implantation in biological systems (to substitute the material inside a defect) [17]. Its bioactivity – the ability to induce particular regenerative processes (establishing the original morphological structure of the tissue) at the implantation place – strongly depends on its physical and chemical characteristics. HAp in crystal forms is of low bioactivity; therefore it is necessary to activate it.

For powdered samples, X-ray powder diffraction analysis (also noted as XRD) is common technique for determining the material structure, particularly the chemical composition and physical characteristics of HAp [1–3]. Collimated monochromatic X-rays, reflected from planes in crystal lattice of the sample, constructively interfere satisfying the Bragg's law and form the diffraction pattern. In powdered samples, all orientations are equally represented. Due to rotational averaging, scattered radiation forms circular patterns (rings around the impinging beam axis) at the detector plane.

In FT-IR spectroscopy, the sample is exposed to the series of beams, each having a spectrum of multiple frequencies [5, 7]. The light from a collimated, non-monochromatic source is directed to a Michelson interferometer, where the sample is placed in one arm of the interferometer. A movable mirror of the interferometer provides the changeable optical path length, each position corresponding to one spectrum of the impinging light. All recorded data are processed by software in order to obtain the interferogram where the light transmitted through the sample (I_T) is a function of the wavelength (λ).

The aim of the study was to determine the bioactivation - structural, morphological and chemical changes of HAp induced by artificial saliva using XRD, FT-IR and SEM.

2. Materials and methods

2.1. HAp synthesis

In order to obtain crystallographicaly pure phase, HAp was synthesized by the reaction in the solution of calcium-nitrate and amonium-phosphate [18]. Drops of heated (320 K) amonium-phosphate were being poured into strongly mixed calcium-nitrate solution. Obtained milky-white suspension was heated and, after keeping it boiling for 10 min, left to cool down for 18 h at room temperature. Clear fluid above the sediment was removed and the suspension was filtered. Filtered suspension was being washed by heated distilled water until ammonia smell disappeared, leaving it in the form of gel (crude HAp), which was then being dried for 6 h at 373 K. Dried HAp was milled in order to obtain the powder with particle size less than 10 μm.

Ten HAp samples, each of 0.5 g, were exposed to artificial saliva for 35 days (i.e. activated) and observed. The composition of artificial saliva contains 0.05 M acetate buffer with 2.2 mM $CaHPO_4$ adjusted with glacial acetic acid to pH 5.0 [7]. During the experiment, both the pH and the temperature of the samples were being kept in a water bath at values common for the human oral cavity. At regular intervals of 7 days (0–35 days, day 0 means unexposed sample), XRD, FT-IR spectra and SEM micrographs were obtained from the samples.

2.2. XRD analysis

XRD analysis was performed by a Siemens 50 rd (Siemens AG, Munich, Germany) diffractometer. The samples were placed on a glass holder, exposed to the X-ray radiation (1.5418 Å) of a Cu-K_α source (45 kV, 40 mA) and examined in the range (2θ) 25–80° (step size 0.026°, counting time 500 s/step and 72 min/pattern) with 256-channel PIXcel detector (position of slits 0.04 rad and 0.5°). The data are presented in the graphical form where intensity (I) is a function of a scattering angle, 2θ (a diffractogram).

2.3. FT-IR analysis

For FT-IR analysis, Perkin-Elmer FTIR 403 system with corresponding program package was used (spectral range 600–4000 cm^{-1}, resolution 2 cm^{-1}, averaging: 32 scans). Particular components in the system were: Bruker Optic's Hyperion 3000 microscope (Ge lens x20 with attenuated total reflectance) and Vertex 80 FT spectrometer with HgCdTe detector (Ge-on-KBr beamsplitter) attached. In the interferogram, the transmittance $T=I_T/I_0$ (I_0 is the intensity of light impinging upon the sample) of the material is presented as a function of a wavenumber k (cm^{-1}).

2.4. SEM examination

SEM micrographs were obtained by Philips 30 XL microscope (5kV), providing both secondary-electron and backscattered-electron imaging.

3. Results and discussion

3.1. XRD analysis

A diffractogram of an untreated sample is presented in figure1.

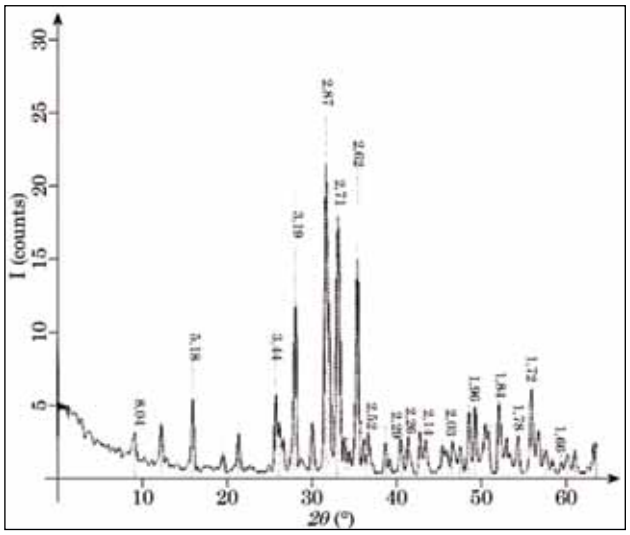
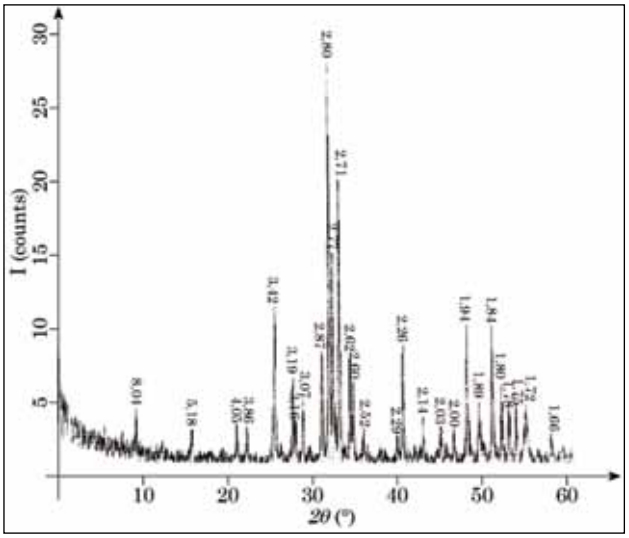


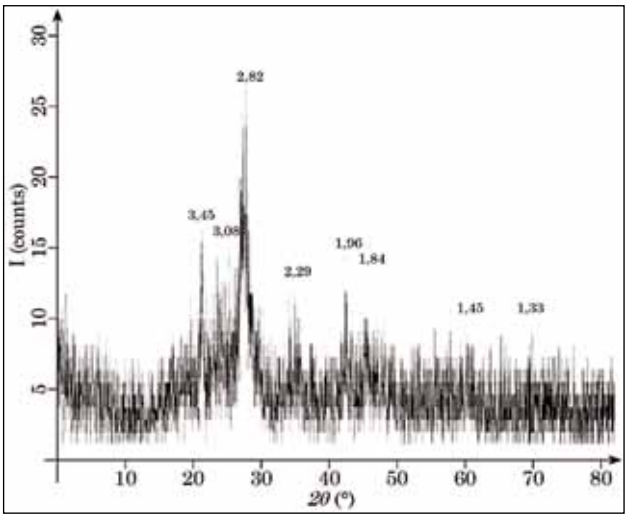
Figure 1. Diffractogram of an untreated HAp sample

Clearly visible baseline and typical maxima for Hap (denoted in the figure) indicates the crystalline structure of the unterated material and no amorphisation.

In figure 2, the diffractograms of HAp samples treated for 21 and 35 days in the artificial saliva solution are presented. It is notable in the diffractogram of the 21-day treated sample (figure 2.a) that the base line is less clear, with more noise, which indicates the change in the material structure – the amorphisation occurs at the low level. Nevertheless, typical maxima in all areas are still visible.



a



b

Figure 2. Diffractograms of HAp samples activated for (a) 21 and (b) 35 days in the artificial saliva

In the diffractogram of the 35-treated sample (figure 2.b), more changes are visible. Base line is unclear, a lot of noise exist and only few typical maxima are visible – a higher degree of amorphisation occurs, which is the sign of increased bioactivity. This confirms the assumptions that the chemical treatment activates the stucture of the initial HAp material which enables the interaction with the surrounding tissue. The concentration of Ca an P ions changed over time (figure 3).

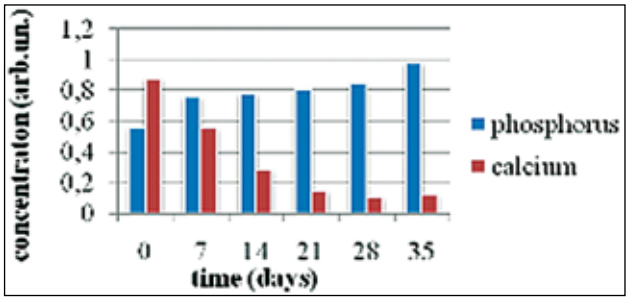


Figure 3. The change in Ca^{2+} and P^{5+} ions concentration of HAp samples as measured by XRD

3.2. FT-IR analysis

A FT-IR spectrum of the initial HAp sample (untreated, day 0) is presented in figure 4.

In this graph, several features are distinctive. A typical OH^- vibrational band (4000–3000 cm^{-1}) is due to the water absorbed on the HAp sample surface. Calcium vibrational bands (1422 cm^{-1} and 2289 cm^{-1}) are also visible. Two bands at 2512 cm^{-1} and 2396 cm^{-1} are due to the constituents of the organic phases adsorbed at the surface.

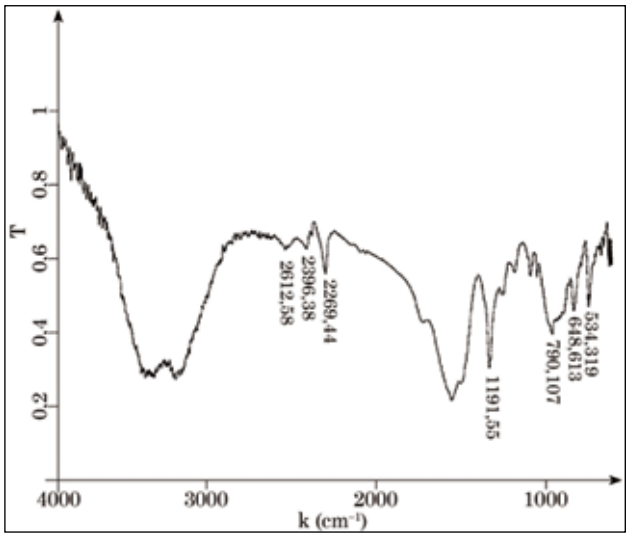
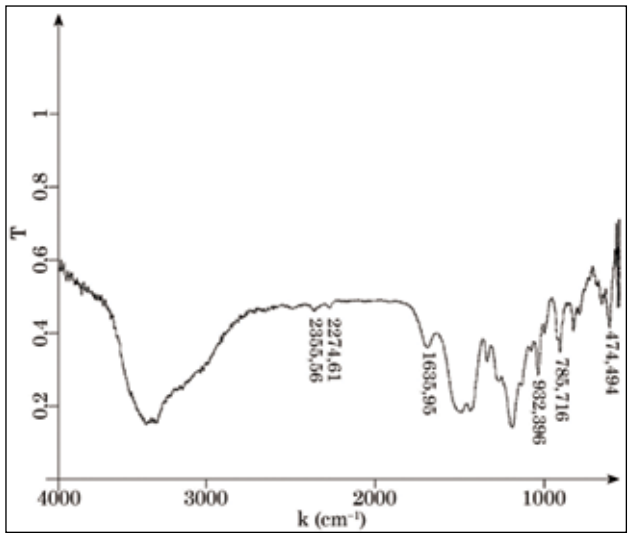
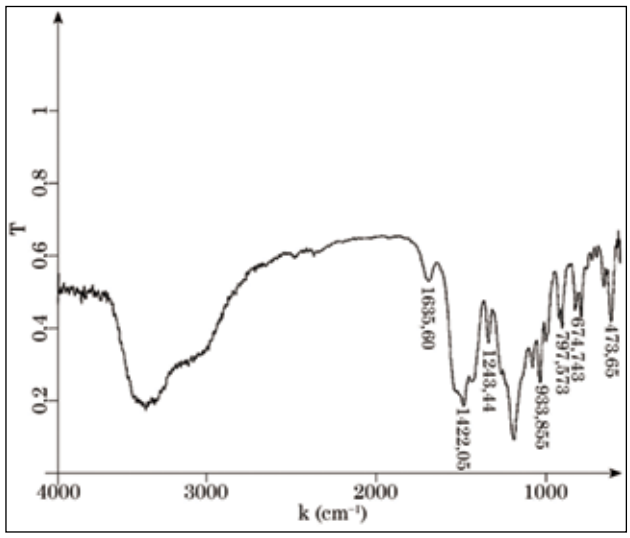


Figure 4. FT-IR spectrum of an untreated HAp sample (day 0)



a



b

Figure 5. FT-IR spectrum of a HAp sample activated for (a) 14 and (b) 35 days in the artificial saliva

The FT-IR spectrum of the sample treated for 14 days is presented in figure 5.a.

It is notable that the vibrational band at 2289 cm^{-1} (Ca) is no longer visible and that the constituent bands at 2395 and 2512 cm^{-1} decreased in their magnitude, while the OH bands remained unchanged (concentration of the water absorbed in HAp saturated), which points to the links between Ca and the organic constituents. On the other side, the intensity of typical phosphorous band at 1191 cm^{-1} increases and the 1426 cm^{-1} band deformed in shape, which indicates the synthesis of organo-calcium compounds with reduced bonds between calcium ions and the HAp matrix, which also points to the mechnism of the chemical activation of HAp during the artificial bone synthesis.

After 35 days of tratement, the FT-IR analysis (figure 5.b) confirms further changes in the material, as concluded by XRD. The complete area from 2500 to 2200 cm^{-1} lack in vibrational bands, which indicates the transport of Ca ions by organic constituents of the artificial saliva into the surrounding solution. Phosphorous band at 1191 cm^{-1} further increases in its intensity, and the second Ca band at 1422 cm^{-1} suffers further shape changes. This is explained as the occurrence of active phosphorous ions at the material surface with no significant structural changes of the bulk.

FT-IR analysis of the artificial saliva (figure 6) shows changes in Ca^{2+} and P^{5+} concentration during samples treatment.

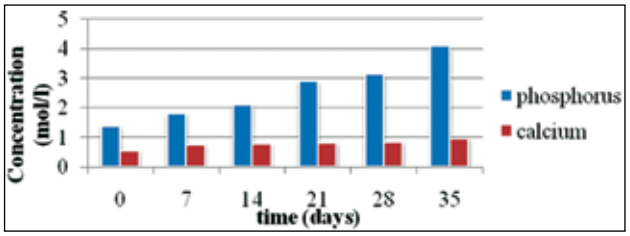
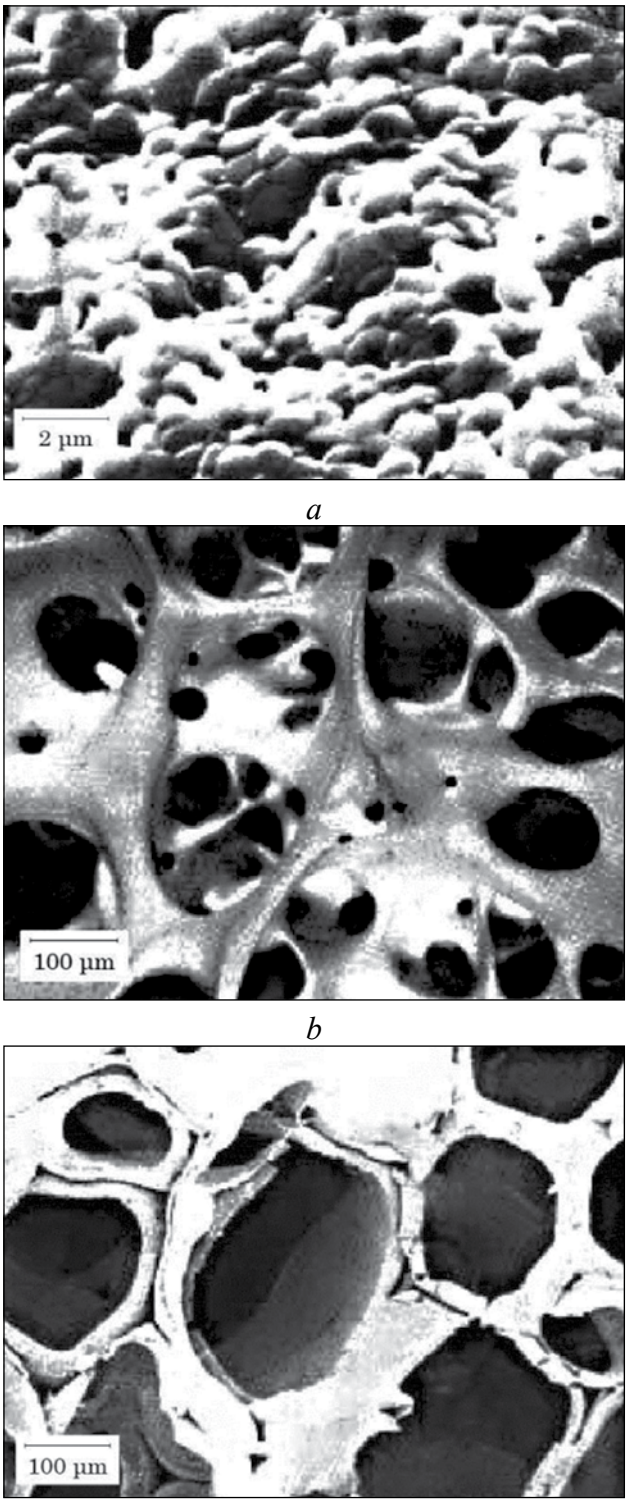


Figure 6. The change in Ca^{2+} and P^{5+} ions concentration in the artificial saliva solution (FT-IR)

Combined XRD and FT-IR show the changes in concentration of Ca an P ions in HAp, as well as the ions interchange with the surrounding solution. Analysis shows that the activation goes towards the decomposition of the hydroxile bonds, and the release of Ca and P ions, thus enabling the reaction. The components in the artificial saliva absorb the OH^-, reducing its unwanted influence.

3.3. SEM analysis

The SEM micrographs of the material before and during the treatment are shown in figure 7. Untreated – initial – material (day 0) have small crystal particles of the initial powder visible (figure 7.a).



a

b

c

Figure 7. SEM micrograph of a of a HAp sample after treatment of: (a) 0 days; (b) 28 days; (c) 35 days

After 28-day (figure 7.b), and particularly after 35-day treatment (figure 7.c), significant structural changes are clearly visible. The material does not have the form of the powder, but the sponge-like structure, with a lot of unoccupied space. This type of structure enables the material to be incorporated into the morphological system. Besides the regeneration of bone tissue, the implementation of HAp in the dental tissue regeneration is also viable [19], as well as the implementation of composite dental materials with HAp as the constituent [20, 21].

Conclusion

By using XRD it was shown that the presence of a chemical agent – the artificial saliva – enables the decomposition of the primary crystal structure of HAp (amorphisation). FT-IR analysis showed that calcium ions dissociate in the surrounding solution during the "activation" of HAp, while free phosphorous ions increase in the concentration at the material surface. By combining the methods of XRD, FT-IR and SEM, the mechanism of HAp activation by the influence of a chemical agent is proposed.

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Voice fundamental frequency in the circumstances of exam stress and personality dimensions

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Abstract

The objective of the study is to explore the relationship between vocal characteristics in stress inducing circumstances, and personality dimensions. Tridimensional Personality Questionnaire (TPQ), a self rating questionnaire, was administered to one hundred medical students of both genders. Their pronunciation of the five vowels in Serbian language just prior to an exam was recorded. The main characteristics of speech signals, such as the duration of vowel pronunciation, intensity and time necessary for the signal to rise up to maximum intensity, were analyzed for all the vowels. Voice fundamental frequency (F_0) was determined for the vowels A, I and U. Canonical correlation analysis revealed the relation between acoustic characteristics of the "averaged" vowel, as well as the vowels A and I on the one side, and personality dimensions on the other. There is a positive correlation between fundamental frequency, on one side, and harm avoidance and reward dependence on the other, and a negative correlation between fundamental frequency and novelty seeking. These results may be considered in the context of exam stress influence on the speech signal characteristics dependent on the personality type postulated by Cloninger.

Key words: voice fundamental frequency (F0); exam stress; personality

Introduction

Acoustic analysis of speech signal provides various information on the speaker, both related to his continuous characteristics (1), and to his actual state (2-7). Apparently the most important ones amongst the variables that exert significant influence on speech characteristics are the constitutional features, cognitive structure and emotional reactivity. Emotional reactivity has a large impact on the personal vocal style markers' mediation. Stress is a highly personalized process. Marked variations in the physiological and psychological reactions to stress can occur (8, 9). General and specific resistance, as well as general and specific vulnerability in stressful situations depend on numerous personality characteristics, cognitive and affective characteristics, personal psychological organization, and dominant defence mechanisms (i.e. individual differences in coping mechanisms in response to stress). There are findings suggesting that coping strategies could be linked with personality features. It is probable that the degree of stressful impact on various subjects exposed to the same stressor differs greatly. There are individual differences in vocal reactivity, as well as in the psycho physiologic and behavioural reactivity. Clear individual differences related to the numbers and types of vocal parameters which seem to be linked with stress have been demonstrated in the majority of research available. Individual differences in reactivity, such as the apparent presence of clear individual differences in autonomic reactivity in the conditions of physiological stress experiments, could be an important factor in the research of vocal indicators of arousal.

Research of the effects of stress and emotional tension upon various acoustic features of speech studies the role of individual differences in an attempt to clarify the link between psychological and physiological variables on one side, and speech production on the other. As the individual differenc-

es are impossible to eliminate, an attempt of their control has been made. With a better knowledge of the bases of individual reactivity, it is possible to predict different vocal responses to stress (10), based on the personality test scale achievement via independence. There is a significant increase in fundamental frequency (F_0) under the influence of stress in the subjects with high scores in achievement via independence, while there is no change in the subjects with low scores. This indicates the possibility that separate types of subjects with particular speech styles could be isolated using personality tests. Giessen Laboratory was conducting a research on a group of repressors (subjects who are verbally denying being under stress but are displaying a high autonomic reactivity) and a group of sensitizers (subjects who openly verbalize stress but display a low physiologic reactivity), in order to demonstrate that coping strategies are involved in the vocal reactivity to stress. It was shown that the repressors responded to stress inducing stimuli with an increase in F_0, while the sensitizers did not react. Researchers emphasize that the arousal type in a situation labelled as stress inducing can vary depending on whether the predominant emotion is fear or anger. In addition, a speaker can transgress through different phases of stress, which can affect his vocal production in a number of ways. For this reason, it is important to get samples of comparable states for all the subjects. It is not possible to establish if the speakers will demonstrate similar patterns of vocal responses (even if these patterns are individual specific) for various types of stressors, e.g. an emotional stress resulting from an unpleasant experience. The results arrived at by the Giessen group show that significant interaction effects between stressor types and coping strategies of a speaker are in existence (11).

An intriguing model has been developed by Cloninger (12), that suggests three brain systems (behavioural activation, inhibition and maintenance) which relate to three personality dimensions (novelty seeking, harm avoidance and reward dependence), each modulated with the main monoamine neurotransmitter (dopamine, serotonin, and norepinephrine), producing predictable behavioural responses to the relevant stimuli. The three cerebral systems are activated by the stress system and reversely affect its activity: the mesocortical and mesolimbic dopamine systems are activated by the LC-NA/sympathetic systems; the amygdale/hyppocamus complex is activated by noradrenergic neurones or "emotional" stressors, such as fear; CRH neuronal activity leads to pro opiomelanocortin neuronal activation, and they affect the PVN and LC-NE, induce analgesia and, possibly, exert influence on the emotional tone (13).

Individual stress response variability can be an expression of the extreme ends of high and low sensitivity of a stress system, which can lead in a change in a person's vulnerability to the effects of stress (14).

Available research shows that it is possible to gain more of the relevant information related to affect and personality assessment from the speech aspects that are independent of speech content, and from the acoustic voice characteristics sooner than speech content. The results of research on connections between speech signal characteristics, and personality dimensions, as estimated by applying Tridimensional Questionnaire (TPQ) by Cloninger, showed that persons with high values of "harm avoidance" (HA) and "reward dependence" dimensions, and low values of "novelty seeking" (NS) dimension, have higher values of F_0 (15). The extra linguistic features of the speech signal, average and maximum intensity, time of maximum intensity arrival, duration of pronunciation, and F_0 of the Serbian language vocals studied change significantly under the influence of examination stress (16, 17). Speech is not a marker of the speaker as such, but of the speaker in a particular situation (18, 19). Situational analysis is an exceptionally important strategy for following of an individual within an interaction in a particular situation, and the societal structure that determines such an interaction (20, 21). Our interest was in determining if speech signal characteristics in the conditions of exam stress show a relation with personality dimensions. The objective of our research is to establish the relation between speech signal characteristics in the situation of anticipated exam stress, and personality dimensions.

Materials and methods

Subjects

Informed consent was obtained from 100 students from Faculty of Medicine, who participated

voluntarily in the experiment. The sample comprised one hundred of the second and third year medical students, aged 20-22 years. The sample was balanced with respect regards to gender. The participants in our study were fulfilling three criteria: they were medical students, their mother tongue was Serbian, and they were sitting their Physiology exam for the first time.

Procedure

TPQ, translated into Serbian, with one hundred questions answered by the subjects, based on own assessment, with a YES or a NO, was utilized for personality features' markers establishment.

The subjects pronounced Serbian language vowels immediately prior to their exam. They were instructed to pronounce the vowels in the following order: a, e, i, o, u. The vocal pronunciation was recorded on a tape recorder, Panasonic brand, following which the speech signal was memorized onto a PC hard disk. Average and maximum intensity, duration of pronunciation and maximum intensity arrival time (delta parameter) for all vowels (Figure 1) were determined utilizing corresponding computer programs (22).

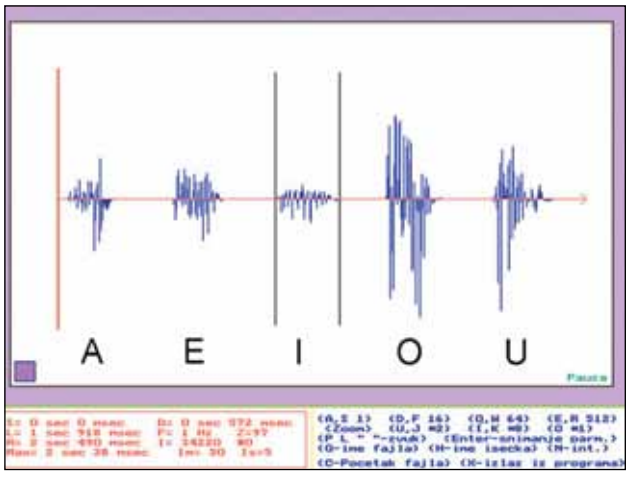

Figure 1. Programme ADS for the analysis of vocal characteristics

The mean values of these characteristics for all vowels were expressed as "averaged" vocal. Also, the recorded speech material was analyzed at the level of period, namely in terms of the A, I and U vocals' fundamental frequency and numbers of sub waves (Figure 2).

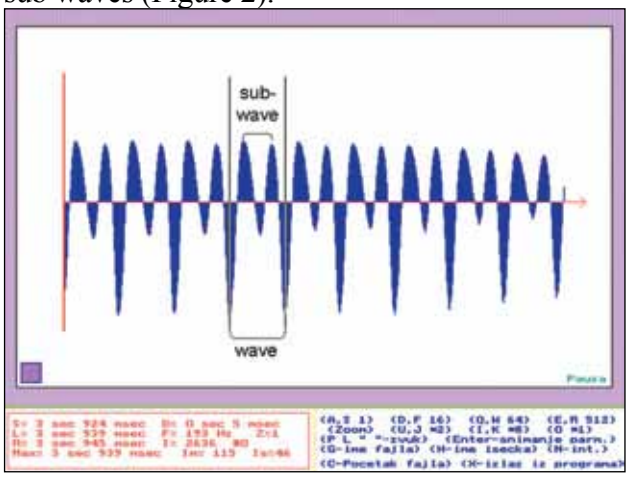

Figure 2. Programme ADS for the analysis of vocal characteristics at a period (wave and subwave) level

Results

The relationship between personality dimensions and vocals' acoustic characteristics was tested with canonical correlation analysis application. In the context of this, personality dimensions was a group of variables identical across all the combinations. The other group of variables contained different characteristics of the vocals pronounced in the exam situation. Significant values of the correlation coefficient are shown in the Table 1 and the corresponding factors' values in the Tables 2 and 3.

Table 2. Personality dimensions' factors F1 and F2 values

Value of factors	Dimensions of personality		
	HA	NS	RD
F1.	.202	-.775	.722
F2.	-.701	.762	-.566

Table 1. Canonical correlation coefficient values for pairs of variables: "averaged" vocal characteristics and personality dimensions

Pairs of variables	Values of coefficients of canonical correlations					
	Rho	rho2	Lambda	$\chi 2$	Df	p
1.	.472	.223	.690	34.30	21	.034
2.	.374	.140	.834	17.15	9	.046

Table 3. "Averaged" vocal characteristics' factors F1 and F2 in exam circumstances values

Values of factors	Characteristics of "averaged" vowel						
	F1	F2	F3	VD	VI	VK	VM
F1.	.595	578	.605	-.228	.185	.007	.204
F2.	-.941.	-.897	-.915				

Table 4. Values for pairs of variables: Dimensions of personality and Characteristics of vowel A at the exam, according canonical correlation analysis

Dimensions of personality							
HA	NS	RD					
.432	-.452	.924					
Characteristics of vowel A							
AF	AIS	AMS	AT	AD	AI	AK	AM
.595	.02	-.03	-.43	-.06	.14	-.24	.17

Each one of the three personality dimensions of a normal person is expressed as a mean value, while a personality disorder is characterized with extreme values of one, two or all of the three dimensions (22). Within the F1 factor combination, the biggest contribution to the structure was given by the NS and RD personality dimensions, therefore this combination could characterize a passive-dependent personality, whereas there is a pronounced contribution of all the personality dimensions in the F2 factor combination, and so this type of combination could be a characteristic of an antisocial personality (Table 2) (12, 23).

Combinations of F1 factors shown in tables 2 and 3 may be interpreted as follows: higher values of average F_0 for three successive periods (F1, F2, F3) for an "averaged" vocal correspond to passive-dependent personality, and, to a smaller degree, also an increase in maximum (VM) and average intensity (VI), along with a decrease in average vocal pronunciation length (VD); lower F_0 and intensity values and longer average vocal pronunciation length in exam circumstances correspond to active and independent personalities (who have high NS and low RD values).

Combinations of F2 factors shown in tables 2 and 3 may be interpreted as follows: antisocial personality is characterized by low F_0 values for all of the three average vocal segments in exam circumstances, whereas high F_0 values characterize personalities with high HA and RD dimensions scores, and low NS dimension scores.

Cannonical correlation test was significant for "averaged" vocal (Tables 1, 2, and 3), as well as for vocal A (Table 4). Canonical correlation coefficient value for pairs of variables: vocal A characteristics and personality dimensions (Ro=0.535, rho^2 =0.287, Lambda=0.610, $\chi 2$ =45.94 (df=24), p=0.005) is significant.

Combinations of factor (table 4) may be interpreted as follows: higher vocal A fundamental frequency values (AF), along with lower sub wave number values (AT), and, to a lesser degree, delta parameter to pronunciation length ratio (AK) characterize a passive-dependent personality; the remainder of the vocal A characteristics studied, i.e. average (AIS) and maximum (AMS) intensity at the period (wave) level and pronunciation length (AD), give an unremarkable contribution to the correlation between two groups of variables. Opposite vocal A characteristics to these were found in the personalities with low RD dimension. In other words, passive-dependent personalities respond to exam stress with an increase in F_0, and a decrease in sub wave numbers, which is a pattern opposite to the one of extroverted and "non passive", independent personalities.

Discussion

According to the findings of Cloninger, there is a negative correlation between NS and RD personality dimensions, whereas there is a positive correlation between HA and the neurotransmitters that determine them. For persons who, in addition to low values of dopamine and serotonin, have high noradrenalin values, low "averaged" vocal, equally as vocal A, fundamental frequency valu-

es were found, with higher sub wave's numbers for the latter. In opposite situations, where high dopamine and serotonin values, along with low noradrenalin values are present (like in the cases of dependent and easily frightened personalities), high "averaged" vocal and vocal A fundamental frequency values along with lower sub wave numbers values were found. In addition, high maximum intensity values and decrease in pronunciation duration are found in the latter situation.

The primary characteristic of antisocial personality are low F_0 values, followed by higher sub wave numbers values, and, to a smaller extent, lower vocal A intensity values at the period level in a control situation. Passive-dependent personality is characterized by higher F_0 values, lower sub wave numbers and higher vocal A average intensity values at the period level.

Fundamental frequency is determined by the number of vocal cord vibrations, these being under the autonomic system control. Vocals A, I, U and "averaged" vocal mean F_0 values for the first three successive vocal segments show higher vocals A and I F_0 values, and higher first segment value compared to the following two segments, as well as higher average values in exam circumstances. MANOVA demonstrated that there is a significant difference in the percentage change for the averaged vocal: $F(7, 92) = 6.02$, $p < 0.000$. Percentage change and F ratio values for the averaged vocal calculated using variance analysis show that significant differences are in connection with average and maximum intensity, pronunciation duration and fundamental frequency average value for the "average" vocals' first segment (16). The biggest contribution to the difference between exam circumstances and control conditions comes from intensity parameters' variation, and the smallest contribution from F_0 variation. However, subsequent to an assessment of the link between personality variables and these vocal characteristics, the highest contribution to personality evaluation based on speech signals comes exactly from F_0, and substantially less from pronunciation intensity. These findings are in accordance with research that shows that F_0 and the change in spectral energy distribution seem to respond to the induction of psychological stress (19). Sympathetic activation mostly affects F_0 parameters (3, 4).

If a person feels powerful and able to in control the situation, the F_0 of its vocalization is lower and the energy is concentrated in the lower parts of the spectrum. Spectra of various types of calls depend on the position of the animal studied on the dominant-submissive continuum, with lower frequencies being more characteristic of dominant, and higher frequencies of submissive or defeated animals (24). Significant vocal I and A fundamental frequency increase were found in exam circumstances, along with a decrease in vocal A sub wave numbers. In exercise circumstances, a link between low serotonin and dopamine values and high noradrenalin values (personalities with low HA and RD dimensions, and high NS values), as well as low average vocal fundamental frequency values were found. The highest contribution to these values in a control situation comes from the vocal A, analyzed at the period level, for which was found low F_0 values and high sub wave numbers (25). The same relationships for this personality structure operate in exam circumstances, for the "averaged" vocal, vocal A, with characteristics at the level of the vocal and its period, and vocal I, at the period level. This could be interpreted as it would to be easier to conduct a personality evaluation based on voice, with a larger number of analyzed variables in a stressful situation compared to a control situation. In addition to this, bearing in mind that the results we arrived at in this research lead to similar conclusions to the ones we derived from the control situation, our findings support the claims that stress accentuates latent personality features, as well as the opinion that Cloninger's personality model is suitable for personality evaluation based on speech signal characteristics. One of the causes of the more pronounced link between personality dimensions and vocal characteristics in exam circumstances is that vocal production becomes significantly more difficult to control with increasing stress, and coping becomes harder and more demanding.

While the causes for individual differences remain obscure (26), detection of stress based on vocal parameters will persist as a difficult task. It is hard to achieve identical stress levels for all the subjects in an experiment. Not only is a psychological evaluation of a potentially stress inducing stimulus or event different for each subject, but

equivalently their coping strategies (in terms of repression or other defence mechanisms) and/or their psycho physiologic structures may be different and thus result in a broad variation in vocal response patterns. Additionally, subjects can differ in terms of expressed control levels potentials, if their vocal production is under an adequate emotional arousal. This can affect internal feedback level and vocal production apparatus fine tuning.

Novelty seeking and reward dependence can be relatively independent of the current mood. In contrast to this, harm avoidance dimension covariates with mood and anxiety. It was noted that students showing high scores for harm avoidance dimension, which can, according to some interpretations, be a measure of anxiety (27), have higher Spielberg knowledge test scores, and specifically for questions relating to propensity towards tension and panic prior to an important exam, as well as inclination to thoughts of failure repercussions, that interfere with their concentration during the course of an exam (16). Cloninger extended his personality concept to a seven-factor psycho biological temperament and character model (28, 29, 30). In addition to the three original personality dimensions, a fourth dimension – maintenance - was identified in the latter studies. These four dimensions represent hereditary aspects of a normal personality, manifested early in life. Research on twins suggests that each one of the seven features has a genetic component (31). Research on twins and adopted children (32) confirms the link between the harm avoidance feature, a measurement of propensity towards anxiety, and 8p21-23 chromosome locus, as well as the link between the 8p locus and chromosomes 18p, 20p, and 21q. A possible role of dopamine D4 receptor long alleles' polymorphism in the novelty seeking determination is being considered (33, 34). With an awareness of the diversity of personality concepts and their application through time, and the opportunities for improvement of the existent and development of novel and more suitable speech signal analysis programs and methods of describing emotion (35-37), we believe further efforts in personality evaluation based on speech signal characteristics in stressful conditions to be of value.

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Epidemiological charactheristics of meningococcal disease in Vojvodina (Serbia) at the beggining of 21st century

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Abstract

Meningococcal infection are ubiquitous. The aim of this study was to determine descriptive characteristics meningococcal disease in Vojvodina (Serbia) in the period of 10 years.

The study included cases of meningococcal disease morbidity in the period of 2000-2009 of Vojvodina. Meningococcal disease we analyzed by chronologically, demographically and topographically. Data were presented as percentages and were shown graphically, in table and a map. Difference in numbers of cases among age groups and sex were tested by χ^2 test.

During the reporting period were 94 registered cases. The values of the rate of incidence of meningococcal disease have ranged from 0.09 to 0.93 per 100.000 population. Only in the one territory of a municipality recorded the incidence rate over the 2/100.000 inhabitants. Of the total number of patients, the disease is laboratory confirmed in 34% (32/94) persons and serogroup B predominates with 93.8% (30/32).

Case fatality rate (CFR) in this period was 13.8% (septicaemia 26.1%; meningitis 2.1%).

The largest number of cases registered in children under 5 years of age (56.4%) and nearly ¾ of patients registered in the period from September to March. Meningitis and septicaemia were reported in about equal proportions (meningitis: 51.1%; septicaemia: 48.9%).

Meningogokna disease in Vojvodina, although a decrising trend, is an important clinical entity, especially if it occurs in the form of meningococcal sepsis with highest case fatality rate all age groups (26%). It is necessary to improve the surveillance since the data on the incidence and distribution of serogroups in the population relevant to the creation of prevention program and immunization strategy.

Key words: epidemiology, meningococcal diseases, surveillance

Introduction

Meningococcal disease is a potentially life threatening condition. Disease occurs after the infection with bacterium Neisseria meningitidis. Five common serogroups (A,B,C,Y and W135) are responsible for about 90% of infections caused by this bacterium and three serogroups (A, B and C) are asociated with the most cases of meningococal disease in the world. Serogroups A and C are responsible for the majority of cases in Asia and Africa and serogroups B and C in Europe and America (1-3). The distribution of serogrups varies over time and geographic location. From 1988 throught 1991, most cases of meningococcal disease in United States of America (USA) were caused by serogrups B and C. The proportion of sporadic meningococcal cases caused by serogroup Y increased from 2% during this period to 30% during 1992-1996 (4,5).

Meningococcal infections are endemic worldwide. The invasive disease can occur as sporadic cases, outbreaks, and large epidemics. Although the largest epidemics affect mainly Sub-Saharan countries in Africa within the meningococcal belt they can occur in any country regardless of climate while sporadic cases may at anytime anywhere (3).

The purpose of this paper is to analyze the epidemiological characteristics of meningococcal disease chronologically, demographically and topographically in the Autonomous Province of Vojvodina (Serbia) during the first 10 years of the 21st century.

Metods

Descriptive epidemilogical method was used. Data for this observational study were obtained by notifications on registered cases of the disease form

hospitals in Vojvodina through national mandatory reporting system. Registered cases of meningococcal disease during the period from 2000-2009 were analysed. Incidence rates were calculated using annual number of registered cases (total, in the age group or for sex) as a numerator and number of inhabitants in Vojvodina according to census 2002 (total, in the age group or for sex) as a nominator and multiplied by 100.000. Chronologicall analyses was conducted after calculation of annual incidence rates per 100.000 population. Data were presented graphically. Analyses on occurence of the disease by months within a year was prepared after the number of registered cases was calculated for a every month in year for the whole period of observation and divided with total number of cases. Data were presented as percentages and were shown graphically.

Age and sex of registered cases were observed in demographicall analyses. Age specific incidence rates for monitored age groups were measured per 100.000 population of the age group, according to 2002 census and sex specific incidence rates were measured per 100.000 population of men and women. Rates were calculated annullly. Data were shown in graph and table. Case fatality rates were presented as proportion of deaths among registered cases for two clinical forms, meningitis and septicaemia, and for the total number of patients. Data were shown in table. Topographicall analyses was prepared using average annual incidence rates for each municipality and data were presented as a map.

Difference in numbers of cases among age groups and sex were tested by χ^2 test and were shown in tables.

Results

During the period from 2000-2009 a total of 94 cases of invasive meningococcal desease were registerd by regional hospitals in Vojvodina. The annual incidence rates were low, below 1 per 100.000 for the whole period of observation (figure 1).

From a total of 43 municipalities of AP Vojvodina, the disease has not been registered in 21 municipalities (48.8%). On the territory of four municipality, the incidence rate registered over 1/100.000 inhabitants. Only in the one territory of a municipality recorded the incidence rate over the 2/100.000 inhabitants (picture 1).

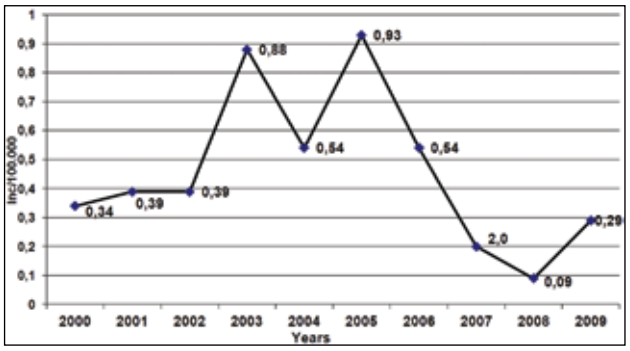
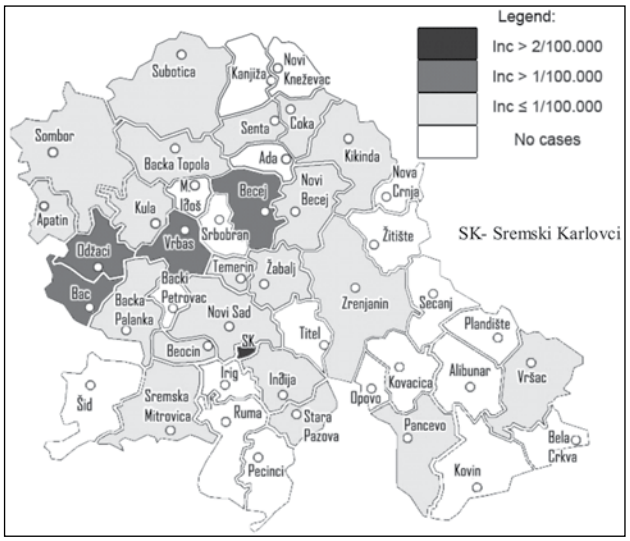


Figure 1. Incidence rates of meningococcal disease in Vojvodina (Serbia) in the period 2000-2009



Picture 1. Topographic distribution per 100.000 population of total number of reported meningococcal disease cases in Vojvodina (Serbia) in the period 2000-2009

Only 32 (34.0%) cases were laboratory confirmed. Among laboratory confirmed cases in 30 (93.8%) serogroup B was determined and in 2 (6.2%) serogoup C. For the remaining 62 (61.1%) cases reported as invasive meningococcal cases serogroup was not determined.

Meningococcal desease occurs throughout the year with higher levels in winter months (figure 2). The highest number of registered cases was observed in the first three months of the year.

Out of the 94 registered patients, 53 (56.4%) were children under five years of age. The highest age specific incidence rates were regitered in infants (6.88/100.000) and children aged between 1-4 years (5.45/100.000). Among the older age groups (>20 years), the disease was reported only rarely (figure 3).

Table 1. Clinical presentation with case fatality ratio of meningococcal disease in Vojvodina (Serbia) in the period 2000-2009 by sex and age

Characteristics		Meningitis			p#	Septicaemia			p#	Total			p#
		N° (%) cases	N° deaths	CFR* (%)		N° (%) cases	N° deaths	CFR* (%)		N° (%) cases	N° deaths	CFR* (%)	
Gender													
Male		26 (46.4)	1	3.8		30 (53.6)	9	30.0		56 (100.0)	10	17.9	
Female		22 (57.9)	0	0	P>0.05	16 (42.1)	3	18.8	P<0.05	28 (100.0)	3	10.7	P<0.05
Total		**48 (51.1)**	**1**	**2.1**		**46 (48.9)**	**12**	**26.1**		**94 (100.0)**	**13**	**13.8**	
Age													
≤ 14 year		36 (48.0)	0	0	P<0.05	39 (52.0)	9	23.1	P<0.05	75 (100.0)	9	12.0	P<0.05
≥ 15 year		12 (63.2)	1	8.3		7 (36.8)	3	42.9		19 (100.0)	4	21.1	
Total		**48 (51.1)**	**1**	**2.1**		**46 (48.9)**	**12**	**26.1**		**94 (100.0)**	**13**	**13.8**	

** Case fatality ratio*

 # probability

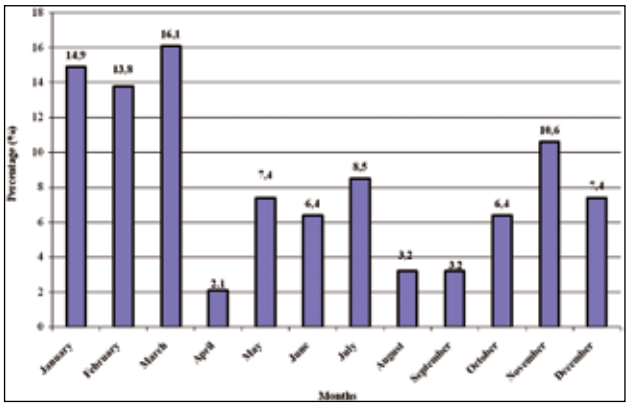


Figure 2. Meningococcal disease in Vojvodina (Serbia) in the period 2000-2009 by months

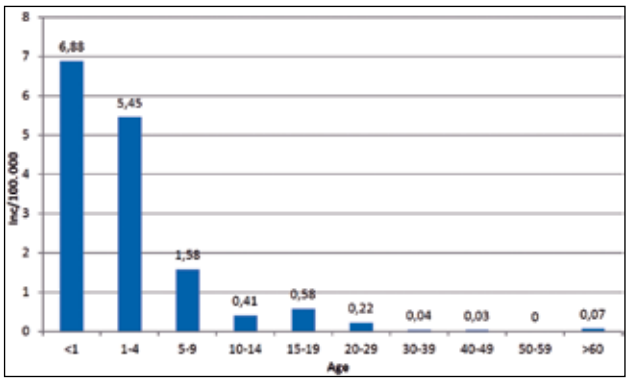


Figure 3. Age specific incidence rates of meningococcal disease in Vojvodina (Serbia) in the period 2000-2009

Invasive meningococcal disease was registered in two clinical forms: meningococcal meningitis and meningococcal septicaemia (table 1). Cases in which both meningitis and septicaemia occur simultaneously are usually regarded as cases of septicaemia.

Among our patients, meningitis and septicaemia were reported in about equal proportions (meningitis: 51.1%; septicaemia: 48.9%). Meningococcal septicaemia was more common clinical entity in men (53.6%) and younger patients (52.0%) with registered significant differences ($p<0.05$). Meningococcal meningitis occurs more common in children than in adults with registered significant differencies.

Case fatality ratio (CFR) for the total number of cases reported in Vojvodina in the period 2000-2009 was 13.8%. However, much higher CFR was found in cases of septicaemia (26.1%) than in cases of meningitis (2.1%).

Discussion

Surveillance is most important for understanding meningococcal disease epidemiology as well as its prevention and control. During epidemics in the meningitis belt of Sub-Saharan Africa the incidence can approach 1.000 per 100.000, or 1% of the population (6). Although in other parts of the world the reported incidence of disease is much lower than in the meningitis belt, the global epidemiological situation show that the epidemiology of meningococcal disease varies substantially by geographic area and time (6).

Most of epidemiological data on meningococcal disease in Europe comes from Surveillance report of European Centre for Disease Prevention and Control. Meningococcal disease appears to be rare in most countries of the European Union (7). In 2008 and in 2009, a total number of 9.615 cases of invasive meningococcal disease were registered in 29 countries with an overall incidence rate of 0.99 per 100.000 population in 2008 and 0.92 in 2009. The lowest incidence rate was reported in Cyprus (0.25 in 2008 and 0.13 in 2009), Hungary (0.37 in 2008 and 0.30 in 2009) and Italy (0.30 in 2008 and 2009). On the other hand, Ireland (3.68 in 2008 and 3.37 in 2009) and United Kingdom (2.29 in 2008 and 2.02 in 2009) reported a relatively higher incidence rate per 100.000 population. It is considered that these differences in incidences may be real, but might also reflect the differences in the sensitivity of the surveillance system and in the case definition used.

The incidence of meningococcal disease in Vojvodina has fluctuated between 0.09 per 100.000 population (2008) and 0.88 (2003). Meningococcal disease in Serbia is mandatory notifiable disease since World War II and reporting is passive. Information on serogroup laboratory confirmation in this period was available only in 1/3 of reported cases and it represents the weeakness of the system. Most of these cases were caused by serogroup B.

Information on serogroup was available in 88% of reported cases in the European Union. Among the known serogroups, serogroup B formed the largest proportion (71%), followed by serogroup C (14% in 2008 and 13% in 2009). Serogroup A activity still remains low (<1%). In Russia, however, serogroup A continues to be reported (8).

Meningococcal disease is associated with an overall case fatality rate of 8% to 13%, with a rate of up to 40 percent among patients with meningococcal sepsis (4, 9). The overal CFR in the Europen countries was 8.5% in 2008 and 7.3% in 2009, almost the same range of values as in the previous years. However, the highest CFR was found among cases reported as septicaemia (16.9% in 2008 and 16.5% in 2009), (7). Overall CFR reported in Vojvodina was similar as elsewhere, 13.8%. Much higher CFR was found in cases of septicaemia (26.1%) than in cases of meningitis (2.1%).

The results of some studies show that the highest rates were registered in infants younger than 1 year. Deficiency of specific host antibodies presented like major risk for developing meningococcal infection (10,11).

Among the older age group (>20 years), the disease was reported in Vojvodina only rarely. Some countries reported elevated incidence in older teenagers and older adults. This change has important implications for preventive strategies (5,7,12).

Our research revealed that the highest values of incidence rate in children under one year of age (6.88 / 100.000), and going to the older age groups the rates of continuous decline.

Observed by age, disease in Europe in 45% of patients registered in the younger age of five years. In this age group registered the incidence rate of 8.6 per 100.000 population, and in age group 15-24 years old rate is 1.4 per 100.000 population. In young ages, the disease is rarely registered. In the youngest age group the highest rate of incidence is registered in Ireland with a rate of 31.3 per 100.000 population, and the rates are slightly lower in the United Kingdom (21.2 per 100.000) and Lithuania (13.2 per 100.000). The highest values of the rate of disease in the age group 15-24 years registered in Malta (10.3 per 100.000), (13). Based on the data of Anual epidemiological report, slightly higher rate meningococcal diseases in males (1.09 against the 0.86 per 100.000) seen in females. Similar relationship presented our research with incidence rate 0.57 per 100.000 population by males, and 0.36 per 100.000 by females.

In relation to part of the year, meningococcal disease in European countries registered at least in the summer months, mostly in the winter months. In 2006. in Europe is the largest number of cases

registered during the first three months (13, 14). Similar situation is in our research with higher registered cases in march and january.

Conclusions

Meningococcal disease in Vojvodina occurs sporadically. Serogroup B predominates, but only 1/ 3 cases were laboratory confirmed.

It is necessary to improve the surveillance since the data on the incidence and distribution of serogroups in the population relevant to the creation of prevention program and immunization strategy.

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Successuf delivery in patient with severe psychosis and preeclampsia

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Abstract

Introduction: Gravidity represents special period in life of every pregnant women. During pregnancy,besides physiologic and morphologic changes some psychological changes can appear, sometimes very intensive.This fact is importance to notice, as different kind of mental disorders have primomanifestation between 20 and 40 yesrs old, so, according to this facts, there is a chance to occure before,or during pregnancy. When it is necessary, psychopharmacs had to be administrated during pregnancy, even in the period of organogenesis.

The aim of this article was to point out that if psychotic disorder persist in pregnant women,there is no absolute rule to discontinuate psychopharmacs during pregnancy. Not so rare, the better choice is to continue treating such women with most safely medicaments, for her and the baby with minimal or no theratogenic effect, and to hold mother in good psychiatric remission.

Case report: Female, age 38, was admitted in Clinical Centre, Clinic for gynecology and obstetrition in Novi Sad, because she demonstrate symptoms of preeclampsia in 32 week of pregnancy. For the last 15 years, she was treating with psychopharmacs, as she had diagnosis of Psychotic disorder (F 29, according to ICD X).During whole pregnancy, patient took regulary psychopharmacs recommanded by her psychiatrist. Patient was in social remission, during all this period. In the third trimester, preeclamptic symptoms appears, as well as trombophillia and this complication was the reason for sectio caesarea, in 34 week of gestation. A healthy female child was delivered,weight 1510 gr, lenght 41 cm. Postpartal period was without any medical or psychiatric disruption, so patient was dissmised from hospital with reccomandation to continue with psychiatric, nephrologic and haemastayiologic control egyaminations.

Conclusion: Pregnancy in women with psychotic mental disorder require multidisciplinare planing and following development of pregnancy and after delivery. Whenever it is possible, psychopharmacs should be avoided during period of organogenesis, but not so rare, they had to be given, and than psychiatrist try to choose the most safety and effective medicaments for both mother and child health. .After delivery, multidisciplinatoru tim should take care about patient and baby and to help them to improve qvality of life .

Key words: psychosis, gravidity, preeclampsia multidisciplinatory approach

Introduction

Gravidity represents a a special period in the life of pregnant women. Besides physiologic and morphologic changes, some psychological changes can appear, which can sometimes be so intensive that disrupt women`s life style, and can causes severe complications through pregnancy, so doctors must suggest ending pregnancy.

It is very important to notice that different types of mental disorder have first manifestation between the age of 20 and 40, so, they may occur before or during pregnancy. Different ways of mental functions are more than usual in pregnancy, so pregnant women can have even severe mental problems throug pregnancy. Psychotic disorders appears very often in adolescent period or in youth. Psychotic disorders (F 29, in ICD X) represent heterogeny group of mental disorders. The basic feature of psychotic disorders include mental desorganization and deterioration with various types of psychotic features, like paranoid or interpretative ideas, grandious ideas, ideas of hypochondriasis, etc. Psychotic disorders could be caracterized by various types of halucinations (auditive, cenestopathic, etc), by affective turbu-

lence and disturbance of other mental functions (1,2,3). Assumed to symptoms, such psychotic disorders could dissrupt social, professional and familly functioning. Therefore, it is very important to recognise psychotic disorder on time, and to treat it adequately (3,4,5). Etiopathogenesis of psychotic disorders still remains unclear (1,5,6), no doubt it is multifactorial. Nowadays, investigation in the field of psychotic disorders point out that in addition to genetic predisposition and neurobiochemical disturbances (DA, 5 HT2, NA - objasniti skraćenice) transmission, as well as other neuromodulators; chronical stressfull accidents could be an intrizing factor which results in psychotic features (6,7,8). Treatment of mental illness depends on clinical features, but most of all, adequate treatment requires not only appropriate pharmacotherapy, but also psychotherapy and sociotherapy as well. If it remains untreated, mental disorders, especially psychotic can cause serious troubles during pregnancy, like miscariage, preterm delivery, growth retardation or baby small for grow weight. (5,6,7). According to mental health, such disorders can result in loss of interest and devotion to the newborn baby, and, finally, such mentally ill mothers, without adequate treatment could cause serious mother´s and/or baby´s injury (altruistic murder and suicide) (6,7,8). One of the primary aims of psychiatric care in psychotic pregnant woman is to suppress such behaviour, as well as to help women to carry out the pregnancy and deliver healthy children (5,6,7).The decision about therapeutic plan should be made by multidisciplinary approach of team including a psychiatrist, a gynecologist, internist or by consulting other specialist, if necessary. (5,6, 7,8).

The aim of this article was to emphises that if psychotic disorder occur in pregnant women, there is no absolute rule to discontinue psychopharmacs during the whole pregnancy. Not so rare, the best choice for both the mother`s and the baby`s health is to continue treating pregnant women with the safest psychopharmacs for her and the child, with minimal or no theratogenic effect (6,8,9).

Case report

A pregnant woman, aged 32, from Novi Sad, married, was admitted into the Clinical Centre of Vojvodina, Department of Obstetrics and Gynecology/pathology of pregnancy. It was first, planned pregnancy, and from the beginning, the pregnant woman went regularly to a gynecologist. The course of pregnancy was regular, but with weigh increase of 23 kg. One month before being admitted into hospital, patient noticed swelling of her face, forearms and both legs. She doesn´t control her blood preassure. Few days before admission, she complained about headache, and at that moment, her blood pressure was 150/90 mm Hg. She visited her gynecologist and the doctor sent the patient to the hospital with diagnosis of preeclampsia.

At admition into hospital, patient had swelling face, arms, and legs,with blood pressure of 170/90 mm Hg. The patient had no uterus contraction, CTG was regular. Ultrasonographic examination showed that the fetus was in good condition, 32 GW, mature placenta (III degree) and descrete lower level of amniotic fluid, fetus weight was 1350 g.

Patient denied any physical problems or operation before getting pregnant, but confirmed that for the last 15 years she regularly went to her psychiatrist and she took psychopharmacs. She decided to visit a psychiatrist 15 years ago because she complained about hostility, sleeping problems, she felt extreme irritability and had paranoid ideas. The psychiatric diagnosis was psychotic disorder, and prescribed her a combination of sedative and incisive antipsychotic drugs with low doses of benzodiazepines. The doses of pharmacotherapy were changed few times. Most efficacy dosage of therapy was: chlorpromazine 300 mg/day, flufenazine 7,5 mg/day and diazepam 5 mg/day. Under this treatmentall psychopathological symptoms disappeared, and the patient accomplished a solid remission. She functioned well at her job, as a piano player, and composer and was quite inconspicuous. From time to time, when her psychiatrist tried to reduce the pharmacotherapy, some of psychopatological symptoms appeared, like irritability or sleep disturbance, but when her doses were appropriate, the symptoms disappeared. The patient got married, and before getting pregnant, she visited her psyciatrist, who reduce doses of therapy because patient was in solid remission and had a good compliance with her doctor. Shortly before conception, at her husband suggestion, the patient discontinued to take any medicaments. After a few days of wash

out period, she became hostile, irritable, she could not sleep well, she became anxious, with paranoid and interpretative ideas. The patient went to see her psychiatrist, and all medicaments were precribed in regular doses. Again, after a very short time, symptoms disappeared. During the whole pregnancy, before being admitted into hospital, the patient took her pharmacotherapy in same doses, regulary, and was in solid psychiatric remission.At admition patients thoughts were coherent, without dellusins or hallucinations. During the whole time in hospital the patient was in solid psychiatric remission, and she took medicaments regularly. The psychiatrist visit patient twice and the dosage of antypsychotic was reduced (daily dosage was chlorpromazine 250 mg/day, flufenazine 5 mg/day and diazepam 5 mg/day). Laboratory investigations showed hypoproteinemia (46,3 g/ml), with proteinuria (Esbach 1 %), so with a consultation of an internist proteins were substituted. Liver test was in referent values. Because of prolonged partial tromboplastin time, hemostazeologist was involved, who suggest low molecular weight heparin. Next laboratory test show lupus anticoagulans positive, so patient had thombophilia. Laboratory tests confirmed nephrotic syndrome. The pregnant woman was without subjective complaints, but hypertensive (150/90-180/110 mm Hg), although three different antihypertensive medicaments were administrated (methyldopa, nifedipine and occasionally furosemide in low doses). After this combination, parenteral application of urapidil was prescribed by an internist.

Multi-disciplinary team (psychiatrist, gynecologist, internist) made a decision to terminate pregnancy with sectio caesarea. After preoperative interventions, sectio caesarea was made in 34 GW, and alive, healthy female child was delivered, weight 1510 g and 41 cm of lenght, Apgare score was 6/8. Before, during and after the operation the patient remained hypertensive (TA 160/90–180/110 mm Hg) consequently, antihypertensive therapy was changed until the patient became normotensive.

After birth psychomotoric developement of the child was adequate.

Because using psychopharmacotherapy patinet must stop lactation in early puerperium. The patient was dissmissed 9 days after operation, in good physical condition, and in solid psychiatric remission. She was not febrile, laboratory tests was in reference. In gynecological findings, the uterus was in regular evolution, with regular physiological function Swelling of her face, legs and arms was in regression. When dismissed, the doctors advised her to continue with regular control in psychiatric and internistic ambulance, and to continue with antihipertensive and pharmacotherapy therapy.

At the discharge of hospital patient use: methyldopa a 250 mg 3x1, chlorpromazine a 25 mg 1+1+4 flufenazine a 5 mg 0+0+1, diazepam a 5 mg 0+0+1.

Discussion

Most of mental disorders have first manifestation between 20 and 40 years old. According to this data, it is not uncommon that some pregnant women take various types of psychopharmacs before conception when they have mental problems. In such cases, doctors advise that pregnancy should be planned, and if the patient has a solid remission, psychopharmacs should be consequently discontinued, whenever it is possible, especially in the period of organogenesis (1,4,5,6). Anyway, such pregnancies are not always planned, and in such cases it is not so easy to make adequate decisions whether to continue with psychopharmacs during pregnancy, or not. The final decision depends on mental status of pregnant women, compliance between patients and doctors, and most importantly the decision requires a multi-disciplinary team (a psychiatrist, a gynecologist, possibly an internist or other specialists). Sometimes, due to mental illness and patient condition, psychopharmacs should be given during pregnancy, for mothers` and babies` health. And in such cases, the safest medicaments should be given, with minimal or no theratogenic effect (5,6,7,8,9). If a patient has a psychotic disorder, and has psychopatological symptoms there is a recommendation to administer haloperidol, flufenazine or chlorpromazine, in minimal efficacy therapeutic doses, especially during the period of organogenesis (7,8,9). Benzodiazepines should be avoided whenever it is possible during the first three months of pregnancy, and the last week before delivery (7,8,9,10). Investigation about administrating antipsychotic new generation during pregnancy is still inconsistent (9,10,11).

Conclusion

Pregnancy in psychotic women is not such a rare problem. In a patient with a psychopathological symptoms, pregnancy is often not planned. In such mental disorders, pregnancy requires multidisciplinary approach (psychiatrist and gynecologist), and most importantly, good complinance with pregnant psychotic patient.(4,7,9)The whole pregnancy and delivery in psychotic women can be regular, without complications, if communication and compliance between such patients and medical staff is satisfactory. Discontinuation of psychopharmacs during pregnancy is not the best choice in all patients. Sometimes, and not so rarely, tbe best decision for both the mother`s and the baby`s health is to continue with pharmacotherapy, to avoid anxiety, psychotic delussions, hostility, or agressive behaviour of such pregnant women to herself, her fetus, or to other people. (6,7,9,10)

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Do bolton's ratios apply to a Serbian population?

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Abstract

Introduction: To achieve good occlusion, orthodontists must consider tooth size discrepancies between the jaws. Previous studies have shown that populations differ with respect to intrarch tooth size relationships.

Aim of research: The aim of this study is to establish tooth size ratio of the Serbs, to compare with size ratio among gender and to compare tooth size ratios of Serbian population with Bolton's ratios.

Material and method: Dental casts and cephalometric radiographs of 60 subjects (30 males and 30 females) were used in this study. The age range was 17 to 25 years. All subjects had normal Class I occlusion, with no history of orthodontic treatment. The mesiodistal width from first molar to first molar was measured on each pretreatment cast to the nearest 0.01mm using digital caliper, and the anterior and overall ratios were calculated.

Results: Student t-test was used to compare tooth size ratios between this study and the Bolton study, and between genders. No statistically significant differences between men and women were found in either the anterior or overall ratio. The combined male and female anterior and overall ratios were 79.28±3.09 and 91.41±2.70, respectively. The combined male and female anterior ratio showed a statistically significant difference from the Bolton standard, whereas the overall ratio showed no statistically significant difference.

Conclusion: Differences between the Serbian values and Bolton's were significant, and specific standards for Serbian people might be needed. It is suggested that Bolton's prediction tables can be used for the Serbs until a large enough representative sample is studied to allow the drawing of prediction tables.

Kew words: tooth size discrepancies, Bolton analysis, Serbian population

Introduction

The mesiodistal tooth size of the maxillary and mandibular arch must relate to each other in order to obtain an excellent occlusion at the completion of the orthodontic treatment.

Tooth size is inherited [1-3], though there are attitudes that there is an external influence of local etiologic factors [4, 5].

The association between tooth size and sex is confirmed by investigations of numerous authors, showing that tooth size in males is greater compared to tooth size in females [6-12]. The association between tooth size and ethnic origin has also been confirmed [6, 11, 13-16], while the opinions on tooth size in different orthodontic anomalies are still divided.

Investigations of certain authors point to the association between tooth size and malocclusions [6, 17-20], while some authors deny the influence of tooth size on the appearance of orthodontic anomalies [21-23].

The existence of intermaxillary tooth size discrepancy is determined by values introduced by W. Bolton [24, 25]. Bolton established ideal anterior and overall ratios with mean values of 77.2 % and 91.3 %, respectively, for proper harmony of maxillary and mandibular teeth [24, 25].

The aim of this investigation was to establish tooth size ratio of the Serbs, to compare with size ratio among gender and to compare tooth size ratios of Serbian population with Bolton's ratios.

Material and methods

The sample for the present study consisted of 60 dental casts (30 males and 30 females). All the subjects were homogeneous Serbs with normal class I occlusion and no history of orthodontic treatment. The selection criteria of the casts were:

- All permanent teeth present in each arch (excluding second and third molars) and sufficiently erupted to allow measurements of the mesiodistal crown dimension.
- Good quality of the study models.
- The absence of mesiodistal and occlusive abrasion, caries lesions, Class II fillings.
- The absence of prosthetic or composite restoration.
- The absence of anomalies in regard to shapes, structures and tooth development.

The measurements were taken by a digital caliper of Japanese production (Model No. CD6 GS, Mitoyoto, Tokyo) with precision of 0.01 mm. All the measurements were taken by one examiner. The mesiodistal width of each tooth was measured at the greatest distance between the contact points on the proximal surfaces. The measurement mistake was determined by repeated measurement of ten models selected at random, which was done ten days after the first measurement by means of Wilcoxon statistical test. The results did not show any significant difference between the two measurements. The anterior and overall ratios were calculated for each cast using the method described by Bolton [24, 25].

Statistical analysis was done using SPSS 15.0 software (SPSS Inc, Chicago, Illinois). Continuous variables are presented as mean value ± standard deviation and coefficient of variation (in brackets). Differences between sexes and between our sample and Bolton norms were tested by t-test.

Results

The mean anterior and overall ratios for males and females are presented in Table 1. The mean Bolton anterior ratio for males and females were 79.06 ± 3.09 and 79.51±3.12, respectively. The mean Bolton overall ratio for males and females were 91.57 ± 2.60 and 91.26 ± 2.83, respectively.

Table 1 also shows that no significant sexual dimorphism in either anterior or overall ratio were found; therefore, the sexes were combined for all other analyses.

Table 2 compare the sample with Bolton' s original sample.

The mean Bolton anterior ratio for subjects of the present study are significantly higher compared with Bolton's original mean. The difference was at the level of $p<0.001$.

The mean Bolton total ratio for subjects of the present study are close to Bolton's original mean.

Table 1. Descriptive statistics of anterior and overall Bolton ratio (N=30 males, 30 females)

Measurement	Male		Female	
Anterior Bolton ratio	79.06±3.09	(3.91)	79.51±3.12	(3.93)
Overall Bolton ratio	91.57±2.60	(2.84)	91.26±2.83	(3.10)

Table 2. Comparison the sample with Bolton' s original sample.

Measurement	Male		Female	
Anterior Bolton ratio	79.28±3.09***	(3.90)	77.20±1.65	(2.14)
Overall Bolton ratio	91.41±2.70	(2.96)	91.30±1.91	(2.09)

*** - *p<0.001*

Discussion

The existence of balance of tooth size between the upper and lower jaw is a precondition for attaining a good occlusion.

As well as many other human attributes, tooth size is inherited also [1-3]. Some authors, besides hereditary component, also point to the influence of local etiologic factors [4, 5].

Numerous investigations have shown that males have bigger teeth than females [6-12], and great differences have been described in regard to tooth size in persons of different ethnic origin [6, 11-16, 26, 27].

The tooth size discrepancy analysis of both the upper and lower jaw expressed by the Bolton anterior and total ratios have shown that the mean values of both ratios are similar in our examinees of both sexes (79.06 for males, and 79.52 for females for Bolton frontal ratio, respectively; 91.55 for males, and 91.26 for females for Bolton total ratio, respectively), which shows the absence of sex differences. The results of our investigation coincide with results of previous researches who also have not found the sexual dimorphism in the values of Bolton ratios [11, 21, 25, 28], though there have been some different results as well [14].

The mean value of the Bolton anterior ratio obtained in our investigation both for males and females is significantly higher compared to the value presented by the original research of the author and coincides with the results of Santorio [16], Heusdens [29], Alkofide [30], Binder [31]. The obtained differences can be explained by ethnic characteristics [6, 11, 13-16]. The mean values of the Bolton total ratio in our examinees of both sexes do not show differences compared to the values obtained in the original research of this author, which coincides with the findings of other authors [15, 32, 23].

Conclusion

Tooth size ratios among the Serbs have been established. Bolton's anterior ratio was not applicable to the Serbian population and specific standard tooth size ratios for the Serbian population might be needed.

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Cognition, behavior, intellectual disabilities: Intervention strategies

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Abstract

Introduction: This study focused on the strategies of practical activities implementation in children with intellectual disabilities, aimed at encouraging and rehabilitation of neurophysiological processes of attention, behavior and cognition**.**

Subject: This study was aimed at children with mild intellectual disabilities and it shed a light on their cognitive and behavioral functioning, in relation to different aspects of the applied treatment strategies.

Material and Methods: The study sample consisted of 124 examinees with mild intellectual disability of both sexes, aged from 8 to 13 years, from primary schools in Belgrade. In this research we applied the Trial Making Test (TMT; Reitan, 1971) for attention assessment, the IOWA Conners' Rating Scale for Children for behavior assessment, while for the assessment of cognitive function, the Test of Concept Utilization (TCU; Crager & Lane, 1989) was administered.

Results: The results indicate the presence of developmental disabilities in the examined areas in more than 50% of the surveyed children and a high statistically significant correlation between the applied treatment modalities and tested abilities and functions ($r = 0.52\text{-}0.59$, $df < 0.01$). The study points out the necessity of implementing the multimodal oriented approach: team work of professionals and non-professionals (cooperation between professionals and parents), complementary treatment (medical and special treatment, psychosocial interventions, combination of treatment strategies), psychotherapy and psychopharmacotherapy when necessary, as well as special education rehabilitation, based on individual educational programs and individual training programs (IEP and ITP).

Conclusion: In the conclusion we proposed new treatment strategies with an emphasis on the special rehabilitation treatment.

Key words: intervention strategies, intellectual disability, cognition, attention, behavior.

Introduction

Modern neuropsychological approach to cognitive functioning and learning is based on the view that learning success is determined by the sensorimotor efficiency, which is reflected in the subcortical and cortical capacities for receiving stimuli, sensory memory and motor planning. According to this view, cortical, as well as subcortical structures are functionally important elements of the integration of sensory and motor processes that determine speech and higher cortical functions.

Neurobiological control of cognition and behavior, as pointed out by Meshulam (1990), is organized within several functional levels. The first level, which involves the corresponding neuroanatomical structures, is organized in the form of multiple connected networks that provide functioning of the next level. The second level involves neural operations, as a parallel distribution of information processing, which is finally reflected in the third level, the level of behavioral components- cognition and behavior [1].

Cognitive and learning processes are conceptually perceived, and empirically treated by the authors of this study, through neuropsychological functioning of voluntary attention, behavioral and conceptual-verbal, as well as general cognitive functioning of examinees in both inclusive and regular educational conditions. The cognition implies processes of perceptual receiving and neurophysiological processing of information, which serve as a basis of adaptive and expressive functions [2, 3, 4].

Cognitive processes, presented in this study, empirically treat and examine those neuropsychological functions and abilities that present the basis of the learning, i.e. cognitive functioning of an individual in the development period. That presents the period when children with intellectual di-

sability, as well as children of typical population, acquire their first knowledge and form first conceptual experiences, essential for their later education and existential functioning in general.

In this research segment, the examined field involved neuropsychological abilities and learning functions, behavior, conceptual formations, as well as aspects of the neurophysiological mechanisms of voluntary attention and academic abilities during their education in a typical school situation where the rehabilitation treatment for such children is being carried out.

Taking this model into account, the cognition implies processes of information receiving and processing, which serve as a basis of adaptive and expressive functions. Cognitive processes are in constant interaction and are closely associated with the development of attention, emotion and motivation. In further attitudes, it is stressed that the level and quality of development of some cognitive functions are called individual ability. Therefore, cognitive functioning could be observed through abilities, as well as through achievement. In that sense, intervention strategies could be directed towards processes or towards results of the processes [5, 6, 7, 8]. The Model, presented in this study, treats the relations between the process and the result of the process, i.e. relation between development potentials and achievement. As part of a larger scale study*, this article treats two important neuro-developmental aspects of behavior, such as socioemotional functioning and cognitive behavior in regular school conditions, in which surveyed children with developmental disabilities are included.

Modern theoretical approaches to solving these scientific problems are based on a statement that most of the developmental disorders, such as behavioral disorders, are the result of disorders of higher cortical functions (executive functions, self regulation functions, emotional and motivation processes).

These theories also propose the etiological hypothesis based on the assumption about the possible causes, such as metabolic dysfunction and dysfunction of neurotransmitters of catecholamine in prefrontal cortex and its relationship with subcortical structures (basal ganglia). The latest data in recent scientific studies, reported by World Federation of ADHD, point out that these disorders affect about 5% of the children worldwide [9, 10-13].

Specifically defined individual treatment program is offered for these developmental disorders. Such activities are based on:

- Pharmacotherapy
- Behavioral therapy
- Pharmacotherapy and behavioral therapy combination
- Education of all persons involved in patient care activities, such as parents, teachers and children

Subject of the Study

Empirical framework of this study is perceived through this theoretical context, based on the possibilities of implementing a multimodal oriented approach to behavioral and cognitive disorders of children with intellectual disability. Based on these initial assumptions, we formulated a hypothesis, founded on the view that there is significant correlation between the applied aspects of treatment and examined neuropsychological functions and processes of children with intellectual disability. Practical implications of the research are reflected in the ability to define dimensions of multimodal treatment adapted to behavioral disorders of children with intellectual disability.

Materials and Methods

The study was conducted on a random sample of 124 examinees with mild intellectual disability with an IQ ranging from 51 to 70, according to the WISC scale (Wechsler Intelligence Scale for Children). The calendar age of the respondents in the sample ranged from 8 years to 13 years and 6 months, due to the prolonged period of adaptation to the conditions of regular school attendance and/or inclusive education. The sample included examinees who attend elementary schools in Belgrade from 2nd to 5th grade. Gender distribution is also present in the sample, with 39.5% of female and 60.5% of male examinees.

Methodological design of this study provided and implemented control of the research conditions. All these factors, as characteristics of the examined sample, which may influence the examined variables and achievements of the children on the applied test, are controlled within the wider rese-

arch study and will not be shown here because of the spatial and conceptual limitation of the scope of this study, which focuses on hypotheses and results.

Voluntary attention mechanisms were examined through Trial Making Test – TMT test, Reitan, 1971 [1].

A complex non-verbal test of attention examined the recognition abilities regarding symbolic meaning of the numbers and letters, ability of continuously following the target stimuli among the irrelevant distractors, sequence identification of the next numerical and graphical symbols and flexibility of integration of the numerical and alphabetical series within the time limited for the task.

Assessment of the cognitive abilities was made by the Test of Concept Utilization, Crager & Lane, 1981 [1]. The test comprises of five relatively independent and exclusive conceptual domains such as color, form, relation functions, homogeneous usability functions and abstract function, class or noun. It gives an insight into the qualitative and quantitative indicators of cognitive functioning of individuals, and this study presents quantitative indicators (collective, summary scores).

Behavior of the examinees was assessed by IOWA Conners Rating Scale [6]. This test was chosen since it is a proven and standardized measuring instrument for assessing behavioral disorders associated with ADHD. It is most often used for working with children with intellectual disability, primarily aimed at the mild level of disorders. It consists of a scale for parents and a scale for teachers. In this study, we applied the scale for teachers- special educators. When the purpose is evaluation of the effectiveness of a medication therapy, which is used as a supplement in some cases of ADHD, it is applied once a week. This assessment instrument is a four step scale and can be used, as noted above, to assess the effectiveness of medication, but also for everyday routine assessment of the effectiveness of other possible models of treatment and their influence on the behavior of respondents. The instrument consists of two subscales that assess deficits in attention and motor activity such as the rebellious and disobedient (troublesome) pattern of behavior. Maximum final score of 15 is an indicator of the presence of potentially high risk of behavioral problems and ADHD associated disorders. For the statistical analysis, the summary score on the applied scale is as significant as independent scores obtained on each scale separately. This is a significant indicator of the possibility of estimated behavior item analysis, which enables qualitative insight into the problems manifested. The instrument is very useful in monitoring the effects of treatment rather than for diagnostic purposes, but may present a good choice for both of these purposes in clinical and epidemiological studies [1, 6, 14, 15].

Other data, relevant to the research, included in the control of survey conditions, as well as indicators of academic and cognitive achievements of the examinees, are the result of standard procedures of school records analysis. To reach the study results, the following statistical methods were used: numerical and percentage format. Survey results are presented in tables and graphs. Testing of the hypothesis was carried out by Pearson`s „r" coefficient of correlations, as well as their statistical significance [1].

Results

Sample Distribution of the Examined Abilities and Functions

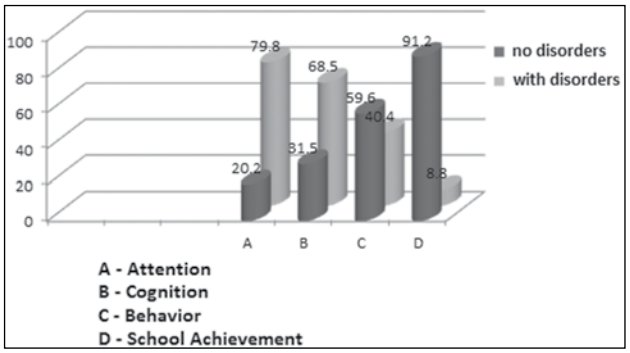

Figure 1. Tested Variables

Presented results indicate that the majority of surveyed children (over 50%) have significant disturbances of neuropsychological functions and abilities, except in the examined domains of behavioral and school achievement, where examinees with no developmental disorders prevail, but their percentage is still relatively high (40.4%). Most of the tested children show symptoms of attention deficit disorder and cognitive disorders in terms of concept formation in their standard school situation (Figure 1).

Results of Statistical Analysis of Correlation Between the Applied Treatment and Examined Abilities and Functions

Obtained results indicate that there is a statistically high significant correlation between most of the neuropsychological functions of surveyed children and the applied form of treatment, which was implemented during their education in a typical school situation, where the sample was formed (Table 1). Applied mode and treatment strategies are individually defined factors within the intervention strategies in working with children with intellectual disability. Results of the statistical analysis indicate that there is a high statistically significant correlation between the applied treatment, which included certain aspects of the multimodal approach, partially directed at the developmental disorders of attention, behavior and conceptual functioning of the examinees.

Discussion

Research results confirmed the initial hypothesis regarding connection and statistically significant correlation between the applied aspects of the treatment and examined neuropsychological functions of surveyed children. A general overview of the achievements reveals a discrepancy in the development of the tested abilities and functions of children surveyed. The concept of harmonic and disharmonic development is significant in terms of the possible occurrence of psychiatric disorders in this population of children. According to this concept, disharmony in the development between certain personality segments (cognition, speech, emotions and behavior) determines the interaction and communication between the child and the surrounding as a conflicting one. Conflicting communication and interaction results in forming the frustrating experiences of a child, which may present the precipitating factor of the appearance of psychopathological personality traits and mental diseases in this population of children [1, 12, 13, 16].

Other researchers in this area also point to the cognitive development issues, as the factors around which the psychiatric risk status of the persons with intellectual disabilities is focused [9, 10]. Therefore, in conclusion, we can point out the significance of the multimodal oriented approach to the rehabilitation process of children with intellectual disabilities in their standard school situation. Our recent researches in the field of behavioral and emotional disorders, such as ADHD in children with intellectual disabilities, emphasize similar conclusions regarding the applicability of the medication therapy as one of the modules within the strategy of treatment of these children.

In connection with the foregoing, in one of these researches the IOWA Conners scale was applied for the assessment of behavior, in order to monitor the effectiveness of the medication therapy for developmental disorders. The presence of emotional and behavioral disorders was found in 10%-40% of the surveyed children and points out the significance of different modalities of therapeutic approach. Emphasis is placed on psychopharmacological approach and application of sympathomimetics and psychostimulants, as well as atomoxetine. The importance of behavioral oriented treatments, such as psychotherapy for children with ADHD and their families, combined with intervention strategies carried out by a special educator, as well as social work with their immediate and wider environment, are also stressed out [13].

Different studies related to medication treatment of behavioral and emotional disorders suggest the positive effects of 18mg Concerta (OROS MPH) in the treatment of children with cognitive disorders and intellectual disabilities. Parallel implementation of special treatment carried out by a special educator, in terms of educational and clinical rehabilitation, is also advised [11].

Other studies also suggest the possibility of applying the aforementioned medication therapy in children with intellectual disability, in which behavioral problems can persist in varying de-

Table 1. Results of Statistical Analysis

	Attention	Cognition	Behavior	School Achievement
Applied Treatment	r=0.599 p < 0.01	r= 0.520 p < 0.01	r=0.568 p < 0.01	r=0.558 p < 0.01

grees of complexity in relation to a variety of intellectual and cognitive problems [12].

Recent studies are investigating the relationship between emotional, cognitive and social functioning in various developmental stages. This shows that impulsivity in preschool children, in relation to social cooperation and social interaction skills, indicates the presence of behavioral specificity, such as explosive behavior, self-centeredness, attention deficit hyperactivity disorder, antisocial, aggressive behavior and tendency to withdraw, as well as occurrence of cyber bullying (harassment in cyberspace) and internet addiction, as possible forms of behavioral disorders represented in children and adolescents in their regular educational situation [2, 3].

Other authors warn of the negative effects of excessive exposure to modern media (TV, computer), as risk factors for adverse reactions to the administered medication therapy and quality of life in general [7, 8].

Presented results indicate the significance of multimodal oriented approach to cognitive and behavioral disorders of children with intellectual disabilities. This approach involves combination of various strategies designed in education and treatment of children and youth with intellectual disabilities, such as: team work of professionals and non- professionals, complementary treatment (special education and rehabilitation, psychosocial interventions, combination of treatment strategies), psychotherapy and psychopharmacotherapy when necessary. As part of special education, individual educational programs and individual training programs (IEP and ITP), based on individual needs and abilities of surveyed children, are also being applied and defined.

Conclusion

The findings of this research have highlighted the need to introduce and develop various intervention strategies for children with cognitive and behavioral disorders. Based on the results of this study we can conclude that it is necessary to apply a complete multimodal approach that includes:

- Team work of professionals and non-professionals (child psychiatrists, special educators, teachers, parents)
- Multimodal treatment which includes strategies of combined therapeutical approaches
- Complementary treatment (education, psychosocial intervention, combination of special education methods, such as reeducation of psychomotor activity etc.)
- Psychopharmacotherapy when necessary
- Individual educational programs (IEP)
- Individual treatment programs (ITP)

Adaptation of the treatment must be focused on the developmental abilities of the child. It also means that new strategies and methods of work with children and adolescents with disabilities should be developed, which will be discussed next.

In the area of the above mentioned interventions, we propose the strategy and technics from our environment, known from French speaking countries as Reeducation Treatment of Psychomotor Activity-RTPA. This methodological and conceptual frame implies the use of speech and motor exercise, team work and supervision of child psychiatrist, while the exercises should be led by a special educator and rehabilitation specialists.

These exercises have to improve the following performances:

- Reduce motor and emotional impulsivity of the child
- Reduce distractibility of child`s attention
- Improve cognitive strategies of the child
- Improve learning strategies of the child
- Improve educational and self-educational strategies of the child, teachers and parents

Multidisciplinary approach includes psychopharmacological approach, psychotherapy with families and children with developmental disorders, as well as social work with environment [12].

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Measuring the Technical Efficiency of Hospitals in Iran: Case of Kerman's province: 2011

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Abstract

Background: Hospitals as the largest functional and costly units in health care system have importance position. The rate of their efficiency can be used as a scale or criterion for the measurement of efficiency and performance or productivity of resource consumption in hospitals. The purpose of this study was to determine the technical efficiency of teaching and non-teaching hospitals of Kerman University of Medical Sciences (KUM) in Iran.

Methods: This study is a descriptive - analytic study in which the efficiency of teaching and non-teaching hospitals in Kerman University of Medical Sciences, including 13 hospitals was determined by using Data Envelopment Analysis (DEA). Data and relevant Statistics were collected from statistics office of the University and Deap2.1 software was used to achieve the objectives of the research. Then the hypotheses of the research were studied by using SPSS software.

Results: The average technical efficiency score of studied hospitals in 2011 was 0.912, managerial efficiency was 0.993 and mean scale efficiency was 0.918. In regard to technical efficiency, 7 hospitals had the maximum technical efficiency (1), 4 hospitals had 0.8 -1 efficiency and in 2 hospitals it was less than 0.8.

Conclusions: In hospitals with technical efficiency of less than one, the optimal and initial values for staff differed and had personnel surplus. Therefore these hospitals should decrease their initial values for staff in order to achieve the expected optimal performance.

Key words: Hospital, Technical efficiency, Data envelopment analysis, Managerial efficiency, Efficiency of scale, Constant return to scale, Variable returns to scale

Introduction

During recent years, most countries have experienced a rapid rise in health care costs in general, and hospital costs and expenditures in particular [1]. This trend has been due to the combined impact of demand-related factors such as demographic change, epidemiologic factors, and society expectations, and supply-related factors that include, among others, the growing use of world-wise technology, and inadequate information available to the consumers of health system [2]. Many researchers have documented that such an increasing expenditure of health system can be due, at least in part, to the inefficient use of resources [3]. Hospitals are regarded as key resource consuming sectors in health care systems [2]. Taken the need to ensure the best use of resources, increasing emphasis is being placed on hospital performance and efficiency measurement to compare relative efficiency and productivity [4]. Hospital efficiency measurement is a necessary tool for improving of management performance, mobilizing resources, and rationalizing resource allocation. The evaluation of hospital efficiency is an important health economics issue. When hospitals are inefficiently organized, the overall potential positive effect of a health care system on population welfare is reduced, as inefficient hospitals leave fewer funds available for other population health measures. Hospitals as the largest functional and costly units in health system have special importance. The rate of their efficiency can be used as a criterion for the measurement of performance and productivity of resource consumption in hospitals [3]. The purpose of this study was to determine the technical efficiency of teaching and non-teaching hospitals of Kerman University of Medical Sciences. Kerman is one of the 31 provinces of Iran. Kerman is located in the south-east of Iran with its admini-

strative center in the city of Kerman. Mentioned in ancient times as the achamenid satrapy of Carmania, it is the second largest province of Iran with an area of 180,726 km [5]. The population of the province is about 2.65 million. The main townships of Kerman province are: BAFT, BARDSIR, BAM, JIROFT, RAFSENJAN, ZARAND, SIRJAN, SHARE-BABAK, KERMAN, MAHAN, RAYEN, KAHNOUJ, RAVAR [5].

The World called today as information age, one of the ideal directors' thoughts in different sections is to gather and categorize information as well as to use analyzed information rightly to document managerial affair [6]

The World Health Report (WHR) 2000 was supported to the development and application of a structure for evaluating the efficiency and performance of health care systems. The structure includes measurement of three goals of health systems that is health, responsiveness and fairness in financial contribution, and an exposition four functions of health systems including provision, stewardship and resource generation, financing, [6]. [7].

Directors and Managers attempt to perform the best works to develop the affairs in the own managerial area.

However, we can see that a professional director is successful in performing his duties and another director has not been able to achieve his/her goal. One cannot say that an unsuccessful director is someone who has not tried to promote his/her own working field but one can say that an unsuccessful director is someone who has not been able to achieve his goals [6].

One can clarify the reasons of directors' failure summarily as: lack of sufficient information and science on management, unfamiliarity with principle of management, lack of leadership art, the effects of environmental factors and instability of environment ,vanquish environmental factors over organization, dominated atmosphere over the country, non considering the feedbacks, non monitoring by controlling offices, high attention to political behavior rather than performing the affairs appropriately, lack of essential facilities, problems in general policies announced by superior boards, pressures by interested groups, unawareness of superior directors or parallel managers with new managerial tactics and lack of dealing among them, etc[7].

Thus, one can say that assessing the efficiency and performance of some similar organizations in an administration and comparing them can be a method to develop and improve organizational performance Perhaps, a general agency or a center has many subordinated sectors with similar efficiency. We can show their directors' performance and, in other words, compare their successes and failures if we compare the efficiency of each unit appropriately and scientifically. However, comparing the performance of units cannot fully clarify the correct or incorrect performance of all directors but it can highly justify their efficiency [5].

Evaluating the efficiency of hospitals is one of the most important accountability of managers and authorities. Today, there is not special technique to change the efficiency of hospitals and no hospital in Kerman province assessed yet. The main aim of hospital is to provide suitable healthcare services to patients. By determining the efficiency or performance rate of hospitals and its quantitative rate and comparing the result in various hospitals, one can investigate the various guidelines to increase the efficiency and performance of hospitals. In addition, by considering the effectiveness of hospitals and by using other researches on Kerman hospitals' efficiency, we can measure their performance. In calculating the efficiency of hospitals, the outputs are measured over the inputs and then efficiency of hospital is achieved. In present study, inputs and outputs shape unknown aspects and variables of the research which include: inputs such as deploying personnel like full-time physicians, full-time nurses, administrative personnel; and outputs are inpatient or outpatient, number of surgeries.

To determine the efficiency of firms in the world, DEA method is used. For example, Focuyama accepted an article titled "technical efficiency and the scales of Japanese Commercial banks: a non parametrical measure" [6]. In this article, he not only studied the nature and scope and scale efficiency among Japanese banks, but also announced a relationship between situation and the amount of performance and efficiency. Estimating of efficiency was done through 1990 sample and to measuring the efficiency, a non parametrical method was utilized which is being popular recently in studying and estimating the performance of non Japanese banks. Also, in a border function

by SHINKIN Bank, Focuyama realized that major factor contributing which exceeds technical inefficiency is pure technical efficiency. It is suggested that size and scale are not important factors for Japanese banks [8].

Another important paper on measuring the branches by analyzing data is performed by David Sherman Veladino to measure the efficiency of 33 branches. [9]

By using Data Envelopment Analysis method, this article has addressed the efficiency and performance of the bank through the quality of services. DEA is method which provides all used resources in branches clearly. This thematic comparison to identify the way of improving the performance of low efficiency branches needs to study and identify the best level of efficiency and the best potential profitability over the best management and performance. To achieve their goals, directors of the firm simplified banking process without lowering the quality of services. To determine productivity and efficiency level and to assure the proper allocation of resources, they used ratios like cost operation, per officer performance, cost – benefit, etc. However, using such indicators to introduce the performance was not so effective due to complexities of banking operations. Meantime, Data Envelopment Analysis is utilized in this article since it with respects all importance services and inputs. To determine 33 branches of a bank, 5 outputs and 5 inputs were respected. Inputs include officer or clerk, service personnel, chief of branches, operating costs and branches' foundation.

In determination or selecting the outputs, 15 important outputs were discussed in 5 groups. Similar outputs in terms of bank management were combined and some outputs were omitted since they were not significant in terms of volume or low recorded operations like trust funds. Outputs include travel checks, drawings, and received checks, deposits, banking checks loans, new accounts and services [9]

Overall, it is forecasted that through the efficiency of 23 inefficient branches (results show that of 33 branches, 23 ones are inefficient) about 9 million dollars decrease in expenditure or costs is available or achievable. According to relevant organization, by using some forecasted results of this article, reductions in some inputs were not practical in short term, the bank downsized about 20% of its personnel during 1 year and it decreased its expenditure or costs by 6 million dollars in next year.

So, measuring of efficiency in health care system is important because this system (health care) is related to human and providing critical services.

Methods

The methodology is divided in 3 sections that are including statistical sample, data collection method and Data analysis in this research.

Statistical Sample

There is no statistical sample all population was analyzed. Statistical population includes Kerman province hospitals which were divided into two teaching and non-teaching hospitals.

Data collection Method

In this research, firstly by studying previous articles and submitted papers on determining the performance and efficiency of hospitals, inputs and outputs variables of each hospital were gathered and secondly gathered data and information were used in statistical gathering forms. Afterwards, the forms were extracted by statistical liaisons of hospitals located in statistical hospitals and medical evidence and documents of hospitals. In the meantime, to deepen studies, information was gathered through published papers/books as well as Internet worldwide and was used in this article. It is essential that write in this research inputs are the number of full time physician, the number of nurse and other staff (administration and financing staff) and outputs are Outputs include the number of outpatient clients, the number of surgeries and the number of beds per day.

Data Analysis

Data were analyzed by Data Envelopment Analysis (DEA) method. Researchers use Deap2.1 (Data Envelopment Analysis program) software for calculation technical efficiency. In this method, the most efficient hospital was regarded as a base to measure other hospitals and hospitals were numbered and measured. In this section, is better that we explain DEA history. DEA usage started with Rhodes' Ph. D. dissertation by the guidance

of Cooper in which US public schools were evaluated. It led into the publication of the first paper on general introduction of DEA in 1978.In the same year, Charles, Cooper and Rhodes (CCR) added data total analysis method to economic literature by developing Farrell's method in a manner to involve the characteristics of production process with multiple production factors and multiple products. The method mainly recognized as an efficiency measuring method in the world, provides a return relative to production separately for firms (hospitals) during efficiency measurement [10].

Today, in the economics world, DEA is an active project and research field to measure the efficiency and is outstandingly welcomed by global researchers. This method is highly applicable to assess the efficiency of general (public and private) firms whose price data is either unavailable or unreliable. In this method, rather than manufacturer, Decision Making Unit is used to cohere. DEA uses linear planning techniques such as non-parametrical estimation of similar production functions. Generally, estimating similar production functions as a comparing standard indicator needs DEA [10].

In this method, those hospitals that operate according to the least cost principles are

Located on a similar function and their efficiency is announced 100%. Analyzing DEA in estimating similar production function does not need any certain pre-assumption on the shape of the function. This method determines the efficiency of a hospital to the efficiency of other hospitals [11].

In such calculus, it is assumed that all hospitals are located on or over similar production curve. Thus, in conditions in which hospitals need more than two production factors to manufacture their product(s), any manufacturing hospital or firm is considered as a point it space in terms of the types and amounts of its own production factors and the dimension of this space is estimated by production factors and point coordinates. Then, by selecting a manufacturing hospital as a studied firm, its position (point) relative to other firms or hospitals sis measured. This operation should be repeated according to the number of firms or hospitals (points) we should have linear planning models accordingly [10].

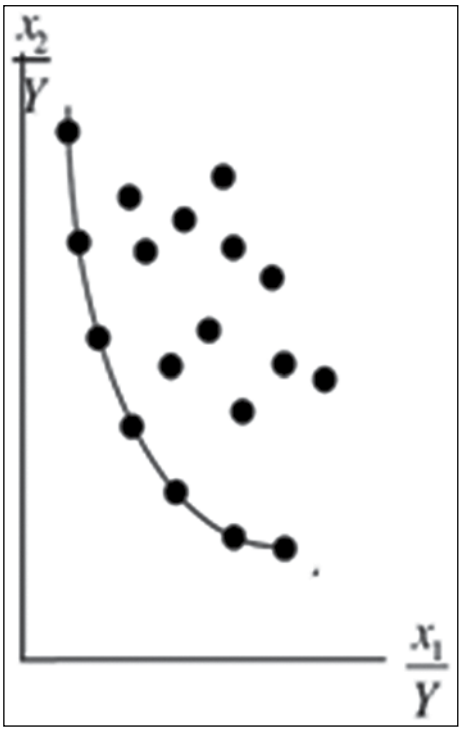

Figure 1. The concept of relatively efficiency in hospitals

In 1985, a paper by Charter and Cooper with title "a starting point for data analysis" was an outstanding work in introducing Data Envelopment Analysis method and clarifying the bases on which DEA is designed. Charter and Cooper extracted a subtle mathematical basis for DEA and delivered their documents of DEA conceptual framework. They examined the suitable if using DEA as method to advocate measuring the efficiency of DMU and showed that the measures of efficiency are based on using input units for producing output units. DEA not only needs no previous weight or functional relations between inputs and outputs but also it does not require measuring units with homogenous roots. [6-7]. in their definition, Charter and Cooper did not formulate efficiency as actual or conceptual efficiency rather as a relative or improved efficiency. According to this analysis, the relative efficiency of any taken DMU is assumed fully efficient to other DMUs only when one cannot prove that relevant DMU is inefficient [11].

Results

Actually, the findings of the research are inputs and outputs of each KUM hospital. Inputs include the number of physicians, the number of nurses,

the number of administrative personnel or other personnel. Outputs include the number of outpatient clients, the number of surgeries and the number of beds per day. [5]

Profile of hospitals data bank is shown in Table 1. Each of the 13 hospitals is general hospitals. In this research we divided general hospitals to two teaching hospitals and non-teaching hospitals. The type of activity, 10 hospitals are non-teaching and 3 hospitals are teaching. The study shows that the number of active beds is 1,857. Kerman city, with 937 beds is highest and RAVAR city with 24 beds is ranked lowest on the bed.

The average technical efficiency of hospitals is 0.912, efficiency of managing 0.993 and the average scale efficiency is 0.918. The results show that the capacity to improve efficiency is around 9%. From total of research society, 7 hospitals are with efficiency score of 1, 4 hospitals are between 0.8 to 1 and another hospital has less than 0.8. Table 2 shows technical efficiency of hospitals with DEA-VRS model.

In 2011, 53.8% of hospitals were efficient and rest of hospitals had efficiency score around less than 0.8 also, results show that 53.8 % of hospitals had constant return to scale, 30.7 % had decrease return to scale and 15.3 % of hospitals had increase return to scale. Also, we did a statistical test for examine difference between technical efficiency of teaching hospital & non-teaching hospi-

Table 1. Characteristics of research society in Kerman provinces, 2010

Townships name	Number of hospitals	Number of beds		Hospital type	
		Proved	Active	Teaching	Non-teaching
KERMAN	3	1186	937	3	٠
JIROFT	2	220	270	٠	2
BAFT	1	120	92	٠	1
BAM	1	96	145	٠	1
BARDSIR	1	50	48	٠	1
ZARAND	1	84	71	٠	1
RAVAR	1	33	24	٠	1
SIRJAN	1	122	122	٠	1
SHAR-E-BABAK	1	85	66	٠	1
KAHNOUJ	1	80	82	٠	1
Sum	13	2076	1857	3	10

Ref: finding of this research

Table 2. Ranking of hospitals with technical efficiency and type of return to scale

Hospitals name	Efficiency score			type of return to scale
	scale	managerial	technical	
H1	1	1	1	Constant
H2	1	1	1	Constant
H3	1	1	1	Constant
H4	1	1	1	Constant
H5	1	1	1	Constant
H6	1	1	1	Constant
H7	1	1	1	Constant
H8	0/925	0/972	0/902	Decreasing
H9	0/894	1	0/894	increasing
H10	0/927	0/932	0/864	increasing
H11	0/819	1	0/819	Decreasing
H12	0/697	1	0/697	Decreasing
H13	0/675	1	0/675	Decreasing
Mean	0/918	0/992	0.911	----------

tal by under assumption test. This difference measuring with SPSS software. Under this assumption H0 &H1 are base on (1) and (2) equations.

$$\begin{cases} H_0 : \mu_1 = \mu_2 \\ H_1 : \mu_1 \neq \mu_2 \end{cases} \quad \text{..... (1)}$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{S_P{}^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \quad \text{..... (2)}$$

After running to SPSS software This test shows that between activities of teaching and non-teaching hospitals is significant so, H0 rejected with α=0.05. table 3 shows difference between teaching and non-teaching hospital with statistical test also, P value calculated 0.0001. Standard Deviation (SD) is 0.077 and 0.055 for teaching & non-teaching hospitals, respectively finally, Efficiency mean for teaching and non- teaching hospitals are 0.73 and 0.966, respectively.

Table 3. Difference between teaching and treating hospital with statistical test

Type of hospital	Efficiency mean	Standard Deviation (SD)	Test Result
Teaching	0.73	0.077	P=0.0001
Non –teaching	0.966	0.055	

Finally, slacks for inputs in KUM hospitals are shown in Table 4.

Table 4. Target and initial inputs via DEA

Variable	Actual	Optimal	Slacks
Physician	33/23	32/468	0/762
Nurse	184/46	182/0756	2/386
Other staff	188/15	176/74	16/682

Conclusion

In this paper, the efficiency or performance evaluation of KUM hospitals in Iran was carried out using DEA. This is the first systematic attempt to examine the efficiency status of the health sector in this country using frontier-based methods. The study is also one of the few attempts to measure hospital efficiency in the Middle East Region. The analysis has provided KUM hospitals' relative technical efficiency scores, the area in which the hospital is not too bad but they can be better ,target setting (i.e. the amount of input and output variables levels that would render a hospital relatively efficient), and a ranking of efficient units. Using DEA, our study clarify that there are a number of KMU hospitals (6 hospitals) that are inefficiently operating relative to other KMU hospitals. The average score for inefficient hospitals was 80 %, suggesting a potential reduction in all inputs by a margin of 20% would have no effect on outputs. In this research developed a number of important methodological issues that needs to be addressed in more details. By showing a full ranking of efficient hospitals comparing with simple ratio analysis, the paper is try to contribute to the existing literature in hospital performance studies using DEA. The lowest efficiency score is related to the H13. The main reason for this hospital (H13) is related to environmental factors that are located in a deprived area. Policymakers should take special care to this hospital. The number of people that covered in H13 is around 60,000. Hospitals12 and 13 are similar in terms of efficiency scores with difference around 0.022. H12 has around 49000 people are under covered. This issue is as important for Kerman University of medical sciences as a policy maker or as accountable.

We mentioned that average technical efficiency of studied hospitals in 2011 was 0.912, managerial efficiency was 0.993 and mean scale efficiency was 0.918. In regard to technical efficiency, 7 hospitals had the maximum technical efficiency, 4 hospitals had 0.8 to 1 efficiency score and in 2 hospitals it was less than 0.8. In hospitals with technical efficiency of less than one, the optimal and initial values for staff differed and had personnel surplus. Therefore these hospitals should decrease their initial values for staff in order to achieve the expected optimal performance. In this paper an introduction to efficiency measurement of decision making units and the DEA methodology of measuring the same is given. With the help of a set of input and output variables from some hospitals in Iran technical efficiency scores were computed under VRS assumption. It was found that 53.8% of hospitals were constant return to scale. This means, more than half of hospitals in Kerman University of medical sciences (KMU) were constant

return to scale. A research by Ali KIA DALIRI is agreement with results of this article. He mentioned in him research 60% of hospitals in Iran University of medical sciences are with constant return to scale. The term returns to scale arises in the context of a hospital's production function. It refers to changes in output resulting from a relatively change in all inputs (where all inputs increase by a constant factor). If output increases by that same proportional change then there are constant returns to scale (CRS). If output increases by less than that proportional change, there are decreasing returns to scale (DRS). If output increases by more than that proportional change, there are increasing returns to scale (IRS) [12].Thus the returns to scale faced by a hospital are purely technologically imposed and are not influenced by economic decisions or by market conditions. A hospital's production function could exhibit different types of returns to scale in different ranges of output [14]. Typically, there could be increasing returns at relatively low output levels, decreasing returns at relatively high output levels, and constant returns at one output level between those ranges. In this research, 7 hospitals are constant returns to scale (CRS) 4 hospitals are with decreasing returns to scale (DRS), finally 2 hospitals are with increasing returns to scale (IRS). The next important issue is about slacks for inputs in KMU hospitals are shown in Table 4.

In general, rate of slacks in other personnel is around ١٧ people and in Nurse Variable Nearly 3 and Physician are less than 1 people. This shows that policymakers should given more care in hiring other personnel. Because if hospitals take more and more other personnel, their efficiency scores will be low scoring. Hossein Hajialiafzali and et al, done a research titled "Efficiency Measurement for Hospitals Owned by the Iranian Social Security Organization" .This researchers shown that identification of slacks for SSO efficient hospitals has shown that there is a general agreement between DEA method and super efficiency scores in differentiating efficient units, particularly for those with very low or very high super efficiency scores. For example, hospitals X, Y, and Z (with the least super efficiency scores) have positive slacks, and hence are weak efficient units [15]. On the other hand, for hospitals M, N, O, and P, which have the highest efficiency scores, the slacks are negative. These hospitals can be considered to be fully efficient hospitals. This result related to Hajialiafzali and et al is agreement with this paper. For comparing the finding of this article with another article one can say that similar finding are obtained from researches on hospitals. In research by Ali KIA DALIRI with title of "determining the technical efficiency of general hospitals in Iran University of medical sciences by DEA method in 1996 – 2004", it was determined that by improving the Efficiency, firms or hospitals can decrease the utilization of inputs remarkably followed by expenditure and wastes. In this article, similar finding was achieved through data analysis software and it was determined that by increasing outputs from constant data or by decreasing fix inputs and outputs, one can achieve to efficiency or performance edge. In researches conduct by Data Envelopment Analysis or DEA, since the results are relatively and cannot be a measurement benchmark as a grade of assessing each firm or hospital in overall and countrywide evaluations [16].

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An Unusual Presentation of Trismus in Temporomandibular Disorder: Nasopharyngeal Carcinoma

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Abstract

In this report, a case of a Nasopharyngeal Carcinoma invading head of mandibular condyle and the Temporomandibular Joint (TMJ) in a 17 year old male has been presented. He had rapid weight loss with TMJ complaints without any previous trauma history. A detailed evaluation with magnetic resonance imaging showed parapharyngeal mass invading the right TMJ and its extension to the right anterior pontocerebellar region. Pathological examination of the biopsy of the mass showed a type II Nasopharyngeal Carcinoma (NPC). An expeditious weight loss with trismus may indicate a possible malign neoplasm such as NPC.

Key words: Trismus; nasopharyngeal carcinoma; temporomandibular disorder

Introduction

Nasopharyngeal Carcinoma (NPC), is a rarely encountered malignancy in young patients, associated with viral, genetic, environmental and dietary factors.[1,2] It shows an intermediate incidence (3-7/100000) in Mediterranean countries and low incidence (1/100000) in the rest of Europe and other western countries.[3,4]

Trismus is a mouth opening restriction that inter-incisal distance is less than 2cm.[5] Trismus is a rare symptom of NPC that it can be observed in either as a presenting symptom at diagnosis or as a late complication of radiotherapy.[5,6] The incidence of trismus ranges from 0 to 5% for malignant nasopharyngeal tumors patients at initial diagnosis.[6] However, tumoral pathologies, such as NPC, must not be ignored in differential diagnosis in examination of temporo-mandibular joint disorder (TMD). Clinicians should take into consideration that rapid weight loss can be seen in TMD because of trismus and weight loss can also be caused by carcinoma.

In this paper, we report a NPC mimicking TMD symptoms in a young male patient with rapid weight loss in one year.

Case Report

A 17-year-old male referred to the hospital for the inability to open his mouth and severe weight loss complaints for one year. According to both him and his family, the main reason of weight loss was the inability to open the mouth and chew, resulting in inadequate oral feeding. In his examination, the inter-incisal distance (distance of mouth opening) was 1 cm (Figure 1). He had facial pain with the Temporomandibular Joint (TMJ) movements. Protrusion, retrusion and lateral excursion movements of the mandible were also restricted. The pain was located temporal, masseter, and submandibular region. There were no other remarkable clinical symptoms about the palpation of temporal and masseter muscles and the TMJ at the initial examination. History revealed that he had no previous trauma, infection or systemic disease. However, we found out that he had undergone a lot of medical treatments, such as; myo-relaxant agents, anti-inflammatory drugs and rehabilitation treatment for TMD for one year. Despite all these treatments, his complaints did not subside clinically. After clinical history and physical examinations, the patient was referred to radiology clinic.

Figure 1. The inter-incisal distance of the patient was 1 cm (anterior view of limited mouth opening)

A detailed evaluation with magnetic resonance imaging showed a homogenous contrast within the right posterolateral nasopharynx with an extension towards anterior pontocerebellar region (Figure 2a). This parapharyngeal mass was invading right TMJ and right condyle of mandible. Extension of the mass was invading the right pontocerebellar region (Figure 2b). For the definitive diagnosis, biopsy was performed. According to histopatological analysis, the diagnosis of the mass was non-keratinising poligonal type, undifferentiated NPC (Figure 3). After diagnosis, the patient was consulted to medical oncology and neurosurgery departments, and then referred to radiation oncology department.

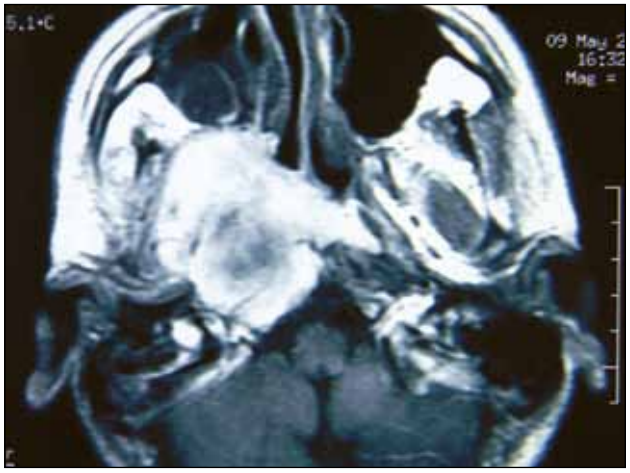

Figure 2a. T1 weighed contrasted MRI views, homogenous contrasted parapharyngeal mass invading right TMJ with extension to the right anterior pontoserebellar region is seen (axial).

Figure 2b. T1 weighed contrasted MRI view (sagittal)

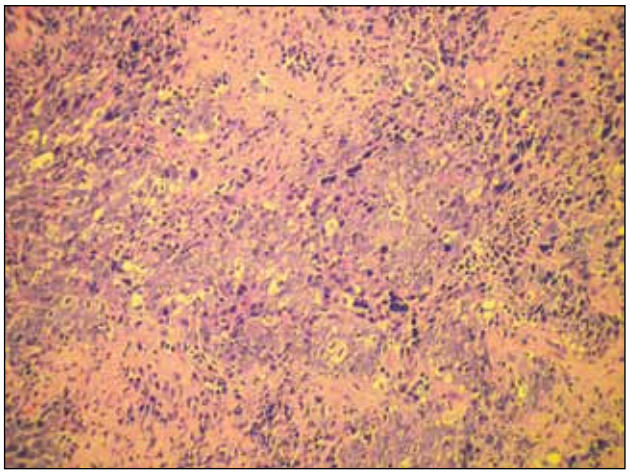

Figure 3. Hematoxylin-Eosine staining, original magnification x200: nasopharyngeal carcinoma of non-ceratinizing type

Discussion

In this case limited mouth opening resulted from infiltration of the right condyle of mandible, causing interference of TMJ functions. Ambiguity of initial symptoms and unclear examination of nasopharyngeal region may cause delay in the diagnosis. Our case presented with vague symptoms, which may not remind NPC at first glance, like difficulty in mouth opening, myofacial pain with jaw movement and weight loss. Although in-

tracranial spreading of tumor was detected in cranial MR, no neurological sign and symptom were observed. Myofacial pain dysfunction syndrome and anterior disc displacements are the most common reasons of painful limitation of TMJ function.[7] Primary metastatic malignancies of the hard and soft tissues, which line TMJ, should be taken into account in a patient with myofacial pain. When TMD symptoms such as pain, swelling, trismus, mandibular deviation are in conjunction with the presence of destructive lesions on radiograph, the possibility of malignancy should be considered. Ozyar et al. found the trismus rate %5 at initial diagnosis in 210 patients.[6] We think that trismus is not a common symptom at diagnosis in NPC moreover a neglected symptom.

NPC, a malign neoplasm, should be considered in the differential diagnosis of facial pain, especially in the Asian.[8] Epstein and Jones reported that %13,5 of the NPC patients had common TMD signs and symptoms such as clicking in the joint, pain while chewing, limited opening whereas 44.2 % of them, described ache in the ear, head, jaw, midface, or neck.[9] In this case there were no symptoms except limited mouth opening.

A standard curative treatment for NPC, in young patients particularly, is not well established.[2] It is reported in several studies that radiotherapy has curable effect with a local control of the carcinoma. Currently, as a choice of radiotherapy treatment, neoadjuvant chemotherapy followed by radiotherapy, or adjuvant immunotherapy with interferon-beta after radio-chemotherapy can be curative in management of NPC.[1,2] On the other hand, trismus can be triggered by radiotherapy, as late complication.

In conclusion, we presented a case of NPC mimicking TMD as these two different situations could have similar signs and symptoms. NPC, a malign neoplasm, must be considered in the differential diagnosis of TMD. We suggest that TMD complaints with rapid development of mouth opening limitation without a previous trauma history, quick weight loss must make the clinicians think of a possible neoplasm such as NPC and should urge the clinician to ask for an adequate radiological examination in order to misdiagnosing this condition as TMD.

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MRI in diagnostics of temporomandibular joint hypermobility: case report

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Abstract

Hypermobility of a temporomandibular joint (TMJ) is usually a result of mouth opening beyond normal limits of translational movement of discus-condyle complex. It can lead to condyle dislocation over the top of the articular eminence of temporal bone.

We present the case of posttraumatic bilateral hypermobility of the TMJ and the role of magnetic resonance imaging (MRI) in diagnostic algorhytm.

MRI is a crucial tool in the diagnostics of temporomandibular dysfunctions (TMD) because it has capability to show TMJ discus without using ionizing radiation. In diagnostic algorhytm MRI uses no i.v. administration of contrast material and therefore presents non invasive method.

Key words: Magnetic resonance imaging, Temporomandibular joint, Hypermobility, Diagnostics.

Introduction

Hypermobility of a TMJ is usually a result of mouth opening beyond normal limits of translational movement of discus-condyle complex, which can lead to condyle dislocation over the top of the articular eminence (AE) [1]. The etiology of condylar hypermobility (CH) includes laxity of the ligaments after dental or oral interventions, anatomical variations [2], intubation, bronhoscopy, tonsillectomy, whereas 15% of cases are consequence of injuries [3]. It can manifest as isolated hypermobility,e.g. Charcot' s joint or generalized hypermobility as in Ehler Danlos syndrome.

This article presents the case of bilateral hypermobility of a TMJ after trauma, its diagnostics by MRI and its physical treatment.

Case report

Clinical diagnostics and status

A 35 year old male patient referred to the Clinic of Dentistry in February 2011 due to the pain in the right TMJ, which occurred after a motor car accident. He suffered a blow in the left side of his chin and face during motor vehicle accident 15 days ago. Clinical examination revealed moderate facial soft tissues swelling of the right side, painful palpation of the right TMJ and pain followed with a noisy click during opening and closing mouth at the distance of 25 mm between upper and lower incisors. Active mouth opening was 50 mm, and passive was 53 mm, accompanied with pain. The pain on the right side appeared during right laterotrusive movement. The amount of extreme border movements was within normal limits. There was no deviation of the lower jaw upon mouth opening. During the muscular spasm, the patient rated the pain on the analogue-visual scale as 8/10. The habitual occlusion was rated as class II by Angle [4].

MRI of the TMJ

Patient underwent MRI of the TMJ and brain using 3T imager (Trio Tim, Siemens, Erlangen, Germany). Proton density sequence was used (TR/1850, TE/15, FOV 13cm), with 3 mm slice thickness in parasagital plane- along the long axis of the mandibular body. Dynamic imaging of the TMJ was performed in closed, semi-open and maximally open mouth (MOM) position using self-made triangular opening mouth device made of polymethyl methacrylate with five distances for mouth opening – from 25 to 50 mm.

MRI of TMJ during the MOM has shown bilateral CH – more pronounced on the left side 150 ˚ vs 145˚on the right TMJ(Figure 1A). Partial rupture of the right lateral pterygoid muscle (LPM) was

detected (Figure 1B), as well as signs of the right articular disc contusion. We adapted classification of the condyle mobility according to Benito [5] and Yang [6]. Condylar movement was determined on the console of MRI unit on parasagital image of the TMJ. Horizontal tangential line was placed on the top of the articular fossa (AF) and a vertical line through the top of AE. The top of AF is on 0º and the top of the AE on 90º. Two lines meet each other in point "O". The AE was divided by angles into three sectors: 0-90˚, 90-120˚ and 120-180˚. From the point "O", angle of 30˚ was added to the vertical line through the top of AE (90˚), forming the angle of 120 ˚ in order to determine terminal position of the anterior margin of condyle representing border angle for a diagnosis of CH. The diagnosis of condylar mobility was made by measuring the position of the top of the condyle in MOM position. (MC = mandibular condyle).

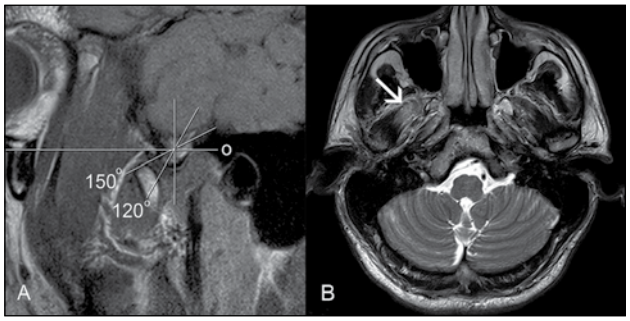

Figure 1. A) MOM position – 150˚ on the left TMJ and B) partial rupture of the right lateral pterygoid muscle (arrow).

The nocturnal occlusal appliance was made and restriction from hard food and MOM was recomended. After the low-level laser therapy in dose of 4 J/cm^2 of both right and left joint, Ketoprofen localy and a kynesiotherapy program by Schulte [7] a significant improvement was noted - pain in TMJ and muscles decreased and noisy click during mouth opening and closing disappeared.

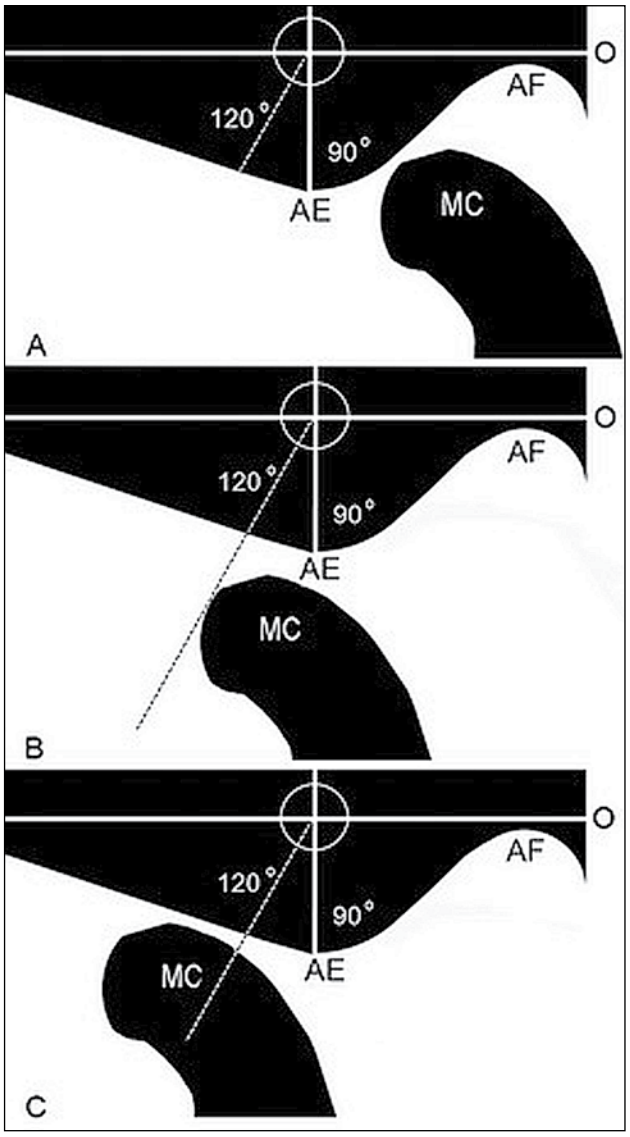

Figure 2. Classifications of the condylar mobility in MOM position - schematic view. Condylar hypomobility - anterior margin of the mandibular condyle is located in sector between 0-90˚ of AE (A). Normal mobility – anterior margin of the condyle is located between 90-120˚ (B). CH - MC translates excessively, beyond and superior of the AE, over 120˚(C).

Discussion

It has been reported that MRI is to be 95% accurate in assessment of disc position and disc morphology and 93% accurate in assessment of osseous changes [8,9,10] and in evaluation of masticatory muscles [6]. Despite the presence of LPM tear, we did not observed disc dislocation (DD) but condylar hypermobility with noisy click only wich was described as the most common clinical complaint [11,12].

Literature data reported that clicking in TMJs with hypermobility might not be associated with DD. On the other side, Yang [6] found an anterior disc displacement with reduction accompanied with CH caused by trauma in 10/12 patients (83%). Explanation could be that symptoms of condyle hypermobility may be caused by laxity of capsular structures, whereas joint laxity may lead to joint clicking even without DD. It seems that TMJs with disc in normal position may have clinical symptoms as well as the joints with DD when condyle hypermobility has occurred. Numerous nonsurgical and surgical techniques for mandibular dislocation treatment have been proposed but noninvasive and reversible methods are preferred [11,12,13]. Stabilization appliance was our option due to impact on masticatory muscles and mandibular movements and therefore surgical method was not taken as a option.

Conclusion

MRI is an accurate method for condyle hypermobility assessment and it has been used as supreme method comparing other methods. MRI provides accurate information about the DD, osteoarthritic changes of condyle, tear of the disc and its morphological changes, presence cyst, tumor and pathology of the periarticular soft tissues. MRI is proved to reduce the operation time, avert surgical complications and improve outcome during preoperative orthognatic and maxillofacial surgery assessment.

Determination and classification of the condyle mobility according to Benito et al 1998. and supplemented by Yang 2002 was very comfort, simple and useful for diagnosis of hypo-, normo- or hypermobility of TMJ.

Dentist, radiologist, physiatrist and physical therapist are crucial team members for adequate treatment and successful outcome in patients with TMD.

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A case report of a patient with epilepsy and synesthesia

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Abstract

Synesthesia is a relatively rare condition in which sensory stimuli cause unusual additional manifestations. These additional manifestations often occur between the modalities, such as the perception of colour as we listen to music or the sensation of tangible shapes during the food tasting. One of the most common and the most extensively studied form of synesthesia is grapheme - color synesthesia, in which the identification of letters or numbers causes the experience of colour. It is important to focus on four main topics in studying synaesthesia: genetic, cognitive, perceptual and neural models of synasthesia, functional imaging studies of synesthesia and the role of individual differences. We have presented the case of the patient with epilepsy and synasthesia and, for this particular case we, being guided by the patient's medical history of specific sensory manifestations during the observation of letters and numbers, came to the conclusion that the patient suffered from a grapheme-color synesthesia. During the testing we used synesthetic tests of visual search processes with the application of a texture segregation process and set paradigm, which all confirmed the existence of a certain form of synesthesia. The fact that the patient has epilepsy and synesthesia goes in favor of some of the theories dealing with the basics of synesthesia such as local cross-activation, multistage processing and feedback mechanism. The study of synesthesia may be important for the overall perception of behavioral and cognitive characteristics, especially those related to creativity and memory skills.

Key words: epilepsy, synesthesia, psychophysiology.

Introduction

Synesthesia is a relatively rare condition in which sensory stimuli cause unusual additional manifestations. These additional manifestations often occur between the modalities, such as the perception of colour as we listen to music or the sensation of tangible shapes during the food tasting. One of the most common and the most extensively studied form of synesthesia is grapheme - color synesthesia, in which the identification of letters or numbers causes the experience of colour (5). Some synesthetes claim that they do not really see these colour photisms, rather that they simply 'know' that a particular letter represents a specific color, while others further report to perceive certain colours, but they claim that they experience the specific colours somewhere within their 'minds' (6,7,13). Although synesthesia was first studied more than a hundred years ago, synesthesia has since been largely treated as a novelty in psychology and neurological studies. In recent years this trend has changed, and a new generation of psychologists and neuroscientists started paying attention to synesthesia (13, 14, 15). It is important to focus on four main topics in studying synesthesia: genetic, cognitive and perceptual studies conducted over the past fifteen years; neural models of synasthesia, functional imaging studies of synesthesia and the role of individual differences in explaining some of the seemingly contradictory results in the perceptual and neuroimaging literature.

Estimated incidence of synesthesia is dramatically variable, as it fluctuates from as high as 1 in 20 individuals (8) to as low as 1 in 25,000 individuals (4). The most frequently cited study to date shows that synesthesia occurs in at least 1 of 2000 people (3), although that is now generally considered to be a too low an estimate, while some studies suggest that the prevalence of grapheme-color synesthesia can be between 1 in 200 (13,12).

Case report

Patient B.S., born in 1985, was admitted to the epilepsy clinic of the Neurology Department of the Niš Clinical Center, for the repeated convulsive loss of consciousness (syncope). The actual syncope occurred 2 weeks before the admission, and its symptoms are consistent with the symptoms of the tonic-clonic seizures accompanied by loss of consciousness and biting of the tongue. The seizure was associated with sleep deprivation and alcohol use. Prior this loss of consciousness he had experienced two more cases of syncope with similar characteristics. His life history testifies to the fact that the observation of numbers and letters causes him to experience colors, where each letter or number has a unique colour or a shade of colour specific for each number or letter. Through food tasting, depending on the type of food, he also experiences tangible coloured shapes of different spectral characteristics.

From the family's medical history we obtained the fact that his younger brother suffers from epilepsy as well and that his mother and his two brothers experience similar sensory sensations. On admission the patient was of the preserved alertness and orientation. Somatic and neurological test results were both normal. Laboratory test results were within normal ranges as well. Magnetic resonance imaging (MRI) was unremarkable.

Figure 1. EEG results (16 channels, circumferential montage): the main activity was symmetrical and well-expressed, medium and high voltages in the regular Alpha rhythm of 10-11 Hz. The effect of VB was preserved. During HV we registered a short generalized outbreak of SWK activity for the duration of 1 sec

Figure 2. EEG results after sleep deprivation: (16 channels, longitudinal-bipolar montage): in wakefulness and superficial sleep we recorded provoked frequent generalized discharges with the spike-wave complex activity of 4-5 Hz with no clear photosensitivity

During hospitalization we performed a neuropsychological testing which showed that the overall memory coefficient was 54, the verbal memory coefficient was 51 and the non-verbal memory coefficient was 57, mnestic capacity for delayed logical memory was below the expected with a reduced scope, strategy of telegraphic style and the influence of proactive interference. These errors are not recorded in remembering complex visual stimuli, and the retention of complex logical stimuli over time was also quantitatively less than the retention of complex visual stimuli in a much longer period. The actual level of intelligence corresponds to the above average intelligence, all subtest achievements were in line with these findings, except the achievements in the sphere of postponed logical memory on several levels, and in the sphere of personality structure that had the characteristics of the obsessive-compulsive type.

Based on medical history, clinical picture and complementary laboratory tests, the diagnosis of idiopathic generalized epilepsy was given and the valproate therapy (500 mg / d) was initiated.

Guided by the medical history data of the patient's specific sensory experiences we decided to use synesthetic tests on the patient.

In our synesthete, the observation of the number 2 will elicit the experience of green photism or color refraction. To test synesthetic colors in this patient, we used a visual search process with the application of texture segregation process in order to present our

patient with the display containing one of the four shapes (4-AFC) which comprise the target grapheme embedded in the background of distracter graphemes (that serves to distract the respondent). In this process, our synesthete was significantly more accurate than the control subjects in identifying the target shape that was presented to them.

We also applied a test where the number was harder to identify and locate with the background colour that matched the synesthetic colour, than with the background colour that did not match it. For example, a 'green' 2 will be more readily detected when presented against a red background than against a green background.

In addition, we tested the possibility that synesthetic colours may be able to help in identifying singleton graphemes in the traditional visual search paradigm. When the synesthetic colours differentiated from target and distracter graphemes (search for number two amongst the fives), our synesthetic subject was much more effective in his visual search. When the target graphemes and the distracter elicited similar colors (search for number six amongst the eights), the search was significantly less efficient. With control subjects, these differences were not observed. By using set paradigm, we investigated whether synesthetic colours can help in identifying the peripheral target grapheme in conditions in which the control subjects were not able to identify the target. Graphemes that were presented in the periphery were difficult to identify when in a group with other secondary graphemes, the occurrence which is known as the group effect. This effect is weakened by the introduction of a target shape in a color which is different from the colors of the secondary shapes. Our subject was significantly better in identifying target graphemes compared to the control subjects.

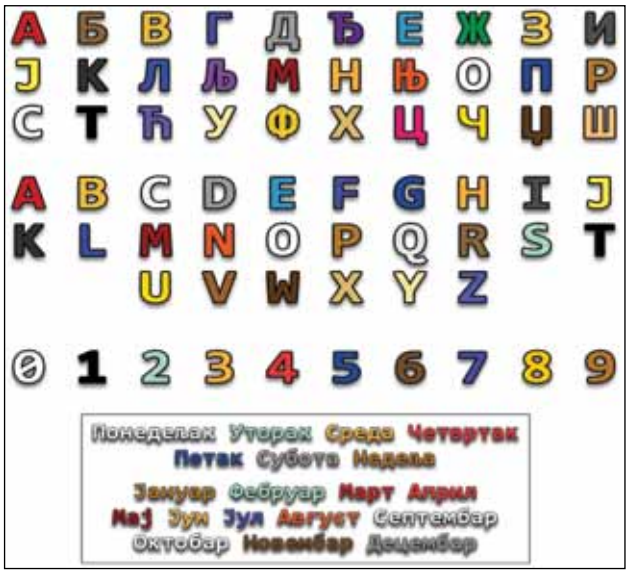

Figure 3. A visual representation of the way our patient experiences numbers and colours

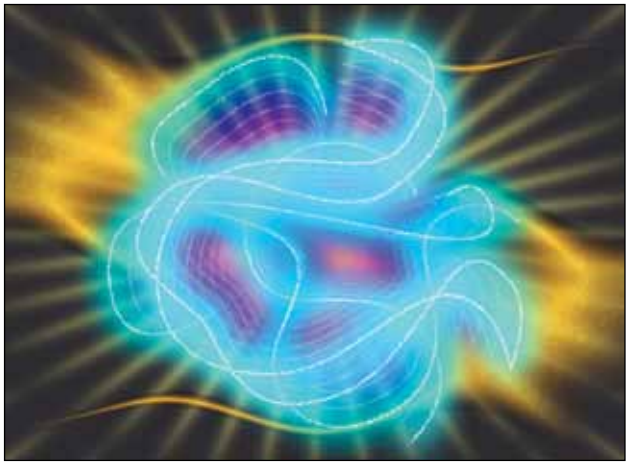

Figure 4. The representation of the patient's subjective experience of a pleasant scent

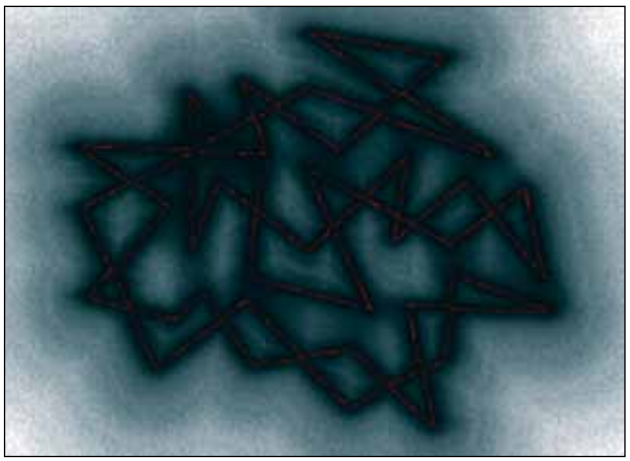

Figure 5. The representation of the patient's subjective experience of an unpleasant scent

Discussion

In of our patient's case we confirmed the grapheme-color synesthesia, but during the tests he showed signs of other forms of synesthesia. In the family medical history he reveals the fact that his mother and his brother have also experienced, similar to him, some special forms of perception of numbers and letters which coincides with the findings of early studies that show synesthesia as a familial trait (3,8) and that suggest it is much more common in women than in men (3), perhaps through a dominant inheritance pattern that is associated with the X chromosome (2). However, the exact genetic locus has yet to be identified, and the preliminary results from the molecular genetic studies of synesthesia show that synesthesia may not be exclusively associated with the X chromosome. When large-scale random studies are performed, there is no gender bias. Recent finds, including the ones obtained from the study of a pair of monozygotic twins without the same reaction to synesthesia (16) and data that suggest that synesthesia can skip a generation (11) can be difficult to reconcile with the dominant conception. All in all, the latest data suggest that the genetic mechanisms underlying synesthesia may be more complex than the direct explanation relating to the dominant X-chromosome which was proposed by the original researchers.

Based on this report of the patient with epilepsy and synesthesia and other published results that show the reality of the synesthetic experiences, it is natural to speculate about its neural basis. To date, there are two somewhat parallel discussions of the neural substrates of synesthesia. The first of these discussions is conducted at the neurophysiological level, and is concentrated on the question of whether synesthetic experience arises from the failure of neural shortenings or some form of disinhibition. The second discussion is conducted at the architectonic level. Three architectonic models have been proposed so far (a local cross-activation, a multistage processing and a far-reaching disinhibition feedback). Other studies have suggested that the syaesthesia may occur due to disinhibited feedback of the 'multisensory ties', such as the parietal-temporal-occipital association area (1,9,10). Another possibility is that the 'one size fits all' approach may fail to capture the variability of synesthetic experiences. Different neural theories have focused on different types of synesthesia, such as the theories of local cross-activation and of multistage feedback that focus on grapheme-color synaesthesia, while the feedback models focus on the word-color and tone-color synesthesia. It is quite likely, given the fact that graphemes, phonemes, music and colours are processed by different parts of the brain, that different forms of synesthesia have different architectural bases. However, the fact that synesthetes from the same family can inherit different forms of synesthesia (17) suggests that common neurophysiological mechanisms can occur in various forms of synesthesia.

Conclusion

Although the study of synesthesia has gained in importance and has became more intense in the last ten years, it, nevertheless, leaves many open questions. Of special interest are the questions concerning the behavioral consequences and neural correlates of various forms of synesthesia. Linking epilepsy and synesthesia in our patient, and especially the fact that this patient deals with graphic design and, therefore, has the ability to graphically present all synesthetic experiences, can highlight the importance of cognitive characteristics of synesthetes in terms of creativity and memory skills.

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The Degree of Gravity of Change of Diabetic Retinopathy in Patients Dependent and Independent of Insulin Historical Prospective Study

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Abstract

Diabetes is a condition of chronic hyperglycemia characterized by metabolism disorder of carbohydrate, protein and fat. The goal of this research is to compare the occurrence of diabetic retinopathy in patients with diabetes who were treated with oral anti-diabetics and those treated with insulin. The group of patients diagnosed with diabetes that was treated with oral anti-diabetics comprised of 60 patients, as well as the other group treated with insulin. Parameters were analyzed in two groups and tested with the appropriate statistical methods. Previously conducted scientific studies demonstrate that the duration of diabetes is a risk factor for occurrence of diabetic retinopathy. Results show that there is a significant difference in duration of diabetes in patients treated with insulin and those treated with oral anti-diabetics. There was no statistically significant difference in the occurrence of diabetic retinopathy in these two groups. It can be concluded that the treatment does not have a crucial role in the development of diabetic retinopathy in examined patients, but poor control of disease, as well as inadequate education of patients, all of which together result in a commencement of taking insulin.

Key words: diabetes, diabetic retinopathy, age, sex, eyesight quality, intraocular pressure.

Introduction

Diabetes mellitus is a condition of chronic hyperglycemia characterized by disorder of metabolism of carbohydrates, proteins and fats (1). The greatest difficulties, both for patients and for a society as a whole, are complications of diabetes that frequently appear, although with different intensity in different populations. The most common complications occur in blood vessels of various organs (2). The diagnosis of diabetes is often based on one set of measurements of glucose in the blood. If the glucose value is located in the area that is not characteristic for diabetes, it is necessary to make an oral glucose test submission (3).

Complications of diabetes can be divided into:

1. acute (diabetic ketoacidosis and coma; *nonketotic hyperosmolar* state and coma, acidosis of lactic acid; hypoglycemic coma)
2. chronic (vascular which include retinopathy and nephropathy, and neovascular chronic complications such as neuropathy).

Out of all late complications, neuropathy is the one that usually appears as first, and is often associated with unpleasant symptoms of numbness, convulsions, loss of sensation, to the very pronounced pain. After 5-10 years of duration of diabetes, the majority of patients develop diabetic retinopathy (4). Diabetic retinopathy is asymptomatic in almost all stages. Potentially blinding forms of diabetic retinopathy can develop before the patient even notices any vision problems (5). The nephropathy occurs as the latest one of all complications, in the beginning being asymptomatic, but its progression leads to severe renal function impairment (6). From a practical point of view, five forms of treatment are used nowadays in the implementation of the treatment of diabetes, which are completely intertwined: 1. educating

persons to live with this disease training them to be able to implement the treatment, and take care of themselves, which is necessary in all patients with diabetes, 2. treatment with diet and nutrition, which is also recommended to all patients with diabetes, 3. treatment with oral anti-diabetics, which is necessary in more than a quarter of people with diabetes, and 4. insulin treatment, which is necessary in less than a quarter of people with insulin-independent diabetes mellitus (7).

Diabetic retinopathy

Data on the prevalence and incidence of diabetic retinopathy are different in the studies performed so far, but it is certain that the number of patients with diabetic retinopathy increases with duration of diabetes (8). Diabetic retinopathy affects more than 60% of patients with type 2 diabetes in the first 20 years of disease duration, which is associated with blood glucose control (9). Occurrence of diabetic retinopathy involves many biochemical and pathophysiologic changes with damage of endothelium of retinal blood vessels. The consequence is a loss of pericytes and thickening of the basal membrane, which creates a greater vascular permeability (10). Patients with diabetic retinopathy lose peripheral vision, which is associated with retinal non-perfused area. Loss of vision is associated with microaneurysms, which is higher in the periphery than in paracentral retinal region (11). The first ophthalmological visible lesions are localized enlargement of capillaries, i.e. microaneurysms. Later, haemorrhages and hard exudates are visible due to increased permeability of blood vessels. With the occlusion of blood vessels, first the capillaries, and then the arteries and veins, areas of hypoxic retina are developed. Along with that, higher hemorrhages and soft exudates are often seen on the fundus with already above-mentioned changes (12).

Diabetic retinopathy can be divided into the following:

1. Non-proliferative diabetic retinopathy characterized by changes in small blood vessels of retina and vein enlargement, which is later converted into an irregular narrowing, so that the veins get the look "sausage" (13).
2. P*re-proliferative* diabetic retinopathy, which is clinically evident in changes of pressure and the calibre of veins, diffuse *teleangiectatic* microangiopathy with multiple focal points of capillary impermeability and edema of the retina (12).
3. Proliferative diabetic retinopathy is characterized by the growth of new blood vessels in the retina and on the back of the vitreous body. That is a malignant form of retinopathy with occurrence of the ablation of posterior vitreous, which often causes bleeding in the vitreous. Macular edema is caused by the relaxation of blood vessels, which will cause thickening of the retina. It can occur in all stages of retinopathy (13, 14).

Success of the treatment largely depends on the stage of its commencement, so regular examination of the eye fundus through dilated pupils at least once in every two years is highly important (15). Direct ophthalmoscopy is recommended as the cheapest and simplest diagnostic method. If necessary, fundus photography, indirect ophthalmoscopy, fundus biomicroscopy and fluorescein angiography can be used (4).

The main risk factor for the development and progression of diabetic retinopathy is poor glycemic control (16). Therefore, qualitative glycemic control is one of the most important things in the treatment of diabetic retinopathy. For now, there is no evidence of efficiency of a drug that can influence the incidence or progression of retinopathy, so the only solution is a surgical treatment (17). Primary treatment of non-proliferative diabetic retinopathy and maculopathy is retinal photocoagulation using laser (11). Laser photocoagulation is used to destroy non-oxidized areas of the retinal tissue outside of the central vision (18). The main indication for surgical treatment (vitrectomy) in proliferative diabetic retinopathy is a six-month presence non-resorptive bleeding in the vitreous body, and ablation of retina that affects the macula. Vitrectomy is used to remove the vitreous body and the proliferative membrane, and to release the tractions on the retina (19).

Examinees and methods

The purpose of this study is to determine the occurrence of diabetic retinopathy in patients with diabetes who were treated with oral anti-diabetics

and those treated with insulin. Higher prevalence of diabetic retinopathy is expected in patients with diabetes treated with oral anti-diabetics than in those treated with insulin.

A historical prospective study was conducted on examinees with diagnosed diabetes at the Ophthalmological department and Internal Medicine department of the Clinical Hospital Mostar, in the period from 1st of January 2000 to 31st of December 2005. The study included patients diagnosed with diabetes, who were treated with oral anti-diabetics and those treated with insulin. During this period, 120 patients diagnosed with diabetes were included in this survey, with 60 of them treated with insulin and 60 treated with oral anti-diabetics. Data were collected from the Ophthalmological department and Internal Medicine department of the Clinical Hospital Mostar, and were taken from the archives. Some data are complemented at the Ophthalmological department of the Clinical Hospital Mostar. The availability of parameters in the history of the disease was a condition to include the specific parameter in the study.

The observed parameters were: duration of diabetes, diabetes treatment (insulin / oral anti-diabetics), blood pressure (measured by RR), blood glucose (measured from venous blood), age and sex. At the department, examinations of visual acuity (vizus) and eye fundus (fundus) were preformed. Goldmann a*pplanation tonometry* was also measured.

Results

In this study 65 (54%) males and 55 (46%) females participated. The median age of respondents was 64±13 years. The youngest patient is 19 and the oldest 82 years. Duration of diabetes in patients treated with oral anti-diabetics was 6±9 years, while in patients treated with insulin 11±16 years. The shortest period of diabetes is 1 year and the longest is 32 years. While comparing the duration of diabetes between the two groups, statistically significant difference was discovered in patients treated with insulin, i.e. duration of illness was significantly longer (Mann-Whitney test=1139,000; *P*=0,001).

By comparing the visual acuity of the right eye in both groups, it can be seen that there is no statistically significant difference between the groups (χ^2=9,856; df=3; *P*=0,011; Fisher's exact test), while the finding of visual acuity in the range of 0,01-0,1 is more frequent in patients treated with insulin (χ^2=6,301; df=1; *P*=0,012; Fisher's exact test) (table 1.). After statistical analysis of visual acuity of the left eye, it can be seen that there is no statistically significant difference between the groups (χ^2=6,834; df=3; *P*=0,061; Fisher's exact test) (table 2).

Table 1. Visual acuity of the right eye in both examined groups.

Visual acuity	Number (%) of patients treated with		P*
	oral anti-diabetics	insulin	
Normal findings 1,0	21 (65,6)	11 (34,4)	0,068
0,2-0,9	29 (53,7)	25 (48,3)	0,635
0,01-0,1	78 (26,9)	19 (73,1)*	0,012
Can only see outlines	0	1	0,993**

**P=0,011 (Fisher's exact test). ** Fisher's exact test.*

Table 2. Visual acuity of the left eye in both examined groups

Visual acuity	Number (%) of patients treated with		P*
	oral anti-diabetics	insulin	
Normal finding 1,0	20 (62,5)	12 (37,5)	0,161
0,2-0,9	32 (51,6)	30 (48,4)	0,932
0,0,1-0,1	5 (31,3)	11 (68,8)*	0,165
Can only see outlines	0	3	0,236*

**P=0,016 (Fisher's exact test), ** Fisher's exact test*

During the study, the intraocular pressure values of right and left eye were measured in patients treated with oral anti-diabetics and those treated with insulin. The statistical analysis showed that there is no significant difference between the intraocular pressure of the right (Mann-Whitney test=1255,500; *P*=0,057) and left eye (Mann-Whitney test=1292,000; *P*=0,093) in both examined groups.

Results of eye fundus examination in both examined groups are shown in Table 3. There are significantly more normal findings in patients treated with oral anti-diabetics (71,9% towards 28,1%

χ^2=7,202; df=1; *P*=0,007). There is no statistically significant difference in the findings of retinopathy (χ^2=4,051; df=1; *P*=0,044).

Table 3. Comparison of the eye fundus finding in both examined groups.

Eye fundus	Number (%) of patients treated with	
	oral anti-diabetics	oral anti-diabetics
Normal finding	23 (71,9)*	9 (28,1)
Retinopathy	22 (39,3)	34 (60,7)
Cataract	14 (48,3)	15 (51,7)
Maculopathia	1 (33,3)	2 (66,7)

**χ^2=7,202; df=1; P=0,007*

Statistical analysis showed that there is no significant difference between the number of patients with diabetic retinopathy in relation to duration of diabetes (χ^2=4,992; df=5; *P*=0,421; Fisher's exact test).

In this study, the blood pressure and concentrations of blood sugar were monitored. It can been seen that there is no statistically significant difference (χ^2=1,432; df=1; *P*=0,231) between patients treated with oral anti-diabetics and those treated with insulin in relation to blood pressure as well as the concentrations of sugar in the blood (χ^2=3,882; df=2; *P*=0,144).

Discussion

The aim of this study was to verify the supposed frequent occurrences of diabetic retinopathy in patients treated with oral anti-diabetics than in those treated with insulin. However, the statistical analysis showed that there is no difference in the occurrence of diabetic retinopathy between the two groups. The reason is quite simple; there is no difference between the duration of diabetes in the two groups. Already conducted scientific studies show that the duration of diabetes is a risk factor for occurrence of diabetic retinopathy (8). Wisconsin Epidemiology Study of Diabetic Retinopathy demonstrated the frequent occurrence of retinopathy in patients in whom the disease is discovered in the thirties or later, and who are treated with insulin, compared to those treated without insulin (20). In this study, the visual acuity of the right and left eye in the two groups was observed. The data obtained in this study show that the type of treatment of diabetes does not affect visual acuity. A possible complication in patients with diabetes is glaucoma (18). Therefore, the intraocular pressure in the left and right eye in both groups was measured. In a healthy population, the mean intraocular pressure is 16±2,5 mmHg. In this study, the mean intraocular pressure in the left and right eye is 18±2,5 mmHg. Recent global studies on patients with diabetes showed that, with proper control of blood pressure, progression of diabetic retinopathy can be decreased by 34%, and risk of visual impairment reduced by 47% (21). In this study, a blood pressure was observed, and the result was that there is no statistically significant difference between patients treated with oral anti-diabetics and those treated with insulin. Another risk factor for the development of diabetic retinopathy is incorrect blood glucose control. Patients included in this study, both those treated with oral therapy and those treated with insulin, did not control blood sugar. After statistical analysis no differences between the two groups in blood sugar concentration were found. Such data imply to low self-control of patients. In total, it can be concluded that in the examined patients the treatment does not have a crucial role in the development of diabetic retinopathy, but poor control of disease, as well as inadequate education of patients, all of which together result in a commencement of taking insulin.

It is widely known that the duration of diabetes as a risk factor for the development and progression of diabetic retinopathy cannot be influenced. The task of the health service is to provide a healthy life to patients with diabetes. From the viewpoint of ophthalmological service, that means to preserve good peripheral and central vision and prevent a*mblyopia* and the appearance of blindness (2). In order to achieve this under conditions in which our examinees live, it is necessary to have a good cooperation of diabetes-internists, general practitioners and ophthalmologists with patients and the community in which the patient lives. Certainly, the most important factor is good education of patients, as well as perseverance of the doctors in order to properly regulate the disease.

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Presence and serological characteristics of Listeria monocytogenes in meat and meat products

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Abstract

Listeria strain is presented by small number of species. *Listeria monocytogenes* is the only species from this strain which is pathogenic for humans and animals, causing a disease called listeriosis. Since *L. monocytogenes* is an ubiquitous microganism and has been isolated from almost all environments, it is clear that it is not being spreaded as zoonosis, but there are different sources of listeriosis outbreak. Several outbreaks of listeriosis in the world, in past twenty years, were connected with consumption of food which was contaminated by pathogen of *L. monocytogenes.* Knowing the phenotype characterisctics of *L. monocytogenes* may contribute to elucidating the routes of spreading the infection which are still insufficiently searched. In this document phenotype and genotype characteristics of *L. monocytogenes* strains isolated from meat and meat products are analysed, as well as the level of contamination of these sorts of food by *L. monocytogenes* and other species from the *Listeria* strain. The research has included analysis of raw beef, pork and chicken, and semifinished and final products from all sorts of meat. So, 360 samples of meat and meat products taken from seven localities of the Northeast Bosnia (Tuzla, Srebrenik, Kalesija, Brčko, Orašje, Bijeljina and Ćelić) have been analysed. Presence of three kinds of listeria have been detected in analysed samples: *L. innocua*, *L. monocytogenes* and *L. welsimeri.* The results indicate high contamination of meat and meat products by listerias: *Listeria* spp. 37,2%, respectively *L. monocytogenes* 15,3%. Beef and pork have the highest level of contamination of 22,1%, respectively 20,0%, whereas the chicken has the lowest level of infection of 5,7%. Regarding the type of product, raw meat shows the highest level of infection by *L. monocytogenes* of 23,3%, then final products of 11,1% and semifinished products of 3,3%. The largest number of *L. monocytogenes* positive samples was recorded at the locality of Bijeljina (31,7%), and the least at locality of Orašje (8,3%). Analysis of phenotype (morphological and biochemical) characteristics points to phenotype similarity of isolated strains of *L. monocytogenes.* All strains are morphologically (microscopic aand macroscopic) identical and have the same biochemical profile. Differences between the isolated strains are noticed in presence of somatic an flagelar antigens which may be of importance at identification of epidemiologic strain. The six serotypes: 1/2a,1/2b,1/2c, 4b, 4c and 4ab have been determined by serotyping. The most frequent serotype is 1/2 a (46%), which is present in the whole tested area. Serotype 1/2c is present in 34.0% of isolates, whereas the serotypes 1/2b and 4b each in 10% isolates of *L. monocytogenes.* To this serotype (4b) belong three *L. monocytogenes* strains isolated in our area as well, while it is known that serotype 4b is most frequently included in an outbreak of human Listeriosis. This research has confirmed the earlier learnings on existence of *L.monocytogenes* in the area of Bosnia and Herzegovina and indicates the need of serious approach to prevention of this occurence. One of the first steps to be taken is an introduction of legal duty of food control for this pathogen.

Key words: *L. monocytogenes,* serotype, meat products.

Introduction

Within the genus *Listeria,* in which a pathogenic role for humans and animals have been recognised, are *L. monocytogenes*, *L. seeligeri* and *L. ivanovii,* but *L. monocytogenes* is the only species among

them to which importance is attached as a human pathogen. This intracellular bacterium is a cause of Listeriosis, a serious illness in humans and animals[1,2]. Approximately 2,500 humans in the world catch Listeriosis each year and about 500 die[3].

It is known that the transfer of this pathogen by consuming the contaminated food is one of the major routes of Listeriosis transmission[4,5]. Certain segments of the population, including the elderly, newborns, pregnant women, immuno-compromised persons and individuals subjected to immunosuppressive therapy, are at increased risk of infection. Unlike most of human pathogens, *L. monocytogenes* can grow at low temperatures[6]. The ubiquitous distribution of this bacterium in the environment, its ability of growing in the cold ($+4^0$C) and its pathogenic potential make this bacterium dangerous for food safety, in particular of ready to eat refrigerated food and the food consumed without any previous heat treatment.

Listeria spp., like other bacteria, differs in the antigenic determinants expressed on the cell surface. Such antigenic variations are the product of many different substances that enter the structure of bacterial membranes (including lipoteichonic acid, membrane proteins) and extracellular organelles (flagelles, fimbriae). These differences can be identified by serological typing. *L. monocytogenes* strains possess 13 somatic (O) and 4 flagellar (H) antigens. On the basis of antigenic characteristics, *L. monocytogenes* is presented with four serogroups (1/2a, 3, 4 and 7) and 13 serotypes. There is a certain link between antigenic characteristics of *L. monocytogenes* and pathogenicity. *L. monocytogenes* strains of serotypes 1/2a, 1/2b and 4b are in most of the cases the causes of human and animal listeriosis[7,8]. Serotype 4b is of particular interest, as it is implicated in approximately 40% sporadic cases and most of the epidemics of food-borne listeriosis, which were reported in Northern Europe and America over the past 20 years[9,10,11].

In the past period, many countries reported on the cases of listeriosis, which were associated with the consumption of meat products.[12,13,14,15]. In the past 15 years, no cases of listeriosis were reported in the area of Bosnia and Herzegovina[16]. With legal acts of Bosnia and Herzegovina no inspection of food for this pathogen has been envisaged until today, and the infrequent studies that tested food for presence of *L. monocytogenes* indicate to significant contamination of food[17]. The fundamental intentions of this study have been to ascertain the presence of bacteria from the genus *Listeria* in meat and meat products in the area of North East Bosnia and Herzegovina, as well as serological affiliation of the isolated strains.

Material and methods

The research included the analysis of 360 samples of beef, chicken and pork at three levels of production: raw meat, semi-finished and finished product. The research was performed on seven localities of North East Bosnia and Herzegovina (Tuzla, Brčko, Bijeljina, Orašje, Srebrenik, Kalesija and Čelić). The semples were taken in the period from January-June, in 2000. In the localities of Tuzla, Brčko, Bijeljina and Orašje beef, chicken and pork were examined, and in the localities of Čelić, Kalesija and Srebrenik beef and chicken. Of each type of meat, 10 samples of raw meat, 5 samples of semi-finished and 5 samples of finished products have been analysed.

For analysis of raw beef and pork minced meat was used, and for analysis of raw chicken the meat in one peace. For analysis of semi-finished products the chicken, beef and pork hot dogs, and the beef and pork half-durable sausages, were taken. Chicken bologna was analysed as a finished chicken product, smoked meat and sudžuk as finished beef products, and durable sausages and smoked ham as finished pork products.

The average weight of a sample was 150 gr. Samples were taken into the sterile flacons and transported in a portable fridge to the laboratory for two hours, where they have been examined microbiologically. Isolation and identification of bacteria from the genus of *Listeria* species have been performed on the basis of phenotypic characteristics of isolates by applying ISO 11290-1/97[18].

Serotyping of *L. monocytogenes* isolates was determined by agglutination method in a test tube and on the plate by using O and H antiserum (Denken Seiken, Tokyo, Japan), according to procedure described by Miettinen et al.1999[19].

Results

Bacteria from the genus *Listeria* were identified in 134 samples (37.2%) of totally analysed 360 samples of meat and meat products from seven locations of North East Bosnia and Herzegovina (Table 1).

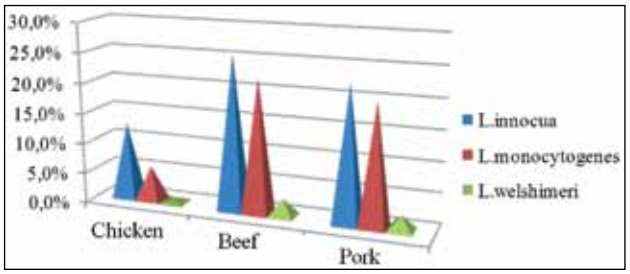
From this genus three types have been identified: *L. innocua* in 72 samples (20.0%), *L. monocytogenes* in 55 samples (15.3%) and *L. welshimeri* in 7 samples (1.9%) (Table 1).

L. innocua is the most frequently represented type, with the highest percentage of isolates in the locality of Srebrenik (32.5%). The lowest percentage of the isolates of this type is from the locality of Čelić (10.0%).

L. monocytogenes was isolated in all localities. The highest percentage of isolates of this type is from the locality of Bijeljina (31.7 %) and the lowest from the locality of Orašje (8.3%).

The least represented type in the analysed samples of meat and meat products is *L. welshimeri.* This type was isolated in four localities: Srebrenik (5%), Brčko (1.7%), Orašje (5%) and Čelić (2.5%).

The obtained results indicated that beef was the most contaminated, as 31 of 140 analysed samples were positive to *L. monocytogenes* (22.1%). Of 80 samples of pork 16 have been infected with *L. monocytogenes* (20%). Chicken is the least contaminated with *L. monocytogenes,* where of 140 samples 8 have been positive to this pathogen (5.7%) (Table 2; Graph 1.).



Graph 1. Proportionate participation of types of L. monocytogenes, L. innocua, L. welshimeri in chicken, beef and pork meat

Table 1. Percentage of presence of bacteria from the genus Listeria and isolated types in meat and meat products

Locality	Number of samples	*Listeria spp.*		*L. monocytogenes*		*L. innocua*		*L. welshimeri*	
		Number of isolates	%	Number of isolates	%	Number of isolates	%	Number of isolates	%
Tuzla	60	22	36,7	11	18,3	11	18,3	0	0
Srebrenik	40	20	50	5	12,5	13	32,5	2	5
Kalesija	40	14	35	5	12,5	9	22,5	0	0
Brčko	60	19	31,7	6	10	12	20	1	1,7
Orašje	60	22	36,7	5	8,3	14	23,3	3	5
Bijeljina	60	28	46,7	19	31,7	9	15	0	0
Čelić	40	9	22,5	4	10	4	10	1	2,5
TOTAL	360	134	**37,2**	55	**15,3**	72	**20**	7	**1,9**

Table 2. Percentage of presence of L. monocytogenes in chicken, beef and pork meat in different groups of products in the area of North East Bosnia

Type of meat	Type of product											
	Raw meat			Semi-finished product			Finished product			Total		
	No. of samples	No. of isolates	%	No. of Samples	No. of isolates	%	No. of samples	No. of isolates	%	No. of samples	No. of isolates	%
Chicken												
	70	7	10,0	35	1	2,9	35	0	0,0	140	8	**5,7**
Beef												
	70	24	34,3	35	0	0,0	35	7	20,0	140	31	**22,1**
Pork												
	40	11	27,5	20	2	10,0	20	3	15,0	80	16	**20,0**
TOTAL	180	42	**23,3**	90	3	**3,3**	90	10	**11,1**	360	55	**15,3**

The highest percentage of isolates from raw meat is of beef with 34.3% (24/70), pork with 27.5% (11/40) and the least from chicken with 10% (7/70). *L. monocytogenes* strains were isolated from pork semi-finished products with 10% (2/20) and from chicken semi-finished products with 2.9% (1/35). *L. monocytogenes* has not been isolated in beef semi-finished products. In finished beef products *L. monocytogenes* has been identified in 20% (7/35) samples. Of finished pork products 15% (3/20) of samples were positive to *L. monocytogenes*, while in chicken finished products they were not identified. (Table 2).

Observing the groups of products regardless of the type of meat, the highest percentage of isolates has been identified in raw meat (23.3%). In semi-finished products the percentage of presence of *L. monocytogenes* is 3.3%, and in finished products 11.1%. (Table 2).

Serological testing has been performed in 50 *L. monocytogenes* strains. With serotyping in the examined sample six serotypes were determined as follows: serotype 1/2a was determined in 23 strains or 46%, serotype 1/2b with 5 strains or 10%, serotype 1/2c in 17 strains or 34%, serotype 4c in 1 strain or 2%, serotype 4b in 3 strains or 6% and serotype 4ab in one strain or 2%. Serotypes 1/2a, 1/2c and 4b were isolated in all three types of meat. The highest percentage of serotypes 1/2a (22%) and serotype 1/2c (26%) was isolated in beef. Serotype 1/2b has been isolated in chicken and beef. The isolates with serotype 4c have been found in beef, and serotype 4ab only in chicken (Table 3).

Discussion

Listeria monocytogenes is ubiquitous microorganism with high resistance to abiotic factors, which enables its survival under unfavourable conditions of the external environment, due to which the food can easily be contaminated. Contamination of food with Listeria, as well as of meat and meat products, is a global issue. Presence of disease caused by this agent in all parts of the world, a relatively high percentage of deaths, inaccessibility to many epidemiological data in many countries and the presence of this microorganism in different types of food (milk and milk products, fresh meat and products of meat, fish and vegetables) have initiated a more thorough research, with an objective to define a strategy of protection of health of humans and animals. According to literature data, a similar research has not been performed in our country. Our interest was focused on examining the presence of bacteria from the genus Listeria, including also *L. monocytogenes* in the area of North East Bosnia and Herzegovina from the aspect of the presence of this pathogen in meat and meat products and characterizations of features of the isolated strains.

With this research, it has been determined that 37.2% (134/360) of samples of chicken, beef and pork have been positive to presence of *Listeria* species, which corresponds to data from literature [12,13,14,15] and generally indicates to a high degree of contamination of meat and meat products with bacteria from the genus *Listeria,* including *L. monocytogenes*.

Results of analyses of chicken obtained in this paper indicate to presence of *Listeria* spp. with a relative participation of 19.2% and distribution

Table 3. Proportionate participation of serotypes of L. monocytogenes in chicken, beef and pork

Type of Meat	SEROTYPE												
	N	**1/2a**		**1/2b**		**1/2c**		**4b**		**4c**		**4ab**	
		n	%	n	%	n	%	n	%	n	%	n	%
Chicken													
	50	2	**4**	2	**4**	1	**2**	1	**2**	0	**0**	1	**2**
Beef													
	50	11	**22**	3	**6**	13	**26**	1	**2**	1	**2**	0	**0**
Pork													
	50	10	**20**	0	**0**	3	**6**	1	**2**	0	**0**	0	**0**
TOTAL	50	23	**46**	5	**10**	17	**34**	3	**6**	1	**2**	1	**2**

according to types: *L. innocua* 12.8% (18/140), *L. monocytogenes* 5.7% (8/140) and *L. welshimeri* 0.7% (1/140) respectively.

The previous results of the mentioned authors, as well as the results of analysis of beef in this paper, confirm a high degree of contamination of beef with *Listeria* spp. with participation of 50.7% (71/140) and distribution according to types*: L. innocua* 25.7% (36/140), *L. monocytogenes* 22.1% (31 /140) and *L. welshimeri* 2.8% (4/140).

Analyses of pork in this paper confirm a similarity with the world's results on contamination of pork with *Listeria* spp. Results of our research indicate to presence of *Listeria* spp. in 45.0% (36/80) samples and distribution according to types: *L. innocua* 22.5% (18/80*), L. monocytogenes* 20.0% (16/80*)* and *L. welshimeri* 2.5% (2/80).

Results of analyses of raw meat and meat products for presence of *Listeria* spp.*/L monocytogenes* obtained in this study, as well as the results of other authors[20, 21, 22], show that raw meat is the most infected with this pathogen.

The research of Lončarević et al.[17] in Bosnia and Herzegovina, in 1994, conducted on 20 samples of beef and 50 samples of pork indicated to presence of *Listeria* spp. in 20%, respectively 18% samples, and *L. monocytogenes* in 10%, respectively 8% samples.

In comparison between the 1994 results in Bosnia and Herzegovina and our results presented in this paper, a significant increase in contamination of raw meat has been noticed.

Presence of *L. monocytogenes* in semi-finished and finished meat products, which may be consumed without further heating or cooking, represents a bigger problem and danger of causing an infection than the contamination of raw meat.

High resistance of *L. monocytogenes* to changed external conditions enables survival of pathogen in the course of technical process of meat processing (high temperatures, high concentrations of NaCl, as well as other preserving agents).

Experiments conducted by Karaionnoglou and Xenos [23], who tested resistance of *L. monocytogenes* to heat in raw meat products indicate to survival of *L. monocytogenes* in grilled meatballs, which were exposed to temperature of 110-120 ^{0}C for 15 minutes. Internal temperature of the meat product reached a value of 78-85^{0}C. Also, the other experiments, which simulated usual stages of heat treatment in preparation of raw meat for finalization, showed that a certain number of Listeria survived a pasteurisation treatment.

Among the different preserving agents that are used in food industry, nitrites are efficient and inhibit the growth of some microorganisms. Experiments conducted with high concentrations of nitrites on *L. monocytogenes* do not have any effect on vitality of the bacterium. Also, resistance of *L. monocytogenes* to high concentrations of NaCl (10%) increases its presence in meat products [24].

The results obtained in this paper with the analysis of semi-finished and finished products indicate that meat products in Bosnia and Herzegovina are also highly contaminated with this pathogen: 14.4% of samples of semi-finished meat products are positive to *Listeria* spp., 3.3% to *L. monocytogenes,* while the finished products have a contamination rate of 35.5% with *Listeria* spp. and 11.1% with *L. monocytogenes.*

In total, results obtained in this study and the results obtained in other coutries indicate that a significant part of the European processed meat is contaminated with *Listeria* spp. including *L. monocytogenes*. Presence of other Listeria except for *L. monocytogenes,* both in processed and raw meat, may indicate to a possible contamination with *L. monocytogenes*.

Analysis of phenotypic characteristics conducted in this study indicate to presence of six serotypes. A dominant serotype is 1/2a, to which 46.0% of the isolates of *L. monocytogenes* strains belongs. Serotype 1/2c is present in 34,0% of isolates of *L. monocytogenes*. Serotype 4ab, 4b, 4c (serotype 4 according to old method of serotyping) is present in 10% of isolates of *L. monocytogenes*.

The obtained results are in accordance with the researches conducted in Switzerland [25], which show that 86% of isolates of *L. monocytogenes* belong to serotype 1/2a, and 14% to serotype 4. The results of Cantoni et al. [26] indicate to dominance of serotype 1/2c, whereas the serotype 4 has been found in 7% of the examined samples.

The most common outbreaks of human Listeriosis, which included the largest number of cases in the past thirty years have been caused by serotype 4b [3]. Three isolated strains of *L. monocytogenes* from the localities of Srebrenik, Brčko and Orašje belong to this serotype.

Conclusion

It is evident that there are no boundaries for the bacterial world and that the area of Bosnia and Herzegovina is contaminated with a pathogen of *Listeria monocytogenes*. Valid law regulations do not provide food monitoring to this pathogen.

Our research showed a highly frequent contamination of beef, pork and chicken, as well as of all types of products of this meat, which should be a stimulus for introduction of legal provisions on food monitoring for *Listeria monocytogenes,* as well as involvement of all relevant institutions in solving this problem.

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Heart defects in university students in Sarajevo

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Abstract

Introduction: Congenital and acquired heart defects are defined as abnormalities in cardiocirculatory structure or function that occurs at birth and later in the life. Congenital and acquired heart defects are evolving, so that the morphology of heart changes in time. For example, pulmonary stenosis can become pulmonary atresia. The morphology, pathophysiology, treatment and prognosis between these two disorders are enormous. Often these defects are discovered accidentally during routine examinations even in old age patients. Congenital heart defects are the most common out of all human birth defects. Most of all acquired heart defects were of rheumatic etiology. Heart defects often go undetected in the general population and are discovered even in the late stage of disease or even end up with a sudden death in athletes. Symptoms usually begin between the ages of 20 and 30. There are cases of sudden cardiac death in children and youth, during or immediately after physical activity - athletes.

Objective: To determine the type and frequency of congenital and acquired heart defects in the student population at the University of Sarajevo. To identify the symptoms and physical signs of congenital and acquired heart defects in the student population at the University of Sarajevo. To assess the significance of the electrocardiogram and 24h Holter-heart monitoring and ultrasound in the diagnosis of congenital and acquired heart defects in the student population at the University of Sarajevo.

Materials and methods: The study was conducted as prospective, retrospective, clinical, and descriptive analytical. The sample consisted of students at the University of Sarajevo. The sample included students in regular and systematic examinations of Institute for Health Protection of Students University of Sarajevo in the period 2005 - 2010. Research methods included personal history, auscultatory findings of the heart, an electrocardiogram, 24hHolter-moitoring heart and echocardiogram.

Results: Following heart defects were recorded in students: Mitral valve prolapse with or without regurgitation in 50.45% patients; Mitral and tricuspid valve regurgitation 18.35% patients, mitral valve insufficiency in 7.34% of the patient; aortic valve regurgitation in 3, 67% patients, aortic valve insufficiency in 2.75% patients; condition after surgery intraventricular septal defect at 1.83%, and the condition of the patient after surgery for aortic stenosis patients 0.92%;

Key words: University of Sarajevo students, congenital and acquired heart defects, heart murmur, abnormal heart rhythms, heart echocardiography findings.

Introduction

Congenital and acquired heart defects are defined as abnormalities in cardiocirculatory structure or function that occurs at birth and later in the life. Congenital and acquired heart defects are evolving, so that the morphology of heart changes in time. For example, pulmonary stenosis can become pulmonary atresia. The morphology, the pathophysiology, treatment and prognosis between these two disorders is enormous. Often these defects are discovered accidentally during routine examinations even in patients of old age. Congenital heart defects are the most common human of all birth defects.

Most of all acquired heart defects were of rheumatic etiology. Heart defects often go undetected in the general population and are discovered even in the late stage of disease or even end up with a sudden death in athletes. Symptoms usually begin between the ages of 20 and 30. There are cases of sudden cardiac death in children and youth, during or immediately after physical activity - athletes.

Congenital heart defects are defined as abnormalities in cardiocirculatory structure or function that occurs at birth, although it can be detected much later. These malformations are caused due to the disorders of the embryonic development of normal structure. Abnormal blood flow due to anato-

mical defects may substantially affect the structure and function of organs. Congenital heart defects are the most common human of all birth defects. Data on the incidence of congenital heart defects varies between 0, 8 - 0, 10%, in 1000 live births.

If we take account of the two easier defects, bivalve aorta and mitral valve prolapse, they occur in about 2% of live births. In most patients cannot determine with certainty the etiology of CHD. Most acceptable explanation is a genetic predisposition, but the CHD develops if there is appropriate and adverse environmental impact over time of pregnancy. It is believed that 6-10% of patients with CHD have a chromosome aberration. Today, more and more attention is paid to the detection of various environmental factors that may influence the development of CHD.

Most often are accused medications, infections, diseases and irradiation of pregnant women. Multifactorial Inheritance. According to this concept, disturbances at the level of genes alone are not sufficient to lead to the development of CHD, but only in conjunction with certain environmental factors. There is a certain genetic predisposition for the development of CHM, but it is necessary that appropriate factors effect from environment. Division of congenital heart defects are displayed on pathoanatomical and hemodynamic criteria.

Anatomic pathology distinguishes between: atrial septal defect, ventricular septal defect, ductus arteriosus persistens, stenosis or atresia of heart valves or blood vessels (tricuspid atresia and pulmonary stenosis), abnormal position of the large blood vessels. Hemodynamic distinguishes defects without communication, such as pulmonary stenosis and aortic coarctation and defects with communication: a) atrial left - right shunt (atrial and ventricular septal defect and ductus arteriosus persistens), b) vein - atrial and right - left shunt (Tetralogy of Fallot, Ebstein anomaly).

Acquired heart defects are the most common of rheumatic origin. Involvement of the mitral valve occurs in 3/4, and aortic valve 1/4 cases with rheumatic heart disease. Stenosis and regurgitation frequently occur together. Acute rheumatic fever is a disease caused with infection with streptococcus group A as a complication of previous nasopharyngeal infection. Clinical and pathological manifestations of acute rheumatic fever are direct consequence of pharyngeal infection with streptococcus beta-hemolytic group A, which occurs two to three weeks behind. The cross-reactions between streptococcal antigens, relatively antigen M, and adequate antibody in myocardium and valvular tissue is confirmed.

Rheumatic heart disease usually includes pericarditis, myocarditis, endocarditis, and pancarditis. Vegetations on the free edge mitral valves are often present. Cordites is the most serious clinical manifestation of acute rheumatic fever since it alone can cause death in the acute phase and result in residual damage and subsequent mortality. Clinical features of carditis may be asymptomatic to fulminant with signs of acute heart failure and death in several weeks. Calcifying degenerative valvulopathy has become the most frequent valvulopathy and now the most common heart disease after hypertension and coronary artery disease. Mitral valve prolapse syndrome is among the most common heart valve abnormalities. It occurs in> 3% of adults.

Materials and methods

Respondents The sample consisted of the University of Sarajevo students. The sample included students in regular and systematic examinations of the Institute for Health Protection of Students University of Sarajevo in the period 2005 - 2010. The study group consisted of all students aged 18-26 years who had been diagnosed during monitored period with presence of congenital or acquired heart defects. As a source of data the primary medical records (diagnosis of health records) and secondary medical records (hospital discharge and / or clinics, the medical internist's documentation and / or cardiologist) were used. The study included congenital and acquired heart defects of the heart recorded during the previous pediatric or internal medicine cardiology examination, or was first discovered during the regular and systematic review of the Institute for Health Protection of Students University of Sarajevo.

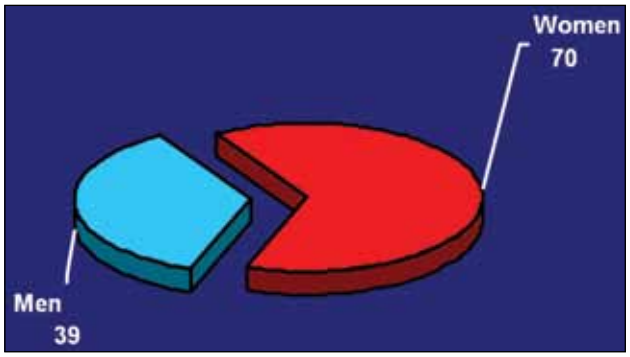
Research Methods: Diagnosis of congenital and acquired heart defects:

a) Personal history data for assessment of cardiac status of the patient and family

history of the student population at the University of Sarajevo;

b) auscultatory data on cardiac rhythm and regularity, intensity and quality of heart sounds, systolic and diastolic sounds, heart noises of the University of Sarajevo students;
c) electrocardiographic findings in the student population at the University of Sarajevo;
d) 24 hour Holter-monitoring in the diagnosis of heart rhythm disorders in students with congenital and acquired heart defects.
e) Echocardiography findings in the student population at the University of Sarajevo.

Results of investigation and discussion



Graph A. Gender distribution of the sample

The study included total of 109 the University of Sarajevo students, out of which were 70 or 64% female and 39 or 36% male patients with significant difference on level of p<0,005 (t=2,97) for females.

Mitral valve prolapse (MVP) is the most common condition of the heart valves. Some studies show it affects 6% of all women. MVP is extremely interesting since it is so commonly diagnosed in young women and yet, the incidence decreases markedly in elder women. This drop off in incidence is not seen in the male population (refer to graph below). The occurrence of MVP in men is consistent in both young and old populations. Previous to the Framingham study, the incidence of MVP was thought to be much higher in women, however, with this new data, it is now believed that MVP affects equal numbers of men and women. This intrigues researchers searching for the cause(s) of mitral valve disease and attempting to explain why the condition manifests itself so differently in men and women. The cause of MVP is usually unknown but occasionally, MVP is associated with other heart conditions (e.g. atrial septal defect, coronary artery disease, diseases of the heart muscle) but most likely, these diseases would have been present with or without MVP. The

Table 1. Display of presence of congenital and acquired heart deffects in male patients

R/b	Type of disorder	Number of patients	%	
1	Prolapsus valvulae mitralis (with or without regurgitation)	11	28,21	%
2	Insuffitientio valvulae mitralis	3	7,69	
3	Regurgitatio valvulae mitralis et tricuspidalis	13	33,33	
4	Regurgitatio valvulae aortalis	3	7,69	
5	Insuffitientio valvulae aortalis	1	2,56	
6	St. post operationem defectus septum ventriculorum	1	2,56	
7	St. post operationem stenosis valvulae aortalis	1	2,56	
8	Aorta bicuspida	1	2,56	

Table 2. Display of presence of congenital and acquired heart deffects in female patients

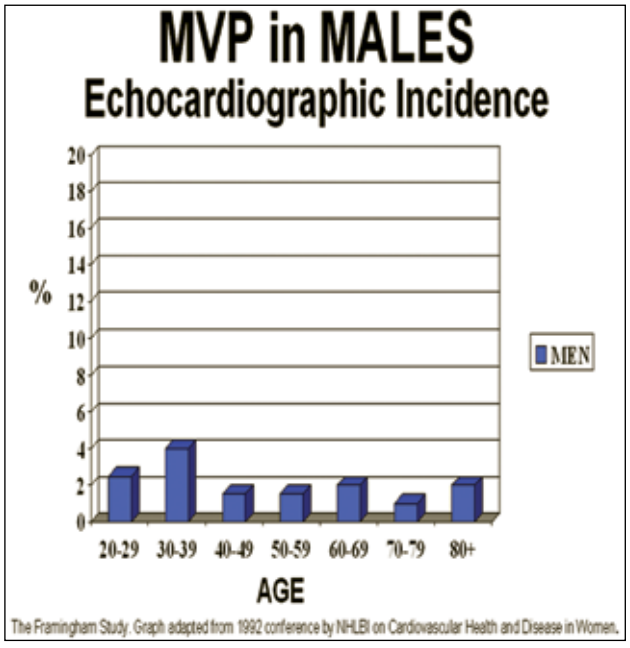
R/b	Type of disorder	Number of patients	%	
1	Prolapsus valvulae mitralis (with or without regurgitation)	44	62,86	%
2	Insuffitientio valvulae mitralis	5	7,14	
3	Regurgitatio valvulae mitralis et tricuspidalis	7	10,00	
4	Regurgitatio valvulae aortalis	1	1,43	
5	Insuffitientio valvulae aortalis	2	2,86	
6	St. post operationem defectus septum ventriculorum	1	1,43	
7	St. post operationem stenosis valvulae aortalis	0	0,00	
8	Aorta bicuspida	0	0,00	

Table 3. Display of presence of congenital and acquired heart deffects in all patients

R/b	Type of disorder	Number of patients	%	
1	Prolapsus valvulae mitralis (with or without regurgitation)	55	50,46	%
2	Insuffitientio valvulae mitralis	8	7,34	
3	Regurgitatio valvulae mitralis et tricuspidalis	20	18,35	
4	Regurgitatio valvulae aortalis	4	3,67	
5	Insuffitientio valvulae aortalis	3	2,75	
6	St. post operationem defectus septum ventriculorum	2	1,83	
7	St. post operationem stenosis valvulae aortalis	1	0,92	
8	Aorta bicuspida	1	0,92	

Prolapsus valvulae mitralis (with or without regurgitation) was recorded in female patients in 50% of examined women with significant difference on level p<0,005 (t=3,t=3,33 and t=3,25). The same finding was recorded in total sample with significant difference on level p<0,005 (t=2,88, t=3,15,t=3,22,t=3,29 and t=3,35).

outcome from MVP differs for men and women too. Recent studies have indicated that, for men, the incidence of mitral prolapse requiring surgical intervention is higher than for women and increases with age. The two graphs below depict the differences in the incidence of mitral valve prolapse in men and women. As the graphs indicate, the incidence remains rather consistent in the male population. Contrast, occurrence starts off high in females, then sharply declines in older women. Data is derived from the Framingham study.



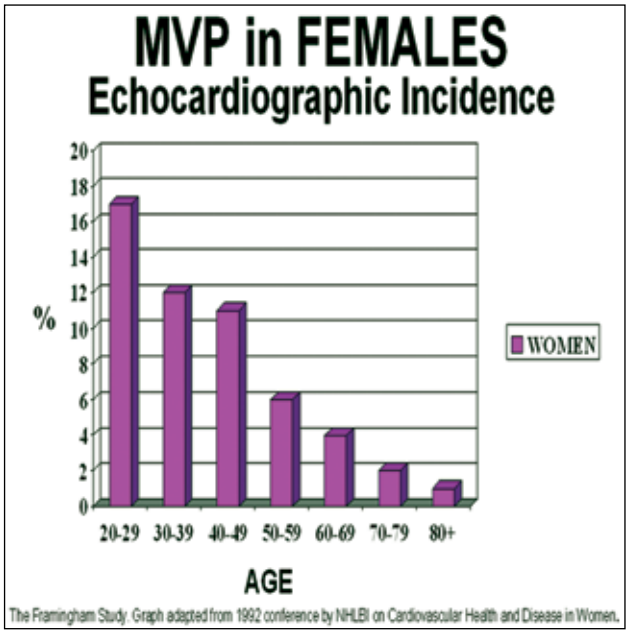
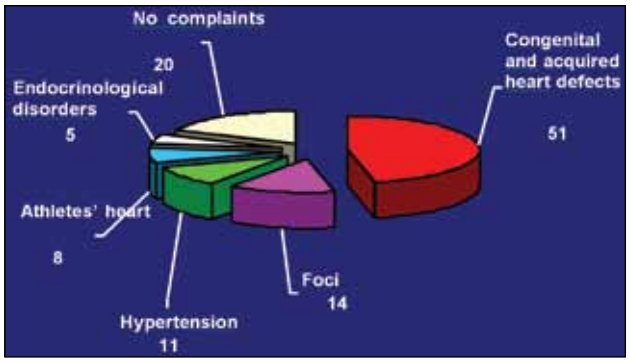


Table 4. Display of heart murmor according to pathogenesis in all patients

Type	Number of patients	%
Congenital and acquired heart defects	51	47 %
Foci	14	13 %
Hypertensio art.	11	10 %
Endocrinological disorders	5	7 %
Athletes' heart	8	5 %
No disorders	20	18 %
TOTAL	109	100%



There was no significant difference in responses in total sample and in female and male patients except for endocrinological etiology on level p<0,0001 with t=4,04, and athletes' heart in girls on level p<0,0005 with t=3,58

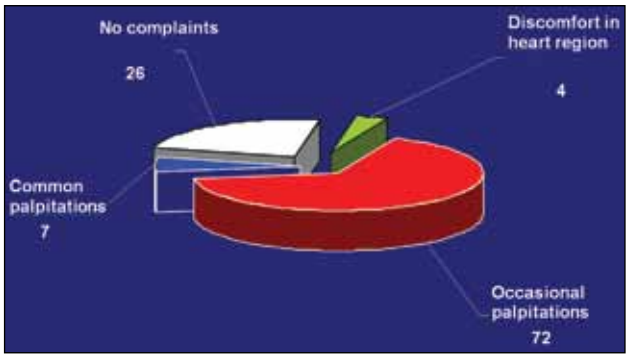
Summary of the research of heart murmur in students

Heart murmurs are relatively long series of auditory vibrations of varying intensity, frequency, quality, configuration and duration. If there are cardiac murmurs, they can indicate pathological changes in heart and have a role in the etiology of arrhythmia and arrhythmia flow forecasting. During this study of heart murmur is present in the highest percentage of patients with congenital and acquired heart defects.

Systolic ejection murmur is the interval between the first tone and the beginning of murmur and is called a crescendo-decrescendo pattern, what is based on auscultation of basis of heart and precordiuum, and it is mostly audible in mitral prolapse valvulae. Functional noise is present in the conditions with high output, i.e., the states with high ejection volume in athletes' heart, but also excitement, elevated temperature and anemia. It is essential to check the differential diagnosis of certain cardiac noise in relation to duration, location, radiation, intensity, the maximum puntcum and quality, and on that basis determine the need for further cardiac examinations as well as treatment.

Table 3. Display of presence of palpitation in all patients

Type	Number of patients	%
Discomfort in heart region	4	4 %
Occasional palpitations	72	66 %
Common palpitations	7	6 %
No problems	26	24 %
TOTAL	109	100%



Graph 3. Relation of frequency of palpitations in all patients

The most common answer was "sometimes" with highly significant difference to other all response on level P<0,0001 and for young men with t=4,09, t=3,95 and t=4,34, for girls t=4,02 and t=3,92, relatively for total sample on level p<0,0000 with t=5,5,t=5,68 and t=4,17. There was no significant difference among gender.

Summary of research of palpitations in students

From the listed results this subjective symptom is present in more than half of the tested students. Etiologically it can be of extracardial origin (anemia, increased sympathetic tonus, fear, excitement, caffeine, nicotine, infection, etc.), but also an information on the possible presence cardiac problems. Palpitations caused by possible paroxysm of tachycardia or premature individual beats may be transient, but however, may indicate serious cardiac problems, and based on this we come to conclusion that presence of palpitations is important symptom in the detection of heart defects among the students and therefore should not be neglected, but taken as a starting point in the cardiac evaluation, as is done in the course of our research.

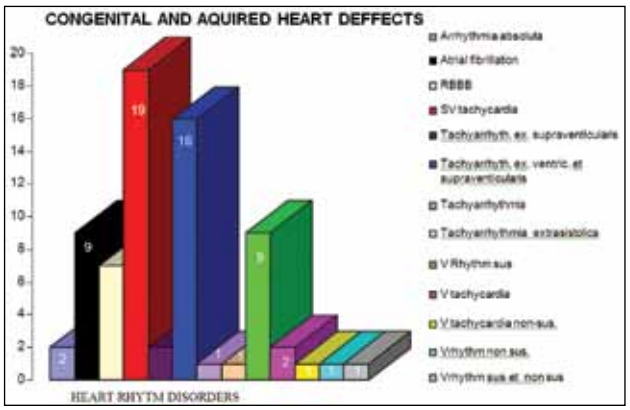
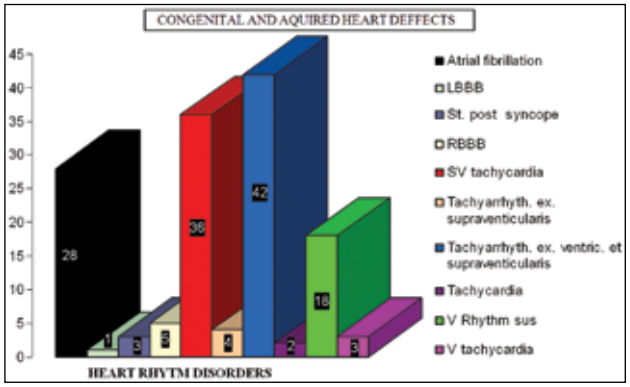


Table 5. Display of presence and type of heart rhytm disorders in congenital and acquired heart deffects in patient population

Type	Number of patients	%
arrhythmia absoluta	2	5,13
Atrial fibrillation	9	23,08
RBBB	7	17,95
SV. Tachycardia	19	48,72
Tachyarrhyth. extrasystolica supraventicularis	2	5,13
Tachyarrhyth. extrasystolica ventric. et suprav.	16	41,03
Tachyarrhythmia	1	2,56
Tachyarrhythmia extrasystolica	1	2,56
V. rhythm sus	9	23,08
V. tachycardia	2	5,13
V. tachycardia non-sus	1	2,56
V. rhythm non sus.	1	2,56
V. rhythm sus.et non-sus	1	2,56

Table 6. Display of presence and type of heart rhytm disorders in congenital and acquired heart deffects in female patient population

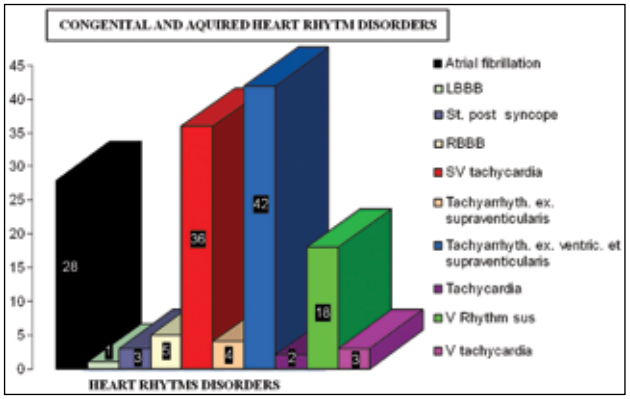
Type	Number of patients	%
Atrial fibrillation	28	40,00
LBBB	1	1,43
St. post syncope	3	4,29
RBBB	5	7,14
SV. Tachycardia	36	51,43
Tachyarrhyth. extrasystolica supraventicularis	4	5,71
Tachyarrhyth. extrasystolica ventric. et suprav.	42	60,00
Tachycardia	2	2,86
V. rhythm sus.	18	25,71
V. tachycardia	3	4,29



Graph 2. Relation of frequency and type of heart rhytm disorder

Table 7. Display of presence and type of heart rhytm disorders in congenital and acquired heart deffects in all patients

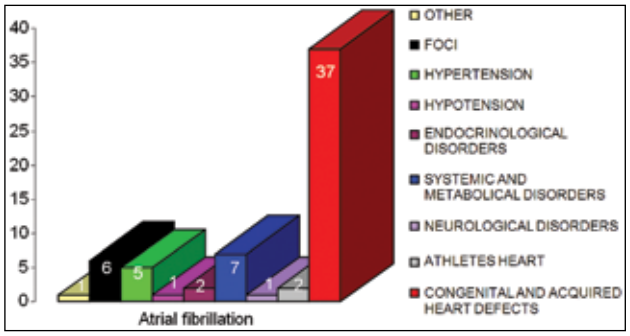
Type	Number of patients	%
Arrhythmia absoluta	2	1,83
Atrial fibrillation	37	33,94
LBBB	1	0,92
St. post syncope	3	2,75
RBBB	12	11,01
SV tachycardia	55	50,46
Tachyarrhyth. extrasystolica supraventicularis	6	5,50
Tachyarrhyth. extraystolica ventric. et suprav.	58	53,21
Tachyarrhythmia	1	0,92
Tachyarrhythmia extasystolica	1	0,92
Tachycardia	2	1,83
V. rhythm sus.	27	24,77
V. tachycardia	5	4,59
V. tachycardia non-sus.	1	0,92
V. rhythm non sus.	1	0,92
V. rhythm sus.et non-sus	1	0,92



In congenital and acquired heart defects there are present cardiac rhythm disturbances ventricular and supraventricular from simple, individual to complex: tachyarrhythmia extrasistolica supraventricular and ventricular in 58 patients or 53% of patients, supraventricular tachycardia in 55 patients or 50.46%; atrial fibrillation in 37 patients or 33.94%; ventricular tachycardia in 5 patients, or 4.59%, absolute arrhythmia in 2 patients, or 1.83% and ventricular rhythm in 1 patient, or 0.92%; Torsade de pointes 9 patients or 8.06%; AV block in 13 patients or 10.10%.

Table 8. Display of presence of atrial fibrilation in all patients

Type	Number	%
Other	1	0,92
Foci	6	5,50
Hypertensio art.	5	4,59
Hypotensio art.	1	0,92
Endocrinological disorders	2	1,83
Systemic and metabolic disorders	7	6,42
Neurological disorders	1	0,92
Athletes' heart	2	1,83
Congenital and acquired heart deffects	37	33,94

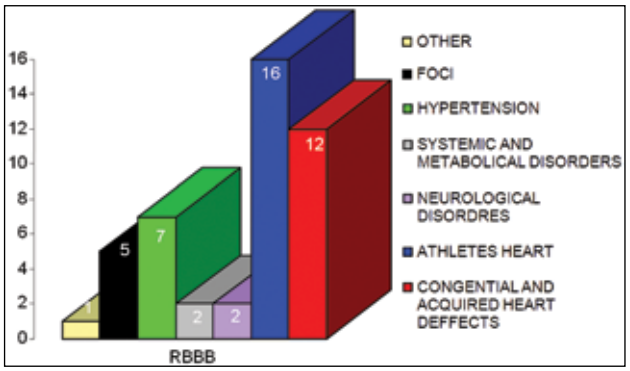


Graph 4. Relation of frequency of atrial fibrilation in all patietns

There is a significant difference on level p<0,01 compared to congenital and acquired heart defects with t=2,68 and t=2,62 and less significant on level p<0,05 for t=2,41 and t=2,27

Table 9. Display of presence of right brunch bundle according to patiogenesis in all patients

Type	Number	%
Other	1	0,92
Foci	5	4,59
Hypertensio art.	7	6,42
Systemic and metabolic disorders	2	1,83
Neurological disorders	2	1,83
Athletes' heart	16	14,68
Congenital and acquired heart deffects	12	11,01

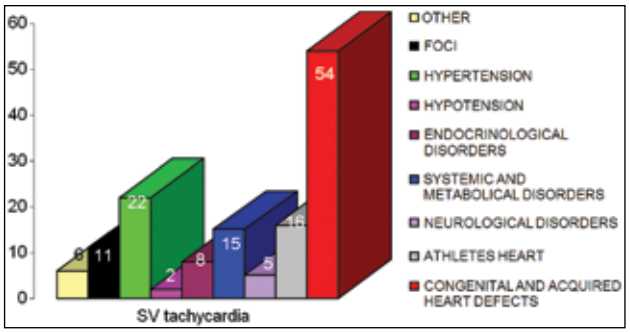


Graph 5. Relation of frequency of right brunch bundle according to patiogenesis in all patietns

There was no statistically significant difference in any single group regarding total sample.

Table 10. Display of presence of supraventricular tachicardia in all patients

Type	Number	%
Other	6	5,50
Foci	11	10,09
Hypertensio art.	22	20,18
Hypotensio art.	2	1,83
Endocrinological disorders	8	7,34
Systemic and metabolic disorders	15	13,76
Neurological disorders	5	4,59
Athletes' heart	16	14,68
Congenital and acquired heart deffects	54	49,54



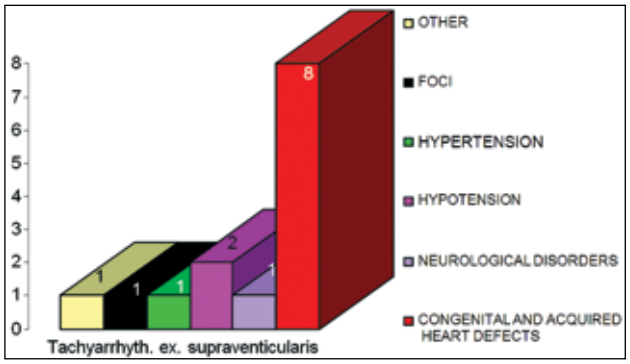
Graph 6. Relation of frequency of supraventricular tachicardia in all patients

SV tachycardia is noted with the highest percent in group with congenital and recorded in highest percent in group with congenital and acquired heart defects with highly significant difference on level p<0,0001 compared to groups ,,other diseases'' and group with low blood pressure (t=3,8 and t=4,09).

The difference is less significant to groups with endocrinological and neurological disorders on level p<0,0005 (t=4,09 and t=4,59).

Table 11. Display of presence of ventricular nad supraventricular tachiarrytmia according to ethiopathogenesis in all patients

Type	Number	%
Other	1	0,92
Foci	1	0,92
Hypertensio art.	1	0,92
Hypotensio art.	2	1,83
Endocrinological disorders	1	0,92
Congenital and acquired heart deffects	8	7,34



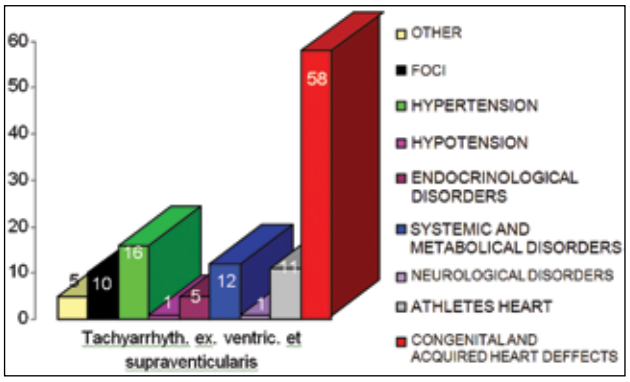
Graph 7. Relation of frequency of supraventricular tachyarythmia according to ethiopathogenesis in all patients

There was no statistically significant difference in any single group regarding total sample

Table 12. Display of presence of ventricular and supraventricular tachyaritmia according to ethiopatogenesis in all patients

Type	Number	%
Other	5	4,59
Foci	10	9,17
Hypertensio art.	16	14,68
Hypotensio art.	1	0,92
Endocrinological disorders	5	4,59
Systemic and metabolic disorders	12	11,01
Neurological disorders	1	0,92
Athletes' heart	11	10,09
Congenital and acquired heart deffects	58	53,21

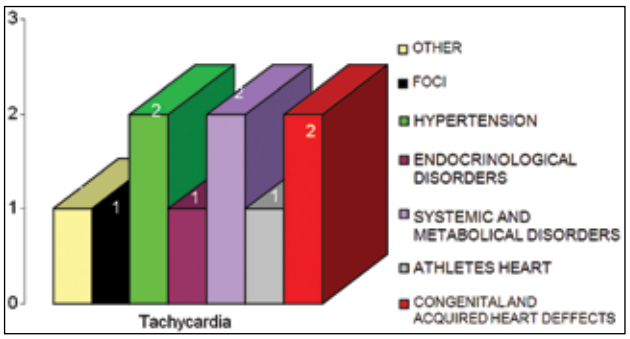
Highly significant difference on level p<0,0000 (t=4,26 and t=4,52) was observed in group with congenital and acquired heart defects compared to other examined patients.



Graph 8. Relation of frequency of ventricular and supraventricular tachyaritmia according to ethiopatogenesis in all patients

Table 13. Display of presence of tachycardia according to pathogenesis in all patients

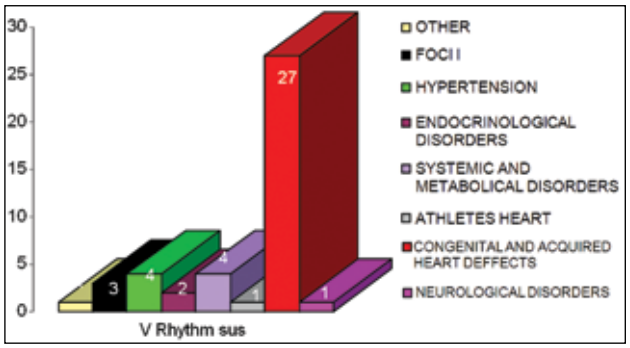
Type	Number	%
Ostalo	1	0,92
Foci	1	0,92
Hypertensio art.	2	1,83
Endocrinological disorders	1	0,92
Systemic and metabolic disorders	2	1,83
Athletes' heart	1	0,92
Congenital and acquired heart deffects	2	1,83



Graph 9. Relation of frequency of tachycardia according to pathogenesis in female patient population

Table 14. Display of ventricular rhytm according to pathiogenesis in all patients

Type	Number	%
Ostalo	1	0,92
Foci	3	2,75
Hypertensio art.	4	3,67
Endocrinological disorders	2	1,83
Systemic and metabolic disorders	4	3,67
Athletes' heart	1	0,92
Congenital and acquired heart deffects	27	24,77
Neurological disorders	1	0,92

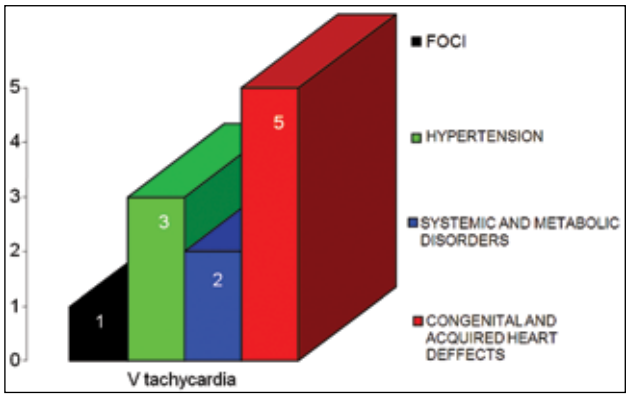


Graph 10. Relation of frequency of ventricular rhytm according to pathiogenesis in all patients

There was no statistically significant difference in any single group regarding total sample.

Table 15. Display of ventricular tachycardia according to pathiogenesis in all patients

Type	Number	%
Foci	1	0,92
Hypertensio art.	3	2,75
Systemic and metabolic disorders	2	1,83
Congenital and acquired heart deffects	5	4,59



Graph 11. Display of frequency of ventricular tachicardia according to pathiogenesis in all patients

There was no statistically significant difference in any single group regarding total sample.

Student population had no previous regular scheduled and systematic examination especially for war and post-war generations. Patients from rural areas still always have undiagnosed congenital and acquired defects. Internist office of the Institute for Public Health students at the University of Sarajevo was established in 2005 and since then, is mostly dealing with cardiac problems among students at the University of Sarajevo. The most common defects are asymptomatic, which are firstly registered on a systematic examinations at the Department of Public Health for students at the University of Sarajevo, or the patient-students come for the first time to examination due to already expressed subjective complaints in terms of precordial pain, dizziness, heart palpitations and easy fatigue.

Systematic examinations at the admission to college and regular cardiac examinations of students-athletes and those students who are admitted the Faculty of Physical Education are particularly important since many heart defects are manifested only at sport trainings. Occasional heart pain is present in students, which is significant information about the possible presence of intermittent cardiac problems that have extracardiological or primary cardiac genesis. Cardiac origin of pain is usually associated with physical effort or known history of CHD. The appearance of syncope was the main symptom of aortic stenosis and may be the first symptom of the presence of aortic vitium.

Mitral stenosis can lead to cardiac syncope and this usually happens when there is tachycardia or other cardiac arrhythmias. In mitral valve prolapse associated with ventricular and supraventricular arrhythmias, may occur syncope. Students also come with medical records that previously recorded heart defects in the pediatric age group or surgically treated congenital anomalies that require further monitoring and regular treatment. Certain congenital and acquired heart defects undergo asymptomatically, and therefore pediatric cardiology cannot detect them and treat, and internists, cardiologists at the tertiary level of care are often confronted with the problem of congenital and acquired heart defects when the changes are final and irreversible with advanced complications.

Based on the work of Internal medicine Cabinet which continuously deals with detection of cardiac problems among the students of Sarajevo University a need occurred to study heart disease in these populations in order to determine the incidence of congenital and acquired heart defects in the University of Sarajevo students, which allows the application of appropriate therapy before the appearance of symptoms and to determine the importance of monitoring and screening for heart defects among the University of Sarajevo students in relation to the time of their discovery, and to establish a computerized database of the pathology.

Based on the results of the investigation leading problems related to heart defects are mitral valve prolapse which is present in 55 patients or 50.46%; mitral and tricuspid valve regurgitation in 20 patients or 18.35%, mitral valve insufficiency in 8 patients, or 7.34%; aortic regurgitation in 4 patients value or 3.67%; St. post operation defectus ventriculorum septum in 2 patients, or 1.83%, and state following surgical treatment of aortic stenosis in 1 patient or 0.92%. In congenital and acquired heart defects are present cardiac rhythm disturbances both ventricular and supraventricular from simple, individual to complex: supraventricular arrhythmias and ventricular extrasytolia in 58 patients or 53% of patients, supraventricular tachycardia in 55 patients or 50.46%; atrial fibrillation in 37 patients or 33.94%; ventricular tachycardia in 5 patients, or 4.59%, absolute arrhythmia in 2 patients, or 1.83% and ventricular rhythm in 1 patient, or 0.92%; Torsade de pointes 9 pts or 8.06%; AV block in 13 patients or 10.10%.

In all patients we analyzed the presence of rhythm and conduction of heat signal. In particular, attention is addressed to:

- Electrical-axis and P waves. Abnormally high P wave will direct to the Epstein anomaly due to the wide right chamber. Right axis of AVSD, VSD, deviation to the right of mitral stenosis.
- The presence of hypertrophy of the left chamber. Abnormal P mitrale wave occurs in mitral defect, particularly mitral valve stenosis. Occurs due to the enlargement of left chamber, which are due to tricuspidalization of mitral defect and joins the widening of the right cahmber.VSD, high P II and V2.
- The presence of atrial arrhythmias- atrial fibrillation is present in K-TGA, mitral stenosis, mitral insufficiency, aortic stenosis and tricuspid regurgitation.
- The presence of right ventricular hypertrophy and disturbances in the conduction in congenital heart defects. The presence of incomplete or complete right bundle branch block with changing forms of RSR 'with R' for whose emergence is liable hypertrophy of right ventricular outflow tract in ASD.
- The presence of signs of biventricular hypertrophy in pulmonary artery stenosis with a deviation of electrical axis to the right; mitral stenosis, with a deviation of electrical axis to the right and tricuspid regurgitation.
- The presence of signs for left ventricular hypertrophy in the presence of obstacles in exit part of the left ventricle such as aortic stenosis with (especially the lower interval ST and wave sharp negativity T). The left ventricular volume load as in aortic stenosis, ST and T changes are more in a sense of subendocardial ischemia.
- Extended PR interval (first degree AV block) with K-TGA, e.g., VSD, a volumetric load of the left ventricle into the left leads V5 or V6.
- The presence of branch blocks: In Epstein's anomaly complete right bundle branch block with hypertrophy of right atrium. AV block 1st degree and WPW syndrome. P wave is abnormally high, prolonged PR.
- Right bundle branch block, right axis deviation with aortic stenosis and aortic regurgitation.
- Partial right bundle branch block with Y RSR in lead V1 as well as atrioventricular and intraventricular disorders of conduction with acquired aortic valve disease.
- The presence of ST segment changes on the high symmetrical T waves with ST segment PMV. ASD also with PMV.

Congenital heart defects are the leading problem in pediatric cardiology. Most of them are genetically caused, and only some occur under the influence of genetic and environmental factors. The task of internist cardiology practice is to continue the monitoring and treatment of verified pediatric cardiac diseases and to identify new problems, as it is done in this investigation. Most of the presented acquired heart defects were discovered during the first systematic and regular review of a student in the Department of Public Health students University of Sarajevo. Heart defects were identified based on the patient's subjective complaints, objective examination of the characteristic noise, and confirmed in the course conducted further cardiac evaluation: chest X-ray, 24-h Holter monitoring of heart and blood pressure, and ultrasound of heart that definitely confirms presence and type of heart defect and underwent TEE if necessary and electrophysiological studies of the heart.

Conclusion

Following heart defects in students were recorded: Mitral valve prolapse with or without regurgitation in 50.45% of the patient; Regurgitation of Mitral and tricuspid valve in 18.35% of the patient, mitral valve insufficiency in 7.34% patients, aortic valve regurgitation at 3.67% patients, aortic valve insufficiency in 2.75% of the patient; condition after surgery of intraventricular septal defect at 1.83%, and the condition of the patient after surgery for aortic stenosis is 0.92% of the patient. Cardiac arrhythmias are most pronounced in patients with congenital and acquired heart defects. Dilated cardiomyopathies were found in 20 patients or 18.35%. Listed congenital and acquired heart defects were recorded during the previous pediatric cardiologic examination or discovered during the first regular and systematic review of the Department of Public Health students at the University of Sarajevo.

Roadmap in the detection of heart defects were the patients' subjective symptoms, heart murmurs, electrocardiogram records, chest X-ray and 24-h Holter monitoring of heart, and definitive confirmation of the presence and types of heart defects were done with ultrasound of the heart. This investigation demonstrated inadequately studied area of preventive actions, which can have extreme ethical, humanistic value and importance. Certain congenital and acquired heart defects undergo asymptomatic, and therefore pediatric cardiology cannot detect them and treat, and clinical cardiologists and internist are often faced with the problem of congenital and acquired heart defects when the changes are final and irreversible with advanced complications. The significance of this study was determined by the specific life age of the patients between 18-27 years of life, and is related to all aspects of the life of a young man, and is defined through the following tasks:

A. Detection of congenital and acquired heart defects, and monitoring the evolution of anatomic and hemodynamic changes in order to assess the need for medicament or surgical treatment;
B. Ultrasound monitoring of surgically treated congenital anomalies;
C. Prophylaxis of bacterial endocarditis;
D. Systematic screening for congenital and acquired heart defects, that allows the introduction of appropriate therapy before onset of symptoms of disease;
E. Advice to female students with congenital and acquired heart defects in relation to contraception and pregnancy;
F. Genetic counseling for potential parents with congenital anomalies;
G. Evaluation of the physical activity limitations for students with congenital and acquired heart defects;
H. Advice to students with congenital and acquired heart defects regarding the selection of schools and the workplace.

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Every sent article gets its number, and author(s) will be notified if their paper is accepted and what is the number of paper. Every corresponedence will use that number. The paper has to be typed on a standard size paper (format A4), leaving left margins to be at least 3 cm. Ali materials, including tables and references, have to be typed double-spaced, so one page has no more than 2000 alphanumerical characters (30 lines). Sent paper needs to be in the form of triplicate, considering that original one enclosure of the material can be photocopied. Presenting paper depends on its content, but usually it consists of a page title, summary, text references, legends for pictures and pictures. Type your paper in MS Word and send if on a diskette or a CD-ROM.

Title page

Every article has to have a title page with a title of no more than 10 words: name (s), last and first of the author (s), name of the instituion the authors (s) belongs to, abstract with maximum of 45 letters (including space), footnote with acknowledgments, name of the first author or another person with whom correspondence will be maintained.

Abstract

Second page needs to contain paper abstract, 200 words at the most. abstract needs to hold all essential facts of the work-purpose of work, used methods (with specific data, if possible) and basic facts. Abstract must have review of underlined data, ideas and conclusions from text. Abstract has no quoted references. For key words, at the most, need to be placed below the text.

Central part of the article

Authentic papers contain these parts: introduction, goal, methods, results, discussion and conclusion. Introduction is brief and clear review of a problem. Methods are shown so that interested reader is able to repeat described research. Known methods don' t need to be identified, it is cited (referenced). Results need to be shown clearly and legically, and their significance proven by statistical analysis. In discussion, results are interpreted and compared to existing, previously published findings in the same field. Conclusions have to give an answer to author's goal.

References

Quoting references must be in a scale in which they are really used. Quoting most recent literature is recommended. Only published articels (or articles accepted for publishing) can be used as references. Not-published observations and personal notifications need to be in text in brackets. Showing references is as how they appear in text. References cited in tables or pictures are also numbered according to quoting order. Citing paper with six or less authors must have cited names of all authors; if seven or more authors' wrote the paper, the name of the first three authors are cited with a note "et all". If the author is unknown, at the beginning of papers reference, the article is named as "unknown". Titles of the publications are abbreviated in accordance to Index Medicus, but if not listed in the index, whole title of the journal has to be written.

Footnote-comments, explanations, etc., cannot be used in the paper.

Statisticial analysis

Tests used for statistical analysis need to be shown in text and in tables or pictures containing statistical analysis.

Tables and pictures

Tables have to be numbered and shown by their order, so they can be understood without having to read the paper. Every column needs to have title, every measuring unit (SI) has to be clearly marked, preferably in footnotes below the table, in Arabian numbers or symbols. Pictures also have to be numbered as they appear in text. Drawings need to be enclosed on a white paper or tracing paper, while black and white photo have to be printed on a radiant paper. Legends next to pictures and photos have to be written on a separate A4 format paper. All illustrations (pictures, drawings, diagrams) have to be original and on their backs contain illustration number, first author last name, abbreviated title of the paper and picture top. It is appreciated if author marks the place for table or picture. Preferable the pictures format is TIF, quality 300 DPI.

Use of abbreaviations

Use of abbreviations has to be reduced to minimum. Conventional units can be used without their definitions.