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CORRELATION OF METABOLIC AND ANTHROPOMETRIC PARAMETERS WITH PHYSICAL ACTIVITY AND SMOKING STATUS OF STUDENTS OF THE UNIVERSITY IN TUZLA

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ABSTRACT

Reduced physical activity and an increase in sedentary habits, as one of the factors in the development of cardiovascular diseases, hypertension, type 2 diabetes mellitus and other diseases, are also present in the youth population. The increasing of sedentary lifestyle and the reducing of physical activity can have negative consequences for the health of both genders, including increasing the risk of cardiovascular diseases (CVD). It is believed that almost 50% of young people do not practice regular physical activity. Regular physical activity reduces the risk in adults of early death caused by coronary heart disease, high blood pressure, type 2 diabetes mellitus, colon and breast cancer and depression. Studies investigating the sedentary lifestyle of young people in the United States show that the length of watching TV is directly proportional to the frequency of obesity. Daily moderate (medium-intensity) physical activity is beneficial for all people, regardless of age. The World Health Organization, within its "Health for All" strategy for the region of Europe, has set the goal for young people to be healthier and more capable to fulfill their roles in society in the year 2020 and that the psycho-social condition of people needs to be improved and help and service should be available to them, which will be better able to include and be more accessible to people with a mental health problem.
***Key words**: Blood pressure, BMI, smoking status, physical activity*

INTRODUCTION

The student population is especially problematic because it is an age in their everyday life when they are not able to participate in physical activity. Many students spend most of their time sitting in a seating manner like sitting in classrooms, learning, watching television every day, using computers and playing video games (U.S. Department of Labor, Bureau of Labor Statistics, 2009); (Cvenić, 2016). Smoking is today considered a major risk factor for the development of bronchial and lung cancer, cavity cancer, throat cancer, nasal cavities and paranasal sinuses cancer, larynx cancer, esophagus cancer, pancreas cancer, kidney cancer, urinary bladder cancer, increased heart rate, constriction of small blood vessel, increase of blood pressure, increase of cholesterol and it promotes the formation of atherosclerotic pressure (Knežić & Hudorović, 2014).

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Obesity is an increasingly common problem in the student population, and research by American authors has shown that a critical period for getting overweight is the beginning of study (college).
It is assumed that the main factors responsible for the increasing occurrence of obesity in the youth population are: stress, inadequate nutrition, lack of physical activity, and increased alcohol consumption. Balanced nutrition for young people is the basis for healthy development, preservation and improvement of health, on the one hand, but it can also be the cause of the disease or its prevention, on the other. Physical activity is one of the key behavioral factors for health promotion, as many studies testify. Unfortunately, regular and proper physical activity is not an integral part of everyday life of a large part of the population. According to WHO estimates, 60% of people around the world are not physically active enough (Milosevic, Georgiev and Krajnovic, 2016). From the position of the contemporary sedentary man (homo sedens), which is characterized by hypokinesia, excessive nutrition and stress, motion, sport and kinesiological activities are imposed as a real need (Rogulj et al., 2011).

The aim of the research

The main goal of this research is to examine the connection or correlation of metabolic and anthropometric parameters with the physical activity and smoking status of students of the Faculty of Education and Rehabilitation. The fact is that sedentary habits, lack of physical activity and smoking lead to an increase in blood pressure. As a consequence of the sedentary lifestyle and inadequate nutrition of students, obesity or an increase in the body mass index occurs. Therefore, the need for pointing to a healthy lifestyle is imposed, which involves everyday physical activity and adequate nutrition.

METHODS

The research was conducted at the Faculty of Education and Rehabilitation, University of Tuzla. The study covered 73 respondents-students of the first year of the Faculty because it is a period when it can still be prevented in terms of promoting a healthy lifestyle. All subjects were examined at the Department of Physiology at the Faculty of Medicine, using the form of the questionnaire and carried out measurements in order to determine the metabolic (arterial blood pressure) and anthropometric parameters (body weight, body height and body mass index). The measuring instrument that was used was the Total fat intake questionnaire and the equipment used was a pressure gauge to measure blood pressure, and a centimeter tape for height and a scale for weight determination, all for the purpose of calculating the body mass index. After the survey, the data obtained were processed by the computer statistical program SPSS 20.0 for the Microsoft Windows operating system. The basic statistical parameters were calculated: minimum and maximum results, arithmetic mean and standard deviation. The Pearson coefficient determined the statistical significance of the correlation between the observed variables. ANOVA was applied. It was applied because within the group the connection/correlation with sub-variables was examined and that they are presented in three levels as a low, moderate and high intake of fat. This is important because the measured parameters depend on the level of fat intake.

RESULTS AND DISCUSSION

In a study conducted by Djuric and associates in 2017 on the BMI variable, 22.40% of subjects were pre-obese, and 2.40% were obese. The average values of the parameters tested are within the limits of the reference values. The recommended BMI values were the same for both genders and were higher in male respondents (24.36 ± 2.63) compared to female respondents (21.59 ± 2.45), which is a common result in research by authors from the region and around the world. Most of the students at the University of Banja Luka are normally nourished and regularly engaged in sports activities. However, it is worrying that one third of students do not practice any kind of sporting activity, which is partly related to the significant frequency of pre-obesity in this population. So, this points to the importance of promotion and the creation of conditions for dealing with student sports, which will reduce the prevalence of pre-obesity and its consequences.
In our study, we obtained values on the BMI variables: 16.44% of the subjects were pre-obese, and 5.48% were obese.
Table 1 shows descriptive characteristics in relation to physical activity from which it can be seen that differences in BMI, SAP and DAP in subjects with no physical activity are not significantly different. The effect of fat intake on BMI, SAP and DAP was observed in subjects with significant physical activity.

Table 1. Descriptive characteristics in relation to physical activity

SPORTS ACTIVITY		N	Mean	SD	Min	Max
Physically active	BMI	53	23.370	3.68	16.9	31.5
	TFI	53	28.57	7.24	17	49
	SAP	53	111.98	14.01	80	150
	DAP	53	72.55	10.12	50	95
	Total	53				
Physically inactive	BMI	20	21.840	2.67	16.6	27.7
	TFI	20	29.40	4.91	20	37
	SAP	20	109.00	12.52	80	140
	DAP	20	70.25	10.06	45	80
	Total	20				

Legend: BMI (Body Mass Index); TFI (Total fat intake); SAP (Systolic arterial pressure); DAP (Diastolic arterial pressure)

The analysis of the variance of the body mass index among the various kinesiologically engaged students did not confirm the expected assumption that respondents who are more kinesiologically engaged have a lower body mass index (Rogulj et al., 2011). The results shown in Table 2 indicate that a quantitative increase in fat intake statistically significantly influences the increase in all observed parameters.

Table 2. Vital parameters of physically active subjects compared to total fat intake (ANOVA)

SPORTS ACTIVITY			N	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min	Max
							Lower Bound	Upper Bound		
Physically active	**BMI**	Low fat intake	1	2.00	.	.	.	.	2	2
		Moderate fat intake	48	2.25	.72	.10	2.04	2.46	1	4
		High fat intake	3	2.00	.00	.00	2.00	2.00	2	2
		Total	52	2.23	.70	.09	2.03	2.43	1	4
	SAP	Low fat intake	1	90.00	.	.	.	.	90	90
		Moderate fat intake	48	111.56	13.68	1.97	107.59	115.54	80	150
		High fat intake	4	122.50	12.58	6.29	102.48	142.52	110	140
		Total	53	111.98	14.01	1.92	108.12	115.84	80	150
	DAP	Low fat intake	1	65.00	.	.	.	.	65	65
		Moderate fat intake	48	72.60	10.51	1.51	69.55	75.66	50	95
		High fat intake	4	73.75	4.78	2.39	66.13	81.37	70	80
		Total	53	72.55	10.12	1.39	69.76	75.34	50	95

$F(2,50)=18.8$; $p < .001$

According to Table 3, Diastolic arterial pressure significantly increases under the influence of smoking ($p < .05$), while BMI is significantly associated with systolic and diastolic arterial pressure ($p < .001$).

Table 3. Correlation matrix of smoking status, BMI and metabolic parameters

	SMOKER	SA	TFI	SAP	DAP	BMI
SMOKER	1					
SA	-.023	1				
TFI	-.151	.056	1			
SAP	.108	-.098	.124	1		
DAP	**.235***	-.102	-.120	**.692****	1	
BMI	-.010	-.197	-.093	**.620****	.516**	1

*. Correlation is significant at the .05 level (2-tailed).
**. Correlation is significant at the .01 level (2-tailed).
Legend: SMOKER (Smoking status); SA (Sports activity); TFI (Total fat intake); SAP (Systolic arterial pressure); DAP (Diastolic arterial pressure); BMI (Body Mass Index)

Smoking causes damage to blood vessels, instant rise in blood pressure, and the reduction in body tolerance to physical strain. In addition, tobacco smoke components cause a reduction in oxygenation and an increase in the risk of blood clots (Zeković et al., 2015). Arterial pressure increases in proportion to the increase in body mass index (BMI), and so, prevention of childhood obesity is a crucial factor in preventing the development of elevated arterial pressure in adults. The values of arterial blood pressure in children are one of the most measurable markers of potential cardiovascular risk in later life (Trutin et al., 2017).

Insufficient dietary patterns in which food is not usually prepared at home, and meals are converted into partial meals that do not meet the recommendations of nutrients and calorie values, and reduced physical activity due to the sedentary lifestyle contributed to an increase of chronic diseases in most people (cardiovascular disease such as hypertension, coronary artery disease, high blood cholesterol, obesity, type 2 diabetes, osteoporosis, osteoarthritis, colorectal cancer, breast cancer) (Bodolović, 2018). Every day, it is necessary to satisfy the requirements of the organism regarding the intake of fat. A certain age has certain needs, so the daily recommended intake requirements for fetus, newborns, adolescents, adults, pregnant women and geriatric population are different (Kauzlarić, 2017). A properly balanced diet is characterized by: controlled energy intake (energy intake adjusted for the person depending on his/her gender, age and height, and the daily intensity of physical activity); Balance (adjustment of energy input to its consumption); diversity (intake of various foods from different food groups); and moderation (limited intake of foods that may have negative health implications if they are entered in quantities greater than recommended); (Malenica, 2016). The benefits of physical activity for health are of paramount importance, and regular physical activity contributes to improving the quality of life. For the protection and preservation of health, physical activity from childhood to old age is important. Adopting healthy habits is important in the period of childhood and adolescence (Malenica, 2016). Given that physical activity is an important benefit for young people's health, improving physical activity among young people is an important public health challenge. Two important recommendations for young people are as follows: all young people should be moderately to intensely physically active at least one hour a day (Malenica, 2016). Smoking, different forms of addiction, unhealthy diet and low physical activity and motion are the personal choice of every individual he/she can influence. Students in Croatia are quite involved in the teaching of physical and health culture, which is the only form of organized physical activity for most students. They are also very well versed in the importance of dealing with physical activity. According to Vracan, Pisacic and Slacanac (2009), even 94% consider physical activity very important, but 56% of them are not included in any other form of physical activity outside the physical and health culture. Regular physical activity is of great importance for health as well as for the quality of life itself and should be accepted as a "foundation stone" of a healthy lifestyle. It is medically desirable and a protective behavior. It is associated with a reduction in the risk of various chronic diseases, some of which include: heart disease, type 2 diabetes, overweight body and obesity, and so on. (Sliško, 2015). Žiža (2012) examined the nutritional and life habits of the students of the University of Osijek in her work, and for this purpose a questionnaire was formulated which was anonymously filled by students at main faculties.

All respondents were compared with regard to gender and education. The body mass index was calculated through self-assessed body weight and height. The average BMI values for males were 24.7 kg / m2 and 20.9 kg / m2 for females, 21.5% of students had an overweight body, 30.1% of students consumed less than three meals a day, and the most commonly used meal was breakfast (Cvenić, 2016). Zach and Shalom conducted a study on the impact of physical activity on working memory. The participants trained volleyball twice a week, and before and after that exercise, tests of the working memory were carried out. The results showed that playing volleyball considerably enhances memory and based on this, it can be concluded that immediately after acute exercise, there is an increase in the function of the working memory (Grdić, 2016). Eating habits and nutritional status are most often influenced by addiction (alcohol, drugs and cigarettes), physical activity / inactivity, stress and socioeconomic status. Numerous studies confirm the fact that smokers have lower body mass than non-smokers, either due to a decrease in appetite or increased energy consumption, and that the effect of cigarettes on body weight control is more pronounced in females compared to males (Bradley et al., 2010). Body weight decreases with duration but not intensity of cigarette consumption (Hu et al., 2002). However, the loss of body weight in smokers does not necessarily reflect the reduction of fatty tissue. Likewise, the cessation of cigarette consumption is associated with gain on body weight (Pomerleau et al., 2000; Klein et al., 2004). For smokers and non-smokers, nicotine reduces appetite, resulting in a lower calorie intake during meals (Chiolero et al., 2008). These facts explain why smokers tend to have a lower body mass than non-smokers and why stopping smoking often results in an increase in body weight (Williamson et al. 1991; Ward et al., 2001). Most young people are healthy. However, more than 2.6 million young people, aged 15-24, die every year. An even greater number of young people suffer from various diseases that reduce their ability to grow and develop to their full potential. Most continue to practice behavior that not only jeopardizes their current state of health, but also the state of health in the years to come. Almost two thirds of premature deaths and one third of all adult illnesses are directly related to conditions and behavior in their youth, including: tobacco use, lack of physical activity, unprotected sex, poor nutrition and exposure to violence. Students are the last age group where preventive actions can be done by changing unwanted habits (Macanović et al., 2013). In addition to reducing stress, the psychological aspect of physical activity is also evident in the fact that it promotes non-smoker lifestyle and proper nutrition. It also increases the level of positive psychosocial characteristics by decreasing addiction and mood amelioration (Edwards, 2006) by reducing the intensity of neurosis and depression (Tyson, Wilson, Crone, Brailsford, & Laws, 2010; Lawlor & Hopker, 2001). As a critical period for the adoption and retention of the habits of physical activity, the age of adolescence and youth was recognized. Namely, physical activity in the childhood and adolescence period determines the later activity of the individual and thus directly affects the overall health status of an individual's organism. Therefore, structured programs should encourage adolescents to participate actively in physical activity during their free time and develop a positive attitude towards physical activity (Horvat et al., 2013). The beginning of study (college) in most young people is a sensitive period in which the level of physical activity decreases and the number of activities that do not require physical effort increases. It can be concluded that carefully planned, continuous physical activity of adequate intensity has a positive impact on the growth and development of the organism and the preservation of the health status of the organism (Vrkić, 2018).

CONCLUSION

So far, research in the field of assessment of the intensity of physical activity and the sedentary lifestyle of young people has not been conducted in Bosnia and Herzegovina, so this research represents a unique contribution to the elucidation of this complex problem. Preventative action through nutritional habits and adequate physical activity is important in order to reduce the risk of developing a disease. It is necessary to start developing guidelines for encouraging young people to engage in physical activity and prevent the occurrence of obesity, cardiovascular diseases and diabetes as frequent problems of this population.

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