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Dietary habits and nutritional status of school children in urban and rural environments

Navike u ishrani i status uhranjenosti školske dece u gradskim i seoskim sredinama

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ABSTRACT

Objective. Proper nutrition means satisfying organism's needs for daily intake of energy and adequate amount of nutritional and protective substances which are essential for maintenance of physiological functions of organism and health. The aim of this study was to determine eating habits and nutritional status of school children.

Methods. The research was designed as a cross-section study. It was carried out in primary school "Sveti Sava'' in Foča and primary school "Sveti Sava'' in Gacko, branch in Avtovac. The study included 110 pupils aged from 10 to 14 years. As a measuring instrument, anthropometric measurements (height and weight) were used as well as a questionnaire.

Results. The questionnaire included primary school pupils of different gender and age. Among the respondents, there were 66 (60%) boys and 44 (40%) girls. Most of the pupils (80,9%) had normal body weight, 48 (43,6%) boys and 41 (37,3%) girls. Among overweight pupils, there was statistically significant larger number of male pupils who were overweight in comparison with female pupils (=8,490; p=0,037). Also, there was statistically significant larger number of overweight pupils from urban environment in comparison with pupils from the rural one ($\chi 2$=8,614; p=0,035). Most of the pupils regularly have breakfast (50,9%). There is statistical significance in that larger number of children from urban environment consume fast food daily in comparison with children from rural environments ($\chi 2$=10,187; p=0,006).

Conclusion. Eating habits of the elementary school children are not satisfying, being reflected in frequent skipping of breakfast, overconsumption of sandwiches, snacks and candies, while healthy foods, such as fish and vegetables are deficient in nutrition.

Key words: nutritional status; obesity, exercise.

APSTRAKT

Cilj. Pravilna ishrana podrazumeva zadovoljavanje potreba organizma za dnevnim unosom energije i adekvatne količine hranljivih i zaštitnih supstanci koje su neophodne za održavanje fizioloških funkcija organizma i zdravlja. Cilj ovog istraživanja bio je da se utvrde navike u ishrani i status uhranjenosti školske dece.

Metode. Istraživanje je osmišljeno kao studija preseka. Realizovano je u Osnovnoj školi „Sveti Sava" u Foči i Osnovnoj školi „Sveti Sava" u Gacku, područna jedinica u Avtovcu. Istraživanjem je obuhvaćeno 110 učenika uzrasta od 10 do 14 godina. Kao merni instrument korišćena su antropometrijska merenja (visina i težina), kao i upitnik.

Rezultati. Upitnikom su obuhvaćeni učenici osnovnih škola različitog pola i uzrasta. Među ispitanicima bilo je 66 (60%) dečaka i 44 (40%) devojčica. Najviše učenika (80,9%) imalo je normalnu telesnu težinu, 48 (43,6%) dečaka i 41 (37,3%) devojčica. Među gojaznim učenicima, statistički značajno je veći broj gojaznih učenika u odnosu na učenice ($\chi 2$=8,490; p=0,037). Takođe, zabeležen je statistički značajno veći broj gojaznih učenika iz gradske sredine u odnosu na učenike iz seoske ($\chi 2$=8,614; p=0,035). Većina učenika redovno doručkuje (50,9%). Statistički značajna je činjenica da veći broj dece iz urbane sredine svakodnevno konzumira brzu hranu u poređenju sa decom iz seoskih sredina ($\chi 2$=10,187; p=0,006).

Zaključak. Navike u ishrani djaka osnovnih škola nisu zadovoljavajuće, što se ogleda u čestom preskakanju doručka, prekomernoj konzumaciji sendviča, grickalica i bombona, dok obroci oskudevaju u zdravoj hrani, poput ribe i povrća.

Ključne reči: dijetetski status; gojaznost; vežbanje.

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INTRODUCTION

Adolescence is a period of intense biological, social, physiological and cognitive changes, during which changes in diet occur as well. Period of adolescence is followed by accelerated growth and development which directly requires increased intake of energy, as well as increased intake of protein. The term "proper nutrition" implies satisfying organism's needs for daily intake of energy and an adequate amount of nutritional and protective substances which are essential for maintenance of physiological functions and health. In young people, during the adolescence period, there are frequent eating disorders or, at least, inadequate attitude towards food.[1] The problem of both children's and young people's diet is, still one of the leading public health challenge both on an international level and in our country. Nutritional status of children is a reflection of their overall health.[2]

Obesity among children and adolescents is especially worrying, which in comparison with the situation 25 years ago, almost tripled. According to the data from International Obesity Task Force (IOTF) and World Health Organization (WHO) at the 2005 and 2006 years, around 2.1 billion people suffer from obesity, 160 million children, of which as many as 22 million are under the age of five years. Prevalence of obesity is manifested more in western countries, where figures show that the number of those suffering from obesity was increased three times over the last twenty years. The number of the obese children aged 6 to 15 years is 22-31% and is constantly growing. It is estimated that today, for example in the USA, every fourth child is obese. Unless urgent measures are taken in order to prevent this current, we can say, epidemic, these numbers will constantly grow, and it is considered that that number will be increased every year by 1.3 million children.[3]

General objective of this research is to determine eating habits and nutritional status of school children. Specific objectives of this research are: to examine eating habits and differences in eating habits of school children in relation to gender and place of living and to determine nutritional status and differences in nutritional status of school children in relation to gender and place of living.

SUBJECTS AND METHODS

The research was conducted in primary school "Sveti Sava" in Foča (urban environment) and primary school "Sveti Sava" Gacko, branch Avtovac (rural environment). 55 pupils were from urban environment and 55 in rural environment. The parents made a written statement and gave their consent for the examination of their children. All pupils who attended classes that day were interviewed and BMI was done. The study included 110 pupils aged from 10 to 14 who were attending classes at the moment of research. Before the start of the research, the consent of Ministry of Education and Culture was requested, which is in accordance with instructions on realization of programs and activities of non-government organizations, other institutions and organizations in schools, and the consent was acquired in written form. The research was conducted during the period from 3rd April 2017 to 28th April2017.

The research was designed as a cross-section study. As the measuring instruments, anthropometric measurements (height and weight) and questionnaire (22 anonymous questions about dietary and life habits and attitudes) were used. The first six questions in the questionnaire relate to the sociodemographic characteristics of the respondents, body weight and body height were entered in the questionnaire by the author, based on the measurements taken at the place examination. The questions in the questionnaire were closed type. Respondents were chosing one of the offered answers, whereby they could only choose one answer. Information of eating habits and the types of foods they most commonly consume was obtained by providing pupils with self-reported types of some foods.

Nutritious status of school children was evaluated with application of standard body mass index (BMI), according to classification of Centers for Disease Control and Prevention, which is calculated with formula , where m represents body mass and h2 represents height per square, and sorting BMI values according to percentile curves.

Categorization of nutritional status according to percentile range:

- malnutrition is represented by the percentile range under 5 (<5) percentiles;
- normal body mass is represented by percentile range from 5 to 85 percentiles;
- overweight is represented by percentile range from 85 to 95 percentiles;
- obesity is represented by percentile range above 95th (>95) percentile.

The observed differences among groups were analyzed using SPSS software system (version 20). When it comes to statistical tests, chi-square ($\chi 2$) test was used and $p<0.05$ value was used for the level of statistical significance. Results were scrutinized and documented in details, presented with absolute numbers, relative numbers, statistical values using statistical indicators, and presented with simple and comprehensible tables and charts.

RESULTS

Research included 110 subjects, consisting of 66 (60%) boys and 44 (40%) girls. Most of the subjects (27%) were children 14 years of age. In the age group of 13 and 12 years we had 26% of subjects in both groups, then in age group of 11 year-olds we had slightly less, or 19%, and the youngest participants (10 years of age) were actually the least represented with only 2% (Figure 1). Regarding the place of living, the structure of subjects is equal. In the research, equal number of pupils from urban and rural environments, 55 (50%) in both groups, participated.

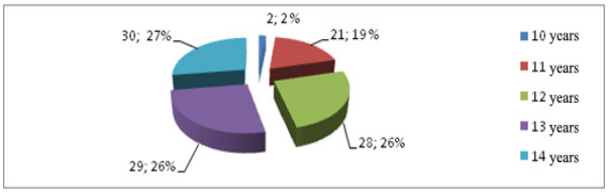

Figure 1. Age structure of the respondents.

Table 1 shows us that out of total number of examined pupils, 5,5% are malnourished, 80,9% have normal body weight, 10,9% are overweight, while the least number of them (2,7%) are obese. Statistically significant differences ($\chi2$=8,490; p =0,037) were found with respect to gender, where there is statistically larger number of overweight boys (10%), compared to 0,9% of girls. Also, there is statistically significant ($\chi2$=8,614; p =0,035) larger number of overweight pupils from urban environment (9,1%), compared to 1,8% of pupils from rural environments.

Table 1. Nutritive status of the subjects in the examined sample with respect to gender and place of living

Variable*	Nutritive status according to percentile curves				x2	p
	Malnutrition	Normal body weight	Overweight	Obesity		
	N (%)	N (%)	N (%)	N (%)		
Male	4 (3,6)	48 (43,6)	11 (10)	3 (2,7)	8,49	0,037
Female	2 (1,8)	41 (37,3)	1 (0,9)	0 (0)		
Rural	5 (4,5)	47 (42,7)	2 (1,8)	1 (0,9)	8,614	0,035
Urban	1 (0,9)	42 (38,2)	10 (9,1)	2 (1,8)		

*-gender and place of living, as appropriate

The largest number of pupils regularly eat breakfast (50,9%), 7,3% of pupils often eat breakfast, 38,2% of pupils sometimes eat breakfast, while the least number never eats breakfast (3,6%). No statistically significant differences were found between the groups of pupils with respect to gender and the groups of pupils with respect to place of living (Table 2..

Table 2. Frequency of eating a breakfast within examined sample with respect to gender and place of living.

Variable*	Do you have breakfast?				x2	p
	Never	Sometimes	Often	Regularly		
	N (%)	N (%)	N (%)	N (%)		
Male	1 (0,9)	28 (25,5)	3 (2,7)	34 (30,9)	4,519	0,211
Female	3 (2,7)	14 (12,7)	5 (4,5)	22 (20)		
Rural	2 (1,8)	21 (19,1)	4 (3,6)	28 (25,5)	0	1

*gender and place of living, as appropriate

When it comes to number of daily meals, 3,6% of pupils have two meals, 57,3% of pupils have three meals, 31,8% of pupils have four meals, while 7,3% of pupils have five meals. No statistically significant differences were found between groups with respect to gender and the groups of pupils with respect to place of living (Table 3).

Table 3. Number of pupils' daily meals with respect to gender and place of living.

Variable*	How many meals do you have daily?				x2	p
	2	3	4	5		
	N (%)	N (%)	N (%)	N (%)		
Male	2 (1,8)	41 (37,3)	19 (17,3)	4 (3,6)	1,653	0,647
Female	2 (1,8)	22 (20)	16 (14,5)	4 (3,6)		
Rural	2 (1,8)	32 (29,1)	20 (18,2)	1 (0,9)	5,23	0,156
Urban	2 (1,8)	31 (28,2)	15 (13,6)	7 (6,4)		

*-gender and place of living, as appropriate

When the answers of the total sample of pupils are analyzed, most of them (71.8%) sometimes eat fast food, 19,1% eat fast food every day, while the least number of pupils (9.1%) stated that they never eat fast food. Highly statistically significant ($\chi2$=10,187; p=0.006) larger number of pupils from urban environments consumes fast food daily (15.5%) compared to 3,6% of pupils from rural environments who have tendency towards that kind of behaviour. The largest number of interviewed participants (55,5%) sometimes consume sweets, 43,6% of them consume sweets every day, while the least number of interviewed participants (0,9%) never eat sweets. When it comes to consumption of sweets, no statistically significant differences were found between the groups of pupils with respect to gender and the groups of pupils with respect to place of living (Table 4.).

Table 3. Number of pupils' daily meals with respect to gender and place of living.

Variable*	Variable*	Pupils' answers			x2	p
		Never	Some-times	Every day		
		N (%)	N (%)	N (%)		
How often do you eat fast food?	Male	6 (5,5)	43 (39,1)	17 (15,5)	4,862	0,088
	Female	4 (3,6)	36 (32,7)	4 (3,6)		
	Rural	5 (4,5)	46 (41,8)	4 (3,6)	10,187	0,006
	Urban	5 (4,5)	33 (30)	17 (15,5)		
How often do you eat sweets?	Male	1 (0,9)	41 (37,3)	24 (21,8)	3,989	0,136
	Female	0 (0)	20 (18,2)	24 (21,8)		
	Rural	1 (0,9)	36 (32,7)	18 (16,4)	5,984	0,05
	Urban	0 (0)	25 (22,7)	30 (27,3)		

*gender and place of living, as appropriate

Out of total number of pupils, most of them, or 41,8% sometimes eat fish, 31,8% rarely eat fish, 16,4% often eat fish, while the least number of pupils (10%) never eat fish. When it comes to fish consumption, no statistically significant differences were found between the groups of pupils with respect to gender and the groups of pupils with respect to place of living (Figure 4).

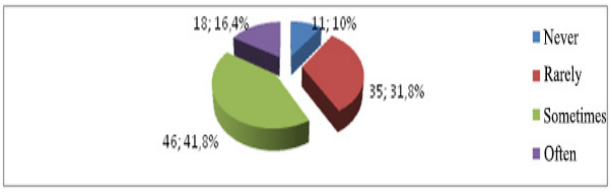

Figure 4. Frequency of fish consumption by the pupils.

DISCUSSION

In our research, 50,9% of pupils have regular breakfast, while the rest either don't have breakfast or don't have breakfast regularly. This result is worrying, especially if the fact that the highest percentage of pupils who eat a sandwich for breakfast (69,1%) is taken into consideration. The situation in the region is similar to this one, In Croatia 50% of pupils have breakfast,[3] while in Serbia only 37,7% of pupils regularly have breakfast.[4] It is well known that skipping breakfast and eating unhealthy food cause obesity in children. Obesity leaves negative emotional and social effects on the individual. Only one kilogram of body fat has around 6 kilometers of new blood vessels which additionally burden cardiovascular system, which explains correlation between obesity and cardiovascular diseases.[3] Research conducted by Ahadi et al. showed that pupils who regularly consume breakfast are less likely to suffer from mental disorders and violent behaviour.[5]

Other relevant studies in the world justified this result, also highlighting the importance of having regular breakfasts and the link between the rise of the obesity epidemic and skipping breakfast in elementary school students, and emphasize the need to educate students about the importance of regular breakfast and obesity prevention.[6] It is noticeable that pupils in our research never or rarely consume fish (42,8%). In research in Serbia in adolescent population, 56% of subjects stated that fish was never present in the diet during the previous week, which is the result similar to ours.[7] Fish takes significant place in the diet of people due to its nutritive value. Fish meat is significant, and in many countries dominant source of protein, being good source of magnesium, phosphorus and selenium as well, which are essential for proper development of school children.[8]

Fish is significant element in Mediterranean diet. The research conducted in Greece which included the sample of 1610 adolescents aged from 12 to 17 showed that Mediterranean diet contributes to reduction of waist size (WHR) and risk of obesity in adolescents.[9] Healthy diet during the adolescence is connected with lower risk of cardiovascular diseases as well. Healthy dietary habits which have an early onset are important for primary prevention of cardiovascular diseases.[10] Highly statistically significant larger number of children from urban environments consume fast food daily (15,5%) compared to 3,6% of children from rural environments who have tendency towards that kind of behaviour.

Bad diet is great cause of children's bad behaviour. There are evidence and practically irrefutable findings that delinquency and fast, low quality food are tightly connected. Research conducted by Derrick Lonsdale from Cleveland Medical Centre showed that adolescents, whose diet consisted mostly of that type of food, developed symptoms of "marginal malnutrition", with symptoms similar to that of beriberi, which is a serious disorder manifested by lack of B1 vitamin (thiamine).

According to dr Lonsdale, "fast food" addicts, in which thiamine deficiency was noticed, often experience personality changes, they become irritable and aggressive. In addition to that, they suffer from low abdominal pain, they are anxious, and have trouble sleeping and experience nightmares.[11] Almost 20% of children aged from 3 to 17 in Germany eat sweets daily.[12] Percentage of daily sweets consumption in our study is even higher, because sweets are being consumed daily by 43,6% of pupils, which is higher percentage than daily intake of vegetables (36,4%). Sweets are important source of energy, but everyday consumption of them does not contribute to healthy life style and presents a risk for development of medical disorders.

In our research, only 2,7% of pupils are obese, but there are much more overweight pupils (19,9%), which may lead to obesity in the future. These results are similar to research conducted in Croatia, where 15,4% of pupils were overweight and 8,8% of pupils were obese.[13] However, in Croatian study there are much more pupils with malnutrition (14,5%) compared to percentage of malnourished pupils in our study (5,5%). Frequency of overweight and obese children was increased two to five times in developed countries during the period between 1980. to 1990. For example, for boys in Canada, this increase was from 11% to 30%. Statistical data indicate approximately four times higher frequency of over nutrition in developing countries, such as Brazil, where this increase was from 4% to 14%.[14]

Children consuming fast foods and foods that are risk factors for obesity have not yet developed obesity in our study, which may be related to the fact that children at this age have a faster metabolism and children are of developmental age and have a lot of energy for growth and development. Although our respondents do not have a high percentage of obesity, few have already developed obesity, so education and proper education would be welcome as a prevention of obesity. Our results show that there are statistically significant higher number of obesity boys in comparison with obesity girls. This obtained result is in accordance with the research of The Institute of Public Health of the Republic of Srpska which showed that significantly more boys (36,8%) were obese compared to girls (26,5%).[15] Also, the results of regional research are similar, namely in Serbia, where in children aged 12, on the territory of Vojvodina, it was found that girl population has tendency towards obesity in 9,9% cases, where 2,9% of girls were obese, while in boys, it was found that 15,1% has tendency towards obesity, while 7,9% of the boys were obese.[16] Similar trend of obesity is more expressed in boys in almost all European countries, except in Ireland where girls have higher prevalence of obesity.[17] Possible explanation for this result can be found in the fact that girls naturally have higher responsibility towards physical appearance.

There is statistically significant higher number of pupils in urban environments with overweight compared to pupils from rural environments. This result can be correlated with both lower percentage of available unhealthy food in rural environments and sedentary life style which often prevails in urban environments. It is well known that children in urban environments spend much more time at a computer than on playgrounds, which significantly contributes to higher level of children who are obese compared with children from rural environments. We have a similar result in California, a study that examined weight status in California students showed a statistically significant difference in BMI and a lower prevalence of obesity in suburban areas compared to urban areas, with average BMI and obesity prevalence lower in rural areas.[18]

Unlike our research, similar research conducted in Poland, which compared Body Mass Index (BMI) between adolescents living in urban and those living in rural areas of southwestern Poland found no significant differences in nutritional status of subjects in regard to place of living.[19] BMI measurements were performed according to the protocol, in standardized manner, and research makes a valuable contribution to the study and prevention of weight loss in students of this age. However, there are limitations to this study because the pupils were taken from only urban and only rural area. The pupils were not monitored for a long period of the time because the cross-sectional study provided current data. Data from pupils were only taken from those who were in school that day assuming that several pupils were also absent, so this research may be basis for more extensive research.

Considering the above results, as well as the results of other studies, there is a need to educate students in schools on the ways and importance of proper nutrition, and education should include parents. Many pupils in our research have normal body weight, the frequency of different types of nutritional status depended on gender and place of living of subjects, dietary habits of pupils are not satisfying, being reflected in frequent skipping of the breakfast, overconsumption of sandwiches, snacks and sweets, while healthy foods, like fish, are not consumed represented enough in the diet and the fast food is being consumed by significantly larger number of pupils from urban environments compared to pupils from rural environments.

REFERENCES

1. Branković S. [Model of health education and effect on behavioral determinants of health]. Doctoral dissertation. Sarajevo: Faculty of Health Studies, University of Sarajevo, 2015.

2. Osmanagić E, Husić L, Hamzagić LH, et al. [Healthy lifestyles, a handbook for teachers]. Sarajevo: Ministry of Education, Science and Youth of Sarajevo Canton, 2013.

3. Mitrović N, Pelemiš M, Pelemiš V. [Nutrition analysis in boys and girls of younger school age]. Bijelj Metod Čas 2014; 1: 41-6.

4. Ilić M. [Adolescent eating habits in Zajecar]. Tim Medic Glas 2010; 35: 57-63.

5. Ahadi Z, Qorbani M, Kelishadi R, et al. Regional disparities in psychiatric distress, violent behavior, and life satisfaction in Iranian adolescents: the CASPIAN-III study. J Develop Behav Ped 2014; 35: 582-90.

6. Kesztyüs D, Traub M, Lauer R, Kesztyüs T, Steinacker JM. Skipping breakfast is detrimental for primary school children: cross-sectional analysis of determinants for targeted prevention. BMC Public Health 2017; 17: 258.

7. Rožek T, Petrović V. [Body mass index and eating habits of high school adolescents in Indjija]. Tim Medic Glas 2015; 40: 231-6.

8. Baltić M, Kilibarda N, Dimitrijević M, Karabasil N. [Fish meat - importance and consumption]. In: IV International Conference "Ribarstvo". Proceedings of the lecture, 2015; 280-87.

9. Bacopoulou F, Landis G, Rentoumis A, Tsitsika A, Efthymiou V. Mediterranean diet decreases adolescent waist circumference. Euro J Clin Invest 2017; 47: 447-55.

10. Dahm CC, Chomistek A, Jakobsen MU, et al. Adolescent diet quality and cardiovascular disease risk factors and incident cardiovascular disease in middle-aged women. J Am Heart Ass 2016; 5: 1-10.

11. Majer V. [The importance of proper nutrition in the prevention of obesity in preschool children]. Final work. Pula: Faculty of Education, Juraj Dobrila University, 2015.

12. Dinarević S, Branković S, Hasanbegović S. [Nutrition and physical activity of primary school students in relation to obesity]. J Health Sci 2011; 1: 45-6.

13. Mikulić M, Tkalec J. [Eating habits and nutritional status of preschool and school age children in rural areas in Varaždin County]. Hrv Čas Javno Zdrav 2015; 1: 26-7.

14. Flynn MA, McNeil DA, Maloff B, al. Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. Obes Rev 2006; Suppl 7(1): 7-66.

15. Nezavisne novine. [Boys are more obese than girls]. Banja Luka: NIGD "DNN", 2009. (www.nezavisne.com/novosti/banjaluka/Djecaci-gojazniji-od-djevojcica/39363).

16. Đokić Z, Međedović B, Smiljanić J. [Nutritional status, postural status and quality of physical education classes in primary schools]. TIMS Acta J Sport Sci Tourism Wellness 2011; 5: 10-9.

17. WHO Europe. Prevalence of excess body weight and obesity in children and adolescents. Fact sheet No. 2.3. Code RPG2_Hous_E2. Geneva: World Health Organization, 2007.

18. Strochlic R, Au L, Ritchie L. Is urban-rural location associated with weight status in school children? An examination of 42 small and rural Californian counties. Rural Remote Health 2017; 17: 3966.

19. Czaja K, Fiszer K. Kołodziej M. The relation between selected health behaviour and body mass index amongst adolescents living in urban and rural areas in south-western Poland. Rocz Panstw Zakl Hig 2013; 64: 135-41.