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Effects of Atorvastatin on clinical and radiological disease process in patients with multiple sclerosis

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Abstract

Background: Multiple sclerosis is an autoimmune disease that affected the central nervous system. The most common way for treatment of disease is the use of immunosuppressive drugs. Atorvastatin is a statin family of drugs which is effective in control of cholesterol synthesis. This study investigated the effect of Atorvastatin on the MS disease process.

Methods: In this clinical trial study, demographic data were recorded. Patients were divided into two groups. Before treatment, the measurement of immunological parameters at Baseline and MRI were performed. Case group treated for 12months with 80mg daily oral Atorvastatin. Samples were taken at the end of the study again. At the beginning and end of the study for all patients EDSS and FSS forms were completed.

Results: The results showed that administration of Atorvastatin in patients with multiple sclerosis improved patients motor ability ($p < 0.05$).The drugs improved digestion and bladder function, sensory function and visual function of patients. But these changes were not statistically significant.

Conclusions: Considering the positive effect of Atorvastatin on the ability to get the motor, sensory and visual function, cerebellar function, digestion and bladder function and patient satisfaction it is recommended to be used in the treatment of multiple sclerosis patients.

Key words: Atorvastatin, Clinical Trial, EDSS, FSS, Multiple sclerosis, radiological disease.

Introduction

Multiple Sclerosis is an autoimmune disease that causes dysfunction of the central nervous system, where the immune system destroys the myelin nerve fibers (1,2). The most common treatment for patients diagnosed with Multiple Sclerosis the use of immunosuppressive drugs that are only partly effective in reducing the relapse rate, slowing disease progression, and diminishing the number and volume of lesions visible on an MRI (3-7). Systemically weakening the immune system by using these immunosuppressive drugs will lead to complications. Drugs such as Atorvastatin, which modify the immune response can be effective in the treatment of this disease. There are only two studies on the effects of Atorvastatin on patients with MS (8, 9). Vollmer et al presented a study in 2004 where Atorvastatin was administered orally to 28 patients with MS for six months, which showed that it can be effective in improving patients' conditions (9).Due to the small sample size and lack of several parameters, a study on a larger sample size and with a longer duration of treatment is necessary. Statins (inhibitors of 3-hydroxy-3-methylglutaryl coenzyme A Reductase) are potent inhibitors of cholesterol biosynthesis and are useful in the treatment of cardiovascular diseases (10). Experimental and clinical evidence suggests that Statins improve endothelial cell function, inhibit atherosclerosis, and effective in reducing inflammation and oxidative stress (11-13). Also, Statins, like lovastatin, arecurrently

being used in a clinical trial for the treatment of cancer and inflammatory diseases (14,15).

Materials and Methods

In this study, information about the patients' conditions and treatments (e.g., duration, severity, drug, etc.) were recorded based on a designed questionnaire. Patients were divided into two groups through random allocation (IRCT2015071323184N1). All the patients underwent a brain MRI. Additionally, a sampling of immunological parameters was performed to establish a baseline before starting treatment.

A focus group was treated with an 80mg oral dose of Atorvastatin, every day, for one year. Patients were excluded if they showed sensitivity to the drug or if their LDL levels reduced more than normal. Patients in the control group only followed their routine treatment. The Lipid profiles for all participants in the study were measured once every two months. After one year of treatment, at the end of study, treatment samples were taken from all patients (both the focus group and the control group) again. The forms studied in this research were FSS (Kurtzke Functional Systems Score) and EDSS (Expanded Disability Status Score).

Results

The study was based on EDSS and FSS questionnaires. It became apparent that the impact of taking Atorvastatin was effective on improving individuals' ability to move and the results were statistically significant at the 5% level($p=0.01$), however, there was no significant differences between the focus group and the control group's results after treatment($p=0.38$) (table 1).

According to the FSS questionnaire, sensory function, visual function, cerebellar function, gastrointestinal and urinary bladder function were examined and the results showed that the disease progression in the sensory functions had stopped. In the group which Atorvastatin was administered, the rate of disease progression was much lower than the control group ($p=0.03$). Also, the data showed that there were no changes in disease's progression in visual functions for any of the groups after treatment ($p>0.05$). Based on the analysis conducted, cerebellar function showed no significant changes in any of the groups after treatment ($p>0.05$).There was no disease progression observed in the gastrointestinal and bladder functions for any of the groups and there was no significant change in the level of 5%, before and after treatment ($p>0.05$). Thus, most patients only saw improvement in their

Table 1. Comparison of Atorvastatin effects on the motor ability (based on questionnaires EDSS) before treatment and after treatment

	(After treatment)EDSS1				(Before treatment)EDSS2			
EDSS Mark	Case group		Control group		Case group		Control group	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
0	2	4.3	4	11.8	5	10.6		
1	6	12.8					3	8.8
1.5	4	8.5	2	5.9	3	6.4	2	5.9
2	8	17.0	3	8.8	8	17.0	1	2.9
2.5	2	4.3	1	2.9	3	6.4	4	11.8
3	8	17.0	5	14.7	7	14.9	9	26.5
3.5	6	12.8	8	23.5	7	14.9	4	11.8
4	4	8.5	4	11.8	4	8.5	3	8.8
4.5	2	4.3	1	2.9	3	6.4		
5	1	2.1	2	5.9	2	4.3	2	4.3
5.5	2	4.3	2	5.9	2	4.3	2	4.3
6			1	2.9	2	4.3	2	4.3
missing	2	4.3	1	2.9	1	2.1	2	5.9
Total	**47**	**100.0**	**34**	**100.0**	**47**	**100.0**	**34**	**100.0**

Table 2. Comparison of Atorvastatin effects on the sensory function (according to the form FSS) before treatment and after treatment

			Sensory Function						Total
			normal	vibration	mild	Moderate	marked	Loss	
Before treatment	treatment	Frequency	9	14	12	9	2	0	46
		Percent	19.6%	30.4%	26.1%	19.6%	4.3%	.0%	100.0%
	control	Frequency	7	4	6	8	4	1	30
		Percent	23.3%	13.3%	20.0%	26.7%	13.3%	3.3%	100.0%
After Treatment	treatment	Frequency	13	12	10	9	3	0	47
		Percent	27.7%	25.5%	21.3%	19.1%	6.4%	.0%	100.0%
	control	Frequency	1	12	5	11	2	1	32
		Percent	3.1%	37.5%	15.6%	34.4%	6.2%	3.1%	100.0%

0 - Normal
1 - Vibration or figure-writing decrease only in one or two limbs
2 - Mild decrease in touch or pain or position sense, and/or moderate decrease in vibration in one or two limbs; or vibratory (c/s figure writing) decrease alone in three or four limbs
3 - Moderate decrease in touch or pain or position sense, and/or essentially lost vibration in one or two limbs; or mild decrease in touch or pain and/or moderate decrease in all proprioceptive tests in three or four limbs
4 - Marked decrease in touch or pain or loss of proprioception, alone or combined, in one or two limbs; or moderate decrease in touch or pain and/or severe proprioceptive decrease in more than two limbs
5 - Loss (essentially) of sensation in one or two limbs; or moderate decrease in touch or pain and/or loss of proprioception for most of the body below the head

Table 3. Comparison of Atorvastatin effects on the visual function (based on form FSS) before treatment and after treatment

			Visual Function						Total
			normal	scotoma	maximal	Moderate	Worse eye	Worse eye maximal	
Before treatment	treatment	Frequency	21	8	9	5	1	1	45
		Percent	46.7%	17.8%	20.0%	11.1%	2.2%	2.2%	100.0%
	control	Frequency	12	8	8	1	0	2	31
		Percent	38.7%	25.8%	25.8%	3.2%	.0%	6.5%	100.0%
After treatment	treatment	Frequency	24	10	7	2	1	1	45
		Percent	53.3%	22.2%	15.6%	4.4%	2.2%	2.2%	100.0%
	control	Frequency	11	9	8	0	1	2	31
		Percent	35.5%	29.0%	25.8%	.0%	3.2%	6.5%	100.0%

0 - Normal
1 - Scotoma with visual acuity (corrected) better than 20/30
2 - Worse eye with scotoma with maximal visual acuity (corrected) of 20/30.20/59
3 - Worse eye with large scotoma, or moderate decrease in fields, but with maximal visual acuity (corrected) of 20/60.20/99
4 - Worse eye with marked decrease of fields and maximal visual acuity (corrected) of 20/100.20/200; grade 3 plus maximal acuity of better eye of 20/60 or less
5 - Worse eye with maximal visual acuity (corrected) less than 20/200; grade 4 plus maximal acuity of better eye of 20/60 or less
6 - Grade 5 plus maximal visual acuity of better eye of 20/60 or less

sensory function scompared to the control group and in other areas both lacked of evidence showing a halt or decrease in disease progression. The focus group was in relatively better condition, but the results were statistically insignificant (Tables 2-5).

Blood samples taken from patients before and after treatment, showed that there was no a significant difference between the pre and post-treatment number of plaques in the brain (p=0.68) due to the effects of Atorvastatin in either treatment groups and that there was no a significant difference post-treatment between the focus and control groups (p=0.97).

Before the intervention, in 47 patients (88.5%) the average number of plaques in the brain was

Table 4. Comparison of Atorvastatin effects on the cerebellum function (based on FSS form) before treatment and after treatment

			Cerebellar Function					Total
			normal	abnormal	mild	moderate	Unable	
Before treatment	treatment	Frequency	19	18	7	2		46
		Percent	41.3%	39.1%	15.2%	4.3%		100.0%
	control	Frequency	13	8	9	2		32
		Percent	40.6%	25.0%	28.1%	6.2%		100.0%
After treatment	treatment	Frequency	19	14	11	2	1	47
		Percent	40.4%	29.8%	23.4%	4.3%	2.1%	100.0%
	control	Frequency	9	12	11	0	0	32
		Percent	28.1%	37.5%	34.4%	.0%	.0%	100.0%

0 - Normal
1 - Abnormal signs without disability
2 - Mild ataxia (tremor or clumsy movements easily seen, minor interference with function)
3 - Moderate truncal or limb ataxia (tremor or clumsy movements interfere with function in all spheres)
4 - Severe ataxia in all limbs (most function is very difficult)
5 - Unable to perform coordinated movements due to ataxia

Table 5. Comparison of Atorvastatin effects on the gastrointestinal and bladder function (based on FSS form) before treatment and after treatment

			Bowel & bladder				Total
			normal	mild	moderate	frequent	
Before treatment	treatment	Frequency	27	12	3	4	46
		Percent	58.7%	26.1%	6.5%	8.7%	100.0%
	control	Frequency	21	5	4	1	31
		Percent	67.7%	16.1%	12.9%	3.2%	100.0%
After treatment	treatment	Frequency	33	6	4	4	47
		Percent	70.2%	12.8%	8.5%	8.5%	100.0%
	control	Frequency	24	1	3	4	32
		Percent	75.0%	3.1%	9.4%	12.5%	100.0%

0 - Normal
1 - Mild urinary hesitance, urgency, or retention
2 - Moderate hesitance, urgency, retention of bowel or bladder, or rare urinary incontinence (intermittent self-catheterization, manual compression to evacuate bladder, or finger evacuation of stool)
3 - Frequent urinary incontinence

14.5 with a standard deviation of 1.18 and 6 patients (11.5%) had an uncountable number of brain plaques. After the intervention, the average number of brain plaques in patients treated with Atorvastatin in 28 patients (90%) was 12.03 with a standard deviation of 1.6 and 3 patients (10%) had an uncountable number of brain plaques. The average number of plaques in the brain, in 17 patients (39%) was 17.1 with a standard deviation of 1.37 after intervention in the control group and 5 patients (61%) which had an uncountable number of brain plaques respectively.

Also, by comparing the effects of Atorvastatin on plaque volume pre and post treatment. There was no significant difference in volume between the focus and control groups after treatment (p=0.11). In the group treated with Atorvastatin, plaque volume in 6 patients (19.4%) increased and in 5 (16.1%) decreased. In 20 patients (64.5%) the plaque volume was unchanged. Additionally, in the control group, plaque volume in 9 patients (40.9%) increased and in 3 patients (13.6%) decreased, while 10 patients (45.5%) showed no change in plaque volume.

Discussion

In this interventional study 12.34% patients (n = 10) were male and 87.66% (n = 71) were female. Studies indicate that Multiple Sclerosis and experimental autoimmune encephalomyelitis (the non-human version of Multiple Sclerosis) fall under the category of inflammatory diseases associated with leukocyte infiltration into the brain and spinal cord. The infiltrating cells in the brain cause inflammatory reactions in the brain tissue, and damage to the myelin. The severity of lesions depends on the extent of cellular infiltration (16- 17).

In the study, the focus group taking Atorvastatin continued their drug routine which included interferon a1and interferon b1, while the control group received placebo with their routine. The results showed that administration of Atorvastatin in patients with Multiple Sclerosis significantly improves their ability to move at the 0.05level compared to before treatment ($p<0.05$). In comparing the focus group and the control group, a significant difference is observed in their sensory functions in the 0.05level ($p<0.05$) and the recovery rate in the Atorvastatin group was higher compared to the control group.

It also improves digestive and bladder function so that 58.7% patients had normal digestive and bladder function before treatment, but 70.2% had normal digestive and urinary bladder function after treatment. Only of46.7% of patients had normal visual function before treatment, which in the Atorvastatin group changed to 53.3% after treatment. These changes were not statistically significant. This means although an improvement observed, the changes were not significant compared to the pre-dose which might be the result of the short-term treatment of patients with Atorvastatin or a low sample size.

The number of plaques in the brain before treatment was 14.5 and the average number of plaques for 11.5% patients were uncountable. After treatment, the average number of brain plaques were 12.03, and the number of plaques in 10%of patients were uncountable. We have seen a decline in the average number of plaques, but the changes were not statistically significant. Also, after treatment plaque volume in 16.1% patients decreased and in 64.5% remained unchanged. It should be noted that due to the progressive nature of the disease, no change in plaque volume and other symptoms means an inhibitory effect on the disease's progression or its remedial effect that physicians expect would prevent the worsening of the patient's health.

In 2013, a study was conducted in Germany on 30,000 patients with Multiple Sclerosis to find the right treatment for this disease. As a result of this study, women with MS were prescribed significantly more non-steroidal and anti-inflammatory drugs, urinary antispasmodics, antidepressants, tranquilizers and sleep medication. Also, due to regional variations the highest volume of disease-modifying drugs were found in eastern Germany. The amount of drug administration showed relatively little change suggesting early treatment was not routine practice. Furthermore, the results indicated that women with MS were more likely to receive treatment for psychiatric symptoms and pain (18).

While our study investigated the effects of these drugs on the patient and focused on the effects of Atorvastatin on improving patient health, most studies to date have examined the effect of Atorvastatin in combination with other drugs at different doses to treat MS.

In 2008, Paul F. studied the effects of high-doses of Atorvastatin in the treatment of relapsing Multiple Sclerosis which showed that a high dose of Atorvastatin in treatment of RRMS is safe and well tolerated. Furthermore, MRI analysis shows the beneficial effects of Atorvastatin alone or in combination with IFN-beta in the new development of GEL (gadolinium-enhancing lesion). Thus, our findings provided fundamental information for the II/III including Atorvastatin's combination with approved immune system treatment regimens (19). It should be noted that in our study, a daily 80 mg dose of Atorvastatin throughout the six-month period of treatment was well tolerated by patients.

In 2008, Birnbaum conducted a study which shows that the combination of Atorvastatin and interferon may increase disease activity. The combination of40 or 80 mg of Atorvastatin three times a week and 44 micrograms of interferon beta-1a in individuals with Multiple Sclerosis resulted in increased MRI and clinical disease activity. Caution is suggested in administering this combination (20).

The results of the Sellner J. study show that Atorvastatin decreases high-sensitivity of C-reac-

tive protein in Multiple Sclerosis. When Atorvastatin is added to interferon-beta, hs-CRP serum levels decrease to the normal range (P<0.05), indicating the anti-inflammatory action of Atorvastatin in MS (21). To support the Th2 cytokines change by Atorvastatin, further investigationis needed, which is consistent with our results.

SWABIMS (Swiss Atorvastatin and interferon Beta-1b trial In Multiple Sclerosis) is designed to give further information about the therapeutic effects of a daily 40 mg dose of Atorvastatin as an add-on therapy to interferon beta-b1 in patients with Multiple Sclerosis. Furthermore, important safety and tolerability data will be generated through this study (22). Low-dose Atorvastatin may be beneficial, as add-on therapy, in poor responders to high-dose interferon beta-a1 alone(23), which our study showed that high-dose Atorvastatin also has a positive treatment impact on the ability to motory, sensory, visual, gastrointestinal, and urinary bladder functions.

The Survey conducted in 2010 by Wang J showed that there is no convincing evidence to support the use of Statin as an effective therapy in MS(24).

The results of research conducted by Russo E. in 2013 shows that Statins, in addition to their beneficial cardiovascular effects, might be able to affect parts of the brain which regulate seizures (25).As a result of another study by Abtahi Froushani SM, combining Atorvastatin and ATRA has immunomodulatory synergistic benefits and this pharmacological approach may be as a useful strategy to control MS(26).

Statins may be beneficial for MS, and clinical trials of the effects of Statins on MS are now in progress, (27).The study titled "Evaluation of Atorvastatin and Simvastatin for treatment of Multiple Sclerosis" has been proposed to be done on the backgrounds, mechanisms of action, and future perspectives of Atorvastatin and Simvastatin as future treatment options in MS (28).

We now turn to a comparison of the two groups of patients taking interferon A1 and interferon B1, while taking Atorvastatin. The results showed that interferon B1 administered with Atorvastatin in patients with Multiple Sclerosis significantly improves motor abilities at the 0.05 level compared with before treatment (p<0.05),while in interferon-A1 group showed no significant change. Sensory and visual functions showed no significant change in either group.

The group receiving interferon B1 and Atorvastatin showed significant improvement in their cerebellum function compared to the pre-treatment phase (p<0.05).They also showed significant improvement in their digestion and bladder function. According to the results, similar studies should be conducted with a larger sample size.

Conclusion

The use of this drug is recommended in the treatment of Multiple Sclerosis due to the positive effects of Atorvastatin on motor abilities, sensory and visual functions, and gastrointestinal and bladder functions, as well as the number and size of brain plaques in MS patients in addition to the improved patient satisfaction after using the medicine.

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Authors' contributions

GH K planned and carried out the study. E M edited the paper and participated in the follow-up and M GH edited the paper. F M performed the clinical testing of the patients participating in the study. F F and AA performed the intervention and follow- up the two groups, M N performed the statistical analysis and helped to draft the manuscript. All authors read and approved the final manuscript.

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High levels of sedentary behavior and associated cardiovascular risk factors in Brazilian adults

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Abstract

Objectives: To analyze the sedentary behavior associated with risks to health (smoking, alcoholism, being overweight, physical inactivity, hypertension, diabetes, high cholesterol and triglycerides) in Brazilian adults.

Methods: Sedentary behavior was assessed (screen time considers TV and computer use)in 2073 subjects (1202 women and 871 men) with an average age of 45.76 (± 7.45 years).The independent variables were smoking, alcohol consumption, body mass index, level of physical activity, as well as hypertension, diabetes, cholesterol and high triglycerides.

Results: The prevalence of individuals with high sedentary behavior (greater than 4 hours per day) was27.2%.Sedentary behaviors demonstrated no difference between genders, but there were higher levels in younger people. Individuals with higher levels of sedentary behavior had smoking habits (OR=1.33 [1.02-1.75], alcoholism 1.38 (1.14-1.68), were overweight (OR=1.54 [1.25-1.88] and were hypertensive (OR= 1.30 [1.03-1.64]). Sedentary behavior was associated with smoking, alcohol consumption, being overweight and hypertension in independent analyses adjusted for sex, age and education level.

Conclusion: Sedentary behavior among Brazilian adults showed an association to health risk factors.

Key words: Sedentary behavior, Public health, Screen time, Adults.

Introduction

Time spent watching TV or using a computer has been associated with metabolic syndrome, weight gain and increased early mortality from all causes, as well as adverse insulin, glucose and vascular profiles (1-3). The rapid changes of technological advances resulted in a substantial energy expenditure reduction in humans, especially for transport, communication, productivity at work and entertainment at home (4). Time in sedentary activities such as remaining sitting for long time at work and screen time activities is responsible for taking up a greater portion of people's waking hours (5, 6).

High levels of physical activity does not appear to be protective for high levels of sedentary behavior (7, 8). Individuals who watch television for seven or more hours a day, even with high levels of moderate/vigorous physical activity have higher chances of death including those originating from cardiovascular problems when compared to subjects with similar physical activity, but with low sedentary behavior (9).

According to national household research, 35.7% of the Brazilian population reported watching television at least for 3 hours a day (10). TV viewing was more frequent in younger people and in people with 9-11 years of education. Individuals with 12 years or more of schooling were more physically inactive. Individuals who watch TV for longer times were also more inactive, compared to those who watched for less time (10).

In developing countries, sedentary behavior may be related to socioeconomic status, and is associated with increased high caloric foods consumption (11). The association of sedentary behavior to other health-damaging behaviors has also been investigated. Higher educated adults have higher alcohol consumption and a higher prevalence of physical inactivity. Furthermore, smoking still affects 15% of the population, with higher prevalence in adults with eight years, or more, of education (12). Smoking was also associated with watching TV (13).

However, descriptive variables such as gender, age and education level, may be potential confounding factors in the analysis of sedentary behavior associations and should be considered in settings with the objective of determining whether these relationships are independent of those factors. This study aimed to analyze the relationship between adults' sedentary behavior and health risk factors, risk behaviors and cardiovascular outcomes.

Methods

The sample of this study is part of a larger study aimed at analyzing the association between health risk factors among adolescents enrolled in public schools in the city of Londrina and their parents/guardians. After a meeting with the Regional Education Center of Londrina-PR, it was observed that the six biggest schools in the central region of Londrina were those that received more students from different areas of the city (North, South, East, West and central area) and so it was decided to choose these schools in order to obtain greater representation of students from all parts of the city.

These schools had approximately 4850 students enrolled. After explaining the objectives and methodological procedures to be addressed in this study, 1267 students agreed to participate. Adolescents took home the consent form for their parents' signature allowing them to participate in this major project, and in addition also took a consent form for parents/guardians sign to agreeing to participate themselves by answering a questionnaire sent along with the terms. In this questionnaire, information was requested regarding weight, height, socio-demographic characteristics, lifestyle and morbidity. Of the total 1267 students who agreed to participate and took the consent form and questionnaires about lifestyle to their parents/guardians, 1231 adolescents (84.9% of those who agreed to participate) returned the questionnaires answered by at least one parent/guardian.

According to the IBGE (Brazilian Institute of Geography and Statistics) Londrina has approximately 430,000 people aged over 18 years. To calculate the sample of this study, which aimed to analyze the association between sedentary behavior and health risk factors in adults, we considered a maximum prevalence of 50% of outcome (14), usually used in epidemiological studies. Considering a tolerable error of 3%, the minimum sample required was 1064 subjects. However, performing an effect design correction of 1.5 (adolescents whose parents or guardians agreed to answer the questionnaire form were selected considering the class as a whole) the required sample size was 1597 individuals, and considering 20% related to possible losses, the eventual minimum total study sample of 1916 individuals. Thus the minimum number of adults who participated in this study was 1597 people. However providing for possible losses or refusals to participate, another 20% were added generating the minimum sample size required, 1916. The size of the final sample was 2073 subjects, 1202 women and 871 men.

The sociodemographic variables of the subjects were sex, age and educational level, determined by years of study. The dependent variable, sedentary behavior was assessed in the manner described by the subject indicating the number of times that they spent throughout the day watching television or using a computer. From this information, the sample was divided into quartiles and those located in the highest quartile (quartile 4) were considered high sedentary behavior.

The weight and height of the sample participants were calculated through self-reported information. Based on this information we calculated the body mass index (BMI) by dividing weight by the square of height. Adults with a BMI greater than 24.99 kg/m^2 were classified as overweight.

Morbidities considered in this study were hypertension, diabetes, high cholesterol and triglycerides. The subjects were asked if had any of these diseases (yes or no) or if they took medication to control some of these diseases. Those people who reported having this problem and/or those who reported making use of medication to control some of these problem were considered to have hypertension, diabetes, cholesterol or triglycerides.

The practice of physical activity was assessed using the Baecke et al (15). This tool considers three different domains of physical activity (work, sports or leisure activities and occupation in free time). This instrument is validated against standard methods for assessment of physical activity (doubly labeled water) (16) and showed good reproducibility in the Brazilian population (17).

The present study considered habits outside of the work environment and also considered the practice of sports and leisure activities during leisure time. After the calculation of the physical activity score the subjects were divided into quartiles and those located in the highest quartile were considered physically active, those in lowest quartiles as physically inactive.

Smoking was assessed using the following question: "Do you currently smoke?" If yes, "What is the average number of cigarettes smoked daily?" Subjects were classified as smokers who reported currently smoking. Alcohol consumption was assessed by questions from the Brazilian Center for Information on Psychotropic Drugs (CEBRID) (18). This questionnaire asks about the frequency of alcohol consumption (do not drink, 1-2 days/month, 3-4 days/month, 1-2 days/week, 3-4 days/week, 5-6 days/week, every day) and how many doses of these beverages were consumed during the last 30 days (none, 1-2 doses per day, 3-4 doses per day, 5-6 doses per day, 7-10 doses per day, more than ten doses per day). Those subjects who reported alcohol consumption often did so about 1-2 days a week with ingestion of 1-2 doses per day (each dose corresponding to 250 ml).

Statistical analysis

Descriptive statistical information were presented as mean and standard deviation. The association between increased sedentary behavior and the other independent variables (overweight, physical inactivity, smoking, alcoholism, and morbidities [hypertension, diabetes, high cholesterol and triglycerides]) was observed by using the Chi-Square Test. The magnitude of the associations was analyzed by Binary Logistic Regression in the unadjusted and adjusted forms (considering gender, age and education level). The significance adopted was 5% and the pre-established confidence interval was 95%. The software used was SPSS version 15.0.

Results

The sample consisted of 1202 women with an average age of 43.31 (±7.18) years and 871 men with an average age of 45.76 (±7.45 years), with men older than women (p-value ≥0.001). Regarding women, 27.2% were located in the highest quartile of sedentary behavior while in men the prevalence was 28.7%, however this difference was not significant (p-value= 0.243). Figure 1 shows the prevalence of sedentary behavior stratified according to the number of hours per day spent watching television or using the computer. The highest prevalence was 27.2% in subjects who have this behavior equal to or greater than 4 hours per day.

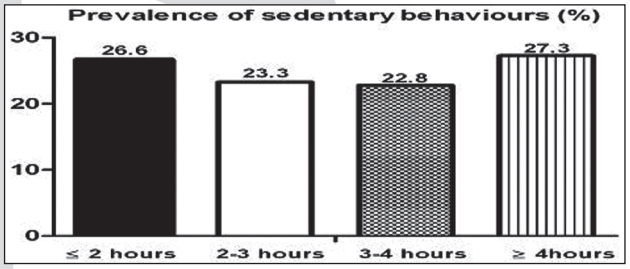

Figure 1. Prevalence of sedentary behaviours in Brazilian adults, Londrina (2011)

Table 1 presents information on the characteristics of the sample according to the stratification of sedentary behavior (low or high). The mean age was higher in subjects with low sedentary behavior. Lesser weight, BMI and consumption of alcoholic

Table 1. Characteristics of the sample according sedentary behaviors status, Londrina-PR (2011).

	Sedentary behaviors		p-value
	Low	High	
Age	44.72 (7.48)	43.33 (7.05)	≤0.001
Weight	72.75 (14.51)	77.15 (16.67)	≤0.001
Stature	166.11 (8.85)	166.83 (8.90)	0.105
BMI	26.26 (4.25)	27.61 (5.03)	≤0.001
Number of cigars	1.95 (0.15)	2.38 (0.27)	0.169
Number of doses	0.87 (0.03)	1.02 (0.05)	0.014
Physical active score	4.72 (1.98)	4.47 (2.12)	0.015

BMI=Body mass index (kg/m²)

beverages doses were lower in people with low sedentary behavior while greater physical activity was higher in the group with low sedentary behavior.

After the high sedentary behavior association analysis with the independent variables, it was found that being overweight, hypertension and alcohol consumption were associated with this behavior (Table 2). In the analyses that formed the adjustments in this study, people who had over 15 years of education were those that were situated in the highest quartile of high sedentary behavior (35.7% [p-value ≤ 0.001]). Sedentary behavior did not differ between genders (p-value = 0.243), however they did differ when considering the age of the sample subjects, with the highest prevalence of sedentary behavior in young people (32.4% [p-value ≤ 0.001]).

Table 2. Association between sedentary behaviors and risk factors for health in adults, Londrina-PR (2011).

High sedentary behaviors			
	%	n	p-value
Smoking			
No	26.6	470	0.117
Yes	31.1	95	
Etilism			
No	22.5	296	0.001
Yes	31.2	270	
Physical inactivity			
No	27.9	447	0.220
Yes	25.0	119	
Overweight			
No	22.3	187	≥0.001
Yes	30.6	379	
Diabetes			
No	27.5	538	0.314
Yes	22.9	28	
Hypertension			
No	26.1	427	0.027
Yes	31.5	138	
Cholesterol			
No	27.2	498	0.893
Yes	27.8	68	
Triglycerides			
No	26.9	518	0.258
Yes	31.5	48	

In the multivariate model, all independent variables that were part of this study were considered, and the unadjusted analysis was significantly associated with high sedentary behavior, overweight, hypertension and alcoholism. After adjustment for confounding variables (sex, age and education level) smoking was associated, together with alcohol consumption, being overweight and hypertension.

Discussion

The main findings of this study observed that high sedentary behavior was associated with being overweight, having hypertension, alcoholism and smoking in adults. Findings regarding the association of low level of sedentary behavior association with lower weight and BMI were also observed in cross-sectional and longitudinal studies (19,20).

Similar associations were found in workers, where those working sitting most of the time had a higher risk of being overweight/obese than those working standing, regardless of physical activity and time sitting at leisure. Individuals who had sedentary behavior during their free time for less than 4 hours/day had a significantly lower risk of obesity as compared to those who spent more than 4 hours in sedentary behavior during leisure time (21). The possible reason for this association was the very low muscular energy expenditure from these activities when compared with physical activities: even relating to physical activities, a 50% reduction in TV viewing time demonstrated a significant increase of energetic expenditure in overweight/obesity adults (22). Another factor was the intake of caloric foods and beverages when watching TV (19). Thus, increased caloric consumption and the lowest daily energy expenditure contributed to increased body weight and, consequently, obesity.

The marginal association between physical inactivity and high sedentary behavior observed in this study follows trends already confirmed in a previous study (23), where high sedentary behavior showed an inverse relationship to exercise. Research suggests that the more time the individual spends doing light physical activities in their daily lives, less time they spend in sedentary behavior. Accordingly, light physical activity can be a viable approach to reducing the deleterious consequences of remaining in sedentary behavior for long periods, once the use of computers has a significant role in young adults' free time and is

Table 3. Multivariate analysis between sedentary behaviors and risk factors for health in adults, Londrina-PR (2011)

	Unadjusted		Adjusted	
	OR (CI)	p-value	OR (CI)	p-value
Smoking	1.24 (0.95-1.62)	0.102	1.33 (1.02-1.75)	0.035
Etilism	1.38 (1.14-1.68)	0.001	1.29 (1.05-1.59)	0.015
Physical inactivity	1.16 (0.92-1.47)	0.199	1.26 (0.99-1.61)	0.055
Overweight	1.54 (1.25-1.88)	≤ 0.001	1.54 (1.25-1.90)	≤ 0.001
Diabetes	0.78 (0.50-1.20)	0.267	0.95 (0.61-1.49)	0.854
Hypertension	1.30 (1.03-1.64)	0.023	1.43 (1.13-1.81)	0.003
Cholesterol	1.03 (0.76-1.39)	0.833	1.12 (0.82-1.52)	0.465
Tryglicerides	1.24 (0.87-1.78)	0.221	1.28 (0.89-1.95)	0.178

Adjusted by age, sex and education level.

negatively associated with physical activity (24). One reason, it is speculated, is that the longer the time spent in sedentary activities such as screen time, the lower the time spent in physical activity.

The association of sedentary behavior to hypertension is also observed in people whose work keeps them in high sedentary behaviors, and demonstrated a risk of cardiovascular disease two times higher and elevated average cardiac frequency levels (25). Hamilton et al.(25) also found that the mortality risk in women with high levels of sedentary behavior was 2.7 times higher than in women with low levels of this behavior. The increase of each hour per day in time spent watching television was associated with an increased mortality risk from cardiovascular diseases at 7% and 4% in the mortality risk from all causes (26). Watching television was significantly associated with different types of biochemical markers of obesity and cardiovascular disease (27).

The association of sedentary behavior to diabetes was observed in previous studies where insulin concentrations were higher in individuals who had high sedentary behavior (28). These evidences were not observed in this study. One possible explanation for this is due to the fact that the studies cited had collected blood samples for analysis, while the present study used self-reporting methods, which may have underestimated the prevalence and strength of association between sedentary behaviors and diabetes, cholesterol and triglycerides.

The association of sedentary behavior to other risk behaviors such as smoking and alcohol consumption was observed in the adjusted analysis, and was also observed in other studies (29). In adults over 50 years old, nicotine dependence showed a positive association with sedentary behavior and lower levels of light and moderate/vigorous physical activity (29). Sedentary time behavior was directly associated with the consumption of alcohol and tobacco in both sexes (30).Bjørk Petersen et al. (31) in a study of more than 70,000 individuals ranging in age from 18 to 99 found that the prevalence of physical inactivity, smoking and alcohol consumption were more prevalent among individuals who sat for ten or more hours. Nicotine dependence was significantly associated with a sedentary lifestyle: Brunori et al. (32) suggests that higher intake of nicotine leads to physical inactivity, or a sedentary lifestyle leads to increased dependence on nicotine. The current consumption of alcohol has been associated with increased difficulty in quitting smoking (33).

Another worsening factor corresponds to the media's contribution in beverage advertisements. Individuals who watch television for hours become frequent targets of commercials. The association of advertisements for alcoholic beverages to consumption of beer was discovered among Brazilian adolescents (34). Studies suggest that the most effective way to control the influence of advertising on alcohol consumption is to reduce exposure of such to the young by restricting the placement of alcohol advertisements, including beer, on television and in other communication media (35).

Due to the cross-sectional design of this study it was not possible to make statements regarding causality of the observed associations and this is a

limitation. Data collection through questionnaires may result in self-reporting inaccuracies in among the individuals surveyed, as they are consciously or unconsciously prone to misreporting. The use of more accurate measuring instruments, such as an accelerometer, could strengthen the associations and accurately account for the entire range of activities undertaken by individuals for several days. However, epidemiological studies like this conducted on the Brazilian population still find financial and operating limitations regarding the use of accelerometers, recruitment of subjects and laboratory collections, unlike research in developed countries. Certainly the use of more precise methods as well as follow-up studies may come to statistically confirm the results already observed. Another factor to be considered in this study is that only parents of adolescents enrolled in the six largest schools in the central region of the city of Londrina were included in the study. Despite these schools meet representing adolescents and parents/guardians from all regions of the city, this factor must also be considered as a limitation, due to the lack of randomization of the sample.

Sedentary lifestyle among Brazilian adults was associated with risk factors such as hypertension and being overweight/obese and health risk behaviors such as smoking and alcohol consumption. These associations were independently verified with the physically active, and levels were increased as sedentary time was increased. Time spent sitting represents an important modifiable risk factor, amenable to intervention for improving the health conditions of the population. Reducing the number of hours per day that the individual spends in sedentary behavior thus becomes an important task for public health.

Authors' contributions

WRT and DGDC was the researcher responsible for the collection, analysis and interpretation of data, and also for writing the manuscript. CCS and EFZ were responsible for the analysis and interpretation of data. LDD and FCSG were involved in the critical review of the manuscript for important intellectual contribution of the same.

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Serum hepcidin levels and anemia biochemical parameters in hemodialysis patients

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Abstract

Objective Anemia is a major clinical problem in hemodialysis patients and also has a significant effect on the quality of life and mortality in these patients. Hepcidin has an important role in iron metabolism and can regulate the plasma iron concentrations by controlling the ferroportin level on iron-exporting cells. We decided that measured serum level of prohepcidin, hepcidin-25 and ferritin in hemodialysis patients compared to healthy individuals as the control group, in order to find the effects and relationships of these factors in hemodialysis patients

Methods: This study was performed on 64 hemodialysis patients (36 women and 28 men), and 64 healthy volunteers (34 women and 30 men). Clinical parameters were measured by standard laboratory procedures.

Results: Hepcidin-25, Prohepcidin, ferritin and TSAT were higher in HD patients than in normal control subjects. Also hemoglobin, serum albumin, iron and transferrin levels were decreased in HD group. In addition, level of iron, hepcidin-25 and prohepcidin in the morning is higher than in the afternoon.

Conclusion: our results indicated that dialysis therapy in HD patients is associated with elevated hepcidine25 and prohepcidin levels. We found significant relationship between hepcidin25 or prohepcidin and serum ferritin. It indicates that inflammation is not a major regulatory factor of hepcidin25 or prohepcidin levels in HD patients.

Introduction

Anemia is a major clinical problem in hemodialysis patients and also has a significant effect on the quality of life and mortality in these patients [1]. Some patients can be successfully treated by recombinant human erythropoietin (rHuEPO); however, a number of other patients are rHuEPO-resistant. Iron plays a critical role in treatment of anemia in hemodialysis patients[2]. There are about 3000 to 4000 mg of iron in the human body which are stored in hemoglobin, hepatocytes and splenic macrophages [3]. It has been shown that the absorption of iron occurs in the duodenum, the first and shortest segment of the small intestine and its homeostasis is controlled by the duodenum, spleen, liver and hormones [4]. In addition, studies have shown that hepcidin is an important regulator of iron homeostasis [5-6]. Hepcidin is a cysteine-rich cationic peptide that was first identified in human blood using mass spectrometry [7]. This compound is synthetized in the hepatocytes as precursor-prohepcidin with 84 amino acids, and is subsequently modified into pro-hepcidin with 60-64 amino acids and then consequently split. Its 25 amino acids (hepcidin-25) form, has main bioactive role [8], while some evidence shown that kidneys may also be involved [9].

Hepcidin has an important role in iron metabolism and can regulate the plasma iron concentrations by controlling the ferroportin level on iron-exporting cells [10-12]. It have been demonstrated that some situation such as anemia, hypoxia, uremia and inflammation could make an increase hepcidin production, and additionally, IL-6 was found that has positive effect on hepcidin synthesis [13-15].

Previous studies in this field shown that the patients who suffer from Chronic Kidney Disease (CKD) had significantly higher serum hepcidin level compared to the control and also subsequent experiments confirmed that there was a converse relationship between serum hepcidin level and Glomerular Filtration Rate (GFR) in patients with CKD [13, 16]. Therefore, in CKD patients, serum hepcidin level has a prominent effect on iron homeostasis and Erythropoiesis-Stimulating Agents (ESA) resistance. So serum hepcidin level is the most important factor of iron malabsorption from the gastrointestinal (GI) tract in CKD patients and the reason why many hemodialysis patients are suffering from lack of functional iron in the presence of inflammation [10]. Serum ferritin has been demonstrated that can be a suitable markers which used for iron management in CKD patients [17].

Serum ferritin is the major iron storage protein in the body[18] as well as is an acute phase protein and its serum concentration would be increased in the presence of inflammation [19-20]. In addition, inflammation is directly linked to the protein-energy wasting in hemodialysis patients [21]. Both serum hepcidin-25 and total hepcidin level have been found to be elevated in patients with renal dysfunction (5, 6, 13, and 16).

In the present study, we measured serum level of prohepcidin, hepcidin-25 and ferritin in hemodialysis patients compared to healthy individuals as the control group, in order to find the effects and relationships of these factors in hemodialysis patients.

Material and method

Patient: This study was performed on patients who referred to dialysis section of Emam Ali's hospital in north khorasan province of Iran and were participating in dialysis program. These patients were selected randomly and inclusion criteria were as follows: stable clinical state, no kidney, no transplantation, no any cancer, no current chemotherapy, radiotherapy or erythropoietin treatment, no evident thrombosis or inflammation, no peritonitis, no infection, without uncontrolled hypertension, and no liver dysfunction (prothrombin time, alanine aminotransferases and aspartate aminotransferases within normal ranges). 64 patients including 36 women and 28 men, the average age of 46.98±18.62 years have been selected. Their height and weight were documented. None have been given any Iron injection since two weeks before this study performance. The duration of dialysis therapy was between 33 ± 24 months. Also, the subjects have been divided into two subgroups due to their hemodialysis process time: 1-Morning group, 34 patients. 2- Midday group, 30 patients. All the patients were notified of the survey's target and gave their permission. The study was admitted by the Medical University Ethic Committee. The control groups consist of 64 healthy volunteers (34 women and 30 men) with normal kidney function (without any disease) aged between 46.82±18.55 (age, sex and BMI matched with the control group).

Method: Blood samples were taken before hemodialysis procedure when they referred to the clinic for routine assessment after fasting overnight. Bloods were transferred to pyrogen-free tubes (without anticoagulant) then samples were centrifuged and serum was separated, and stored at -20 °C until performing analysis. For control group, blood of healthy volunteers was taken from a peripheral vein after an overnight fast and stored at -20 °C too. Finally Serum samples were evaluated for levels of hepcidin-25, prohepcidin and ferritin. Serum hepcidin-25 and pro-hepcidin concentrations were calculated by available ELISA kit from Glory Science (USA) and ferritin concentrations were calculated by from commercially available ELISA Kit from IBL Instruments (Germany) according to the manufacturer's instructions. The levels of serum albumin, iron, transferrin, total iron binding capacity (TIBC) and Hb were measured by standard laboratory procedures in the hospital laboratory. The Percentage of transferrin saturation test (TSAT) was measured as the ratio of serum iron levels to TIBC.

Statistical analysis

Study variables were summarized by mean and SD. Due to its non-normal distribution, differences between study and control groups were evaluated by the Mann-Whitney test for non-parametric continuous data or independent T-test for parametric data. Univariate correlations between biochemical measurements and hepcidin were calculated by the Pearson correlation test. Multiple linear regression analysis was applied to determine the association

of biochemical parameters with hepcidin. P values <0.05 were considered to be statistically noteworthy. Statistical analysis was carried out by SPSS for Windows software, version 16.0.

Result

Demographic characteristics of the subjects are summarized in Table 1 and our results are presented in Table 2.

The mean serum albumin levels were significantly lower in the HD patients than in the control subjects ($p < .001$). Hepcidin-25 and Pro-hepcidin levels were notably higher in patients receiving dialysis therapy than control group ($p < .001$). Hemoglobin levels were considerably lower in HD patients compared with the control group ($p < .001$), and serum ferritin and TSAT were notably higher in HD patients than in control subjects ($p < .001$). Finally, serum iron and transferrin levels were significantly decreased in HD group compared with control group. In the next phase we divided the subjects into two groups according to their hemodialysis process time, in order to find iron and hepcidin-25 or prohepcidin changes through the day. Our data showed the level of iron in the morning is higher than the afternoon, though it is not significant. Meanwhile, the hepcidin-25 level in the morning is significantly higher than the afternoon. Although, ferritin did not shows any changes among these groups. Relation was evaluated between the following variables: hemoglobin, serum iron, ferritin, TSAT, albumin, transferrin, hepcidin-25 and prohepcidin levels. Iron was positively related with ferritin. Prohepcidin and hepcidin-25 related positively with ferritin. Iron and albumin no correlation was found between hepcidin-25 or prohepcidin and the other factors in the control group. Non-parametric relations were also carried out in two sub groups. In the morning group of patients, ferritin related with hepcidin-25, prohepcidin and transferrin and iron related with ferritin. In the group of patient's hemodialysis at midday, transferrin related with ferritin and ferritin related with hepcidin-25, prohepcidin (tables 3).

Discussion

The results of this study indicate that serum level of hepcidin-25 and pro-hepcidin in the hemodialysis group increased significantly compared with the control group. The finding of the current study was confirmed by the previous study that carried out by Turgut et al [22] They reported a considerable increase of pro-hepcidin in the dialysis patients com-

Table 1. Demographic characteristics of the subjects

	HD[1] patient	control	P value
Gender Male Female	 36 28	 34 30	0.602
Age (years)	46.98±18.62	46.82±18.55	0.968
BMI[2] (kg/m^2)	22.88±5.63	23.31±5.16	0.710
Duration on dialysis (months)	56.8±18.4	----------	

1: Hemodialysis 2: Body Mass Index

Table 2. Clinical characteristics in HD patient, data are mean±SD

	patient	control	P value
Hemoglobin (g/dL)	11.2 ± 2.1	13.7± 1.3	0.008
Hepcidin-25 (ng/mL)	97.71±42.59	56.12±30.90	0.022
Iron (µg/dL)	55.43±32.18	96.42±44.03	0.025
Albumin (g/dL)	3.4±0.40	4.4±0.40	0.01
Ferritin (ng/mL)	394.1±289.21	110.14±80.78	0.008
TIBC (µg/dL)	256.90±65.43	298.65±43.60	0.12
TSAT %	37%	32.4%	0.001
Prohepcidin (ng/mL)	401.7±155.2	202.3±168.4	0.001
Transferrin (g/l)	1.26±0.28	2.17±0.27	0.001

Table 3. Correlation coefficients and p-values in the groups of HD patients

		r	P value
Whole group of HD patients	Iron with Ferritin	0.41	0.04
	Ferritin with Hepcidin	0.28	0.02
	Ferritin with pro hepcidin	0.1	0.007
	Iron with Hepcidin	0.24	0.03
	Iron with pro Hepcidin	0.1	0.006
	Albumin with Hepcidin	0.35	0.01
	Albumin with pro Hepcidin	0.1	0.005
Morning group	Iron with Ferritin	0.43	0.04
	Ferritin with Hepcidin	0.40	0.05
	Ferritin with pro hepcidin	0.25	0.01
	Ferritin with transferrin	-0.85	0.001
Midday group	Ferritin with Hepcidin	0.40	0.05
	Ferritin with pro hepcidin	0.25	0.01
	Ferritin with transferrin	-0.78	0.003

pared with the control group. Furthermore, they also found that the levels of pro-hepcidin in HD patients were higher than in PD patients; although, differences were not statistically notable. In another study that was done in 2013 by Sedlackova et al on the serum level of hepcidin in the dialysis patients, the same result was reached [23]. furthermore, In two separate studies by Weiss et al [24] , and Peters et al [25], hepcidin were found to be down regulated in patients after dialysis.

The connection between hepcidin and iron metabolism has been suggested by Nicolas et al [11] and Pigeon et al [26]. They found that hepcidin is a major regulator of iron absorption in response to the body iron storage. Although, extensive researches have done, but still to analysis and assessment of serum iron level in hemodialysis patients is relatively complicated. Taken together, hepcidin and serum iron levels are changed during the day [27]. Some previous studies have shown that serum iron level is higher in the morning than in the afternoon [28-29], and conversely, some studies have revealed that serum iron levels are higher in the afternoon compared to the morning [30-31]. Previous studies in this field have shown that the serum hepcidin levels are dependent on serum iron levels [32]. In the current study we found that the serum iron levels in the morning are higher than the afternoon but the variation is not statistically significant. This increase of serum iron level may be related to iron substitution therapy, although we have not administrated iron substitution to all subjects for 2 weeks before starting the study. Moreover, we found that the hepcidin level in the morning is obviously higher than the afternoon. This result confirmed by Sedlackova et al [23] and Ashby DR et al [13].

In some previous studies, there were not any relationship between hepcidin, serum iron, TSAT and ferritin level [9, 33]. In the case of TSAT, our results revealed that there are no relation between the TSAT level and hepcidin-25 or prohepcidin level, but our findings showed a correlation between hepcidin-25 or prohepcidin with serum ferritin level. In addition, a correlation between hepcidin, ferritin, albumin, and CRP level in in serum was reported by Malyszko et al [34].

Furthermore, in this study we found that the ferritin as an inflammatory indicator was notably increased in the hemodialysis patients compared to control group, and also we found that the serum albumin level is significantly decreased in hemodialysis patients, that is previously confirmed by Xu et al in the year of 2011 [35]. In a study that was done on survey the relationship between proinflammatory cytokines and hepcidin, it has been observed that the patients had high ferritin levels, reduced iron absorption, and iron retention in macrophages [34]. The results of our study on the association of serum ferritin levels and serum hepcidin concentration and also serum albumin in the patients with CKD and HD, are corroborated with other previous

studies in this field [32,33,36]. Conversely, Turgut et al could not find any relation between prohepcidin and inflammatory factors, such CRP and albumin in dialysis patients [22].

Lastly, in this study no correlations between prohepcidin or hepcidin-25 with hemoglobin levels have been found. Taes et al [33] also failed to detect a relation between pro-hepcidin levels and hematocrit. Eleftheriadis et al reported inverse association between hepcidin and hemoglobin [37] and Hsu et al showed the positive association between prohepcidin and hemoglobin [38]. We found significant relationship between hepcidin-25 or prohepcidin with ferritin it indicates that inflammation is not major regulatory factor of hepcidin-25 or prohepcidin levels in HD patients and other factor such as high iron stores also participate.

In conclusion, our results indicated that dialysis therapy in HD patients is associated with elevated hepcidine25 and prohepcidin levels. In addition in hemodialysis patients, the iron metabolism and inflammation parameters were notably changed compared with the control group. Finally we found significant relationship between hepcidin25 or prohepcidin and serum ferritin. It indicates that inflammation is not a major regulatory factor of hepcidin25 or prohepcidin levels in HD patients.

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Assessing knowledge on pelvic floor muscles and role of physiotherapy in urogynecology among Internet users

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Abstract

Background: Knowledge of pelvic floor anatomy is important because it promotes body awareness and positive body image, improves postural patterns, and ensures personal hygiene, which prevents urogenital infections.

Objective: The aim was to determine knowledge among the Internet user population knowledge of pelvic floor muscles, the functions of these muscles, and women's health physiotherapy that focuses on pelvic floor dysfunction.

Study Design: Cross-sectional study.

Methods and Measures: It was conducted through a questionnaire available on a website. The study included 161 subjects, all of whom were Internet users; they were selected by convenience from September/2013 to September/2014. The questionnaire was developed in Google Docs and dissemination of the instrument was performed by the authors of this work.

Results: Out of 161 responses, 114 (70.8%) were female, the average age was 29.8 ± 9.5 years, and most were characterized as white (62%), single (66%), and having at least one paid job (73%). According to the results presented in the questionnaire, 45% (n = 72) said they had never heard about pelvic floor muscles, and 50% were unaware of the role of physiotherapy in urogynecology. Urinary incontinence was the most commonly reported disorder related to physiotherapy in urogynecology.

Conclusions: This study indicates that it is important to inform the population about the anatomy of the pelvic floor, pelvic floor muscles, and the real applications of physiotherapy in urogynecology. Moreover, the public should be given more information regarding urinary dysfunction and pelvic disorders in which there are non-invasive, conservative, and specialized treatments.

Key words: Pelvic Floor, Physical Therapy Modalities, Questionnaires, Urination Disorders, Pelvic Pain.

Introduction

The female pelvic floor is divided into the front part, which includes the bladder and urethra, the middle part where vagina is located, and the posterior part around the rectum (Healy et al, 1997; Nolasco, Martins, Berquo and Sandoval, 2007 and Haddad, Ribeiro and Carvalho, 2010). Knowledge of pelvic floor anatomy and structure is important because it promotes self-perception and body image development (Machado, Malucelli, Carvalho and Bartoszeck, 2011); moreover, it can improve postural patterns (Matheus, Mazzari, Mesquita and Oliveira, 2006), improve vaginal hygiene, and prevent urogenital infection (Giraldo et al, 2013).

The pelvic floor is supported by pelvic fascia and ligaments (pubovesical, round ligament of uterus, and the uterosacral and transverse cervical ligaments). Pelvic floor muscles (PFM) are divided into pelvic diaphragm muscles (the levator ani muscle includes the pubococcygeus, puborectalis and iliococcygeal) and urogenital muscles (the bulbocavernosus muscle, superficial transverse perineal muscle, and ischiocavernosus muscle). These structures provide support and maintenance of proper positioning of the abdominal and pelvic organs (Healy et al, 1997; Nolasco, Martins, Berquo and Sandoval, 2007 and Haddad, Ribeiro and Carvalho, 2010). In addition, strengthening

the PFM is associated with improvement of female sexual function (Piassarolli et al, 2010), prevention of pelvic disorders, genital prolapse (Hagen and Stark, 2011), and urinary incontinence (Hay-Smith, Mørkved, Fairbrother and Herbison, 2008).

Urinary incontinence (UI) is defined as the involuntary loss of urine, and in Brazil, 79% of women with UI symptoms do not seek specialized treatment (Higa et al, 2010). Among women who know of some treatments for incontinence, the most cited is surgery; these women are often unaware of physiotherapy and conservative treatments for urinary dysfunction (Silva and Lopes, 2009).

Currently, education in pelvic anatomy and pelvic floor disorders such as urinary incontinence are still restricted to health professionals and undergraduate students in health-related courses (Portugal et al, 2011; Figueiredo, Baracho, Vaz and Sampaio, 2012). So people with urinary and pelvic disorders can seek appropriate treatment, there is a need for public knowledge about the anatomy of the pelvic floor, as well as the role of physiotherapy for treatment and prevention of related disorders. For this reason, the aim of this study was to evaluate the knowledge of the Internet user population of the PFM, their functions, and the role of urogynecological physiotherapy in pelvic floor dysfunction.

Methods and Measures

This was a cross-sectional study that used an Internet-based questionnaire to evaluate knowledge of pelvic floor muscles and urogynecologoical physiotherapy. The study was approved by the ethics committee at Ibirapuera University (number 367.722).

This study included 161 Internet users, who were selected by convenience due to project design scope, from September 2013 to September 2014. The questionnaire was developed in Google Docs and the content was developed by five physiotherapist specialized in management of pelvic floor dysfunction and women's health research and dissemination of the instrument was performed by the authors by prompting colleagues, who then spread it by email and social media networks. The questionnaire was developed in Portuguese (Brazil language) and was focused on Brazilian population Internet users.

The first page of the questionnaire was the informed consent form; subjects who agreed to participate in the study continued onto the second page of specific questions. The online questionnaire contained in total 16 questions, where eight multiple choice questions about sociodemographic characteristics and economic status of the population, including occupation and profession.

Specific questions about knowledge of the PFM, their functions and physiotherapy in urogynecological treatment also were multiple choice. In some cases, the subjects could choose more than one option; for example, "Which one is(are) function(s) of the PFM?" and "Do you think urogynecological physical therapy may be indicated when..?". These issues had confounding alternatives, i.e., that did not represent the correct answer to the question.

We considered real knowledge to be when the subject chose all correct answers without selecting any confounding variables. The correct alternatives related to the function of the PFM were: a) support the abdominal organs, b) play an important role in sexual function, c) aid in urinary and fecal continence, d) improved vaginal health, e) essential for labor and delivery, and f) assist in posture. The incorrect confounding variables were: a) responsible for balance during walking when the feet hit the ground, b) essential for body contours and c) involved in breathing.

To assess whether individuals had knowledge of when physiotherapy is indicated in urogynecology, some pathologies and specific moments in women's health were listed, including "chronic pelvic pain," "urinary and fecal incontinence," "postpartum," "pre-birth," "sexual dysfunction," "endometriosis," and "prolapse of pelvic organs." The options "breast cancer," "candidiasis," and "sexually transmitted diseases" were confounding variables for this question.

The variables were described in relative and absolute frequencies, and the means were presented with their respective standard deviations. The groups were compared with a chi-square test for categorical variables and a t-test for numeric variables of normally distributed data. Results were considered significant when the p-value was <0.05. The software used for statistical analysis were SPSS version 21 and Graph Pad Prism version 5.01.

Results

Out of 161 responses, 114 (70.8%) were female, and the average age of these Internet users was 29.8 ± 9.5 years; they were mostly characterized as white (62%), single (66%), and having at least one paid job (73%). The sociodemographic characteristics of the population who had heard about the pelvic floor muscles and the role of physiotherapy in urogynecology are shown on Table 1.

According to the results presented in the questionnaire, 45% (n = 72) said they had never heard of the PFM, and 50% (n = 81) were unaware of the role of physiotherapy in urogynecology. Of these, the subjects who knew about the PFM most often learned about them from universities (27%), followed by physiotherapists (16%), and the Internet (9%) (Figure 1).

The total may not complete 100%, as completed this question only those who have heard about the pelvic floor muscles, and they could choose more than one option presented above.

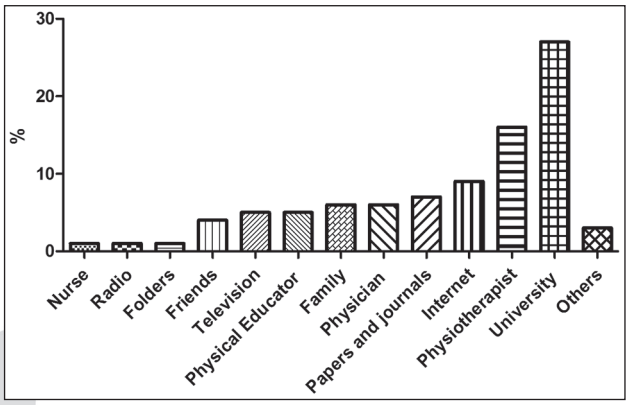

Figure 1. The resource that the subject first heard the term "pelvic floor muscles".

In terms of actual knowledge about the functions of the PFM, 77 (47.8%) subjects selected at least one correct alternative and excluded confounding alternatives that were not related to the function of the pelvic floor muscles. Of these 77 subjects, 13 chose correct one function, 18 chose two functions, 17 chose three functions, four chose 11 functions, 16 subjects chose five functions, and only two Internet users properly selected the all options related to PFM functions. Another 65 subjects (40%) indicated that they did not know

Table 1. Socio-demographic characteristics of the subjects included in this study according to the distribution of knowledge about the pelvic floor muscles and role of physiotherapy in urogynecology (n = 161).

	Have you heard the term "pelvic floor muscle"?		p-value	Have you heard about physiotherapy in urogynecology?		p-value
	Yes n(%)	No n(%)		Yes n(%)	No n(%)	
Gender			0.037[a]			0.001[a]
- Male	20 (22.5)	27 (37.5)		14 (17.5)	33 (40.7)	
- Female	69 (77.5)	45 (62.5)		66 (82.5)	48 (59.3)	
Education			0.008[b]			0.006[b]
- Elementary school	0	2 (2.8)		2 (2.5)	0	
- High school	6 (6.7)	11 (15.3)		6 (7.6)	11 (13.6)	
- Under graduation	47 (52.8)	45 (62.5)		38 (47.5)	54 (66.7)	
- Graduation	36 (40.5)	14 (19.4)		34 (42.6)	16 (19.7)	
Income*			0.183[b]			0.887[b]
- Until R$ 678	2 (2.2)	3 (4.2)		2 (2.5)	3 (3.7)	
- R$ 679 to R$ 1356	12 (13.5)	9 (12.5)		10 (12.5)	11 (13.6)	
- R$ 1356,00 to R$ 3390	24 (27)	21 (29.2)		21 (26.3)	24 (29.6)	
- R$ 3390 to R$ 6780	26 (29.2)	17 (23.6)		20 (25.0)	23 (28.4)	
- R$ 6780 to R$ 13560	17 (19.1)	21 (29.2)		22 (27.5)	16 (19.8)	
- More than R$ 13560	8 (9)	1 (1.4)		5 (6.3)	4 (4.9)	

[a]*Pearson's chi-square test* [b] *Verisimilitude ratio test*

**Values are described according to Brazil currency, 1US dollar = 2.72R$*

the function of the PFM and therefore chose not to answer this question.

The PFM function cited as "aid in urinary and fecal incontinence" was the most frequently chosen option related to the function of the PFM (Figure 2). Similarly, subjects most often chose urinary incontinence (63%) as a disease that indicates the need for physiotherapy in urogynecology, followed by chronic pelvic pain (55%), and the postpartum period (48%) (Figure 3).

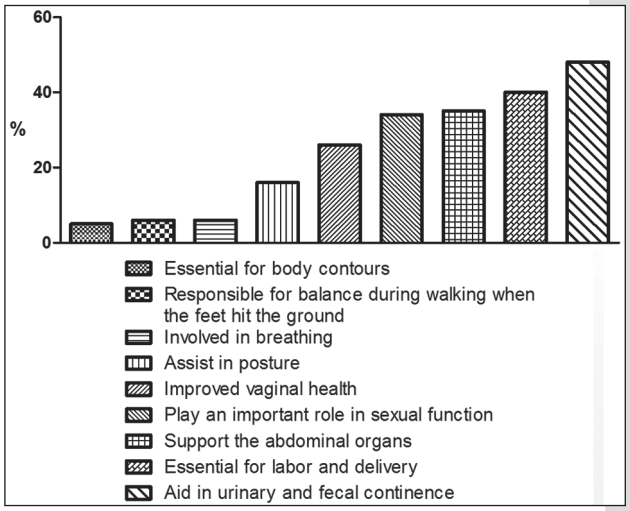

Figure 2. Internet users' opinion regarding the functions of the pelvic floor muscles

The terms "essential for body contours", "responsible for balance during walking when the feet hit the ground" and "involved in breathing" were considered incorrect alternatives.

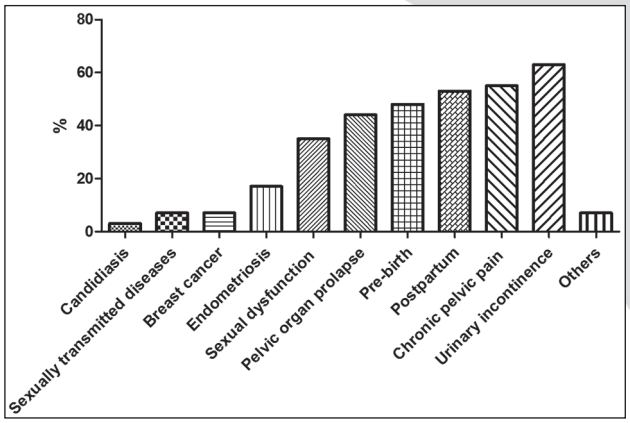

Figure 3. Options selected by the subjects in relation to disorders that are indicated for the intervention of physiotherapist specialist in urogynecology

The total may not complete 100%, as completed this question only those who have heard about the pelvic floor muscles, and they could choose more than one option presented above. The option "others" may consider any other condition the subject thought that could exist and it was not on the list.

It is noteworthy that 22 (14%) subjects said they had needed physiotherapy care in urogynecology or knew someone who did; moreover, 78% (n = 125) would like to receive more information about the role of physiotherapy in pelvic floor dysfunction.

Comment

Approximately half of the subjects who answered the online questionnaire had not heard about pelvic floor muscles or physiotherapy in relation to women's health; moreover, most of them would like to receive more information on this subject. In particular, they wanted unrestricted access to scientific content rather than free content on the Internet.

Some studies have already used self-administered Internet questionnaires for academic research (Osborne, Henley, Josey-Baker and Fryer, 2014; Moretti et al, 2011), or as an orientation form to spread health information. Nowadays, the Internet is used to spread health information by many ministries in different countries, including the World Health Organization (WHO).

Similar to the present study, Osborne, Henley, Josey-Baker and Fryer, (2014) conducted an interview through self-administered questionnaires, however in a different topic with the intention to evaluate knowledge of professionals who practiced oral hygiene. In this study, 96.2% of the population was familiar with the computer and 95.4% with the Internet, which led to the conclusion that the Internet can be used as a tool for teaching and learning; it can be used to keep subjects up to date in areas of health practice.

The subjects who answered this questionnaire were mostly young and highly educated Internet users, which confirms the findings of Moretti et al. (2011), who noted high levels of education in subjects who answered an online questionnaire about knowledge of fibromyalgia; of these, 62% had completed higher education, 36% had completed high school, and 2% had completed only elementary education.

A study by Moretti et al. (2011) found that knowledge is directly related to education and not necessarily to financial situation; they found a significant difference in the education of subjects who answered the questionnaire and were aware of the symptoms of fibromyalgia.

Education of subjects in the current study was related to knowledge of the practice of strengthening pelvic floor muscles in the treatment and prevention of urinary and fecal incontinence; this fact seemed to be the most commonly known. However, other pelvic floor dysfunctions such as endometriosis were mentioned less often, perhaps because of lack of knowledge about nomenclature and information of these diseases.

The source of information most cited was university, which indicates a highly educated population, followed by physical therapists and the Internet. These data may differ according to region due to different socioeconomic profiles and cultural issues. In the United States, 63.7% of the population uses the Internet as a resource for health information, 48.6% seek information on the Internet before consulting with a doctor, and only 10.9% see a doctor first (Hesse et al, 2005). However, in Brazil less than half the population (43.1%) has a computer at home with Internet access (Ministry of Communication, Brazil), so the seek health information may not be as popular as in United States.

The International Organization of Physical Therapists in Women's Health has a mission to facilitate and promote best practices in women's health as it relates to physical therapy.

Recruiting a sample based on convenience can be considered trustworthy (Owen et al, 2014), although other ways of recruiting subjects could be considered for different populations included in a study profile. For example, one should take into consideration that subjects who are Internet users have greater access to information available on social networking sites and digital media, featuring a different population profile. In this study we aimed to evaluate if the self-administered questionnaire was an interesting tool for health information and this impact on our population.

The number of subjects included in this study is another factor that should be considered—161 responses were collected over one year. Likewise, Osborne, Henley, Josey-Baker and Fryer (2014) had a response rate of 7.9% - they obtained 396 answers to 5,007 electronic questionnaires. In this study we were unable to calculate the response rate due to the methodology chose to spread the questionnaire, using social media we could not count how many subjects had contact to the questionnaire. Online questionnaires versus face-to-face interviews should be considered in terms of subject participation; subjects need to interrupt their social activities on the Internet to answer an electronic survey, and the variables of self-administered questionnaires relate to understanding of the subject and clarifying the issues and alternatives.

Conclusion

This study indicates that the Internet users in Brazil, limited to our area needs to receive more information about pelvic floor anatomy, when physiotherapy is indicated in urogynecology, and which urinary and pelvic disorders can benefit from non-invasive, conservative, and specialized treatments. We strongly recommend that a didactic method, one that is easy to read and understand, be developed and widely distributed to Internet users to improve women's health.

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An evaluation of university students' knowledge and views about family planning

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Abstract

Background & Objective: Family planning services are important to a healthy society. This study aims to determine the views of young people—future parents—about family planning.

Materials & methods: In this descriptive study, research sample includes 309 seniors from various departments of Firat University's Vocational School of Health Services. The research was completed with 260 students (84.1%) who attended their classes and agreed to participate in the study. A survey form prepared by the researchers, was used as data collection tool. Data were analyzed using a statistical program. Numbers, percentages, means and chi-square were used in the analysis.

Results: Of the students, 78.1% correctly defined family planning, and 46.2% said condoms were the most appropriate contraceptive method. More than half of the students (54.6%) said that health staff guidance was important in choosing an appropriate contraceptive method. Of them, 86.9% said that family planning improved mothers' health, 85.4% said it improved children's health, and 86.5% said it contributed to the wellbeing of household economies. Of the students, 51.5% said they wished to have two children in the future, and 88.8% said that parents need to wait at least 24 months between pregnancies. Knowing the definition of family planning varied by marital status, place of residence and being informed about family planning ($p<0.05$).

Conclusions: Students' knowledge about family planning, which plays an important role in improving public health, was found to be insufficient.

Key words: Family planning, Student, Knowledge, University, Contraceptive method

Introduction

The WHO defines family planning program as: "a program that allows individuals and couples to anticipate and attain their desired number of children and the spacing and timing of their births" (1). As social welfare levels rise, fertility decreases. It also needs to considered that age of menarche is lowering, that the age of menopause is rising, and that the need for contraceptive methods is thus rising as well (2).

Adolescence is the transition period from childhood to adulthood, accompanied by profound biological, psychological and social changes. The World Health Organization (WHO) states that adolescence occurs between 10 and 19 years of age (3). They define people between the ages of 10 and 19 years as *adolescents*, and those between the ages of 15 and 24 as *youths*. Since the age bands defining adolescence and youth overlap, those between the ages of 10 and 24 are considered *young people* (3, 4). The world population is above six billion, and one-fifth of it (roughly 1.2 million) is between the ages of 10 and 19. This population is increasing, and four out of five members of this age group live in developing countries. The population between the ages of 10 and 24 is 1.6 billion and 1.4 billion members of it live in developing countries (4). Adolescence, the transition from childhood dependency to adulthood independence, is one of life's most dynamic periods. Adolescents' lifestyles, behavioral characteristics, levels of knowledge and social interactions affect both their present and future lives (5). There are 15 million adolescent women per year who get pregnant worldwide. This equals one-fifth of the births worldwide. In the developing world, 40% of women give birth to a child when they are below the age of 20. This percentage is 8% in East Asia and over 56% in West Africa (6). Adolescent pregnancy is less prevalent in developed countries. Nevertheless, it is still a problem in developed countries, as it is in underdeveloped countries. Most adolescent pregnancies in developed countries are extramarital, unwanted and unplanned (7).

Approximately 50 million women per year have unwanted pregnancies terminated by abortions. Half of these abortions occur in unhealthy conditions. This may lead to infertility and other reproductive health problems in these women's successive reproductive years (8, 9). Pro-natalist policies were in place in Turkey until 1965. As a result of excessive increase in population, anti-natalist policies were launched in 1965. These policies foster the provision of family planning services by the state. Family planning is part of population planning policies. It helps regulate the interval between pregnancies, prevent unwanted pregnancies, voluntary miscarriages and pregnancies at excessively young or old ages. Thus, it positively affects maternal and child health and improves children and parents' standard of living. Family planning services are also an important investment to create healthy lives (10). This study aims to determine the views of young people—future parents—about family planning.

Materials and methods

This is a descriptive study. The research sample includes 309 seniors who attended classes in the spring semester of the academic year 2011-2012. They were from various departments of Firat University's Vocational School of Health Services, including medical laboratory, medical radiology, medical secretary and medical anesthesia. This study included the entire research population without choosing a sample, and 260 students answered the survey. The research's comprehensiveness rate was 84.1%. The students gave their verbal consent to participate. The survey was used as the data collection tool. The relevant literature was reviewed to prepare its 27 questions. Pilot testing was done with fifteen students. Their responses were reviewed, and the survey took on its final form. The survey included questions about students' demographic characteristics and their knowledge and views about family planning. The surveys were distributed to students in class and collected while a close watch was kept on the process.

Statistical analysis

The data were collected in April and May, 2012 and analyzed using a statistical program. Numbers, percentages, means and chi-square were used in the analysis. P value < 0.05 was considered as statistically significant.

Results

Of the participants, 60.8% were daytime education students, 39.2% were evening education students, 61.5% lived in cities for most of their lives and 90.4% were single. Of the students, 61.5% were between the ages of 20 and 22, and 51.9% were male (Table 1). Of them, 65.4% had nuclear families, 85% had health insurance and 79.2% did not have a job. Of the students, 49.6% said condom was the most appropriate contraceptive method. With regard to their choice of family planning method, 28.5% cared about its not having side effects, 23.1% cared about its long term effect, 19.6% cared about its easy accessibility, and 54.6% said health staff guidance affected their choice of method (Table 2). Of the participant students, 25.5% said family planning methods had side effects, 83.5% said health institutions need to inform people about family planning methods and 85.8% said sexual and reproductive health services should not be free of charge. When asked about the uses of family planning, 86.9% of the students said it improves maternal health, 85.4% said it improves children's health, and 6.5% said it contributes to the wellbeing of household economies (Table 3).

Table 1. Distribution of demographic characteristics of students

Characteristics	Number (n=260)	%
Age groups (years)		
≤ 19	32	12.3
20-22	160	61.5
≥ 23	68	26.2
Sex		
Female	125	48.1
Male	135	51.9
Family structure		
Nuclear	170	65.4
Large	90	34.6
Health insurance		
Yes	221	85.0
No	39	15.0

Table 2. Students' levels of knowledge about family planning

Variables	Number (n=260)	%
Which is the most appropriate family planning method?		
Hormonal contraceptive	37	14.2
IUD's	51	19.6
Condom	129	49.6
Tube ligation	8	3.1
Diaphragm and cervical caps	3	1.2
Rhythm method	10	3.8
Withdrawal	11	4.2
Douching	4	1.5
Breastfeeding	7	2.7
What do you pay attention to when choosing a family planning method?		
No side effects	74	28.5
Long-term effect	60	23.1
Easy accessibility	51	19.6
Safety	43	16.5
Partner's choice	17	6.5
Cost	15	5.8
What are the factors that affect your choice of method?		
Education in school	64	24.6
Health staff guidance	142	54.6
Social environment	33	12.7
Magazines, books, television	21	8.1

Table 3. The range of students' views about family planning services

Students' views	Yes		No	
	n	%	n	%
Do the family planning methods (contraceptive methods) have side effects?	65	25.0	195	75.0
Does health institutions need to inform people about family planning methods?	217	83.5	43	16.5
Should sexual and reproductive health services be free of charge?	223	85.8	37	14.2
What are the uses of family planning?				
It improves maternal health	226	86.9	44	13.1
It improves children's health	222	85.4	38	14.6
It contributes to the wellbeing of household economies	225	86.5	35	13.4
It contributes to the national economy	210	80.8	50	19.2

Table 4. The range of students' knowledge about the definitions of family planning by certain variables

Variables	Knowing the Definition of Family Planning						Test
	Right		Wrong		Total		
	n	%	n	%	n	%*	
Marital status							Fisher Exact Test P=0.006
Single	185	78.7	50	21.3	235	90.4	
Married	25	100	0	0	25	9.6	
Total	210	80.8	50	19.2	260	100.0	
Place of residence							Fisher Exact Test P=0.003
City	149	93.1	11	6.9	160	61.5	
Rural area	81	81.0	19	19.0	100	38.5	
Total	230	88.5	30	11.5	260	100.0	
Informed about family planning							Fisher Exact test P=0.005
Yes	183	97.9	4	2.1	187	71.9	
No	65	89.0	8	11.0	73	28.1	
Total	248	95.4	12	4.6	260	100.0	

**Column percentages. The rest are line percentages.*

When the students were asked about how many children they wished to have, 11.2% said they wished have one child, 51.5% said they wished to have two children and 37.3% said they wished to have three or more children. Concerning the interval between pregnancies, 88.8% said waiting at least 24 months between pregnancies is a necessity.

The students' definitions of family planning were compared to their demographic variables. All the married students correctly defined family planning ($p<0.05$). Most of the students who lived in cities correctly defined family planning ($p<0.05$). Of the students who were informed about family planning, 97.9% correctly defined family planning ($p<0.05$, Table 4).

Discussion

Of the participant students, 61.5% were between the ages of 20 and 22, more than half of the students (51.9%) were male, and 65.4% had nuclear families. Of them, 49.6% said the most appropriate family planning method was the condom. The second most common response was the IUD (intrauterine device), and the third was hormonal contraceptives. Gokengin et al (11) did a study in Turkey which indicated that the most prevalent contraceptive methods among students were condoms, oral contraceptives and withdrawal. Oztas' study found that 49.8% of the nursing and midwifery students said condom was the most appropriate family planning method they thought to use in future (12). Ege et al (13) found that 58.6% of the students said they planned to use IUD. In studies of other groups, Karaoglu et al (14) and Kitapcioglu and Yanikkerem (15) found that condoms were the most prevalent family planning method used by married couples. Celina et al (16) did a study of adolescents which showed that 100% of men used condoms as a contraceptive method, while women mostly used injections. These finding are consistent with our research results.

To the question "What do you pay attention to when choosing family planning method?" 28.5% marked not having side effects, 23.1% marked long-term effect and 19.6% marked easy accessibility. Dundar et al (17) found that 27.7% of the participants said that they paid attention to side effects and long-term effect. Kaya et al (18) found that women's choices of family planning methods were related to safety (33.8%), health (20.1%) and ease of use (18.8%). Tanriverdi et al (19) identified the factors that affected the choice of method as safety and ease of use.

More than half of the participant students, considered health staff's guidance as an effective factor, and 24.6% emphasized the importance of school education. Wellings et al (20) showed that school courses were considered a source of information. Clark et al (21) indicated sources of information as school (70%), parents (52%) and friends (31%). This corresponds to our findings. Health staff, health system administrators and trainers need to help young people to become healthy and productive adults by correctly informing them and providing consultancy services. Of the students, 28.5 % said family planning methods did not have side effects. In Ege et al study (13), 58.6% of students said family planning methods did not have side effects. This percentage was lower in our study. Of the students, 83.5% said it needed to be informed from health institutions about family planning. Accordingly, 43.9% of students in Karabulut's study (22), 55.1% of participants in Demir's study (23), and 60.7% of women in Cakmak and Ertem's study (24) said they got information on contraceptive methods from health staff.

When the uses of family planning were asked to the students, 86.9% said it improved women's health, 85.4% said they improved children's health, 86.5% said it contributed to household economy and 80.8% said contributed to national economy (Table 3). In Gilic et al study (25), 98.3% said family planning improved mother health, 99.3% said it improved child health and 95.8% said it contributed to national economy. These rates were found lower in our study. With regard to the number of children they wanted to have, more than half of the students (51.5%) said they wanted to have two children. Ege et al study (13) has similarities with our findings. In Salman's study 93.1% of women said they wanted to have 1-3 children (26). In Demir's study (23) 71.2% of participants said they wanted to have two children. The question "How long does the interval between pregnancies need to be?" was asked to the students, and 88.5% said it needed to be more than 24 months. Sozeri et al (27) found that almost all the participants said the interval between pregnancies needed to be 2 years and more. In Aktoprak's

study (28), 92.8% of married women and 91.6% of married men said the interval between pregnancies needed to be at least two years. Basaleem et al did a study of fifth year university students and found that 91.8% marked the choice "true" for the statement, "The interval between pregnancies needs to be more than 24 months" (29).

The relationship between students' correct definition of family planning and their marital status was analyzed, and it was found that all the married students correctly defined family planning. Demirgoz's study (30) indicated that single students' knowledge about family planning was the lowest. This is an expected outcome. The analysis of the relationship between participant students' place of residence and their knowledge of the definition of family planning showed that those who lived in cities were more informed. According to a study, 87.5% of the participants who used effective family planning methods lived in cities (31). Most of the students who were informed about family planning correctly defined the term. This reveals the importance of education.

Conclusion

University students' knowledge about family planning is not sufficient. The research participants are young people and will work in health institutions in the future. They need specifically prepared training programs about family planning. Accordingly, suitable training programs should be prepared for different age groups and presented to them.

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Medical Students' Perception about Smoking Cessation Counseling

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Abstract

Background: Healthcare professionals should be able to play an important role in educating patients about tobacco. The objectives of this study were to determine the current knowledge and attitude of Saudi medical students regarding tobacco use, and to assess their educational attainment about smoking and training in cessation techniques.

Methods: A cross-sectional descriptive study was adopted using a structured, pretested, and self-administered questionnaire distributed among medical students attending governmental universities in the Western Region, Saudi Arabia.

Results: A total 617 students completed the questionnaire; of them 24.8% were current smokers. The majority of smokers' students either tried 59.2% or had a desire to stop smoking 67.8%. Overall 68.5% of the smokers' respondents and 91.6% of non-smokers agreed significantly with the statement that, health care professionals should represent a non-smoker' model, ($P < 0.001$). There was a significant difference between smokers 68.4% and non-smokers 93.8% in their thinking about patients' help to quit smoking ($P < 0.001$). The majority of students 61.2% did not had any course about tobacco cessation methods and techniques.

Conclusion: Training of medical students regarding tobacco cessation control seems inadequate. Efforts are needed to teach medical students on smoking hazards and to train them on tobacco control.

Key words: Smoking use; medical students; curriculum

Introduction

Tobacco smoking is a big health and economic problem worldwide. In Saudi Arabia the median prevalence of smoking among Saudi population is 17.5 (range 2.4-52.9%) (1). Although, healthcare professionals are expected to be the ideal model for the patients, many of them smoke cigarettes. Prevalence of smoking among healthcare professional in Saudi Arabia was found to be 20% according to WHO survey (2).

A study in Australia reported that 22% of nurses were smokers (3), while in Holland, 37% of male and 14% of female doctors were smokers (4). The advice on smoking cessation definitely affected negatively by healthcare professionals' smoking behavior (5). When doctors are smokers, their advices are less valid for patients. An old study emphasizes that, health-care providers who advise patients to stop smoking while they are smokers their instructions may not be accepted (6). In addition, their smoking behaviors may reduce their willingness to advice smoker patients to stop smoking comparing with those who do not (7, 8).

It is noted that most of healthcare providers who smoke started this habit while they were students (9, 10). Published data from the world established the fact that, smoking among medical students is common. A study carried out in more than fifty medical colleges in 42 countries smoking prevalence rate was from 0.5% to 56.9% in males and from 0% to 47% in females. (11) A study by Melani et al. revealed that, 30% of Italian medical students were smokers (12), while 55% of male and 34% of female medical students in Albania were smokers (13). Medical students in Saudi Arabia are not exception. A study conducted in 3 Saudi medical schools found that, 19.4% of the respondent students were current smokers (14). Although smoking attitude and beliefs formed through graduation period; medical students need to start a successful tobacco control program during their study time prior to graduation and become professionals. So medical school curricula must contain at least; one module directing to smoking complication, smoking prevention and training skills in tobacco cessation techniques.

Different studies from developed countries reported the level of medical students training courses about tobacco control methods (15, 16, 17). A study carried out by in United Kingdom and Germany to assess the knowledge of medical students about tobacco (18), showed that, medical students have poor knowledge about smoking and its complication on patients. Students in the study also have no ability to counsel smoking patients. The authors' recommendation was emphasized on improving curricula by including subject about tobacco dependence and control in medical schools. A study from Bahrain, found that, medical schools do not give their students any training courses about tobacco control or cessation (19).

Bearing in mind the importance of knowledge and training medical students about smoking in Saudi Arabia, it is authoritative to assess the current practice of medical students about smoking, prevention, control and tobacco cessation techniques in medical schools programs. The objectives of this study were to determine the current knowledge and attitude of Saudi medical students regarding tobacco use, and to assess the educational attainment of medical student about smoking and training in cessation techniques.

Materials and methods

Design: Cross sectional descriptive study was conducted during the period from February to June 2014.

Setting, target population and sampling: The study was carried out in three large governmental medical colleges in the Western Region, Saudi Arabia including Taif University, Taif City, King Abdulaziz University, Jeddah City and Umm Al-Qura University, Mecca City. These Universities were selected for having a homogenous sample of students as they are the main governmental universities in this Region. All male medical students of these three universities were the target population of this study. Random method of sampling was adopted and a total of 750 students were invited to participate.

Study procedure and instruments: Every student was received anonymous, self-administered questionnaire accompanied with fully instructions. Informed consent was obtained from each accepted respondent. The questionnaires were distributed during the lectures and respondents were randomly requested to complete at sites and return them immediately to the research team. A pilot study was carried out in a similar area for validity testing of the contents and the obtained results were not included in the study.

The questionnaire was grouped into the following sections: demographic characteristics, current smoking status, smokers' section and non-smokers' section.

The smokers' section explored in detail smokers' knowledge, and attitude toward smoking, reasons for starting smoking. The non-smokers' section explored knowledge about smoking, environmental influences, and perception toward smokers. Both smokers and non-smokers' sections were included questions about; students' educational attainment regarding smoking hazards and smoking cessation technique. In addition, the two sections asked the respondents about their perception of exemplary role.

For the purpose of the study, smoking status was defined as regular or occasional cigarette or water pipe smoking during the time of the study. Non-smokers' students were defined those who currently not smoke or were ex-smokers. Verbal consent was obtained from the students who agreed to participate in the survey

Data Entry & Analysis: Data was computed and analyzed by using IBM SPSS Version 22. Descriptive variables' analysis was carried out. Relationships were explored between the demographic variables, smokers and non-smokers' knowledge and attitudes using chi-square, t-test, linear regression and ANOVA whenever applicable. The statistical significance yielded was $P \leq 0.05$.

The study was revised and approved by Vice Rectorate for Graduate Studies and Scientific Research, Taif University. Also permissions were obtained from Umm Al-Qura and King Abulaziz Universities.

Results

Students' demographic characteristics and prevalence of smoking

A total of 617 medical students completed and returned their questionnaires, resulting in 82.3% response rate. The mean age was (21.37±2.12) (min

18 - max 34). About one fourth of them 153 (24.8%) were current smokers; the mean started smoking age was (18 ± 3.0). Demographic data and smoking prevalence of respondents were summarized in Table 1. A significant difference was found between smoking prevalence rate and both different colleges and educational levels of medical students. The highest prevalence rate concerning the students' colleges was among dentistry students (33.7%) followed by health medical science students (27.8%), ($P = 0.013$), and the highest prevalence concerning the students' level was found among postgraduate students (83.3%), ($P < 0.001$).

The majority of smokers' students used to smoke cigarettes (44.4%) or both cigarettes and shisha (29.4%), most of them seemed to be not heavy smokers; consumed ≤ 10 cigarettes per day (44%) and 11 – 20 cigarettes per day (43.1%).

Medical students' knowledge and attitude toward smoking

One third of smokers' students admitted that; smoker person is an outcast person in the community, and 44 (29.1%) of them did not mind if one of their family members was smoker or not. Out of smokers' respondents; 51 (34%) started smoking in the early morning before having breakfast. The majority of smokers' students either tried 90 (59.2%) or had a desired to stop smoking 103 (67.8%). Friends' encouragement was the main reason for starting smoking behavior, while the most influential factor for giving up smoking was pressure from relatives 93 (62%).

The dominant 310 (67.1%) of non-smokers' respondents usually prevent smoking around them, while 227 (49.1%) of them hurt by smoking in their presence. There was no significant difference between knowledge of smokers 69 (46.3%) and non-smokers' students 196 (42.4%) about nicotine supplements therapy ($P < 0.05$).

Perception of exemplary role

Table 2 shows a striking difference between smokers and non-smokers' students perception of exemplary role. Overall 92 (68.5%) of the smokers' students agreed with the statement that; health care professionals should set a model by not smoking, while 426 (91.6%) of non-smokers agreed with this statement, ($P < 0.001$). Eighty-nine percent (414) of non-smokers students and 119 (79.8%) of smo-

Table 1. The relation between smoking status and demographic characteristics

Background Characteristic		Total Frequency (Percentage)	Smoking status		*P*-value
			yes	no	
Residence	City (Urban)	576 (93.4%)	138 (24%)	436 (76%)	0.405
	Village (Rural)	41 (6.6%)	11 (26.8%)	30 (73.2%)	
University	Taif	194 (31.4%)	46 (24%)	164 (76%)	0.529
	Umm Al-Qura	201 (32.6%)	44 (21.9%)	157 (78.1%)	
	King Abdulaziz	222 (36%)	59 (26.6%)	163 (73.4%)	
College	Medicine	282 (45.7%)	52 (18.4%)	230 (81.6%)	0.013
	Pharmacy	153 (24.8%)	42 (27.6%)	110 (72.4%)	
	Dentist	83 (13.5%)	28 (33.7%)	55 (66.3%)	
	Health science	99 (16%)	27 (27.8%)	70 (72.2%)	
Education level	First	46 (7.5%)	9 (19.6%)	73 (80.4%)	0.000
	Second	202 (32.7%)	40 (19.9%)	161 (80.1%)	
	Third	171 (27.7%)	41 (24%)	130 (76%)	
	Fourth	73 (11.8%)	20 (27.8%)	52 (72.2%)	
	Fifth	62 (10%)	23 (37.1%)	39 (62.9%)	
	Sixth	51 (8.3%)	6 (11.8%)	45 (88.2%)	
	postgraduate	12 (1.9%)	10 (83.3%)	2 (16.7%)	
GPA	< 1.5	23 (3.7%)	7 (30.4%)	16 (69.6%)	0.499
	Between 1.5 to 2.5	157 (25.4%)	42 (26.9%)	114(73.1%)	
	> 2.5 to 3.5	211 (32.6%)	48 (25.1%)	143 (74.9%)	
	> 3.5	236 (38.2%)	50 (21.2%)	186 (78.8%)	

kers felt that it is the responsibility of health professionals to persuade their patients to quit smoking, (P = 0.001). In taking patient history, 409 (88%) of non-smokers and 125 (83.9%) of smokers' students admitted that, healthcare providers should ask about the patient's smoking habits, (P = 0.026). More than eighty percent 122 (81.9%) of smokers' students reported that they would not smoke in presence of patients. Slightly more than half 81 (54.3%) of smokers' respondents expected the fact that, patients will respond positively upon their advice for smoking cessation. There was a significant difference between smokers 102 (68.4%) and non-smokers 436 (93.8%) in their thinking about patients' help to quit smoking (P < 0.001).

Students' educational attainment about smoking

Regarding the students taught courses or modules about tobacco related complications; about half 291 (47.9%) of respondents reported that, they had such courses. King Abdulaziz University students were the higher in receiving these courses 125 (57.1%) while Taif students were the least 72 (37.3%), (P < 0.001). Also there was a significant difference between the colleges (P < 0.001). The dental students were more than other students from health medical science college 49 (59%) and 23 (23.5%) respectively. The majority of medical colleges' students 377 (61.2%) did not have any course about tobacco cessation methods and techniques, dentistry colleges was significantly the highest one who having such modules, (P = 0.011). In addition, there was a significant difference between the three universities (P = 0.036); Taif University was the least university that including these subjects into its curriculum, Table 3. Only 96 (15.6%) of medical students had received training in smoking cessation and prevention counseling. There was no statistically significant difference between students from the studied universities (P = 0.317) and dental students (59%) were higher than health science students (23.5%), (P = 0.754).

Discussion

This study focused on prevalence of smoking among Saudi male medical students and tobacco-related content in taught subjects in the universities. The overall smoking prevalence rate in the current study (24.8%) was typical to previous study in Saudi Arabia, which found that 14% prevalence of smoking rate among medical students, 24.8% among males, and 9.1% among females (20). The results also were comparable to a prevalence of smoking among same area population reported by a new study which was 23%, (21), and was slightly higher than Jradi and Al-Shehri study 19.4% among medical students in Saudi Arabia (14). This difference may be attributed to the inclusi-

Table 2. Respondents' perception of exemplary role towards patients

Response	Smoking status	*HP as a model	Usually ask patient about smoking habits	Usually advice patients. To quit smoking	Don't smoke in presence of patients	Advice smokers' patients.	Expect patients accept advice	*HP help patients cessation
Strong Agree	Smokers	66 (44.3%)	72 (48.3%)	82 (55%)	93 (62.4%)	87 (58.4%)	51 (34.2%)	61 (40.9%)
	Non-smokers	360 (77.4%)	285 (61.3%)	315 (67.7%)	362 (78%)	342 (73.5%)	160 (34.4%)	359 (77.2%)
Agree	Smokers	36 (24.2%)	53 (35.6%)	37 (24.8%)	29 (19.5%)	38 (25.5%)	30 (20.1%)	41 (27.5%)
	Non-smokers	66 (14.2%)	124 (26.7%)	99 (21.3%)	61 (13.1%)	82 (17.6%)	144 (31%)	77 (16.6%)
Neutral	Smokers	29 (19.5%)	16 (10.7%)	23 (15.4%)	15 (10.1%)	13 (8.7%)	47 (31.5%)	33 (22.1%)
	Non-smokers	30 (6.5%)	46 (9.9%)	46 (9.9%)	35 (7.5%)	34 (7.3%)	119 (25.6%)	25 (5.4%)
Disagree	Smokers	12 (8.1%)	6 (4%)	7 (4.7%)	11 (7.4%)	10 (6.7%)	12 (8.1%)	11 (7.4%)
	Non-smokers	4 (0.9%)	6 (1.3%)	3 (0.6%)	1 (0.2%)	3 (0.6%)	30 (6.5%)	1 (0.2%)
Strong disagree	Smokers	6 (4%)	2 (1.3%)	0 (0%)	1 (0.7%)	1 (0.7%)	9 (6%)	3 (2%)
	Non-smokers	5 (1.1%)	4 (0.9%)	2 (0.4%)	5 (1.1%)	4 (0.9%)	12 (2.6%)	3 (0.6%)
P-value		0.000	0.026	0.001	0.000	0.000	0.032	0.000

**HP= Health professionals*

Table 3. Students' educational attainment about smoking of different studied universities and colleges

Subjects in curriculum	Response	Total	University			Colleges			
			Taif	Umm-Al-Qura	*KAA	Medicine	Pharmacy	Dentistry	**H.M.S
Subject about smoking complications	Yes	291 (47.9%)	72 (37.3%)	94 (48%)	125 (57.1%)	158 (56.6%)	60 (40.8%)	49 (59%)	23 (23.5%)
	No	247 (40.6%)	101 (52.3%)	74 (37.8%)	72 (32.9%)	93 (33.3%)	64 (43.5%)	27 (32.5%)	63 (64.3%)
	Don't Know	70 (11.5%)	20 (10.4%)	28 (14.3%)	22 (10%)	28 (10%)	23 (15.6%)	7 (8.4%)	12 (12.2%)
	P-value	0.000				0.000			
course in tobacco cessation techniques	Yes	151 (24.5%)	40 (20.6%)	49 (24.4%)	63 (28.4%)	76 (27%)	33 (21.7%)	29 (34.9%)	13 (13.1%)
	No	377 (61.2%)	135 (69.6%)	118 (58.7%)	124 (55.9%)	167 (59.2%)	91 (59.9%)	46 (55.4%)	73 (73.7%)
	Don't know	88 (14.3%)	19 (9.8%)	34 (16.9%)	35 (15.8%)	39 (13.8%)	28 (18.4%)	8 (9.6%)	13 (13.1%)
	P-value	0.036				0.011			
Subject about cessation guidelines	Yes	155 (25.2%)	47 (24.2%)	51 (25.4%)	58 (26.1%)	78 (27.7%)	36 (23.7%)	24 (28.9%)	17 (17.2%)
	No	359 (58.3%)	125 (64.4%)	111 (55.2%)	123 (55.4%)	157 (55.7%)	87 (57.2%)	47 (56.6%)	68 (68.7%)
	Don't know	102 (16.6%)	22 (11.3%)	39 (19.4%)	41 (18.5%)	47 (16.7%)	29 (19.1%)	12 (14.5%)	14 (14.1%)
	P-value	0.136				0.287			
Training in smoking cessation counselling	Yes	96 (15.6%)	26 (13.4%)	35 (17.4%)	35 (15.8%)	46 (16.3%)	26 (17.1%)	9 (10.8%)	15 (15.2%)
	No	468 (76%)	157 (80.9%)	147 (73.1%)	165 (74.3%)	212 (75.3%)	111 (73%)	69 (83.1%)	76 (76.8%)
	Don't know	52 (8.4%)	11 (5.7%)	19 (9.5%)	22 (9.9%)	24 (8.5%)	15 (9.9%)	5 (6%)	8 (8.1%)
	P-Value	0.317				0.754			

**KAA=King Abdulaziz*
***H.M.S=Health Medical Science*

on of female students in their study. Prevalence among medical students was 21% in Iraq (22) and 14.4% in Iran (23).

There was a significant difference in smoking prevalence among the students from different colleges; a study carried out in United State to compare smoking habits among medical and nursing students reported that significant difference between medical and nursing students, (24).

Prevalence of smoking increases as a progress of students through their educational levels. This is in agreement with similar study in Saudi Arabia (20), which found that, smoking prevalence was higher among senior medical students compared to their junior colleagues, this probably due to their contact with smokers' friends. This hypothesis was supported by our findings, that most frequent reason for smoking behavior was friends.

It is noteworthy that positive attitudes to quit smoking among smokers' students expressed by high percentage of them tried or desired to stop smoking, also among non-smokers which usually prevent smoking around them. This is in agreement with positive attitude noticed by Sychareun et al. among medical students in Lao People's Democratic Republic (25).

The majority of medical students agreed that health professionals should be an exemplary model

by not smoking and almost dominant of them have a responsibility to advice patients to quit smoking. Similar students thinking were reported in Pakistan by Khan et al. 2005, (26) and in Saudi Arabia (20).

In this study very small number of students who had reported receiving training programs and prevention counseling in smoking cessation. This finding is less than formal training program in tobacco cessation received by Lao medical students 51.1% (25).

The shortage of proper education and training may be reflected on medical students' professional future role in tobacco control. Their position as health professionals is a suitable to educate the patients about the hazard of smoking and its related complications and to help smokers' patients to quit smoking (27). The evidence confirms that, implementation of educational program and tobacco control training at the time during medical education seems to significantly improve public health students advocacy attitude, motivation and anti-secondhand smoking behaviors (28). It is very important to develop tobacco control curricula to use in medical schools (29). In developed country curriculum had designed to contain a training program in tobacco control, (30, 31), while this program lack in developing countries (32, 33).

The study shows about one fourth of participants were current smokers, although most of medical students expressed positive attitude towards smoking cessation. There was a striking difference between smokers and non-smokers' students perception of exemplary role**.** The study revealed that, training of medical students regarding tobacco control and smoking complications seems inadequate. Effort must be encouraged to improve medical colleges' curriculum for reducing tobacco use among both future health-professionals and ultimately the population.

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Abstract

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In order to effect high quality of Papers, the authors are requested to follow instructions given in this sample paper. Regular length of the papers is 5 to 12 pages. Articles must be proofread by an expert native speaker of English language. Can't be accepted articles with grammatical and spelling errors.

Instructions for the authors

Times New Roman 12 points font should be used for normal text. Manuscript have to be prepared in a two column separated by 5 mm. The margins for A4 (210×297 mm2) paper are given in Table 1.

Table 1. Page layout description

Paper size	A4
Top margin	20 mm
Bottom margin	20 mm
Left margin	20 mm
Right margin	18 mm
Column Spacing	5 mm

Regular paper may be divided in a number of sections. Section titles (including references and acknowledgement) should be typed using 12 pt fonts with **bold** option. For numbering use Times New Roman number. Sections can be split in subsection, which should be typed 12 pt *Italic* option. Figures should be one column wide. If it is impossible to place figure in one column, two column wide figures is allowed. Each figure must have a caption under the figure. Figures must be a resolution of 300 DPI, saved in TIFF format, width 10 cm min. For the figure captions 12 pt *Italic* font should be used. (1)

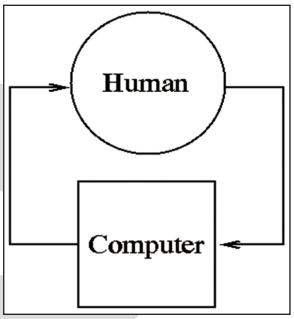

Figure 1. Text here

Conclusion

Be brief and give most important conclusion from your paper. Do not use equations and figures here.

Acknowledgements (If any)

These and the Reference headings are in bold but have no numbers.

References

1. *Sakane T, Takeno M, Suzuki N, Inaba G. Behcet's disease. N Engl J Med 1999; 341: 1284–1291.*
2. *Stewart SM, Lam TH, Beston CL, et al. A Prospective Analysis of Stress and Academic Performance in the first two years of Medical School. Med Educ 1999; 33(4): 243- 50.*

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