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Sadržaj / Table of Contents

Body mass index and sperm counts in infertile men with varicocele

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Abstract

Background & Objective: Varicocele as multifactorial pathological condition is a major cause of male infertility. The exact mechanism of varicocele is unclear. Obesity is recognized as a potential contributor to male infertility. Some studies have been reported that prevalence of varicocele decreases with increasing BMI so we were interested to determine interrelation of varicocoele with height, body mass index (BMI) and sperm count in infertile men with varicocele.

Material & methods: We evaluated the data of all patients who consulted for infertility at Fatemezahra Infertility and Reproductive Health Research Center for six months retrospectively. A retrospective cross-sectional study was conducted on 241 men (21-64 years of age) between 2013 and 2014 and reviewed based on inclusion criteria. We filled out a form with providing the men's age, marital age, height, weight, BMI, semen analysis, and presence or absence of varicocoele.

Results: A total of 241 men, aged 21-64 years who were included in our study, 94 (39%) men had varicocele Compared with 147 (61%) men without varicocele. The mean age and BMI of the participants was 31.5 ± 6.3 and 27.7 ± 4.8 kg/m², respectively. There was a significant difference only in age among infertile men with and without varicocele (p= 0.040). Varicocele was highest in oligospermia males and significantly higher than the men with normal sperm count (p= 0.035). The adjusted OR also showed oligospermia in men with varicocele was higher than those with none varicocele (OR= 2.09, 95% CI= 1.04, 4.22).

Conclusions: The findings of the present study indicated that Male obesity is not associated with the incidence of sperm concentration and the development of varicocoele. However, the need remains for larger randomized controlled trials and prospective studies with enough samples with any intervention to address association between BMI and varicocoele.

Key words: Infertility, Male infertile, Varicocele, BMI, Sperm count

Introduction

Varicocele is one of the common causes of scrotal swelling. It can adversely affect testicular function in a variety of ways. Varicocele as multifactorial pathological condition is a major cause of male infertility. It is found in 15-20% of 25-35 year old men and forty percent of infertile men. The exact mechanism of varicocele is uncertain. Interaction of increased pressure in testicles veins and its venous drainage is suggested to be the contributory factors for varicocele development. With industrialization of societies and lifestyle changes Contributing Factors of infertility through Environmental conditions and threatening factors of health especially obesity, is increasing (Shafi et al., 2014, Masson and Brannigan, 2014, Soylemez et al., 2012, Baazeem et al., 2014, Prasivoravong et al., 2014, Simon, 2014, YOUSEFNIA et al.)

Obesity is associated with significant disturbance in the hormonal milieu that can affect the reproductive system. Obesity due to impaired blood supply base (impaired nitric oxide) with formation of Reactive oxygen species (ROS) and disruption of impaired hormonal axes as Relative hypogonadotropic hypogonadism causes spermatogenesis and also infertility. In men, this relationship is characterized poorly (Cabler et al., 2010, Hadjkacem Loukil et al., 2014, Du Plessis et al., 2010). How varicocele causes impaired spermatogenesis, are still unknown, but increasing testicles temperature, reduction in supply of oxygenated blood nutrient material, elevated harmful metabolism and genetic factors are involved in varicocoele.

But which role is hundred percent, is unclear absolutely. Recent Studies indicated that varicocele prevalence decreases with increasing BMI; In contrast, other studies suggested that taller and obese people have more incidence of varicocele. Obesity may action in detection of varicocele in obese men. In men, the negative effects of obesity on reproductive function are less evident and have been less often studied. Innumerable reports have been published describing the relationship between obesity, reproductive endocrine function, semen characteristics and male infertility recently (Hofny et al., 2010, Gokce et al., 2013, Rais et al., 2013, Lehtihet et al., 2014, Teerds et al., 2011, Phillips and Tanphaichitr, 2010).

Since varicocele is associated with abnormal quality of sperm and a decrease function of leydig cells, it can be beneficial on men infertility. In modern times, the relationship between obesity and male infertility has been largely ignored until recently (Bagci et al., 2014, Liu et al., 2014). Interest in the rapid increase of obesity in Iranian men population progressively, has brought to light the detrimental effects of obesity on health in general and on the reproductive function in particular and interested us to assess the relationship between varicocoele with height, body mass index (BMI) and sperm count in infertile men.

Material and Methods

This study was approved by the ethics committee of Babol University of Medical Science. The research design of this study was a retrospective cross-sectional study based on secondary data from the Infertility and Reproductive Health Research Center. Inclusion criteria were infertile men who presented to our center for six months. 241 men (21-64 years of age) between 2013 and 2014 were selected and reviewed based on inclusion criteria. Demographic data was height, weight, BMI, age, marital age, semen analysis, and presence or absence of varicocele. All subjects as presence or absence of varicocele were classified. Varicocele in the center during physical examination in the upright position was diagnosed and confirmed by using scrotal ultrasongraphy. The BMI was calculated as weight (kg)/height squared (m2). As per the Standard Consensus Statement of body mass index (BMI) for Iranian population, patients were grouped as normal weight <25 and obese ($\geq$ 25). All subjects underwent semen analysis comprehensively.

Sperm parameters analyzed included sperm concentration (10 ^{6} sperm ml), sperm motility and sperm morphology according to the World Health Organization criteria (World Health Organization, 1999). The prevalence of normospermia, oligospermia and varicocele development was calculated and compared among the two BMI groups. Informed consent was obtained from all subjects.

Statistical Analysis

SPSS software version 16.0 (SPSS Inc, Chicago, USA) for statistical analyses was used. Descriptive statistics were used to describe baseline demographic. Adjusted regression analysis was used to test associations between height, BMI and sperm count with varicocele. A P value less than 0.05 were significantly considered.

Results

A total of 241 infertile men were referred to the center. The mean age was 31.5 ± 6.3 years old (21-64 years).94 (38.7%) men were with varicocele and without varicocele were 149 (61.3%). participants mean BMI was 27.7 ± 4.8 kg/m². There were no significant differences in weight, height and BMI among infertile men with and without varicocele but we had significant differences in age among the infertile men with and without varicocele. Percentage of oligospermia was the highest in men with varicocoele compare with men without varicocele (p= 0.035).

Table 2 present the estimated adjusted odds ratio (with 95% CI) for varicocele in relation of BMI, height, and sperm count in male infertile. The adjusted OR for oligospermia in men with varicocele was higher than those none varicocele individuals (OR= 2.09, 95% CI= 1.04, 4.22). Significant association was not seen between the BMI and height in those with varicocele and without varicocele.

Discussion

Obesity prevalence in Iran increased during the last decades and the negative effect of obesity on an individual's health has been known for a long

Table 1. Chracteristics of infertile men with and without varicocele

Variables	Total(n=241) Mean± SD	Varicocele(n=94) Mean± SD	non-varicocele(n=147) Mean± SD	P
Age (years)	31.5±6.3	30.5±4.9	32.1±6.9	0.040
Age at current marriage (years)	26.4±5.2	25.6±3.8	26.7±5.8	0.091
BMI (kg/m)	27.7±4.8	27.2±4.9	28.1±4.7	0.171
Height (cm)	1.7±0.1	173.0±7.3	171.9±6.7	0.238
Infertility duration	3.9±3.4			
Infertility Type	N(%)	N(%)	N(%)	0.537
Primary	182(75.5)	73(77.7))	109(74.1)	
Secondary	59(24.5)	21(22.3)	38(25.9)	
Education (years)				0.570
<6	29(12.0)	9(9.6)	20(13.6)	
6-12	156(64.7)	61(64.9)	95(64.6)	
>12	56(23.2)	24(25.5)	32(21.8)	
Residency				0.682
Urban	150(62.2)	57(60.6)	93(63.3)	
Rural	91(37.8)	37(39.4)	54(36.7)	
Occupations				0.441
Office employees	110(45.6)	40(42.6)	70(47.6)	
workers	131(54.4)	54(57.4)	77(52.4)	
BMI				0.751
≥25	172(71.4)	66(70.2)	106(72.1)	
<25	69(28.6)	28(29.8)	41(27.9)	
Sperm count				0.035
Oligospermia (≤20 million)	94(39.0)	22(23.4)	19(12.9)	
Normal (>20 million)	147(61.0)	72(76.6)	128(87.1)	

BMI: body mass index

Table 2. Adjusted ratio (OR) for varicocele according to body mass index, height, and sperm counts of the subject (n=816)

Variables	Adjusted OR*	95% CI	P
BMI			
≥25	1.01	0.55,1.84	0.976
<25	1.00		
Height (cm)			
≥180	0.66	0.10, 4.4	0.664
165-179	0.75	0.22, 2.57	0.643
<165	1.00		
Sperm count			
≤20 million	2.09	1.04, 4.22	0.039
>20 million	1.00		

* Adjusted for confounder were for age, residency, occupation, BMI, and height

time. Some Author also had described the relationship between obesity and male infertility recently but regarding its mechanisms and the extent of this relationship, still there is controversy. Men obesity with its negative effects on reproductive function is also less evident (Magnusdottir et al., 2005, Sallmén et al., 2006) (Hammoud et al., 2008, Aggerholm et al., 2008).

We found no significant differences in height, weight, and BMI among the infertile men with and

without varicocele but we had significant differences in age among the infertile men with and without varicocele. Another authors also was agree about advanced age and higher prevalence of infertility but they did not mentioned about varicocele (Hassan and Killick, 2003) while U. Levinger et.al. investigated on prevalence of varicocele increasing with age and they found with increasing age prevalence of varicocele excesses with a rise of about 10% for each decade of life with the incidence reaching 75% in the eight decade of life (Levinger et al., 2007)

We found the adjusted OR for oligospermia in men with varicocele was higher than those with none varicocele (OR= 2.09, 95% CI= 1.04, 4.22) while Jensen et. al reported only a higher prevalence of oligozoospermia in overweight and obese men compared with normal-weight men (24.4% vs. 21.7%)(de Mola, 2009).

Obesity and male infertility have multifactorial relationship. Obesity can lead to male infertility by altered spermatogenesis due to the endocrinology of hypoandrogenism. A decrease in sperm count is known to contribute in male infertility (Heráček et al., 2012, Maretti, 2015) but We found no reduction among obese men. In our study, we showed that obesity was not associated with sperm concentration and varicocele. These results were in contrast with other results that showed the relationship between obesity and male infertility. Kort et al. also found that BMI correlated negatively with the total number of normal spermatozoa but they did not report on sperm count or morphology in this study (Kort et al., 2006). Consistent with our findings in this study, Magnusdottir et al. also found no clear effects of BMI on male infertility (Magnusdottir et al., 2005).

Conclusion

The findings of the present study indicated that Male obesity is not associated with varicocele development and sperm concentration varicocoele. Varicocele was associated with oligospermia. The men with a greater BMI have not advantages in relieving varicocele. Despite the limitation, our study demonstrated a association between infertility and varicocele. Therefore, further study is proposed to elucidate association between BMI and varicocele to make a guideline or recommendation for a better management and prevention of varicocele.

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Preventing postoperative stroke: the anesthesiologist's role

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Abstract

Postoperative cerebral ischemic stroke is one of the most serious postoperative complications which is rare, but with great impact on patient's morbidity and mortality. Surgery and anesthesia can increase the likelihood of postoperative cerebral ischemic stroke. Other risk factors are coexisting cardiac and neurologic disease, intraoperative hypotension, dehydration, anticoagulant drugs interruption, exaggerated use of metoprolol, and cannabis sativa (marijuana and hashish) users. This review article will focus on the anesthesiologist preventive measures in order to avoid or minimize the incidence of postoperative stroke.

Key words: cerebral ischemic stroke, anesthesia, postoperative stroke, surgery

Introduction, risk factors, and incidence

Cerebral ischemic stroke has been recently estimated, being a significant cause of perioperative morbidity and mortality. The reported incidence varies from 0.02-0.7% [1]. The perioperative cerebral ischemic stroke (PCIS) can occur in the first week after surgery [2]. If the patients had previously suffered another PCIS, the mortality ranges from 30% to even 60% [1, 2]. The social impact is very high regardless of the low incidence of the PCIS. The reported risk factors are several and each of them has specific importance on cerebral ischemic stroke incidence. Anesthesia and surgery can increase the incidence by approximately 6 times [2, 3]. The most common anesthesia and surgery related risk factors are intraoperative hypotension episodes, dehydration, and perioperative hypercoagulation state [4]. In noncardiovascular patients, several authors [5] found an incidence of 0, 7% after hemicolectomy, 0.2% after hip replacement, 0.6% after lung resection, and increased incidence with age over 65 years old. In the vascular patients, the incidence is higher than in general surgical population. The vascular surgery has a stroke's incidence 0.8%-3% [1], whereas head and neck surgery reaches 4.8% [6] of PCIS preoperative rates. Among several types of surgery, use of cardiopulmonary bypass is associated with the highest incidence of PCIS and cognitive dysfunctions [7]. Mashour et al [3] reported as independent predictors of PCIS: age over 62 years old, history of myocardial infarction within 6 months before surgery, acute renal failure, history of cerebral stroke, dialysis, hypertension, history of transient ischemic attack, chronic obstructive pulmonary disease, tobacco use, and protective role of body mass index 35-40 kg/m² [8]. Perioperative periods are associated with increased risk for PCIS as are hypotension [9, 10], metoprolol use [11], pulmonary resection of metastatic sarcoma [12], and interruption the anticoagulation therapy [13]. Recently the use of Cannabis Sativa (in the form of marijuana and hashish) has been found to be associated with high incidence of PCSI [14-20]. During surgery, surgical induced tissues trauma can liberate procoagulatory factors producing a hypercoagulable state [21, 22].

Anesthetic preventive measures

Anesthetic drugs and techniques

Almost all anesthetic drugs seem to be neuroprotective. Choice of anesthetic agent is of great importance for a suitable anesthesia plan depending on patient's medical status. Some authors found isoflurane and thiopentone having neuroprotective effects [23]. Recently has been reported that nitrous oxide can increase homocysteine

serum level, impairing endothelial function and causing several cardiovascular complications. Other studies found no correlations between nitrous oxide and stroke [24, 25].

Several controversies exist regarding the advantages of regional anesthesia vs. general anesthesia. The studies confirmed that in hip and knee replacement surgery, regional anesthesia offers a low incidence of postoperative stroke [26].

Intraoperative hemodynamic parameters

During perioperative period hypotension may be faced due to decreased circulating volume, chronic use of antihypertensive drugs, anesthesia induced vasodilatation, patient's position, bleeding, and positive pressure ventilation. It seems that hypotension can cause postoperative stroke, and several authors had studied this relationship. POISE study confirmed that use of metoprolol can decrease mean arterial pressure causing hypotension [27]. It is also reported that a decrease of mean arterial pressure more than 30% from baseline can cause postoperative stroke [28].

Another hot point is hemodynamic changes and patient's position. Sitting position is often used in neurosurgery and in orthopedic surgery (shoulder surgery). Due to this position, mean arterial pressure measured in upper extremity, seems to be higher than brain stem arterial pressure. As a consequence of this phenomenon, the degree of hypotension may be more severe in brainstem and/or cerebral tissue [29]. So the induced hypotension can cause postoperative stroke. Delayed postoperative strokes can be increased in size after dehydration and bleeding. The anesthesiologist must take present these changes of regional arterial pressure when the patient lies in sitting position and hypotension occurs. It is recommended that hypotension or great fluctuations of mean arterial pressure from preoperative baseline must be avoided.

The presence of atrial fibrillation can increase the likelihood of postoperative stroke. It is recommended to aggressively control the heart rate using antiarrhythmic drugs (e.g. cordarone) and anticoagulants especially in patients with previous strokes, transitory ischemic attacks, and new onset of atrial fibrillation [30]. The fluid and electrolytes must be corrected, and close monitoring of the patients is mandatory [31].

Perioperative use of beta-blocking agents

Different studies reported that not rationale use of metoprolol is associated with postoperative stroke. This complication is generally mediated by impairing β2-mediated vasodilatation [32]. So other authors recommend the use of ultra short acting agents as esmolol during intraoperative period [33].

Intraoperative mechanical ventilation

Endotracheal intubation and intraoperative mechanical ventilation may have adverse effects on possible postoperative stroke but not enough evidence is available. Nevertheless it is well know that hyperventilation can cause cerebral vasoconstriction and as a consequence reduced cerebral blood flow [34]. It is rationale that unnecessary intraoperative hyperventilation must be avoided.

Table1. The preventive anesthesiologist's actions

Avoid	Actions
Hypotension	Careful evaluation and correction of volume status administering fluids as needed
Bradycardia and new onset arrhythmias	Adequate anesthesia depth, atropine or inotropes, evaluation and corrections of acid-base and electrolytes status
Unnecessary general anesthesia	Choose regional anesthesia when appropriate
Massive bleeding, severe anemia, unnecessary blood transfusion	Strong cooperation with the surgeon, careful/not unnecessary aggressive blood transfusion, maintains hemoglobin level above 9 g/dl.
Hyperventilation and hypocapnia	EtCO2 and blood gas analysis guided intraoperative ventilation
Non rationale use of beta-blocking agents	Do not give beta-blockers (metoprolol) as candies, use ultra short acting drugs as esmolol
Long surgery duration	The duration of surgery must be minimized as much as possible

Intraoperative bleeding, perioperative anemia and blood transfusion

Perioperative anemia, intraoperative bleeding and blood transfusion has recently been on focus, for possible interactions with postoperative stroke. It is understandable that massive bleeding, severe anemia can cause postoperative stroke. Several authors found that these situations were associated with stroke [35, 36]. The anesthesiologist must avoid the combination of anemia, hypotension, and the beta-blocking agents use. Maintaining a hemoglobin level above 9 g/dl is advisable. Table 1 summarizes all the preventive intraoperative measures.

Conclusion

As a conclusion, preventing postoperative ischemic stroke remains a challenge to the anesthesiologist. Preventive actions include: avoiding rapid and severe hemodynamic fluctuations (hypotension and bradycardia), strict correction of circulating volume and electrolytes, rationale use of beta-blocking agents, choosing regional anesthesia when it is possible, minimizing bleeding, careful blood transfusion protocols, and finally maintaining an adequate level of hemoglobin.

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Systematization of the perioperative nursing assistance, development and challenges on its application

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Abstract

The systematization of the Perioperative Nursing Assistance (SPNA) is a process that aims the promotion, maintenance and health recovery of customer and community involved in a surgical experience. It is observed that (SPNA) is not effectively developed in clinical practice by nurses from the surgical center of the Hospital Regional do Cariri (HRC). Thus, there was a search to propose a reorganization of the perioperative nursing assistance from an approximation to the reality experienced by these nurses by identifying the difficulties and facilities found in the use of this instrument. The fact that this is a needy area of study with few publications and knowing that its adjustment will contribute to a better care of the surgical patient, we were encouraged to undertake this research. This is an exploratory qualitative study conducted with nurses from the surgical center of the HRC. Initially the project was submitted to the hospital's Research Centre to release it to the field, soon after it was submitted to the Plataforma Brasil, taking into account aspects of the Resolution CNS No. 466/2012. Data collection was conducted from July to August 2013, during meetings through observation and recording of the speeches of the participants, for such a semi-structured interview guide was used as a tool. The data analysis used was the content analysis, where we arrived to two categories, each with two subcategories. In category one the importance of SPNA was treated, having as subcategory the knowledge of nurses and the application of SPNA and in the category two, the difficulties, broken down in the subcategories of insufficient staff and the current perioperative nursing instrument. With the study, we can see that the concerned service presents a systematization of a structured perioperative nursing assistance service, with some points to be made appropriate. However the service stands out from the others offered in the region in the category of nursing assistance. We observed that some difficulties have been identified by the interviewed, such as an improper form for application of SPNA, the absence of a nurse to perform the function, which, according to the coordinator is being solved. As an applicable suggestion, the restructure of the SPNA instrument currently used was needed. The reformulation of the printed form happened after the suggestions given by the nurses at the time of the interviews and aiming to alleviate the difficulties encountered by them, it was carried out after the formalization of the proposal with the delivery of the redesigned instrument to the coordination of nursing for their comments.

Key words: Nursing in the surgical center; Perioperative nursing; Nursing assistance

Introduction

The surgical patient nursing assistance is called perioperative, characterized by being an interactive process that promotes and / or recover the integrity and bio-psycho-social-emotional fullness and spiritual of the patient. This involves feelings, emotions, commitment, ethics, and effective communication that promote the exchange of experiences between the nurse and the client [1].

The perioperative period involves phases of preoperative, intraoperative and postoperative, each with its own peculiarities, but all with great importance for the assistance. Each phase contributing to the excellence of the assistance offered to the patient, being of the nursing competence to establish an efficient and personalized interaction for this purpose. This efficient interaction will meet the needs of the patient and ensure the applicability of human actions of care [2].

The method founded on the scientific basis, clinical reasoning and ethics used to meet these needs is the Systematization of the Perioperative Nursing Assistance (SPNA), which through the nursing process systematizes the given actions and interrelates them to the patient assistance, formulating principles which when applied to nursing activities are effective to help the patient and to improve the nursing care provided.

The nurse's responsibilities in the Perioperative Care are diverse and complex and aim to maintain the safety of surgical procedures, manage the surgical environment and the medical and nursing staff of this environment. However, one cannot forget the responsibilities with the patient, who must be respected as an individual through an individualized care, having their rights and dignity preserved, and should also be educated about their disease, treatment, health promotion, self-care and like that, to promote care to surgical patients with quality, ensuring the satisfaction of the patient, family and staff [3].

The understanding of the SPNA as a nursing assistance technology involves the qualification of the nursing care to improve it by reflective actions with the implementation of all the steps of the nursing process, guided by the knowledge that support the profession[4].

In this context, the nurse of the perioperative assistance must develop new skills and knowledge regarding this technology to offer a patient assistance with quality, turning the learning process into a constant practice.

The registration of all stages of SPNA is of fundamental importance to guarantee continuity of nursing care as well as legal support, therefore, it is essential that the instrument used for monitoring and evolution of all actions in this period is appropriate to the needs of the patient, professional and the institution [1].

In the hospital in question there is no difference, the nurse of the surgical center performs its management functions in the surgical environment as a whole and also the maintenance of patient safety through the perioperative nursing assistance. These in turn, demonstrate to know and understand its importance as a necessary tool to take care of, but there are some difficulties that impede their effective application, which led to an understanding of this reality.

Thus, aiming suitability of the SPNA instrument in assisting surgical patients and optimization of work done by nurses in this sector, we opted for the realization of this research.

This study is justified by the need felt by the researcher to deepen the theory of SPNA and contribute in practice to the reorganization of the nursing assistance, since I work in the surgical center sector and observe the difficulties for the nurses to implement this instrument.

In view of the foregoing and in trying to answer the research problem: "Is the SPNA effectively applied by nurses of the Surgical Center?" Our objective was to propose a reorganization of the perioperative nursing assistance from an understanding of the reality experienced by nurses from the surgical center. To do this, we sought to identify the difficulties and facilities found by nurses in the use of the instrument of SPNA; consolidate the information obtained to adapt the SPNA instrument; and formalize a proposal to the service of a new instrument SPNA to be used in the surgical center.

The present study aims to involve the nurses from the sector in question with the main difficulties that may impede and / or facilitate its effective application and seek strategies to reorganize the application of SPNA in the service. And thus, contribute positively to improve the nursing assistance given to the perioperative patient by nurses of the service and consequently improve the quality of care and welfare of the patient in the period they are in the surgical center.

Methodology

This is an exploratory study with a qualitative approach. It was held in the city of Juazeiro do Norte, inside the state of Ceará in a large hospital with high complexity and coverage in the urgency and emergency care areas.

The study was conducted with the nurses of this hospital that play activities throughout the surgical center (CC), which includes the post-anesthetic recovery room (PACU) and who agreed to participate in the research. The design of the nursing team in this service comprises of a nurse coordinator and one assistant nurse in each of these sectors (CC & PACU), being therefore, two working in the morning, two working in the afternoon and two working overnight, totaling six, and they take turns on duty according to their roster. Thus, the service has 11 nurses, one is a coordinator and 10 are assistants.

It was considered as inclusion criteria: being a nurse linked to the hospital in question with the surgical center and PACU sector full and who accepted to participate in the research. Exclusion criteria: being a nurse serving the hospital linked to a cooperative, not working in the surgical center and PACU sector and no acceptance to participate in the study. From these, one did not accept to participate in the research and the other was the researcher. Thus, the sample was composed of nine nurses.

The sample selection process followed the acceptance criteria of all respondents to collaborate and participate in the study by signing the Free and Clear Informed Consent (IC), without an embarrassment for those who opposed to participate.

This research was submitted to the Plataforma Brasil on the 02.07.2013 and approved by the Ethics Committee in Research of the Cariri Regional University with CAAE No: 18449813.9.0000.5055 [5].

Data collection was conducted from July to August 2013, during individual meetings with each interviewed. Data were collected during meetings through observation and recording of the speeches of the participants.

The instrument used for data collection was the semi-structured interview guide with questions that focused on the profile of the interviewed and open questions that sought to understand the perception of nurses with relation to the systematization of nursing assistance used in the service, with views to its organization.

The interviews were held at scheduled meetings with each respondent, at a time before or after their duty hours, in order not to disturb the progress of the service and not to compromise the data collection.

Each subject underwent an interview guided by a script where the interviewer asked the questions and the answers were recorded in full with the aid of a tape recorder. The analysis of the current printed form called SPNA was requested from each respondent after the questions were asked; this form is used in the service aiming to guide the systematization of the perioperative nursing assistance provided to each surgical patient. After this brief analysis (since all are familiar with the form because they use it in daily practice) it was asked that each realized the appropriate changes, either to add, modify or even remove the information that they thought unnecessary. At this time each used a printed form and made the modifications they found convenient.

Upon completion of the interviews, we proceeded to a full transcript of the speeches. These were scanned and organized into categories.

The data analysis performed was a qualitative content analysis, more specifically the thematic analysis according to Bardin [6].

Results

In order to get a better organization and discussion of the obtained results, we initially presented the data related to the characterization of respondents and then the data were divided into categories. From the perspective of turning the chapter more dynamic, the discussion of the results was carried out simultaneously with their presentation.

Profile of the interviewed

We can consider with respect to the characterization of the subjects of the study, that they comprised a sample of nine people, as being a uniquely feminine universe (100%). What was already expected as nursing is formed in essence by women.

Regarding the age, three (33.3%) presented with up to 25 years, 4 (44.4%) in the age group ranging from 26 to 30 years and 2 (22.2%) more than 31 years old. It is therefore, a predominantly young group, with training periods ranging from 2 years and 6 months to 10 years.

As for the specialization in the area of performance, 5 (55.5%) do not have any and only 4 (44.4%) have specialization in progress in the area of operation.

Table 1. Characterization of the nurses in the study. Crato-CE, 2013.

Subjects	Age	Sex	Training time	Specialization in the surgical center area	Experience time in the surgical center	Role	Has worked in another surgical center
1	28	F	3 years	In progress	3 years	Coordinator	Yes
2	30	F	4 years	No	1 year	Assistance	No
3	25	F	2 years 11 months	In progress	6 months	Assistance	No
4	36	F	10 years	No	2 years	Assistance	Yes
5	25	F	2 years 6 months	No	2 years	Assistance	No
6	30	F	7 years	No	7 years	Assistance	Yes
7	25	F	4 years	In progress	2 years	Assistance	No
8	33	F	10 years	No	1 year	Assistance	No
9	29	F	5 years	In progress	2 years	Assistance	No

Source: Research data, 2013

Only three have experience in surgical center in other institutions (33.3%), the remaining 6 (66.6%) had their first experience in the surgical center of their current job.

Characterization of the speeches

After the full transcript of the interviews, we got the following categories and subcategories, described in the table below, which after its description will be submitted to analysis and discussion.

Table 2. Categories evidenced by participants' speeches. Crato-CE, 2013.

Category	Subcategory
Importance of SPNA	Knowledge of nurses
	Application of the SPNA
Difficulties	Insufficient staff
	The current perioperative nursing instrument

Source: Research data, 2011

Category 1: Importance of SPNA

We gathered in this category expressions related to assigning the importance given by nurses to the SPNA as a working method within the current service in the Surgical Center. This has been translated in importance according to the knowledge they possess and implementation of the same.

Knowledge of nurses

All respondents consider the SPNA an important working tool in the surgical center service.

According to Possari 2011: "The SPNA is, with no shadow of doubt, the foundation that supports the nursing actions in the surgical center (CC), be-

ing of assistance in the promotion of health and prevention of postoperative complications [7]."

It should therefore, be understood and applied correctly. And the allocation of its importance was clearly seen in the interviews.

Five respondents cited the SPNA as a fundamental tool to the knowledge of the history of the patient and their clinical conditions, allowing proper planning of how to intervene to prevent suspension of the surgical procedure and / or surgical complications, limiting it only to the preoperative period, without mentioning the importance of the same in the other phases.

The systematization of the perioperative nursing assistance is, according to Possari 2011, "a method for organizing the individualized care and administer the assistance." Such activity must be present at all stages in order to ensure "the identification of the patient's health conditions, subsidizing the prescription and implementation of the actions of the nursing assistance"[7].

Application of the SPNA

From the nine interviewed, three said they did not participate directly in the application of SPNA in the sector, by not acting directly in the assistance or for being linked to the post-operative care [8,9].

We observe a limitation of the understanding of nurses with relation to the application of SPNA as a tool to be used in the three phases of the surgical experience, the majority stating their usefulness only in the preoperative visit. In the speeches of the other interviewed, the perioperative period is also cited.

As for the activities provided we observed that these correspond to what the literature recommends. The preoperative visit is the most frequently cited by respondents. COFEN´s Resolution No. 358/2009 stipulates that: "the data or information gathered in the preoperative visit provide additional help to identify problems and should be collected by the nurse of the surgical center"[10].

Difficulties

The expressions related to the difficulties encountered by the subjects in the application of SPNA are met in this category, translated into difficulties related to: insufficient dimensioning of nursing staff to allow effective implementation of the SPNA, the current perioperative nursing instrument, which presents itself improperly to guide the same [11].

Insufficient staff

By contact with the interviewed, we observed that insufficient staff was a common complaint for the effective application of the SPNA, this being the main reason cited by eight of the respondents.

Another complaint observed and cited three times, was the fact of having to leave the sector to perform preoperative visit, where nurses reported having to abandon the assistance of the intraoperative to devote their time to the preoperative. This being also the result of insufficient staff, requiring readjustment of the number of employees for efficient implementation of the SPNA, which is consistent with the difficulties reported in the current literature [12].

Six interviewees emphasized the need for a specific nurse to develop the preoperative and postoperative of the patient. It is important to note that the improper use of the nurses is the cause for important implications on the quality of care provided to the patients [13].

The inadequacy of human resources in nursing injures the clientele in their right of a health care without risks, which also brings negative repercussions for the institution resulting in greater probability of failure occurred in the assistance [14].

This fact is reinforced by current studies, being the main limiting factor for optimal application of the SPNA, "the small number of professionals with relation to the demand of patients," citing Christóforo, 2006:

The short time between hospitalization and surgery, accumulation of functions to be performed by nurses, little integration with other professionals, specially doctors, execution of nursing assistance sometimes in a ritualized form, prioritizing techniques leaving the human side as a second plan, or even ignored [9].

In other words, providing nursing assistance of quality is not always possible. Because the healthcare practice has been placed as a second plan by nurses, to the detriment of other demands of the institution and its adopted routines.

The current instrument of the perioperative nursing

Four respondents cited as a factor of difficulty of the effective implementation of the SPNA, the current instrument that has been used in the sector because it cannot lead professionals in a full and continuous way, giving rise to subjective interpretations.

To make the SPNA more enable, it is necessary, according to SOBECC, 2013: Deploy the nursing assistance in a "comprehensive and individualized way, documenting the phases of preoperative, intraoperative and postoperative, with the record of the nurse's actions in a specific instrument, appropriate for all phases "[11].

Discussions

The main objectives of the SPNA include the assistance to patients and families in order to make them understand and prepare for surgical anesthesia, raising and analyzing the needs in an individualized way; reduce the risks inherent to the sector and to predict, provide and manage human resources and required materials and implement the nursing assistance to surgical patients[8].

What we see in the words of the interviewees was that the majority of them can understand the real role of SPNA, give its due importance and assimilate its goals, but with limitations inherent to the dynamics of the service and its applicability throughout the course of the surgical process. There is some difficulty in understanding the same as an instrument to be applied at all stages of

the surgical experience, observing the allocation of SPNA´s goals only to the preoperative period, forgetting to also involve the intraoperative and postoperative.

Nurses recognize the importance of the systematization of the nursing assistance, the planning of care and guidance on the preoperative stage [9].

Knowing the importance of the SPNA as the basis for the nursing actions within the surgical center environment, it is necessary for the perioperative nurse to carry its application. Since this is a private activity of the category with respect to its leadership and execution [10,11].

In research to evaluate the nursing care to patients undergoing elective surgery, during the preoperative and postoperative, study reports that most respondents could not identify the nursing professional as the responsible for the guidance [12].

This leads us to believe that there are problems with regards to the definition of roles within nursing. Which can happen exactly with the lack of nurses in carrying out their activities of assistance and often even private activities such as in the case of SPNA. The effective application of this gives the patient a more humane care, safer, and with reduction of the risks inherent to the surgical center environment.

The need and importance of the preoperative visit by the nurse is emphasized, as the nurse is aware of the needs affected that may interfere with the perioperative and postoperative patient [13].

This is not always possible due to the small number of nurses working in the surveyed institution, with only one professional in each surgical center, "the realization of this visit by the sector nurse often becomes impossible"[9]. It is important to emphasize the fact that we can never achieve a nursing service with appropriate care to patients without the required number of professionals [7]. One of the great difficulties found is the need to be absent from the sector to carry out the visits, which threatened the other phases of the intraoperative and immediate postoperative period in patients who were already at the surgical center. As well as the limited time available for the completion of the visit, making it impossible to clearly identify the individual needs of each patient.

Also according to SOBECC, 2013:

The patient's records should reflect the plan of care for each patient, including data collection, diagnosis, identification of results, planning, implementation and evaluation. For such, a suitable form to guide such assistance is necessary. Because such documentation is essential for the continuity of the patient care and for comparisons between the obtained and expected results in the assistance. [11]

Conclusion

With this study we can see that the service in question presents a systematic service of structured perioperative nursing assistance, but with some points to be made appropriate. And yet, the service stands out from the others offered in the region in the category of nursing assistance, considering that this is the only one that performs this activity as a routine of the nursing assistance in the Surgical Center.

We observed that some difficulties have been identified by the interviewed, such as an improper form for application of the SPNA, the absence of a nurse to perform the function, which, according to the coordinator is being solved. We found the restructure of the SPNA instrument currently used, as an applicable suggestion. The reformulation of the printed form happened from the suggestions given by the nurses at the time of the interviews and aiming to alleviate the difficulties encountered by them; after the formulation of the proposal, there was the delivery of the redesigned instrument to the coordination of nursing, formalization of the contribution of the research for its appreciation and subsequent implementation.

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The association of coronary artery disease and plasma adiponectin concentration

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Abstract

Objective: Recent studies revealed conflicting results regarding the relationship between adiponectin and coronary artery disease. This study aimed to investigate correlation between adiponectin with severity of coronary artery disease (CAD) assessed by coronary angiography in Kosovo.

Methods: We enrolled 82 consecutive patients undergoing non-urgent coronary angiography for CAD survey. Plasma adiponectin, triglyceride, total cholesterol, high-density lipoprotein, low-density lipoprotein cholesterol, and fasting blood sugar levels were measured. Demographic characteristics such as age, sex, Body Mass Index (BMI), Waist circumference (WC), diabetes mellitus history, systemic hypertension history, and family history of CAD were collected. According to the angiography results, the patients were divided into two groups of CAD and non-CAD. We conducted hospital based, involving study group 45 cases with documented angiographically CAD, and 37 control group cases without angiographic evidence of CAD. The severity of coronary atherosclerosis in the CAD group was defined by using the Gensini score system. This study was approved by the Committee of Ethics. Written informed consent was obtained by the patients prior to enrollment.

The results: In the CAD group, the average age was 64.7 ± 8.6, while in non CAD group the average age was 62.7 ± 8.8. Gender wise, 46 patients were male versus 36 females. From forty-five (58%) documented angiographycally CAD cases, 18 (40%) had one vessel disease, 15 (33.3%) had two vessel disease and 12 (26.7%) three vessel disease. Thirty seven patients have (42%) had no coronary artery disease (Gensini score =0), seventeen patients (37.8%) had mild coronary artery disease (Gensini score <32), thirteen patients (28.9%) had moderate coronary artery disease (Gensini score= 32-58) and fifteen patients (33.3%) had severe coronary artery disease (Gensini score ≥58). Plasma adiponectin concentration in the CAD group was 3.4 µg/ml ± 2.7 µg/ml, and in non-CAD group 3.6 µg/ml ± 2.0 µg/ml (p value = 0.181). Forty patients (48%) were smokers, fifty-nine patients (70%) had hypertension, twenty-six patients (31%) had diabetes mellitus and twenty-two patients (26.8%) had dyslipidemia. Family history for CAD was positive in 40 patients (48%). We found correlations between Gensini score and plasma adiponectin levels.

Conclusion: In conclusion, there is a significant positive correlation between adiponectin and Gensini score among Kosovar patients. These data should stimulate experimental and epidemiological studies to further elucidate the complex role of the adiponectin in atherosclerosis and CAD. Serum adiponectin level should be considered in the laboratory work-up of CAD patients.

Key words: adiponectin, coronary artery disease, Gensini score

Introduction

Although adipose tissue was traditionally regarded as a silent organ storing excess energy, gene-expression profiling of human adipose tissue revealed that it is indeed an endocrine organ (1). It has been found that the proteins encoded by genes expressed in 20% of subcutaneous and 30% of visceral adipose tissue are bioactive secretory molecules. These proteins are named adipokines, including leptin, resistin, plasminogen-activator inhibitor type-1 (PAI-1) and tumor necrosis factor-α (TNF-α). The most abundantly expressed genes in adipose tissue are termed apM1, which is located on chromosome 3q27, a susceptibility locus for diabetes mellitus (DM) and cardio vascular disea-

se (CVD). The protein encoded by apM1 is termed adiponectin. The levels of adiponectin in human plasma could be found in a range from 3 to 30 μg/ml as determined by enzyme linked immunosorbent assay (ELISA). The amounts of adiponectin account for 0.01% of total plasma protein (2).

Adiponectin (ARCP 30, AdipoQ, apM1 or GBP28), secreted by adipose tissue, is a 247-amino acid peptide which was discovered in 1995 (3, 4). The circulating level of this peptide ranges from 5 to 30 μg/ml, accounting for about 0.01% of total plasma protein, three times higher than the concentrations of most other adipose tissue-derived hormones (5). Adiponectin has gained particular interest on account of its relation with insulin sensitivity, atherosclerosis, and inflammation (6). Several experimental studies have reported the anti-atherogenic and anti-inflammatory effects of adiponectin (7, 8). Recent findings suggest that high adiponectin concentration is an independent predictor of mortality in chronic heart failure patients, chronic kidney patients, and elderly patients, who are at high risk for cardiovascular events (9-13). Furthermore, plasma adiponectin concentrations both tend to show varying levels in people of different countries and races (14-17). To our best knowledge, this is the first study performed in Kosovo focusing on this particular issue.

Materials and methods

Study subjects

The study population consisted of 82 consecutive patients who underwent coronary angiography for suspected or known coronary atherosclerosis at the University Clinical Center of Kosovo. With the exception of acute coronary syndromes, the patients had to present in a stable clinical condition without major concomitant non-cardiovascular disease. The study protocol was approved by the Ethical Committee of the Faculty of Medicine, University of Prishtina (decision no: 4335 date: 03.09.2012), and research was conducted in accordance with guidelines in the Declaration of Helsinki. Written informed consent was obtained from all study participants before inclusion in the study.

Coronary angiography

Coronary arteries were cannulated by using the Judkins technique with 5F catheters. After locating stenotic coronary artery, determination of stenosis was conducted by usage of computer-assisted coronary angiography analysis system. We have used Gensini scoring system, shortly elaborated below, for measurement of coronary atherosclerosis severity. In this scoring system, a greater reduction of the lumen diameter assigns a higher score than a distal lesion. Coronary angiography to determine the presence and severity of coronary artery lesions by Gensini score based on the number of affected vessels, localization of the segment, and the grade of the stenosis. Gensini score assesses the severity of coronary artery disease: it grades narrowing of the lumen of the coronary artery and scores it as 1 for 1-25% narrowing, 2 for 26-50% narrowing, 4 for 51-75%, 8 for 76-90%, 16 for 91-99% and 32 for a completely occluded artery. This score is then multiplied by a factor, according to the importance of the coronary artery. The multiplication factor for a left main stem (LMS) lesion is 5, it is 2.5 for proximal left anterior descending artery (LAD) and proximal circumflex artery (CX) lesions, 1.5 for a mid-LAD lesion, and 1 for distal LAD, mid/distal CX and right coronary artery lesions. Gensini score was expressed as the sum of the scores for all three coronary arteries to evaluate the entire extent of coronary artery disease (18).

Anthropometric measurements

Were taken after the patients had removed their shoes and upper garments and had donned an examining gown. Each measurement was performed twice and the average was used in the analysis. Height was measured to the nearest 0.1 cm using a wall-mounted stadiometer. Weight was measured to the nearest 0.1 kg using a hospital balance beam scale. Body mass index (BMI) was calculated as weight (kg) divided by the square of height (m^2). The waist circumference (WC) was measured by tape in cm and was also categorized according to the World Health Organization (WHO) criteria (19). Blood pressure was measured by European Society of Hypertension- International Protocol 2 (ESH-IP2).

Laboratory measurements

The 12-h fasting blood samples were taken in the morning and the sera were stored at -70 C immediately after centrifugation until being assayed.

The laboratory was monitored for the precision and accuracy of glucose and lipid measurements by the surveillance program. Adiponectin serum concentrations were determined by a commercially available ELISA. The primary predictor variable was serum adiponectin level as determined by immunoassay of thawed fasting serum samples. Each sample was assayed in duplicate, and adiponectin level was calculated as the average of the two measurements. The laboratory technicians who performed the assays were blinded to the patient characteristics.

Statistical analysis

Statistical analyses were performed using SPSS statistical package. Among statistical parameters, the structure index, arithmetical average, standard deviation, median, minimal and maximal values were calculated. Quality variables were compared with X^2 –test. The Mann-Whitney test and the Kruskal Wallis test were used to identify differences in non-parametric variables for two independent groups. We used One-Way ANOVA and T-test for parametric variables. All tests were verified by using a degree of reliability of 99.7% (P<0.01) with a reliability of 95% (P<0.05).

Results

Eighty-two patients were enrolled in the study, 45 were part of the study group and 37 part of the control group. Mean age of the study group was 62.7 and for the control group mean age was 64.7 years. Forty patients (48%) were smokers, 59 patients (70%) had hypertension, 26 patients (31%) had diabetes mellitus and 22 patients (26.8%) had dyslipidemia. Family history for CAD was positive in 40 patients (48%).

As a result of performing coronarography, 45 patients had ≥1 stenotic coronary artery, and 37 others had no changes in coronary artery (considered as a control group). From 45 cases documented angiographycally CAD, 18 (40%) had one vessel disease, while 15 (33.3%) had two vessel disease and 12 (26.7%) three vessel disease (Table 1). In control group thirty seven patients have (42%) (Gensini score =0), seventeen patient (37.8%) had mild disease (Gensini score <32), thirty patients (28.9%) had moderate disease (Gensini score=

32-58), fifteen patients (33.3%) had severe disease (Gensini score ≥58).

Eighty patients had normal BMI, twenty-three patients were overweight and fourteen patients were obese. In study group, mean BMI was 28.2 ± 3.3, while in control group mean BMI was 28.7 ± 5.0. (T = 0.517, P=0.606, P>0.05) and Waist circumference in the study group was 97.0 ± 8.4 where as in the control group 94.9 ± 11.9 (T=0.858, P=0.393 P>0.05).

We divided into four groups by age: first group (40-49 years), second (50-59 years), third (60-69 years), and fourth group > 70 years. Observations showed that adiponectin was increased with age but not significantly (Table 2)

Although there was significant correlation between Gensini and aging (r= 0.413, P=0. 004, P<0.01) (Figure 1). Moreover, there was significant correlation between Gensini and adiponectin (r= 0.487, P=0. 0007, P<0.001), (Figure 2).

In terms of the lipid parameters, serum HDL cholesterol concentrations were correlated positively (r= 0.327, P=0. 028, P<0.05) (Figure 3) and serum triglyceride concentrations were correlated negatively (r= -0.513, P<0.001) (Figure 4) with plasma concentrations of adiponectin. Total cholesterol concentration and LDL cholesterol concentrations did not correlate with plasma concentrations of adiponectin (r=0. 25, P=0. 176) (Figure 5) respectively (r=0.289, P=0.053) (Figure 6).

Table 1. Number of diseased vessel in cases with CAD

CAD* –vessel	N	%
1-vessel	18	40.0
2- vessel	15	33.3
3- vessel	12	26.7
Total	45	100.0

*CAD =coronary artery disease

Table 2. Mean serum adiponectin level in cases divided by age-group

Age-group (years)	N	Adiponectin			
		Mean	DS	Min	Max
40 – 49	2	2.8	0.2	2.7	3.0
50 -59	11	2.6	1.5	0.3	5.5
60 -69	19	3.3	2.6	0.8	12.7
70 +	13	4.1	3.6	1.3	15.3
Total	45	3.4	2.7	0.3	15.3
Kruskal Wallis test	P=0.856				

Discussion

The present study found that there was a strong association between adiponectin and coronary heart disease (CHD). These findings provide further evidence for an "adiponectin paradox" in which higher levels of adiponectin may be secreted as a protective or a compensatory response to worse cardiovascular disease. In our study, we find medium significant positive correlation between Gensini and adiponectin (r= 0.487, P=0. 0007, P<0.001). Cavusoglu E *et al* reported that while adiponectin protects against the development of disease, once the disease is established, adiponectin concentrations are elevated as a counter-regulatory response to try to protect against further inflammation and atherosclerosis (20). On a cellular level, adiponectin has been noted to block apoptosis of cardiac myocytes in *in vitro* models, including models of hypoxia and reoxygenation injury (21). With an anatomic level, higher levels of adiponectin have been associated with greater formation of coronary collaterals in patients with at least one occluded coronary artery (22). Recent evidence suggests that adiponectin may even be released from the heart in patients with heart failure (23).

Nakamura Y *et al* (24) reported, there were no significant differences in plasma concentrations of adiponectin between patients with stable angina pectoris (SAP) and control patients (11.3 v 12.8 μg/ml), adiponectin levels in patients with acute coronary syndrome are significantly lower than those patients with stable angina and in normal control patients. Findings from our study were similar to this study, where plasma concentrations of adiponectin between patients with SAP and control group (3.4 v 3.6 μg/ml) had no significant differences.

In the present study, patients in our SAP group had already been receiving some treatment with antianginal and antiatherosclerotic drugs. As certain medical treatments may confound interpretation of plasma concentrations of adiponectin measurements and there may not be significant differences in plasma concentrations of adiponectin between patients with SAP and control patients. Another important clinical finding in Nakamura Y *et al* (24) study, showed that plasma concentrations of adiponectin were considerably increased in older and female patients with CAD. As a consequence of their finding they suggested that unstable plaque may stabilize as the patient grows older or that accumulation of adiponectin in atherosclerotic vascular walls may suppress its elimination half life from plasma, resulting in an increase in plasma concentrations of adiponectin in older patients with CAD.

Dekker JM *et al* reported that including both individuals with and without cardiovascular disease, higher adiponectin has protecting role in those without cardiovascular disease and predictive of worse outcomes in those with existing disease (25). Similarly, studies of patients with coronary disease found that higher concentrations of adiponectin were associated with a higher risk of future cardiovascular events (26-28). Similar to our population of patients, Maiolino et al studied subjects undergoing cardiac catheterization for suspected coronary artery disease with a majority of subjects having stable ischaemic heart disease (IHD), and found that adiponectin was not associated with greater risk of myocardial infarction, but was associated with greater risk of cardiovascular mortality (28). Pischon T *et al*. revealed that male patients with hypoadiponectinemia (<4.0 μg/ml) had a 2-fold increase in CAD prevalence, independent of well-known CAD risk factors (4).

Additionally, in recent studies, Koh *et al*. reported that angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin II receptor blockers (ARBs) have been shown to elevate plasma levels of adiponectin without affecting BMI in clinical trial studies (29).

Relatively small sample of patients that were selected randomly from the general population, may have limited the ability to detect significant relationship between adiponectin and coronary artery disease, thus making it difficult to indicate the results to the general population.

Conclusion

In conclusion, there is a significant positive correlation between adiponectin and Gensini score among Kosovar patients. These data should stimulate experimental and epidemiological studies to further elucidate the complex role of the adiponectin in atherosclerosis and CAD. The serum adiponectin level should be considered in the laboratory work-up of CAD patients.
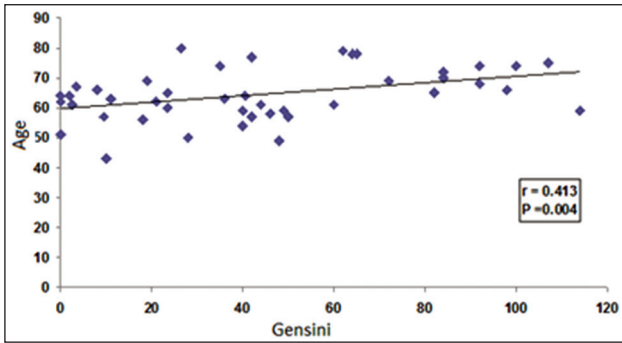
Figure 1. Correlation between Gensini score and age (years)

Figure 2. Correlation between Gensini score and adiponectin (µg/ml) in the coronary artery disease group

Figure 3. Correlation between Adiponectin(µg/ml) and High density lipoprotein cholesterol (mmol/l)
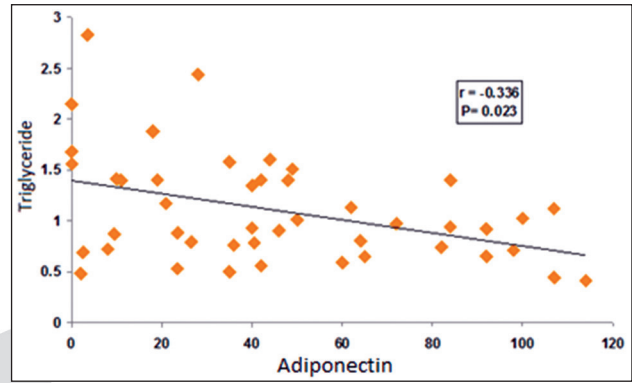

Figure 4. Correlation between Adiponectin(µg/ml) and triglyceride (mmol/l)

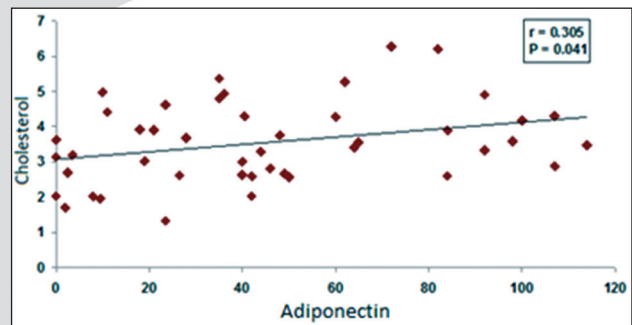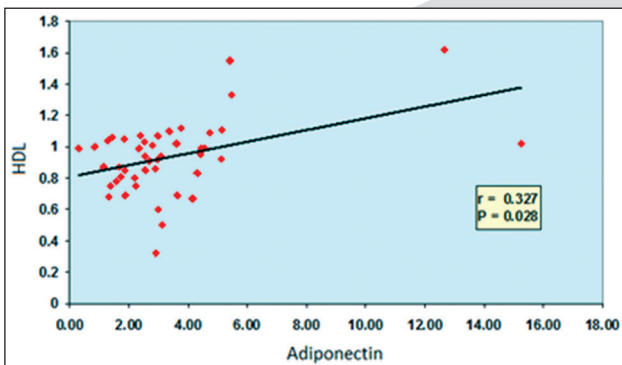*Figure 5. Correlation between Adiponectin(µg/ml) and total cholesterol (mmol/l)*
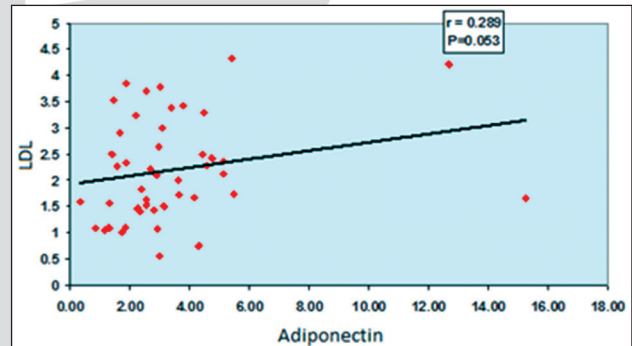

Figure 6. Correlation between Adiponectin(µg/ml) and Low density lipoprotein cholesterol (mmol/l)

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Age as bone detection method and talent selection in sports youth volleyball athletes

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Abstract

The increase of practitioners of sports children and increasing the competitive level between younger and younger athletes, increasingly necessary becomes the expertise and systematic training in volleyball. It is important to proceed in the differentiation and identification of talent or athletes who might eventually be more successful in the sport.

Objectives: to evaluate the anthropometric, physical and maturational characteristics of volleyball athletes of both sexes.

Methods: the sample was composed of 100 adolescents, 50 males and 50 females, aged between 10 and 14 years, participants in a sports initiation volleyball project. The anthropometric variables analyzed were: age, height, weight, BMI, skinfolds; the physical variables: speed, power, strength and agility; and the maturational variables: Bone age and maturational stage according to the Cabral prediction equation (2011).

Results: The findings demonstrated statistically significant results between anthropometric, physical and maturational variables, in both sexes, and the existence of strong correlations between anthropometric, physical and maturational variables with bone age.

Conclusion: The conclusions of this study are que there is a strong correlation between physical and anthropometric variables with bone age and maturational stage, providing clear evidence of this as a reliable indicator of maturity and Demonstrating its importance as a further means of selection and promotion of sporting talent, principally with respect to volleyball. In addition, the variables waist, medicine ball and tapping test were the ones who were not correlated with bone age.

Key words: Maturation, Anthropometry, Physical Qualities, Volleyball.

Introduction

In recent decades, the competitiveness of sport and pressure to win medals, together with the development of sports talent, has led many countries to reorganize their sports structures so that more young athletes benefit from a greater quantity of better quality training at increasingly younger ages.

Physical and physiological attributes are important when considering the determination to succeed in volleyball. On the one hand, there are physical differences between players with different skill levels. On the other hand these players may not need to have extraordinary capacity in any of the physiological performance zones, although the majority demonstrate a reasonably high level of skill: being more rapid and agile and presenting improved vertical jumping performance in tests (1).

In addition to the development of the physical qualities; endurance, speed, agility and explosive strength of the athletes, anthropometry has recently been gaining attention as part of planning in order to contribute more specific knowledge to the technicians about each athlete making up the team, facilitating, by making the team as homogeneous as possible (2, 3). This is thus becoming increasingly decisive in the selection of specific training (4). However, the maturational process does not always occur at the same chronological age (CA) and 90% of the interval for peak growing age is approximately 4.5 years (1).

Consequently, there may be substantial differences in the degree of physiological and physical development in boys or girls with the same chro-

nological age (CA), playing in the same category, in terms of physical, physiological and motor skill acquisition (5). Currently, this is highly relevant as the biological maturity status significantly influences the growth and functional capacity of adolescents of 13-14 years (6-8).

Technicians seeking athletes no longer limit their choice according only to anthropometric profiles, which was formerly the case in large clubs. It is considered then, that analyzing the anthropometric, physical and maturational qualities together may culminate in the selection of a talented athlete, and it is therefore extremely important to deepen the investigation into all these correlated components for power profiling, which may help in selecting talent for the sport. (9).

Indeed, there is little information available on the factors that influence performance in younger players at different competitive levels. In the present study, the anthropometric, physical and maturational characteristics of young volleyball players and the relationship with bone age were analyzed as a means of selecting sporting talents.

Materials and methods

Participants

The research was characterized as descriptive with a comparative and cross-sectional design. The sample consisted of 100 adolescents, 50 males and 50 females, aged between 10 and 14 years, participants in a sports initiation volleyball project.

After selection of the subjects, the parents or guardians were contacted. A Free and Informed Consent form was presented in order to clarify the objectives and procedures to be performed and after acceptance and signature, data collection occurred.

Following the ethical principles of research on humans, this study was submitted to and approved, under protocol no. 866.900/2014, by the Committee for Ethics in Research of the Universidade Federal do Rio Grande do Norte – RN – Brazil and complied with the international standards for human experimentation (Helsinki Declaration of 1975).

Anthropometry

For the anthropometric assessment, body weight was measured using a calibrated scale (Filizola) with an accuracy of 0.1 kg, height was measured using a stadiometer located on the weighing scales with a scale of 0.5 cm, subscapular, triceps and calf skinfolds were measured using a high precision scientific caliper (Harpenden) with a sensitivity of 0.1 mm, according to the Pollock protocol (1984). The anthropometric measurements were then submitted to the prediction equation proposed by Cabral (4).

Bone maturity

Bone age was measured using the prediction equation by Cabral (2011), and anthropometric measurements following the guidelines of the International Society for the Advancement of Kinanthropometry (ISAK)(10), where the Height, Body weight, Arm corrected perimeter (Acp), Triceps skinfold (Tr) and Bone diameter of the humerus (Dh) and femur (Df), were measured according to the equation below: The arm corrected perimeter (ACP) was calculated using an anthropometric tape Sanny® (precision 0.1 mm) to verify the arm circumference in centimeters, less the value of the triceps skinfold thickness (TR) transformed into centimeters. The bone diameters were measured using a caliper of the brand Cescorf® (precision 0.1 mm), confirming the Bi-epicondilian Femur diameter (DF) and Bi-epicondilian Humeral diameter (DH).

Physical tests

The physical qualities researched were: muscle strength in the arms and legs and coordination and speed of the upper limbs. To collect the data of the physical qualities the most validated physical tests for the sport were performed: 20 meter speed test, Tapping test, explosive power of the upper

Table 1. Prediction equation proposed by Cabral

Equation for the prediction of Bone Age, proposed by Cabral 2011
Bone age = - 11.620 + 7.004(height) + 1.226.Dsex + 0.749(age) –0.068(Tr) + 0.214(Acp) – 0.588(Du) + 0.388(Df)
Where Dsex = 0 for males and 1 for females, Height (m), Age (years), Tr = triceps skinfold (mm), Acp = arm corrected perimeter (cm), Dh = diameter of the humerus (cm), Df= diameter of the femur (cm).

limbs and explosive power of the lower limbs. The collected data were recorded in the individual records of each athlete (11).

To verify speed, the 20 meter test was performed according to Silva and Gaya (2007). To verify the explosive power of the lower limbs, an Ergojump Jump Pro 2.0-Brazil carpet was used according to the Bosco protocol (12). To evaluate the explosive force of the upper limbs, the 3kg medicine ball throwing test was used (Gaya and Silva,

2007) and for the speed test and coordination of upper limbs the Tapping Test was used; the plate tapping from the EUROFIT battery of tests (11).

Statistical Analysis

The Statistical Package for Social Sciences (SPSS), version 20.0 was used for the treatment of the data from this study, using descriptive statistics to obtain the means and standard deviations. An analysis was performed to verify the normality

Table 2. Descriptive statistics of the characteristics of the athletes.

Variables	Mean(sd)	Median	Minimum	Maximum
Anthropometry				
Age	12.04(1.13)	12.00	10.0	14.0
Weight	54.45(5.82)	55.85	42.0	68.1
Height	1.68(0.06)	1.68	1.50	1.84
Waist	58.97(18.18)	65.0	50	72
Sitting height	66.14(5.77)	67	50	79
∑Folds	28.91(4.59)	28.3	19.4	41.9
Physical tests				
Speed20m	6.2(1.34)	6.5	4.0	9.0
Cmj	43.26(6.7)	44.50	30	56
Medicine ball	137.71(6.4)	138.0	121.0	158.0
Tapping test	14.39(1.09)	14.20	13.1	16.9
Maturity				
Bone age	12.26(1.72)	12.4	7.9	16.1
Maturational stage **Category** Maturational stage	0.22(0.94) Accelerated 21%	0.20 Normal 35%	-2.10 Late 44%	2.60

Table 3. Demonstrates the existence of an association between anthropometric and physical variables with bone age and maturational stage of male and female volleyball athletes.

Variables	Men Mean(SD)	Women Mean(SD)	P
Anthropometry			
Age	11.7(1.11)	12.4(1.07)	0.000
Weight	53.4(6.5)	55.4(4.8)	0.097
Height	1.66(0.06)	1.69(0.05)	0.060
Waist	63.9(5.8)	54(21.4)	0.050
Sitting height	66(5.8)	63.3(5.7)	0.780
∑Folds	31.2(4.7)	26.5(3.0)	0.000
Physical tests			
Speed20m	5.2(0.9)	7.3(0.7)	0.000
Cmj	48.0(3.7)	38.4(5.5)	0.000
Medicine ball	138.46(7.2)	136.96(5.3)	0.244
Tapping test	14.44(1.20)	14.3(0.98)	0.624
Maturity			
Bone age	11.3(1.57)	13.2(1.26)	0.000
Maturity	-0.41(0.70)	0.86(0.70)	0.000

of the population using the *Kolmogorov-Smirnov* test, the pairs T test was used to evaluate differences between the sexes and the Pearson correlation test, considering a significance level of p <0.05 for the bone age with the study variables.

Results

Descriptive statistics of the young volleyball athletes are presented in Table 2. The mean age of the male and female participants in the evaluation was 12.04 (1.13) years. In addition, according to the results shown in Table 1, the majority of the players were classified as being in the late stage of bone maturation (44%), while the remaining players were classified with normal and accelerated maturation, 35% and 21% respectively.

The age and the sum of the skinfold thicknesses presented significant results in both sexes (0.000). Both the speed test (speed20m) and the strength test of the lower limbs (CMJ) presented significant results in the sport. Muscle strength is crucial to volleyball performance. In the speed test, the boys and girls presented (p = 0.000). It was noted that there was a strong and significant association (0.000) between maturational stage and bone age in both males and females.

Table 4. Correlation of bone age with anthropometric and physical variables.

Variables	R	P
Chronological age	0.860	0.000
Body weight	0.643	0.000
Height	0.767	0.000
Waist	-0.75	0.458
Sitting height	0.561	0.000
∑Folds	-0.362	0.000
Speed20m	0.349	0.000
Cmj	-0.516	0.000
Medicine ball	0.81	0.424
Tapping test	0.35	0.731
Maturational stage	0.790	0.000

Table 4 presents the correlational data between anthropometric, physical and maturational variables with bone age. The test presented strong correlations between most variables; only the BMI, waist, medicine ball and tapping test did not present significant results in the Correlation test.

Discussion

The battery of anthropometric, physical and maturational evaluations, aids the identification and selection of potential sports talents in sports. Volleyball has become a very fast sport, leading to a reduction in the duration of the rallies and an increase in the intensity of pace of play, involving more and more aerobic components during the match. To accompany this development, volleyball players need to develop more muscles, in order to increase their power and efficiency in decisive moves.

In general, talent identification and selection strategies adopted by clubs and schools appear to be strongly influenced by body size and the state of maturity reached by the young athlete. Maturation presented by boys and girls can be classified as late, normal or accelerated, in addition, functional capabilities are related to maturational stage and a wide range of body sizes are present in volleyball players (13, 14).

The importance of morphological changes can be seen in the literature, such as the significant changes the body undergoes, related to anthropometric variables, which were observed in the results found in this study, principally related to weight, the sum of skinfold thicknesses and the waist, confirming the results found in the scientific literature on the subject (15).

What facilitates the use of chronological age for the selection and promotion of young athletes by many sports entities, is that, generally, the categories are still guided by this, in addition to evidence of a correlation between chronological age, maturational stage and the individual motor performance as shown by some studies (14, 15). Despite this, bone age has emerged as the gold standard reference for determining biological and maturational age, whereby the development stage of the individual can be determined with greater certainty. Thus, technicians require more feasible ways to analyze the athletes more thoroughly, with maturity evaluation through bone age being one way to achieve this (15).

Studies with athletes from the Brazilian national adult volleyball team showed that they presented significantly delayed menarche age (13.0), compared to the Brazilian child and adolescent selection (10.5) or even adult athletes (11.1) from

Brazilian clubs (4, 16). This study also mentions that taller athletes are later maturing. Some studies also point to the importance of height as a variable for achieving high sporting performance in volleyball, and thus it is a prominent variable in the selection process of athletes for the sport, which refutes the findings in the present study. However, analyzing a variable such as height in isolation can lead to a serious risk of potential athletes being excluded during the initiation process in sports such as volleyball (17, 18).

When observing the principal significant effects on the maturational stage of the athletes, this study shows that players with accelerated maturation demonstrate higher anthropometric and physical characteristics than normal and late maturing players. Previous research has revealed a performance gradient in male adolescents at the beginning of late maturation for strength, speed, power and agility (Coelho e Silva, 2010; Malina, 2007). However, it is important to consider that the biological advantages in athletes with accelerated maturation are reduced in adolescence and later adulthood (13, 16, 19). What may seem like an advantage at the time of selection does not translate into effective results since many of these athletes can simply be replaced by others who reach maturity a little later (20, 21).

Talent identification and selection programs should recognize that athletes progress at different rates and personal trajectories, which means that if the opportunities are given, high skills can appear later in life (16, 22, 23). Nonetheless what often occurs at an early age is a selection influenced by biological attributes, where athletes with faster maturation are more likely to be selected (24, 25).

In particular a link was observed between age, weight and the sum of the skinfolds, which reinforces the results found in the literature that speak of the reasonableness of the supposition that high adiposity may make it more difficult for athletes to run, jump and throw (26, 27). Therefore, control of excess body weight in boys and girls could be an important factor for improving performance in volleyball.

When considering the results of the physical tests it can be seen that women presented the highest average age, but inferior speed, strength and power and the men demonstrated less agility as evidenced by the results of the Tapping Test and studies presented in the literature (4, 26, 28).

Interestingly, physical fitness seems to be as important as height or body weight in the selection of athletes. Some studies have indicated a strong trend, with significant results ($p < 0.01$) in young people with higher body weight and height, therefore, older and more mature individuals presented better results in performance tests, agreeing with the results shown in the tables above (4, 26, 29).

Conclusion

The conclusions of this study are que there is a strong correlation between physical and anthropometric variables with bone age and maturational stage, providing clear evidence of this as a reliable indicator of maturity and Demonstrating its importance as a further means of selection and promotion of sporting talent, principally with respect to volleyball. In addition, the variables waist, medicine ball and tapping test were the ones who were not correlated with bone age. All measurements are carried out through practical tests easy to apply and reliable minimizing the potential for error and increase reliability in the selection of future athletes through their different maturational stages.

Acknowledgements

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The influence of workplace on overall health in Slovenia and Lebanon – empirical research

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Abstract

Background: The article analyses the influence of workplace factors on satisfaction and their impact on overall health. The research tests three hypotheses: 'business premises' factors have a significant impact on employee satisfaction with the workplace; 'workspace design' factors have a significant impact on employee satisfaction with the workplace, and 'satisfaction of employees with the workplace' has a significant impact on the overall health of employees. The analysis is based on a comparison of respondents' answers in Lebanon and Slovenia. The purpose of the research is, firstly, to assess the influence of business premises and, secondly, to facilitating the improvement of employee health through the application of base parameters and subsequent adequate changes of workspace and work processes.

Methodology: The quantitative research was carried out in Slovenia and Lebanon in 2012. In Slovenia the questionnaire was completed by 1038 employees and in Lebanon by 394 employees from entities in the service sector. All the respondents in the research samples work in offices. The questionnaire is designed with a broad range of questions, scales and differentials. Testing of the questionnaire with the method of internal consistency demonstrates a high level of consistency in the questionnaire. The ethical commission from Slovenia approved the questionnaire. The results were statistically analysed with the factor analysis as a basis. Applied structural equation modelling was used for verifying the statistically significant mutual effects. Furthermore, the researchers analysed the results and carried out statistical calculations to test the hypotheses.

Results: The results show that business premises' factors of the workspace have an impact on the satisfaction of employees and consequently on their health. The factors as 'state of workspace', 'workspace orientation', 'state of business premises', 'illumination of workspace' and 'heating & cooling of workspace' have a statistically significant impact on the satisfaction of employees with the workspace. With the aid of factor analysis and analysis of structural equation modelling, it was tested whether the 'satisfaction of employees' factor affects the 'health' factors. Significant links with following factors were established: 'orthopaedic problems'; 'past health problems', 'cardiovascular problems' and 'state of health'. Despite differences between two countries, influences of workplace on satisfaction and state of health of employees prove similarly.

Conclusions: The statistical significance of the effect of business premises' factors of the workspace on the satisfaction of employees and consequently on the assessment of their health is found. The researchers highlight the need for additional analysis and research of the effect of relevant factors on the health of employees and preventive testing in the work environment.

Key words: workplace, employee satisfaction, overall health, Lebanon, Slovenia

1. Theoretical background

Human health is directly affected by the surroundings and habits. Employees spend a large part of their lives at work and as a consequence the workplaces typically influence their health. Employees encounter working conditions problems related to environmental and physical factors in many organizations around the world (Pizam & Thornburg, 2000). Research on workplace health promotion, friendly workplaces, healthy organizations, job stress, high performance workplaces,

strategic human resources management and leadership styles congregate around the importance of supporting employees to be effective in their jobs in ways that promote their health (Lippel et al, 2011, Vicher, 2008, Yoshikawa et al, 2007, Shain & Kramer, 2004, Van der Doef & Maes, 1996, Cooper and Cartwright, 1994).

Work-related injuries and diseases represent serious and costly burdens to all countries and is a major challenge to managers, unions, governments and the workers themselves. Common health problems such as spinal pain, diseases, allergies, respiratory problems, physical limitations and mental illness, emerge at some point during a worker's life. Many of the health problems of the workforce can be attributed to worsening public health with poor diets, growing obesity, smoking, and more sedentary lifestyles, all playing their part. Some can also be attributed to working conditions and workplace 'stress' (Ford et al, 2011, Quinlan et al, 2010). The long economic crisis in Slovenia poses an additional risk factor for mental health problems which clinicians should internalize and use screening tests. Symptoms of depression and anxiety can be masked in high-utilizers of medical care with physical complains, reported injuries sustained at work or at the way to work or psychoactive drug use (Avgustin et al, 2011). In Slovenia stress, depression and suicidal emotions are still increasing (Margan & Dodic, 2015). Due to recession, health problems are connected with the reality of keeping and getting the jobs, what creates new pathology. Health indicators show that the psychological problems are growing, consequences of stress are stronger, absentism and presentism of employees are bigger. Depression attaks also the younger generation. (Sestan et al, 2014). Grum & Kobal (2015) show that the perceived feeling of security one of the key factors for well-being of the residents' satisfaction.

Today, employee health is becoming a hard, economic 'factor of production'. Governmental agencies, businesses, and economists argue that workplace health and wellbeing ought to guide research and development, investment in technology, and customer relationship management. The issue not only affects the community in which the workplace is located, but also how the organization is managed (Stone, Canedo, & Tzafrir, 2013). Employees tend to reflect the wellness of their workplace environment through their well-being (Ljungblad et al., 2014). Moreover, it must be noted that the impact that a workplace has on its employees' health and well-being is not to be undermined. Poor management of the workplace health can lead to work-related ill health (Arnetz et al, 2011).

The present research is focused on the analysis of specific elements of the work environment and behavioural habits of employees at their jobs with the aim to discover the characteristics of the workplace that have the most effect on the individual. The comparison between Lebanon and Slovenia is made to find similarities and differences of the work environment, satisfaction, and state of health in different geographic, cultural, political, economic and religious environments. The interest of the research is also focused on characteristics of workplace which affect the employees' health in comparison with the results from the other researches.

1.1 Job satisfaction and Employee Health

Job characteristics are not the only factors that influence well-being at work. Individual differences in coping styles appear to have an influence too (Diener, Lucas, & Scollon, 2006). Two acclaimed theories of workplace stress identify the following stressors as key factors in the onset of stress-related illness. First, the Demand-Control-Support model (DCS), predicts that high levels of job demands (external pressures and workload), low levels of job control (over events, and chance to use skills), and low levels of social support (from supervisors, colleagues, feedback) are strongly associated with negative health outcomes (Van der Doef & Maes, 2000). The model predicts interactions between demands and control, and demands and social support, so that control and support will mitigate the negative effect of job demands on health outcomes (Karasek & Theorell, 1990). The second popular model, the Effort-Reward Imbalance model (ERI) predicts that high levels of extrinsic effort (from external pressures), and intrinsic effort (internal motivations/work 'over commitment'); and low levels of reward (pay, job security, recognition, and promotion prospects), will significantly predict negative health outcomes. Reward is predicted to buffer against the negative effect of efforts on health outcomes (Siegrist, 1996).

These two models are found to be good predictors of physical and psychological health outcomes including heart disease, mortality, and depression in many occupational groups (Mark & Smith, 2012; Kinman & Court, 2010; Kinman, & Jones, 2008; Dollard & Winefield, 1998). Factors such as high levels of workload and job demands, low peer support, and poor working relationships in populations would certainly suggest that these populations may be at high risk from stress-related illness. When high levels of workload are present in a job, a person's basic needs for personal growth and performance must be met one way or another (Porter, 2012; Herzberg, Mausner, & Snyderman, 2011). Consequently, a workplace should provide a range of opportunities for employees to build their skills, to improve their performance, and to prepare them for future positions. This makes employees feel valued and supported by their jobs in pursuing their future aspirations. If employees feel that they are not challenged by their jobs, their mental well-being, performance, and self-esteem, will drop (Jacobs & Washington, 2003).

Moreover, a company's ability to recruit and retain talent is directly affected by the quality of the physical workplace environment. Some factors in the workplace environment are fundamental, affecting employees' engagement, productivity, morale, and comfort level, both positively and negatively (Kuvarjee, 2014; Earle, 2003). On one hand, job satisfaction is also considered to be resulting from a set of factors, characterizing the context in which work is performed. Such are typically called company policies and administrative practices. Primary among these, are technical quality of supervision, interpersonal relations, especially with supervisors, physical working conditions, job security, benefits and salary (Jiang, 2013; Maamari & Smith, 2012; Herzberg et al., 2011). On the other hand, dissatisfaction in a job may be caused by environmental factors, such as poor lighting, poor ventilation, poor working conditions, low salaries, and poor supervisory relationships. These are considered to be basic needs and for that matter, are the responsibility of the respective society, businesses and industrial institutions, which are expected to provide for their employees in order to self-actualize (Baricic & Temeljotov, 2014; Herzberg et al., 2011; Kalleberg, 2011; Pirson, & Lawrence, 2010).

Although convenient workplace conditions are requirements for improving productivity and quality of outcomes, working conditions in many organizations may present lack of safety, health and comfort issues such as improper lightening and ventilation, excessive noise and emergency excess (Kalleberg, 2011; Pirson, & Lawrence, 2010). Pech and Slade (2006) identify an increase in so-called employee. They focus on symptoms of disengagement such as distraction, lack of interest, poor decisions and high absence, rather than the root causes. The working environment is probably a key root factor causing employees' engagement or disengagement (Dollard & Bakker, 2010). Another study indicates that improving the working environment reduces complaints and absenteeism while increasing productivity (Roelofsen, 2002). Wells (2000) states that job satisfaction is associated with workplace satisfaction. In recent years, employees' comfort on the job, determined by workplace conditions and environment, has been recognized as an important factor for measuring their productivity (Locke, & Romis, 2012; Johns, 2010). This is particularly true for those employees who spend most of the day operating a computer terminal. As more and more computers are being installed in workplaces, an increasing number of businesses have been adopting ergonomic designs for offices and plant installations. Ergonomics, also called biomechanics, has become popular because of demand of workers for more human comfort (Carroll-Garrison, 2012). Furthermore, the nature and quality of social interactions at a workplace have their effect on the employees' job satisfaction, self-esteem and productivity. As suggested by Weiss and Cropanzano (1996), the most proximal outcomes of aversive work experiences should be affective or attitudinal in nature, in that, social interactions and interpersonal relationships have the ability to elicit strong negative feelings. As a form of mistreatment, it follows that workplace incivility may likewise impact employee attitudes. Workplace incivility reflects a culture, and is broadly characterized as a form of workplace deviance. It is considered as injurious to organizations at both the macro and individual levels. At the macro-level, workplace deviance is believed to increase employee turnover, absenteeism, and litigation, and lower productivity (Hoel, Sheehan, Cooper, & Einarsen, 2011).

The emerging model of healthy workplaces calls for a multidisciplinary perspective that addresses the twin goals of employee well-being and business success (Lowe, 2004). The greatest challenge is that this model requires employees and managers to think about the workplace far more holistically (Gilbreath, 2012; Chu et al, 2000). A healthy organization is one in which employee health and well-being is viewed by all decision makers as an important goal in its own, and at the same time, one that directly contributes to the overall performance of the organization. In any case, this new thinking requires a major shift in an organization's culture and mission (Lowe, 2004).

1.2 Hypotheses

The broader research was devoted to the analysis of specific elements of the work environment and behavioural habits of employees at their jobs with the aim to discover the characteristics of the workplace that have the most effect on the individual. The objective of this study was to use the discovered parameters and consequential changes of the work environment and work processes to ensure a sustainable effect on the improvement of employees' health. The bases of this research were three fundamental hypotheses within which we specified the sub-hypotheses.

Hypothesis 1: Business premises and Workplace factors have a significant impact on the satisfaction of employees with the workspace.

Hypothesis 2: Workspace design factors have a significant impact on the satisfaction of employees with the workspace.

Hypothesis 3: Satisfaction of employees with their workplace has a significant impact on the health of employees.

2. Methods

The researchers carried out a quantitative research using a broad host of questions, scales and differentials, whereby the majority of instruments were specially constructed with suitable measurement characteristics. The questionnaire demonstrated a high level of consistency according to the method of internal consistency or the Cronbach Alpha's coefficient showed that.

The questionnaire comprises 160 variables divided into eight content sections: general questions, business premises and workplace, workspace design, habits, conditions in the workspace, organizational culture, state of health, and mental health condition. The questionnaire included two question designs. A part of the questionnaire included questions with pre-set parameters to choose from, and the remaining part included 3 or 5 component Likert' scale items.

2.1 Research parameters

For the collecting of data, the researchers designed an online anonymous survey questionnaire with closed questions, based on definitions gathered from the literature. It is the fundamental objective of the questionnaire was to investigate the relationship among the selected factors of workspace, organizational culture, and the physical and mental health condition of employees. The cover letter demanded respondents to answer concerning their business building and workspace, organisational concerns and their work.

The questionnaire was responded to by 1038 employees from Slovenia, from organizations within the service sector (i.e. financial sector, healthcare sector, civil service and other), what is 98 % response rate. In Lebanon 394 respondents from the financial and administrative sector answered the questionnaire what was 100% response rate. All respondents included in the sample perform only office tasks and participated voluntarily with the assurance of their anonymity.

2.2 Data processing

The data were processed with the SPSS statistical software and subjected to factor analysis and structured equation modelling. The collected data were first processed with exploratory factor analysis, which was used to research the number of factors required for the presentation of specific information. It continued with a confirmatory factor analysis, which was used to test the quality of the metric and structural part of the model. The confirmatory factor analysis was also used to test hypotheses and the links and/or structure in exploratory factor analysis of specific factors.

In the last stage we applied the Structural equation modelling method was applied, to overcome the restrictions of multi-variant techniques and to achieve statistically efficient and transparent assessment of relationships when dealing with several mutual relationships at the same time.

3 Results

3.1 Theoretical model

In the theoretical model of the researched influences, we included constructs:

The *workspace* construct includes the 'Business premises and workplace', 'Workplace design' and 'Conditions of workplace' questionnaire sections, and comprises a total of sixty variables.

The *state of health* is constructed by thirty-one variables.

3.2 'Business premises and workplace' section

The 'Business premises and workplace' section of the questionnaire comprised 20 questions or statements regarding the description of the macro and micro location of the workspace, e.g.: workspace location, building location, accessibility by public transport, use of public transport, possibility of parking, age of building, description of building construction, description of specific construction components (walls, ceiling and floor) information on

the renovation of building, information on building maintenance, job description (micro location, type of office, location of the nearest superior's office, information on the cleaning of premises.

3.2.1 Slovenia

We confirmed the suitability of data for factor analysis and confirmation of typical correlations in the correlation matrix with the Bartlett test (p=0.000). The results of the KMO test (0.561) showed that the connection and suitability of variables are adequate. Through the application of factor analysis and based on the Kaiser criterion, we selected a solution with three factors, which explain 51.79% of the total variance. Upon the completed rotation, we use the first factor of the section to explain 18.93% of the total variance, the second factor to explain 17.32%, the third factor to explain 15.54% of the total.

Table 1 shows the connections of the remaining 11 variables (Variable/question) of the 'Business building and workplace' section with the following factors (Components): State of workspace, Orientation of workspace, State of business premises.

The first factor is named **State of workspace** and it includes five variables: 'the distance of window', 'the distance of the outer wall', 'location of my workplace', 'floor furnishing', 'kind of workplace'. The second one is named **Orientation of workspace** and it includes two varia-

Table 1. Slovenia - 'Business premises and workplace section' Rotated Component Matrix[a]

	Component		
	1	**2**	**3**
The distance of window closest from my workplace is (less than 1m...more than 4m)	,838		
The distance of the outer wall from the place where I work (less than 1m...more than 4m)	,777		
My workplace is (in the basement, floor, et)	-,545		
The floor of the room where I work is clad with (wood, textile, plastic, stone, other)	,505		
My workplace is in an office (I'm alone, open plan office etc.)	,454		
A large share of windows and walls surfaces is oriented to (north, south...)		,972	
The window surface closest to my workplace is oriented to (north, south...)		,971	
The room where I work was last thoroughly refurbished (building, heating, ventilation…)			,705
Age of the building where I work (less than 5 years...older than 30 years, don't know)			,700
The room where I work is regularly maintained (once a year... once in four years)			,609
The construction of the building where I work (reinforced concrete, wooden etc.)			,571

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 4 iterations.

bles: 'sky orientation of the windows and walls' and 'sky orientation of the window closest to my desk'. The third factor is named **State of business premises** and it includes four variables: 'refurbishment of the room', 'age of the building', 'regular maintenance', 'construction type'.

3.2.2 Lebanon

We confirmed the suitability of data for factor analysis and confirmation of typical correlations in the correlation matrix with the Bartlett test (p=0.001). The results of the KMO test (0.599) showed that the connection and suitability of variables are adequate. Through the application of factor analysis and on basis of the Kaiser criterion, a solution with three factors was chosen. This explains 62.72% of the total variance. Upon the completed rotation, we use the first factor of the section to explain 25.64% of the total variance, the second factor to explain 20.54%, the third factor to explain 16.54% of the total variance.

Table 2 shows the connections of the remaining 9 variables (Variable/question) of the 'Business building and workplace' section with the following factors (Components): State of workspace, Orientation of workspace, State of business premises.

The first factor is named **State of business premises** and it includes two variables: 'construction type' and 'location of the premises'. The second one is named **Orientation of workspace** and it includes

three variables: 'the distance of the outer wall', 'the distance of window' and 'sky orientation of the window closest to my desk'. The third factor is called **State of workspace** and it includes four variables: 'wall furnishing' 'location of my workplace', 'kind of workplace' and 'floor furnishing'.

The results show small differences in the content of three components between Slovenian and Lebanese respondents. The major differences are found out in the component 'State of business premises' – for Slovenian respondents beside the construction of the building, 'age of building, maintenance and refurbishment' are more characteristic for this component, and for Lebanese 'location of the business premises'.

3.3 'Workspace design' section

This section, named as 'The concept of my workplace' in the questionnaire included 10 questions and/or statements on the possibility to control devices in the workplace, e.g. questions regarding heating, cooling, natural lighting and the possibility of control thereof.

3.3.1 Slovenia

The Bartlett test (p=0.001) confirmed the suitability of data for factor analysis, while the result of the KMO test (0.655) indicates a sufficient connection and suitability of variables. We specifi-

Table 2. Lebanon 'Business premises and workplace' section, Rotated Component Matrix[a]

	Component		
	1	**2**	**3**
The construction of the building where I work (concrete/brick, wooden, prefabricated…)	,865		
Location of the business premises where the workplace is in (centre of settlement, inside, periphery, outside)	,836		
The distance of the outer wall from the place where I work is (less than 1m…)		,817	
The distance of window closest from my workplace is (less than 1m... more than 4m)		,807	
The window surface closest to my workplace is oriented to (north, south...)		,502	
The walls of the room where I work are (raw, painted/wall papered, wood/textile clad, made of glass/artificial material, other)			,809
My workplace is (in the basement, floor etc.)			,677
My workplace is in an office (I'm alone, open plan office etc.)			,598
The floor of the room where I work is clad with (wood, textile, plastic, stone, other)			,407

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

ed two factors for the 'Workspace design' section, which together explain 53.03% of the total variance. After rotation, the first factor explains 29.57% of the total variance, the second 23.46% of the total variance. The found factors are shown in Table 3, which we named: Illumination of workspace, Heating/cooling of workplace.

The first extracted factor is named **Illumination of workspace** and it includes 4 variables: 'windows with blinds', 'local regulation of blinds', 'direct sunshine', 'windows could be open'. The second factor is named **Heating/cooling of workspace** and it includes 3 variables: 'central ventilation system', 'local regulation of ventilation system', 'air condition'.

3.3.2 Lebanon

The Bartlett test (p=0.001) confirmed the suitability of data for factor analysis, while the re-sult of the KMO test (0.680) indicates a sufficient connection and suitability of variables. We specified two factors for the 'Workspace design' section, which together explain 66.41% of the total variance. After rotation, the first factor explains 42.41% of the total variance, the second 24.00% of the total variance. The found factors are shown in Table 4, which we named: Illumination of workspace and Heating/cooling of workplace.

Two factors were extracted, the first one is named **Illumination of workspace** and it includes 4 variables: 'windows with blinds', 'local regulation of blinds', 'direct sunshine', 'windows could be open'. The second factor is named **Heating/cooling of workspace** and it includes 4 variables: 'thermostat regulation of heating system', 'local control of air condition', 'cooling-heating system' and 'local control of ventilating system'.

The differences between the two countries are found in the second factor 'Heating/cooling of

Table 3. Slovenia – 'Workspace design' section , Rotated Component Matrix[a]

	Component	
	1	**2**
The windows are furnished with blinds	,750	
The window blinds are controlled from the workplace	,744	
The work place is at least part of the day directly sunlit	,670	
The windows can be open-end	,656	
The room is ventilated by a central ventilation system		,790
The intensity of ventilating can be set with switch in the room		,763
The room is cooled / heated with an air conditioner		,599

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Table 4. Lebanon – 'Workspace design' section, Rotated Component Matrix[a]

	Component	
	1	**2**
The windows are furnished with blinds	,920	
The window blinds are controlled from the workplace	,914	
The work place is at least part of the day directly sunlit	,724	
The windows can be open-end	,687	
The heating elements are furnished with a thermostat to regulate the intensity of cooling / heating		,834
The air conditioner can be controlled with a switch from the workplace		,773
The room is cooled or heated with a cooling - heating element		,755
The intensity of ventilating can be set with switch in the room		,733

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

workplace', where for Slovenian respondents the characteristics connected with this factor are, beside the possibility of local regulation of ventilation system which were mentioned in both cases, are: 'the room is ventilated by central ventilation system' and 'the room is cooled/heated with an air condition'. In comparison, all Lebanese respondents mentioned characteristics in this factor that are focused on the regulating possibility.

3.4 'Conditions of workplace' section

The 'Condition of workplace' section included 30 questions and/or claims, based on evaluation of the level of the satisfaction with different characteristics of the place, for example: indoor quality characteristics, ICT equipment, furniture condition, cleaning and maintenance characteristics, possible real estate characteristics as reasons for changing the job, overall satisfaction characteristics.

3.4.1 Slovenia

The suitability of data for factor analysis was confirmed with the Bartlett test (p=0.001), while the result of the KMO test (0.893) shows a high level of connection and suitability of variables for examination. We specified three factors for the 'Condition of workplace' section which together explain 59.21% of the total variance. After rotation, 15 variables are represented in three components. The first factor, which is named 'Satisfaction of workplace', explains 40.17% of the total variance, the second called 'Climatic characteristics of the workplace' 10.10% and the third one named 'Performing at the workplace' explains 8.93% of the total variance. The found factors are shown in Table 5.

Three factors were extracted, the first one is named **Satisfaction with the workplace** and it includes 9 variables: 'overall satisfaction with the conditions', 'pleasant workplace', 'statement of feeling good in the workplace', 'satisfaction with the business premises', 'satisfaction with the furniture and facilities', 'valuation of cleanliness', 'valuation of hygiene standards', 'satisfaction with 'ventilation', 'desire of changing the job due to physical working conditions'. The second factor is named **Climatic characteristics of the workplace** and it includes 3 variables: 'concentration of humidity', 'dry air', 'too hot or cold place'. The third one is named **Performing at the workplace** and it includes 3 variables: 'concentration problems', 'the influence of the place arrangement on work efficiency', 'work performance'.

Table 5. Slovenia – 'Condition of workplace' section, Rotated Component Matrix[a]

	Component		
	1	**2**	**3**
I am pleased with the conditions of my workplace	,865		
My workplace is pleasant	,853		
I feel good in my workplace	,844		
The business premises are as new and pleasant to work in	,782		
The furniture and facilities assure pleasant feeling and work efficiency	,688		
The workplaces are clean	,667		
The standards of hygiene in business premises are high	,651		
Ventilation of the workroom is good	,613		
Due to the conditions in workplace I am contemplating a change of employment	-,597		
There is only exceptionally too high humidity in the workplace		,789	
There is only rarely to dry air in the workplace		,734	
The workplace is only exceptionally uncomfortably hot or cold		,665	
In my workplace I only exceptionally have problems with concentration			,671
The arrangement of the workplace influence my feelings and work efficiency			,622
As a rule, I have no problem with performance in my workplace			,596

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

3.4.2 Lebanon

The suitability of data for factor analysis was confirmed with the Bartlett test (p=0.001), while the result of the KMO test (0.854) shows a high level of connection and suitability of variables for examination. We specified three factors for the 'Condition of workplace' section which together explain 61.74% of the total variance. After rotation, 14 variables are represented in three components (shown in a table 6). The first factor, which is named 'Satisfaction of workplace', explains 38.11% of the total variance, the second called 'Climatic characteristics of the workplace' 13.94% and the third one named 'Lighting at the workplace' explains 9.69% of the total variance.

Three factors were extracted, the first one is named **Satisfaction with the workplace** and it includes 9 variables: 'pleasant workplace', 'desire of changing the job due to physical working conditions', 'overall satisfaction with the condition', 'satisfaction with the furniture and facilities' 'decision of changing the job due to physical working conditions', 'statement of feeling good in the workplace', 'satisfaction with the business premises', 'valuation of hygiene standards', 'feeling motivated in the workplace'. The second factor is named **Climatic characteristics of the workplace** and it includes 3 variables: 'concentration of humidity', 'too hot or cold place', 'dry air'. The third one is named **Lighting at the workplace** and it includes 2 variables: 'natural lighting', 'additional lighting'.

In this section, differences in the 'Satisfaction with the workplace' section occurred. The Lebanese group characteristics connected with changing the job due to the working place conditions were more influenced than in Slovenian group. The third factors are not the same. In Slovenia it is the factor 'Performing at the workplace', including variables: 'concentration problems', 'the influence of the place on work efficiency', 'work performance' and in Lebanon the factor 'Lighting at the workplace' is extracted, including variables 'natural' and 'additional' lighting.

3.5 'State of health & health care' section

The 'Health condition' section of the questionnaire included 31 questions and/or claims from the perspective of self-assessment of health, as: self evaluation of state of health, does the respondent hold the disabled person status; is he/she a chronic patient; has he/she been diagnosed with an occupational disease; does he/she experience pain in the back, spine, neck, or has high blood pressure; does he/she suffer from headaches, rheumatism, problems with blood flow, allergies; is he/she on a diet; does he/she connect medical problems

Table 6. Lebanon- 'Condition of workplace', Rotated Component Matrix[a]

	Component		
	1	**2**	**3**
My workplace is pleasant	,809		
The conditions in the workplaces may be a reason for changing the employment	-,762		
I am pleased with the conditions of my workplace	,754		
The furniture and facilities assure pleasant feeling and work efficiency	,730		
Due to the conditions in workplace I am contemplating a change of employment	-,705		
I feel good in my workplace	,699		
The business premises are as new and pleasant to work in	,680		
The standards of hygiene in business premises are high	,649		
As a rule I am very motivated in my workplace	,594		
There is only exceptionally too high humidity in the workplace		,808	
The workplace is only exceptionally uncomfortably hot or cold		,784	
There is only rarely to dry air in the workplace		,762	
Natural lighting of the workplace is good			,839
No additional lighting with ceiling or table lamps is necessary in more than 60 % of the time			,728

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

with workplace conditions; is he/she on sick leave and, if so, how long was he/she absent; has he/she had health treatment in spas; does he/she take medication; how many times has he/she been operated on in a hospital; does he/she have regular medical examinations and other questions related to health care habits.

3.5.1 Slovenia

The typical correlations of the correlation matrix were confirmed by a Bartlett test (p=0.001), while the result of the KMO test (0.774) confirmed the suitability of the variables for examination. The criterion of own value determined 13 factors of the section, which – together – explain 55.54% of the total variance. The first factor explains 25.53%, the second an additional 14.83% and the third 10.17% of the total variance. The information in 13 of the variables can be represented by 3 components as displayed in table 7.

The first extracted factor is named **Orthopaedic problems** and it includes 4 variables: 'occasional pain in my back', 'occasional pain in neck', 'occasional pain in the spine', 'suffer from rheu-

matism'. The second one is named **Past health problems** and it includes 4 variables: 'sick leave in the last year', 'therapies in health institutions or spa in last four years', 'physician's help because of troubles at work in last five years' and 'a state of health in last year'. Third factor is named **Cardiovascular problems** and it includes 5 variables: 'high blood pressure', 'regularly taking medicines', 'chronic disease', 'high blood sugar', 'blood circulation problem'.

3.5.2 Lebanon

The typical correlations of the correlation matrix were confirmed by a Bartlett test (p=0.001), while the result of the KMO test (0.892) confirmed the high suitability of the variables for examination. The criterion of own value determined 2 factors of the section, which together explain 59.63% of the total variance. The first factor explains 45.81%, the second an additional 13.82% of the total variance. The information in 15 of the variables can be represented by 2 components as displayed in table 8.

Table 7. Slovenia – 'State of Health & Health Care' section, Rotated Component Matrix[a]

	Component		
	1	**2**	**3**
I have occasional pain in my back (muscle tension)	,877		
I have an occasional pain in neck	,838		
I have occasional pain in the spine	,831		
I suffer from rheumatism	-,383		
In the last year I have been on sick leave because of my own diseases (0 days... more than 15 days)		,732	
In the last three years I have had therapies in health institutions or spa (less than 7 days... more than 29 days)		,726	
In the last five years I have sought a physician's help because of troubles at work (never... more over than three times)		,596	
In the last 12 months my state of health has (remained the same, improved, deteriorated)		-,429	
I have a high blood pressure			,734
Presently I regularly take pills, capsules, drops, salves			-,688
I suffer from a chronic disease			,601
I have high blood sugar			,599
I have a blood circulation problem			,446

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Table 8. Lebanon – 'State of health & Health care' section, Rotated Component Matrix[a]

	Component	
	1	**2**
In the last five years I have been operated on in outpatient dept. or in hospital	,872	
I evaluate my state of health as (very good...very bad)	,852	
I suffer from a chronic disease	-,850	
I do exercise (less than half an hour a week... more than four hours a week)	,821	
Presently I regularly take pills, capsules, drops, salves	,736	
In the last 12 months my state of health has (remained the same, improved, deteriorated)	,706	
Type of exercise (swimming, walking, outdoor individual or group sport, activities inside)	,669	
Presently I am not diagnosed any disease	,642	
Have the conditions in workplace been an immediate cause of sickness	-,617	
At home I check my weight with scales (up to 2 times weekly...never)	,538	
Do you link any of your diseases with the conditions of your workplace	-,537	
In the last year I have been on sick leave because of my own diseases (0 days...more than 15)	,503	
I have occasional pain in my back (muscle tension)		,864
I have an occasional pain in neck		,833
I have occasional pain in the spine		,775

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

The first factor is named **State of health** and it includes 12 variables: 'I've been operated in the last five years', 'evaluation of state of health', 'suffer from a chronic disease', 'I do exercise', 'regularly taking medicines', 'state of health in the last year', 'type of exercise', 'disease diagnose', 'sickness caused by condition in workplace', 'checking the weight', 'diseases caused by the conditions of workplace', 'sick leave'. The second factor is named **Orthopaedic problems** and it includes 3 variables: 'occasional pain in my back', 'occasional pain in neck', 'occasional pain in the spine.

In both countries 'Orthopaedic problems' factor appeared. The difference between the two groups of respondents is evidenced in this section. For the Slovenian group of respondents, two factors are highlighted, 'Past health problems' and 'Cardio-vascular problems', while for the Lebanese, only one, namely the 'State of health' factor.

3.6 Testing of hypotheses

Hereinafter we use the confirmatory factor analysis to test the quality of the measurement and structural part of the model. In the measurement part, we verified the compatibility of pattern data with the theoretic model. We applied the following suitability indicators: chi-squared (χ^2), RMSEA, CFI, GFI and SRMR.

Two main analyses are included in the model:

Business Premises and Workplace -> Satisfaction with the workspace -> State of Health

The Workspace Design -> Satisfaction with the workspace -> State of Health

3.6.1 Slovenia

H 1: Business premises and Workplace factors have a significant impact on the satisfaction of employees with the workspace.
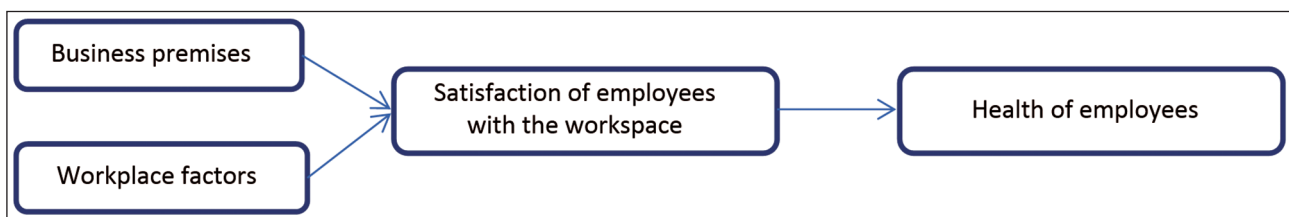

Figure 1. Slovenian model

Through the application of factor analysis and on the basis of factor weight matrix we identified the following factors of the 'Business premises and workplace' section:
- State of workspace
- Orientation of workspace
- State of business premises

H2: The Workspace design factors have a significant impact on the satisfaction of employees with the workspace.

Through the application of factor analysis and on the basis of factor weight matrix we identified the following factors of the 'Workspace Design' section:
- Illumination of workspace
- Heating/cooling of workspace

For the 'Condition of Workplace' section the factor weight matrix, we identified the following factors:
- Satisfaction with workspace
- Climatic characteristics of the workspace
- Performing at the workspace

H 3: Satisfaction of employees with their workplace has a significant impact on the health & health care of employees.

Through the application of factor analysis and based on factor weight matrix, we identified the following factors of 'State of Health & Health Care' section:
- Orthopaedic problems
- Past health problems
- Cardiovascular problems

Table 9. The achieved values of the SEM final model for Slovenia

| Causal Path			Path Coefficient	*p*
Satisfaction with the workspace	<---	State of business premises	-,217	***
Satisfaction with the workspace	<---	State of workspace	-,165	***
Satisfaction with the workspace	<---	Orientation of workspace	-,033	,250
Satisfaction with the workspace	<---	Illumination of workspace	-,228	***
Satisfaction with the workspace	<---	Heating/cooling of workspace	-,087	,003
Cardiovascular problems	<---	Satisfaction with the workspace	,085	,009
Past health problems	<---	Satisfaction with the workspace	-,166	***
Orthopaedic problems	<---	Satisfaction with the workspace	-,207	***

$***p < 0,001$
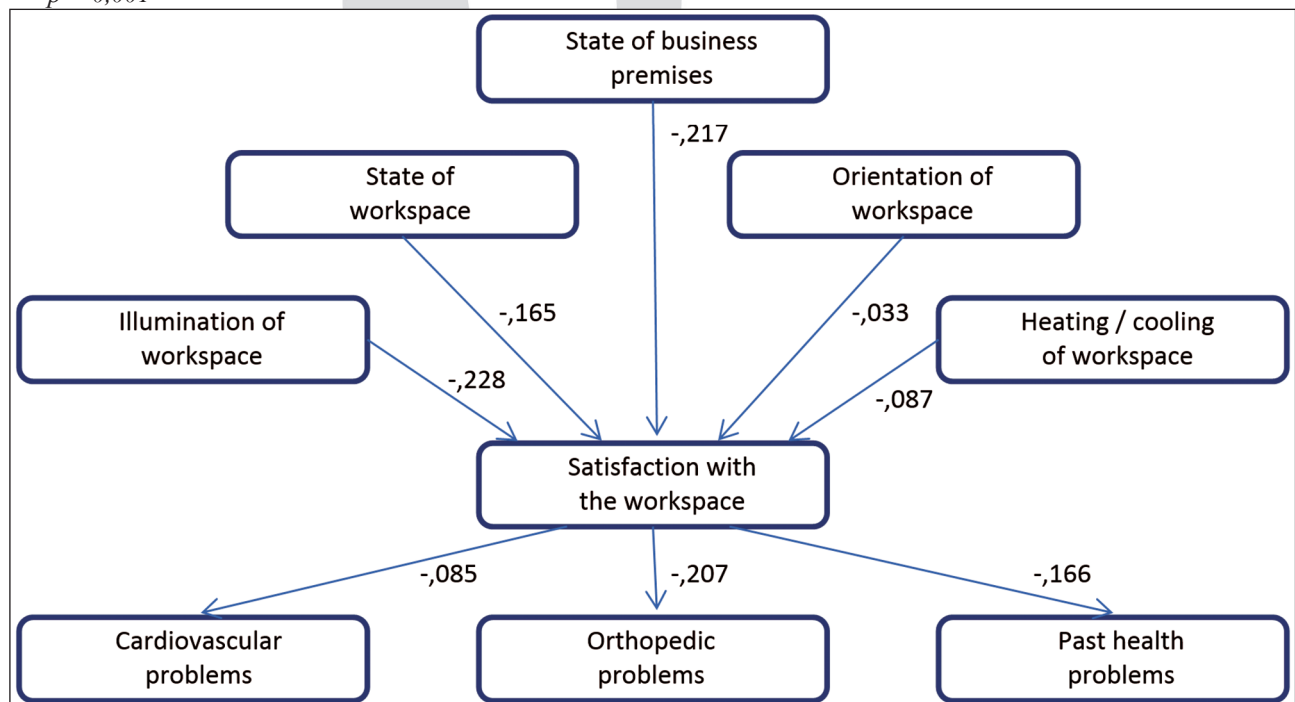
Figure 2. Results of SEM for Slovenia

Model fit information: $\chi^2 = 5{,}9$;
RMSEA$< 0{,}000$; CFI $\approx 1{,}000$; SRMR $= 0{,}010$

Based on the results of structural equation modelling (SEM) shown in Table 9 we established that the '*orientation of workspace*' has a statistically significant ($p < 0.001$) and a positive ($\beta = 0{,}106$) impact on the *Illumination of workplace* and '*state of workspace*' has a statistically significant ($p < 0.001$) and a middle ($\beta = 0{,}521$) positive impact on the *Illumination of workplace*. Moreover, '*Illumination of workplace*' has a statistically significant impact ($p < 0.001$) on the *Satisfaction of employees with the workspace* with a negative standardized β coefficient (-0.228). Following two factors also have statistically significant impact ($p < 0.001$) on the *Satisfaction of employees with the workspace*: '*state of business premises*' with a negative standardized β coefficient (-0.217) and '*state of workspace*' with a negative standardized β coefficient (-0.165). With $\beta = -0.166$ we established the negative link between the S*atisfaction with workspace* and the *past health problems of employees*. *W*ith $\beta = -0.207$ we established the negative link between the S*atisfaction with workspace* and the *orthopaedic problems of employees*. For the Slovenian case all three hypothesis are confirmed.

Hypothesis 1: Business premises and Workplace factors have a significant impact on the satisfaction of employees with the workspace. In the Slovenian case, two factors were found to be significantly important: 'State of business premises' (refurbishment of the room, age of building, regularly maintained room, building construction) and 'State of the workspace' (distance of the closest window, distance of outer wall, position of the workplace, floor finishing and office type-cell room or open space).

Hypothesis 2: Workspace design factors have a significant impact on the satisfaction of employees with the workspace. Factor 'Illumination of workspace' (windows with blinds, window blinds are local controlled, directly sunshine by the day, windows can be opened) was found as the one with the significant influence.

Hypothesis 3: Satisfaction of employees with their workplace has a significant impact on the health & health care of employees. The factor 'Satisfaction with the workspace' is characterized by 9 items: pleased with the condition, pleasant workspace, feeling good, state of business premises, state of furniture, cleanliness, hygiene standards, ventilation, changing the job. The link between this factor and health factors 'Orthopaedic problems' (pain in back, pain in neck, pain in spine, rheumatism) and 'Past health problems' (sick leave, therapies, physician help, state of health) are found to be significant.

3.6.2 Lebanon

H 1: Business premises and Workplace factors have a significant impact on the satisfaction of employees with the workspace.

Through the application of factor analysis and on the basis of factor weight matrix we identified the following factors of the 'Business premises and workplace' section:
- State of workspace
- Orientation of workspace
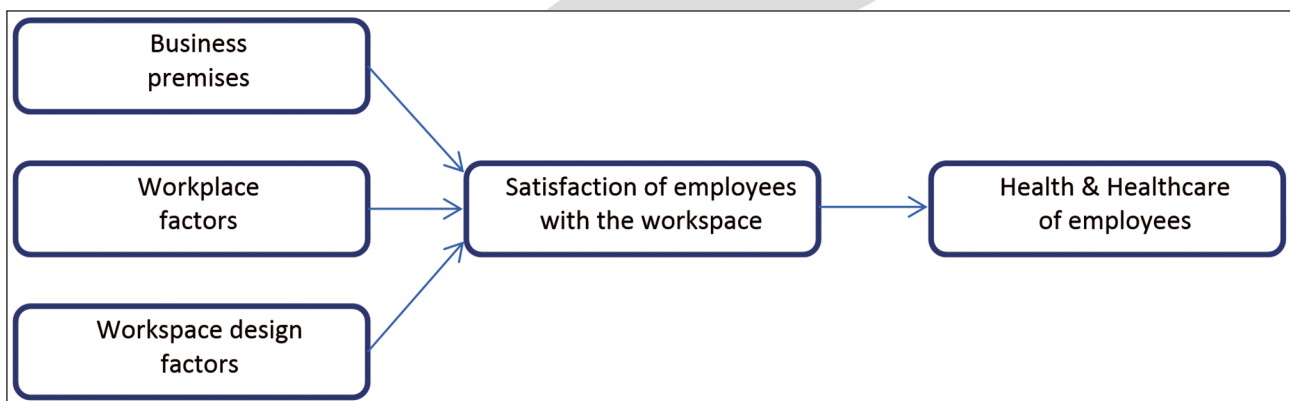- State of business premises

Figure 3. Lebanese model

H2: The Workspace design factors have a significant impact on the satisfaction of employees with the workspace.

Through the application of factor analysis and on the basis of factor weight matrix we identified the following factors of the 'Workspace Design' section:

- Illumination of workspace
- Heating/cooling of workspace

For the 'Condition of Workplace' section the factor weight matrix, we identified the following factors:

- Satisfaction with workspace
- Climatic characteristics of the workspace
- Lighting at the workplace

H 3: Satisfaction of employees with their workplace has a significant impact on the health & health care of employees.

Through the application of factor analysis and based on factor weight matrix, we identified the following factors of 'State of Health & Health Care' section:

- Orthopaedic problems
- State of health

Model fit information: $\chi^2 = 5,1$; RMSEA < 0,008; CFI ≈ 1,000; SRMR = 0,015

On the basis of results of structural equation modelling shown in Table 10 we established that the following three factors have statistically significant impact (p < 0.001) on the *Satisfaction*

Table 10. The achieved values of the SEM final model for Lebanon

| Causal Path			Path Coefficient	p
Satisfaction with the workspace	<---	Orientation of workspace	,248	***
Satisfaction with the workspace	<---	State of business premises	-,025	,609
Satisfaction with the workspace	<---	State of workspace	-,194	***
Satisfaction with the workspace	<---	Heating/cooling of workspace	,032	,471
Satisfaction with the workspace	<---	Illumination of workspace	-,460	***
Orthopaedic problems	<---	Satisfaction with the workspace	,482	***
Health care and state of health	<---	Satisfaction with the workspace	-,259	***

***p < 0,001
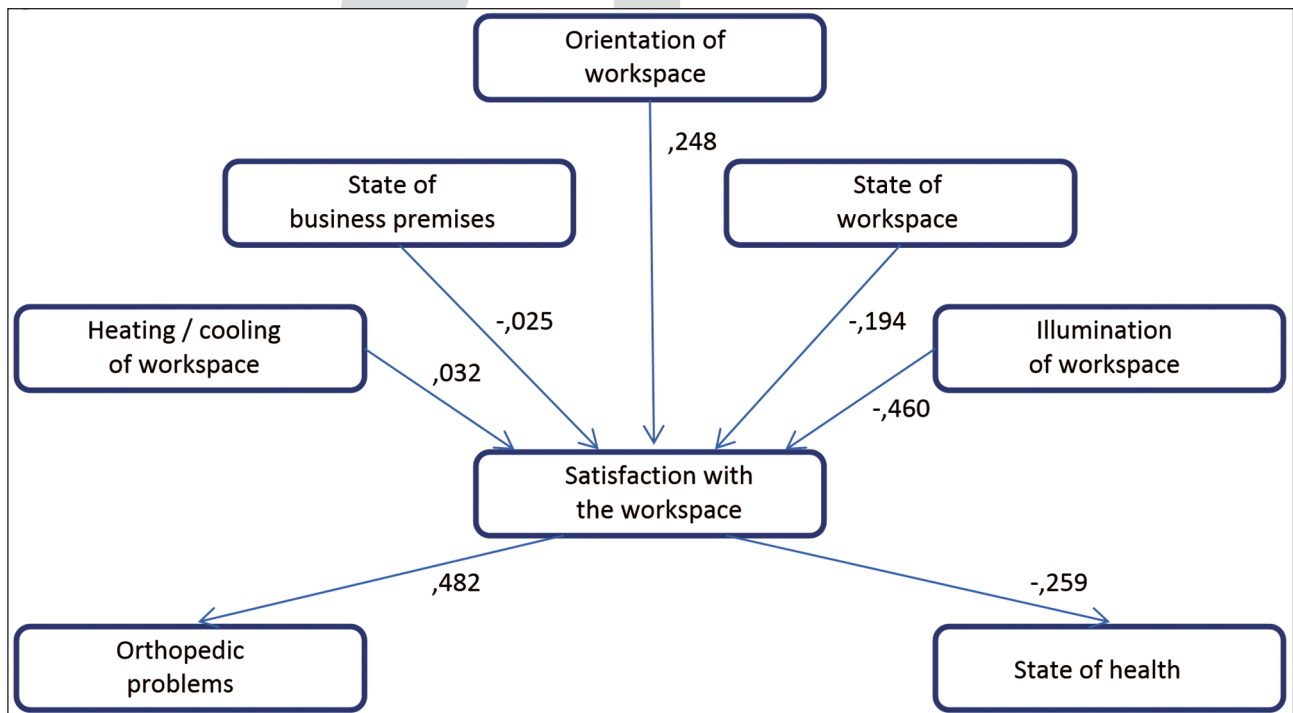
Figure 4. Results of SEM for Lebanon

of employees with the workspace: 'Orientation *of workspace'* with a positive standardized β coefficient (0.248), *'State of workspace'* with a negative standardized β coefficient (-0.194) and *'Illumination of workspace'* with a negative standardized β coefficient (-0.460).

The positive link between the S*atisfaction with workspace* and the *Orthopaedic problems of employees* is established (β = 0.482) and the negative one between the S*atisfaction with workspace* and the *Health care & state of health* (β = -0,259), both with statistical significant impact (p < 0.001).

All three hypotheses are confirmed.

Hypothesis 1: Business premises and Workplace factors have a significant impact on the satisfaction of employees with the workspace. In Lebanon's case, two factors were found to be significantly important: Orientation of workspace (distance of outer wall, distance of closest window, the closest window orientation) and State of workspace (wall finishing, position of workplace, office type-cell room or open space, floor finishing).

Hypothesis 2: Workspace design factors have a significant impact on the satisfaction of employees with the workspace. The same as in the Slovenian case, the factor 'Illumination of workspace' (windows with blinds, window blinds are locally controlled, directly sunshine by the day, windows can be opened) was found as the one with significant influence.

Hypothesis 3: Satisfaction of employees with their workplace has a significant impact on the health & health care of employees. The factor 'Satisfaction with the workspace' is characterized by 9 items: pleasant workspace, changing the job, pleased with the condition, furniture and facilities assures pleasant feeling, changing the employment, feeling good, state of premises, hygiene standards, motivation at work. Differently from Slovenian respondents only the link between this factor and overall health factor 'Health care and state of health' (being operated, state of health, chronic disease, exercise, taking pills, state of health in last 12 months, type of exercise, disease diagnose, workplace as a cause, checking the weight, link between workplace condition and disease, sick leave) was found to be statistically significant in the Lebanese work environment.

5. Discussion

The main purpose of the study is determining the healthy workplaces from the employees' perspective in Slovenia and Lebanon. It was important to find out the reaction on employees in the time of economic crisis, like in Slovenia, situated on European side of Mediterranean see or in the developed Arabic country as Lebanon, situated on the crossroads of the Mediterranean Basin and the Arabic hinterland. The theoretical and practical solutions, which were found from the other papers, are taken into account and results are compared. In the discussion, we stress that some of the findings were similar to the findings from the literature review part, and some are more specific.

In Slovenia as well as in Lebanon, the researchers found that Business premises and workplace factors have a significant impact on the satisfaction of employees with the workspace. In both cases, some of the characteristics were the same, like distance of the closest window, distance of the outer wall, floor finishing, a position of the workplace and office type (cell office or open space). This is in line with what is reported in the literature reviewed, where the physical conditions of the working environment are reported to affect the job satisfaction (Kalleberg, 2011, Pirson &Lawrence, 2010, Visher, 2008, 2005, Wells, 2000) and preferences of the employees (Temeljotov, 2005). For the Slovenian case, the factor 'State of business premises' includes the following characteristics: refurbishment of the room, age of building, regularly maintained room, building construction. These kinds of characteristics are frequently mentioned in the Sustainable Facility Management (FM) studies, from the perspective of added value for FM (Støre et al., 2014; Huovila et al., 2012; Jensen at al., 2012). In the Slovenian case, the main business area is in the city centre where the average business building's age is about 60 years, which should be renovated or refurbished. The employee psychological health and well-being depend on different organizational interventions (Nielsen & Abildgaard, 2013), which also include changes in working conditions.

Illumination of the workspace is a factor with a significant influence of Workspace design on employees' satisfaction in both countries and compri-

ses characteristics: windows with blinds, window blinds are local controlled, directly sunshine by the day, windows can be opened. The effect of workspace lighting on employees, and the need for local regulation, were investigated by several researchers (Haldi et a.l,2008; Nicol et al., 2006; Galasiu et al., 2006; Veitch, 2006), while measuring quality of the indoor environment. These researches were focused on heterogeneous factors of Indoor Environment Quality IEQ, especially physical ergonomic conditions of the workplace. Many of them reported a positive correlation between the satisfaction of users and the importance of individual control of conditions in their work environment (Toftum, 2010; Andersen et al., 2009; Haldi et al., 2008; Huizenga, 2006). Some of them claimed that in office buildings, users mostly complained about (too) low temperature, dry air, bad air or cold radiation next to windows, lack of sound privacy in open office spaces, as well as bad cleaning services. However, in this study, the researchers are surprised to find that the factor 'heating and cooling' of workplace is not significant for the satisfaction of employees, which means that heating and ventilating systems work well in office buildings in both countries.

As predicted, we found that satisfaction of employees with their workplace has a significant impact on the 'health of employees'. In both the Slovenian and the Lebanese cases, the factor 'Satisfaction with the workspace' is characterized by nine items, some of them common, such as: pleased with the condition, pleasant workspace, feeling good, state of business premises, hygiene standards, and some different, as: state of furniture, furniture and facilities assures pleasant feeling, cleanliness, ventilation, changing the job, changing the employment, motivation at work. The link between this factor (health & health care of employees) and the health factors 'Orthopaedic problems' (pain in back, pain in neck, pain in spine, rheumatism), 'Past health problems' (sick leave, therapies, physician help, state of health) and 'Health care and state of health' (being operated, state of health, chronic disease, exercise, taking pills, state of health in last 12 months, type of exercise, disease diagnose, condition on the workplace as a cause for sickness, checking the weight, link between workplace condition and disease, sick

leave) was found to be statistically significant in both Slovenia and Lebanon.

In both countries the results show the seriousness of the researched theme, especially from health care perspective. Being motivated, feeling good in a nice and clean surrounding is essential for people to being healthy at work. The results show that employees connect all these characteristics and also search for new opportunities (changing the job, changing the employment) if they are not satisfied, or if the environment causes them sickness (physical- pains, therapies, state of health, chronic diseases, etc. or mental – stress, depression). As mentioned in the theoretical part, many researchers report positive correlations between the job satisfaction of employees and their health condition, including stress, depression, obesity, and cardiovascular diseases, with the focus on the aspects of health promotion on the job (McTernan et al, 2013, Ford et al, 2011, Drach-Zahavy, 2008; Noblet & LaMontagne, 2006; Shannon et al., 2001) and also connecting pain in the neck, spine and back as caused by stress (Cernelic, 2008). It is reported that people working under inconvenient conditions may end up with low performance and face occupational health diseases causing high absenteeism and turnover (Leblebici, 2012).

Workplace culture is a mediating factor in either reducing or increasing stress. On one hand, morale, autonomy, and team dynamics can have an effect on workplace stress and subsequently productivity (Consiglio, 2013). Bullying, discrimination, and abuse of employees are extreme examples of poor workplace culture. On the other hand, investment in creating a positive workplace culture can be viewed as an investment in social capital, which is a resource that all individuals can access (Hillier, Fewell, Cann & Shephard, 2005). There is no doubt that reducing the risk of workplace injury, morbidity and mortality, will yield large benefits for the economy, the health care system, and for individuals and their families (Goetzel & Ozminkowski, 2008). For example, workplace wellness programs have been increasingly popular, especially in the United States in recent years, since these programs can support and promote employee health, medical costs reduction, and increased productivity, where they are estimated to generate savings by spent on wellness

programs, while absenteeism costs fall for every dollar spent (Baicker, Cutler, & Song, 2010).

Findings from the research should be taken seriously, as we are aware that synchronous stressor strain effects tend to strengthen over time, with stressor-psychological strain effects increasing especially when workers are constantly exposed to stressors (Ford et al, 2014).

6. Conclusions

The present research examined the impact of business premises' factors of the office workplaces in Lebanon and Slovenia on the satisfaction of employees and, consequently, health of employees. Thereby we set the research impact model, which includes three constructs: business premises' factors of the business building, satisfaction of employees and health of employees. Furthermore, we designed dimensions for each of the above.

Based on the results of the Structural Equation Modelling, and similarly to previously reported research results presented in the theoretical part, the researchers established that within the framework of the business premises' factors of the business building construct, Business premises and Workplace factors, as Orientation of workplace, State of workplace, and State of business premises, have a significant impact on the satisfaction of employees with the workspace. The mentioned characteristics in the factors are: distance of outer wall, distance of closest window, the closest window orientation, wall finishing, floor finishing, and position of workplace, office type-cell room or open space, floor finishing, refurbishment of the room, age of building, regularly maintained room, and building construction. We confirmed significant influence of Workspace design factor 'Illumination of workspace on the satisfaction of employees with the workspace with the characteristics: windows with blinds, window blinds are local controlled, directly sunshine by the day, windows can be opened.

Based on set hypotheses we then also confirmed the impact of satisfaction with the workspace factor on the health factor. Factor 'Satisfaction with the workplace' is characterized by 9 items: pleased with the condition, pleasant workspace, feeling good, state of business premises, state of furniture, cleanliness, hygiene standards, ventilation, changing the job. In Slovenian case it was linked with the health factors 'Orthopaedic problems': pain in back, pain in neck, pain in spine, rheumatism and 'Past health problems' :sick leave, therapies, physician help, and state of health. In Lebanon Satisfaction of employees with their workplace is strongly connected with Health & health care of employees factor, with characteristics: being operated, state of health, chronic disease, exercise, taking pills, state of health in last 12 months, type of exercise, disease diagnose, workplace as a cause, checking the weight, link between workplace condition and disease, sick leave.

In order to ensure overall health of employees it is important to establish the system for its promotion in the workplace with goals to: enable healthy and safe work environment, to preserve working ability, to reduce absence from work, and to prevent work-related injuries, occupational diseases or diseases caused by work or through the work environment. From a managerial perspective, it is important to understand the straight line relationship between employees productivity and wellbeing, so one of the answers on the question 'what works based what we know' is creating the working environment in employees' comfortable way, from physical and mental perspective, to keep them creative and healthy.

Major changes in economic situations nowadays focus future studies on a deepened research on impacts or connections between specific business premises' factors and the occurrence of depression symptoms. The link between specific business premises' factors and specific elements of organisational culture, the research on the link of satisfaction with the physical workspace, specific elements of organisational culture and research of the link between the perception of workspace and specific elements of organisational culture and possible positive influence on the employees, remain to be explored.

The recommendation is to perform the evaluation analysis of recognised statistically significant correlations of factors, to study their impact on employees' health, and to monitor them periodically.

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The impact of timing surgery to adenoidtonsillectomy of children aged 3 through 15 years old in appearance of coughing and laryngospasm during awaking from general anesthesia

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Abstract

Introduction: More frequent and dangerous complications during waking from general anesthesia in children who underwent operative intervention adenotonsillectomy are coughing and laryngospasm. These complications are quite harmful and have a risk to life. The purpose of this research is to investigate the influence of the surgical duration of procedure in filing coughing and laryngospasm during waking from anesthesia.

Methodology: It is a prospective study on the impact of operative duration in presenting two postanesthetic respectively postoperative complications: coughing and laryngospasm, of children who underwent adenoidotonsillectomy operative intervention. The study was conducted at period of time from 1.03.2012 - 10.1.2013 and research included 120 children aged between 3 to 15 years old. They were classified according to the American Society of Anesthesiologist (ASA) in status I. Operations are performed under general anesthetic. After collecting the data, results were analyzed with the SPSS 20.0.

Results: The children who presented cough, surgery lasted an average of 43.3 minutes (SD ± 5.6 min). Children who haven't had coughing surgery lasted an average of 37.1 minutes (SD ± 4.4 min). The children presented laryngospasm, surgery lasted an average of 43.5 minutes (SD ± 5.5 min). Children who haven't had the laryngospasm surgery they lasted on average 37.4 minutes (SD ± 4.6 min).

Conclusion: From the results obtained in our research is observed that postanesthetic complications were more frequent in cases where surgery lasted more. More time surgical procedure was the result of manipulation longest gorge space, multiple burns and irritation electrocoagulation greater.

Key words: children, cough, laryngospasm, anesthesia, complications

1. Introduction

Tonsils are located on both sides of throat. They are important components of the immune system and help protect against infections, especially infections of the throat and upper respiratory tract. Tonsils are the first line of defense from microorganisms and other harmful substances to the air component.(1,2,3,4)

Tonsilloadenoidectomy or operating avoiding almond is the most frequent operation in pediatric otorhinolaryngology (ENT). This surgical intervention is done under general anesthesia.(7,8,9)

Among the most serious complications and frequent enough postanesthetic is coughing and laryngospasm. These complications are expressed during retirement (arousal) from general anesthesia in children who underwent operative intervention adenoidotonsillectomy.

The cough is reflexive response to the presence of foreign particles in the respiratory tract. Through coughing organism tends to release the presence of secrecy, dust mites and various irritants (11,12) In adenoidotonsillectomy throat is irritated after surgery, burns with electrocoagulation, secrecy and blood added in varying amounts. All these elements increase the possibility of coughing during awakening from anesthesia.

Laryngospasm is reflexive closure of the plica vocalis caused by contraction of the muscles of the larynx interior, which provokes obstruction partial or complete respiratory tract (6,10). Entry into reflexive action laryngs closed under the action of nervus vagus and prevents the entry of

the content. The most frequent cause of laryngospasm, especially in children, is erosion of glottis, irritation (burning, logging), secret or blood after surgery in the upper respiratory tract like tonsillectomy.(5,6,13)

Laryngospasm can be from mild forms of stridor inspiratory until the closure of upper respiratory.

The purpose of this research is to investigate the influence of surgical duration of procedure in filing coughing and laryngospasm during waking from anesthesia. It undertook a prospective study on the impact of operative duration in presenting two postanesthetic respectively postoperative complications: coughing and laryngospasm, in children who underwent operative intervention, adenoidotonsillectomy. The study was conducted in the period 1.03.2012 - 01.10.2013 in the Clinic of Anesthesiology and Intensive Treatment, Unit for Otorhinolaryngology Clinic of the University Clinical Centre of Kosovo (UCCK).

2. Methodology

After approval of the research study by the Professional Ethics Committee at the University Clinical Center, the parents of all children were informed and their consent were received in writing. The research included 120 children aged between 3 to 15 years, classified according to the American Society of Anesthesiologist ASA status/classes I. Operations were carried out under general anesthesia. On the basis of duration of surgery, children were divided into four groups. To all these groups are observed and recorded the quality of awakening and eventual appearance of coughing and laryngospasm.

Induction is done with: Atropine, Propofol, Fentanyl and Esmeron. Intubimi is made of armored tubus size dependent on age. Anesthesia was maintained with inhalational gas Sevofluran and mixing Nitrogen and Oxygen (O N2 / O2) at 50: 50 reports.

The operating according to the duration of surgery were divided into four groups:

1. Duration of operation from 30 to 35 min.
2. Duration of operation from 40 to 45 min.
3. Duration of operation from 50 to 55 min.
4. Duration operation over > 60 min.

After collecting the data, results were analyzed with the SPSS 20.0. P value and standard deviation, Average, Mann-Whitney is used to find the significance.

3. Results

The children who presented cough, surgery lasted an average of 43.3 minutes (SD ± 5.6 min), range 35 to 55 minutes. In children who haven't had coughing surgery lasted an average of 37.1 minutes (SD ± 4.4 min), range 30 to 45 minutes. With the Mann-Whitney significance test have earned the distinction with statistically significant between the duration of the operation under the appearance of coughing (P <0.0001) (Table 1)

Table 1. The average duration of the operation by the presence of coughing

Duration of surgery (Min)	Cough	
	Yes	No
N	23	97
Average	43.3	37.1
SD	5.6	4.4
Min	35	30
Max	55	45
Mann-Whitney test	P<0.0001	

The children presented laringospasm, surgery lasted an average of 43.5 minutes (SD ± 5.5 min), range 35 to 55 minutes. Children who have not had the laringospasm surgery lasted on average 37.4 minutes (SD ± 4.6 min), range 30 to 50 minutes. With the Mann-Whitney significance test have earned the distinction with statistically significant between the duration of the operation as presented laringospasm (P <0.001) (Table 2).

Table 2. The average duration of the operation by the presence of laringospasm

Duration of surgery (Min)	Laryngospasm	
	Yes	No
N	17	103
Average	43.5	37.4
SD	5.5	4.6
Min	35	30
Max	55	50
Mann-Whitney test	P=0.0001	

4. Discussion

Considering that the surgical field is in the airways tract, it also decided to provide ventilation tube, the postanestetike complications are inevitable. Very severe complications with threatening risk of life are cough and laryngospasm. Coughing as a sigle does not present the risk, if not accompanied by airways spasm. Our research given us evidence that with increasing duration time of the operation increases the possibility of presenting complications. Tonsillectomy if it is done harshly, is more possible the appearance of postanesthetics complications.

5. Conclusion

From the results obtained in our research is observed that postanesthetics complications were more frequent in cases where surgery lasted more. More time surgical procedure was the result of manipulation longest gorge space, multiple burns and irritation elektrokoagulant greater. In addition, increases the possibility of postanestetik complications.

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Instructions for the authors

Preparing Article for HealthMED Journal

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Abstract

In this paper the instructions for preparing camera ready paper for the Journal are given. The recommended, but not limited text processor is Microsoft Word. Insert an abstract of 50-100 words, giving a brief account of the most relevant aspects of the paper. It is recommended to use up to 5 key words.

Key words: Camera ready paper, Journal.

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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
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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)
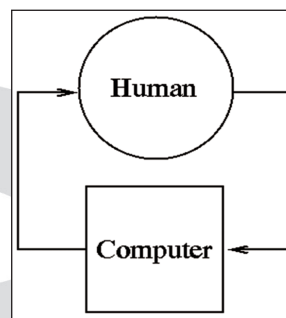

Figure 1. Text here

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.

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