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## NUTRITIONAL HABITS AND PHYSICAL ACTIVITY OF STUDENTS IN A PRIMARY SCHOOL IN KONJIC

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**Abstract:** Health care begins at an early age. Proper nutrition and regular physical activity are inseparable parts of the physical development of children from an early age. Everything we adopt in childhood is reflected in old age, while knowledge and skills are passed on to the next generations. Material and Methods: The survey included 121 students, of eighth (N=61) and ninth (N=60) grades, divided into male (N=67) and female (N=54) gender. Respondents attend the Second Primary School in Konjic. A standardized survey from the World Health Organization *Global school-based student health survey* was used to research that included a nutrition module and physical activity. Students gave voluntary consent to participate in the research. The results show that respondents have increased fruit intake (50.4%) and vegetables (42.1%), even over six days, and consumption of carbonated beverages and fast food is reduced to 1-3 days. Respondents stated that they are over six days physically active in a period of 60 minutes/day. The relationship of eating habits of fruit consumption has shown statistical connectivity with all forms of physical activity. The mean strength of the connection concerned the food habit of consuming fruit and physical activity 60 minutes/day, while the eating habits of consuming vegetables in physical activities 60 minutes/day showed a strong statistical connectivity. There was a statistically significant link in eating habits in fruit consumption compared to the gender  $\chi^2(2) = 6,867, p = 0,032$ . Conclusion: The intake of fruits and vegetables has increased, and the consumption of carbonated drinks and fast food has decreased for 1-3 days. Students practice the most daily form of physical activity for 60 minutes/day. Awareness of the importance of adequate nutrition and good health for all school children should be raised and the involvement of parents and the wider community encouraged.

**Keywords:** students, nutrition, physical activity.

### 1. INTRODUCTION

Health conservation care should be learned from the earliest age. One should dedicate oneself to health and invest in it from birth, throughout one's life, and become responsible for one's own health (Topolovčan et al., 2016). Proper nutrition and an appropriate level of physical activity are important factors that affect the growth and development of children and their health in adulthood. The benefits of establishing proper eating habits and engaging in physical activity in childhood are numerous: better physical, psychic and cognitive development (Bodega et al., 2019) reducing the risk of suffering from chronic non-communicable diseases (Kelsey et al., 2014) as well as reducing the risk of development of obesity (Cecchini et al., 2010). A modern lifestyle that characterizes a long working day, irregular food intake, eating at least one meal a day away from home and changing eating habits in terms of choice, type, method of preparation and amount of food in the daily diet, with reduced physical activity, have led to an increase in health problems based on improper diet (Ministry of Health of Montenegro, 2009). In addition to nutrition, in today's time, children and adolescents spend more and more time in home activities using electronic devices (laptops, smartphones, video games), while the time spent outdoors decreases (Bassett et al., 2015). Proper nutrition and physical activity, are leading factors for the successful and effective performance of daily activities, to maintain good health. There is immensely much evidence of nutrition and health as well as about the connection between physical activity and health. Koprivnjak (2008) states that a healthy diet is the basis for health and that poor nutrition is associated with many diseases such as atherosclerosis, coronary disease, diabetes, hypertension, and also various malignant diseases. Therefore, a healthy, proper and balanced diet should be one of the main goals of each family (Koprivnjak, 2008). Pejnović Franić et al., 2011) point out that physical activity is

invaluable. Body activity also increases the quality of sleep that is crucial for the quality of life in general. The causes of an increasing number of obese children are numerous, and the most important are cultural influences on eating habits and physical inactivity (Brajković, 2015). Despite the fact that physical activity and eating habits in children and adolescents have been observed until recently as separate factors, lately these two components are beginning to be seen as interdependent factors that together contribute the most to the health and development of the child (Manz et al., 2019; Katzmarzyk et al., 2019; Wadolowska et al., 2016).

According to this fact, the goal of work was to determine the eating habits and level of physical activity of a primary school student of different genders and correlation between eating habits and physical activity.

## 2. MATERIAL AND METHODS

### Responders

The consent for conducting the research within the school was given by the management with the consent of the principal, and the research was anonymous and was conducted with the voluntary consent of the respondents. The cross-sectional survey was conducted in May 2022 and included 121 students, of eighth (N= 61) and ninth (N=60) classes attending the Second Primary School in Konjic. Respondents were divided into male (N=67) and female (N=54) gender.

### Methods

The research was conducted using a standardized survey questionnaire of the World Health Organization. The survey includes six modules (alcohol consumption, nutrition, physical activity, hygiene, tobacco use and protective factors), two of which (nutrition and physical activity) were used for research purposes. The first part included general data on respondents (gender, age and grade), while the second part related to questions about nutrition (consumption of fruits, vegetables, soft drinks and fast food), physical activity 60 minutes/day, walking or cycling for the last 7 days and going to physical education classes every week). Three issues included body weight, height, and skipping meals. The consent for conducting the research within the school was given by the management with the consent of the principal, and the research was anonymous and was conducted with the voluntary consent of the respondents.

### Statistical analysis

Specific significance tests were performed on the demonstrated correlation between variables using nonparametric analysis of the Kendall Tau test, as well as an additional Goodman-Kruskal gamma test to calculate the estimated predictive value among the variables. Test strength for the Kendall Tau test was measured on a scale (0–0.19=weak bond; 0.2–0.29=mean bond; 0.3 and higher=strong bond). We proved the analysis of the connection between the variables with the help of the chi-square test, when proving the relationship between gender and physical activities. The results of all tests were considered statistically significant with  $p < 0.05$  or at a 95% confidence level. The results of all tests were considered statistically significant with  $p < 0.05$ . The analysis was conducted using the IBM Statistics SPSS v 25.0 sociological research package. The research results are presented in text and tables.

## 3. RESULTS

The ratio of the frequency of half within the sample is almost as symmetrical, 55.5% respondents was of male, and 44.6% female gender. The students who filled the questionnaire were almost equal, 50.4% eighth grade, and 49.6% ninth grade. (Table 1).

**Table 1. General/demographic characteristics of the respondents**

General/demographic characteristics		N	%
Gender of students	Male	67	55.4
	Female	54	44.6
	Total	121	100.0
Student class	Eighth	61	50.4
	Ninth	60	49.6
	Total	121	100.0

N-number, %-percentage

For the examined sample, the height of the subjects ranged from 150 to 194 (cm) with an average height  $\bar{x} = 171.3$  and a standard deviation  $\sigma = 8.3$ . The body weight of the tested sample had values from 40 to 98 (kg), with a mean value of  $\bar{x} = 61.1$  and a standard deviation of  $\sigma = 11.8$  (Table 2).

**Table 2. Parameters related to the body height and body weight of the respondents**

	Hight (cm)	Weight (kg)
$\bar{x}$	171.3	61.1
$\tilde{x}$	172.0	60.0
$\sigma$	8.3	11.8
Range	44	58
Minimum	150	40
Maximum	194	98

N-number; %-percentage

By examining Primary school students (N=121), we assessed their eating habits by consuming fruits, vegetables, soft and carbonated drinks, and fast food on a monthly level. The results show that it is fruit and vegetable consumption is on the rise, (over 6 days) in relation to the consumption of alcohol and soft drink and fast food, the frequency of which is reduced, most often reduces to 1-3 days (Table 3).

**Table 3. Eating habits by consuming fruits, vegetables, soft and carbonated drinks and fast food on a monthly basis**

Nutrition	Days	N	%
Fruit meal	1-3	30	24,8
	4-6	30	24,8
	>6	61	50,4
	Total	121	100,0
Vegetables meal	1-3	47	38,8
	4-6	23	19,0
	>6	51	42,1
	Total	121	100,0
Non-alcoholic and carbonated drinks	1-3	59	48,8
	4-6	24	19,8
	>6	38	31,4
	Total	121	100,0
Fast food	1-3	73	60,3
	4-6	25	20,7
	>6	23	19,0
	Total	121	100,0

N-number; %-percentage

According to the table, the physical activities that are administered 60 minutes/day are the most common with over 6 days (44.7%), walking or cycling is weaker represented with 38% over 6 days, and body education classes prevail in activities in 71 students (58.7%) (Table 4).

**Table 4. Physical activity of students (60 minutes/day, walking or cycling and physical education classes)**

Physical activity	Days	N	%
Physical activity 60 minutes/day	1-3	32	26,4
	4-6	35	28,9
	>6	54	44,6
	Total	121	100,0
Walking or cycling	1-3	46	38,0
	4-6	29	24,0
	>6	46	38,0
	Total	121	100,0
Physical education classes	1-3	33	27,3
	4-6	17	14,0
	>6	71	58,7
	Total	121	100,0

N-number; %-percentage

In addition to activities, the time students spend sitting by watching TV on a daily basis is most common under 1-3 hour (50.4%), confirmed by 61 students. Of the total sample (N=121), the smallest number of students are retained over 6 hours sitting for TV (23.1%) (Table 5).

**Table 5. Time spent sitting and watching TV outside of school and school activities**

Sitting and watching TV (h)	N	%
1-3	61	50,4
3-6	32	26,4
>6	28	23,1
Total	121	100,0

N-number; %-percentage

Dietary habits of fruit consumption showed a statistical correlation in all these physical activities. For physical activity 60 minutes/day, the correlation coefficient with fruit eating was  $r_b=0.271$  ( $p<0.05$ ), which shows the average strength of the correlation. Also, a medium significant positive association exists between eating fruit and physical activity 60 minutes/day  $\gamma=0.403$ . The activity of walking or cycling in relation to eating fruit had a correlation coefficient  $r_b = 0.175$  ( $p<0.05$ ) which shows a weak strength of the connection of these two variables. Physical education classes as an activity correlated with fruit consumption with medium correlation strength  $r_b=0.237$  ( $p <0.05$ ). The greatest association was shown by physical activity of 60 minutes/day with fruit consumption (Table 6).

**Table 6. Relationship between eating habits of fruit consumption and physical activities of surveyed students (N=121)**

		Physical activity 60 minutes/day			Total	
		1-3	4-6	>6		
Fruit meal	Days					
	1-3	13	7	10	30	$r_b=0,271$ $p=0,001$
	4-6	8	15	7	30	$\gamma=0,403$
	>6	11	13	37	61	
	Total	32	35	54	121	
		Walking or cycling			Total	
		1-3	4-6	>6		
Fruit meal	Days					
	1-3	12	10	8	30	$r_b=0,175$ $p=0,027$
	4-6	15	8	7	30	$\gamma=0,266$
	>6	19	11	31	61	
	Total	46	29	46	121	
		Physical education classes			Total	
		1-3	4-6	>6		
Fruit meal	Days					
	1-3	12	6	12	30	$r_b=0,237$ $p=0,003$
	4-6	10	4	16	30	$\gamma=0,378$
	>6	11	7	43	61	
	Total	33	17	71	121	

p-statistical significance

Eating habits of vegetables at physical activity 60 minutes/day showed a strong statistical correlation  $r_b = 0.320$  ( $p<0.05$ ) and Goodman-Kruskal gamma  $\gamma=0.476$  with the ability to predict with 47% more accuracy of the second variable if the first is known. Other physical activities did not show statistical correlation with eating habits of vegetables ( $p>0.05$ ) (Table 7).

**Table 7. Relationship between eating habits of vegetables and physical activities of surveyed students (N=121)**

	Physical activity 60 minutes/day			Total		
	Days	1-3	4-6			>6
Vegetables meal	1-3	19	17	11	47	$\tau_b=0,320$ $p=0,000$ $\gamma=0,476$
	4-6	7	4	12	23	
	>6	6	14	31	51	
	Total	32	35	54	121	
	Walking or cycling			Total		
	Days	1-3	4-6			>6
Vegetables meal	1-3	21	12	14	47	$\tau_b=0,105$ $p=0,207$
	4-6	6	8	9	23	
	>6	19	9	23	51	
	Total	46	29	46	121	
	Physical education classes			Total		
	Days	1-3	4-6			>6
Vegetables meal	1-3	14	9	24	47	$\tau_b=0,023$ $p=0,789$
	4-6	9	0	14	23	
	>6	10	8	33	51	
	Total	33	17	71	121	

p-statistical significance

Consumption of non-alcoholic and carbonated beverages as a dietary habit did not show a statistical relationship with the physical activities of the respondents ( $p>0.05$ ) (Table 8).

**Table 8. Relationship between dietary habits of non-alcoholic and carbonated beverages consumption and physical activity of surveyed students (N=121)**

	Physical activity 60 minutes/day			Total		
	Days	1-3	4-6			>6
Non-alcoholic and carbonated drinks	1-3	15	16	28	59	$\tau_b=0,023$ $p=0,789$
	4-6	5	12	7	24	
	>6	12	7	19	38	
	Total	32	35	54	121	
	Walking or cycling			Total		
	Days	1-3	4-6			>6
Non-alcoholic and carbonated drinks	1-3	23	14	22	59	$\tau_b=0,32$ $p=0,688$
	4-6	7	6	11	24	
	>6	16	9	13	38	
	Total	46	29	46	121	
	Physical education classes			Total		
	Days	1-3	4-6			>6
Non-alcoholic and carbonated drinks	1-3	16	8	35	59	$\tau_b=0,176$ $p=0,040$
	4-6	10	2	12	24	
	>6	7	7	24	38	
	Total	33	17	71	121	

p-statistical significance

Kandall's Tau test was used to analyze the connection between the consumption of fast food as a eating habit and the physical activities of the respondents (N=121). Eating habits of fast food consumption at physical activities 60 minutes/day showed a weak statistical correlation  $\tau_b = 0.176$  ( $p<0.05$ ). Other physical activities did not show statistical correlation with eating habits of vegetables ( $p>0.05$ ) (Table 9).

**Table 9. Relationship between fast food eating habits and physical activities of surveyed students (N=121)**

Fast food	Physical activity 60 minutes/day				Total			
	Days	1-3	4-6	>6				
	1-3	15	21	37			73	$\chi^2=0,176$ $p=0,040$
	4-6	6	10	9			25	
>6	11	4	8	23				
Total	32	35	54	121				
Fast food	Walking or cycling				Total			
	Days	1-3	4-6	>6				
	1-3	27	15	31			73	$\chi^2=0,110$ $p=0,186$
	4-6	11	8	6			25	
>6	8	6	9	23				
Total	46	29	46	121				
Fast food	Physical education classes				Total			
	Days	1-3	4-6	>6				
	1-3	25	6	42			73	$\chi^2=0,110$ $p=0,186$
	4-6	4	9	12			25	
>6	4	2	17	23				
Total	33	17	71	121				

Legend: p-statistical significance

In our statistical values, both sides measured p is less than 0.05, which allows us to reject the null hypothesis and conclude that there is a statistically significant relationship in eating habits in fruit consumption in relation to gender  $\chi^2(2)=6.867$ ,  $p=0.032$ . Other eating habits do not have statistically significant correlations with the gender of students ( $p>0.05$ ) (Table 10).

**Table 10. Relationship between eating habits and gender of surveyed students (N=121)**

Days	Fruit meal			Total	p
	1-3	4-6	>6		
Male	16	11	40	67	0,032
Female	14	19	21	54	
Total	30	30	61	121	
Days	Vegetable meal			Total	p
	1-3	4-6	>6		
Male	27	11	29	67	0,72
Female	20	12	22	54	
Total	47	23	51	121	
Days	Non-alcoholic carbonated drink			Total	p
	1-3	4-6	>6		
Male	29	12	26	67	0,15
Female	30	12	12	54	
Total	59	24	38	121	
Days	Fast food			Total	p
	1-3	4-6	>6		
Male	37	14	16	67	0,28
Female	36	11	7	54	
Total	73	25	23	121	

Legend: p-statistical significance

#### 4. DISCUSSION

A proper diet is the foundation of healthy life. It is very important to adopt it as early as possible and keep healthy habits throughout life. This study was attended by students of eighth and ninth grades of primary school who were divided into male 55.4% and female 44.6% gender. According to respondents who referred to body height and weight parameters, the average height of the respondents was 171.3 cm and the body weight was 61.1 kg. The segment related to eating habits included consuming fruits, vegetables, soft and carbonated drinks and fast food. Analyzing the results of other authors engaged in fruit and vegetable consumption, the data show that as many as 63% students do not consume fruit daily, and 73% does not eat vegetables every day, while in the years 2009/2010,



the results were even more disappointing, 66% students did not eat fruit, and 76% did not eat vegetables every day (Pejnović Franelić et al., 2011). In the Federation of Bosnia and Herzegovina, research showed that over a third of respondents 36.2% consume fresh yellow and orange vegetables less than once a week. Fresh leafy vegetables are rarely used, over half of respondents consume it 1-2 times per week or less 41.5% or 14.5% (Zavod za Javno zdravlje Federacije Bosne i Hercegovine, 2012). In Croatia, fruit and vegetable consumption in most of the young people did not meet expert recommendations. Namely, data for 2010 show that a total of 66% students do not eat fruit, and 76% do not eat vegetables every day (Hrvatski zavod za javno zdravlje, 2012). By reviewing the above results, we can say that the results of our research show a great contrast. Respondents state that they consume fruits 50.4% and vegetables 41.2%, over six days, which is of great importance to their growth and development and that they have a development awareness of the importance of fruits and vegetables for their organism. Our data obtained can be compared to the results of research by sixth grade school children in the Bjelovarski-Bilogor County where there is data that fruit is consumed several times a week 52.0% of respondents, every day 33.0%, a rare 15.0% of respondents (Beretić, 2013). Results in Montenegro showed that 41.5% children and adolescents of age 7-19 who go to school reported the daily intake of fresh fruit in seven days, and 33.4% the same group eat fresh vegetables every day (Ministarstvo zdravlja Crne Gore, 2010). Today, children on their way to school and in the very circle of school have many shops where they have a varied carbonated drinks at their fingertips. As for the results obtained on consuming soft and carbonated drinks and fast food, respondents in this study in both genders mostly stated that they consume it 1-3 days. Our results obtained coincide with the results of the research conducted in the Lika-Senj County, where 25% students replied that they consume fast food 2-3 times a week. Also, half of students eat sweets and drink carbonated drinks 2-3 times during the week (Starčević, 2015). Looking at the results of previous research on the consumption of soft and carbonated beverages and fast food show that several times a week respondents consume carbonated juices and fast food, and where the results show that children in fifth grade 4.3% students consume fast food every day identical to the research (Beretić, 2013 & Koprivnjak, 2008). However, examining the relationship of eating habits in our students has only established a statistic significance in eating habits in fruit consumption compared to gender ( $p=0,032$ ), while other eating habits do not differ in boys and girls. In today's time, a sedentary way of life is increasingly represented. Children have very little activities and more and more of their leisure games are associated with sitting activities (video games, social networks.) One of the questions related to time spent sitting when children were out of school and school activities. The results show that 50.4% of the respondents spend 1-3 hours sitting. The results coincide with the research conducted among fifth grade students in the Bjelovar-Bilogor County where 28.8% watch television for 2 hours while 27.7% respondents watch for 3 and more hours (Beretić, 2013). A similar study conducted in Zadar with students of seventh and eighth grades of primary schools shows that 24.6% watch television up to 2 hours, up to 3 hours 31.9% and over 3 hours 30.8% of respondents. Playing for three or more hours, they 7.8% spend most of their time in a sedentary type game 61.1%. It can be concluded that the respondents spend little time doing some physical activities that would certainly contribute to their better physical and mental state (Miliša & Milačić, 2010). Regular physical activity in addition to diet is equally responsible for keeping children healthy and able to perform daily activities. Regular physical activity allows children to grow, build muscle mass, build bones, act positively on the immune system, and affects the development of motor skills such as coordination, strength and endurance. In this study, the results show that the students of eighth and ninth grades over six days, or 44.7% were physically active 60 minutes/day. This is followed by walking or cycling, where students equally responded to walk or ride a bicycle 1-3 or over six days 38%. Our results related to physical activity 60 minutes/day coincide with the proclamation of research conducted at the Primary School of Dr. Jure Turčić where there is information that 42% respondents engage in activity 1-2 hours per day (Cacić, 2021). Physical education classes are also a form of physical activity. In a study that touched on physical activity, it was discovered that more than one third of students were physically inactive in the last 7 days. During the school year, 14.9% of boys and girls had physical education classes once or less a day, and 8.1% of them never had any information about the benefits of physical activity (Tawfik & Farag, 2017). The results of the authors (Peltzer, 2010) show that only 14.2% school children were often physically active (5 days and more a week, at least 60 minutes/day) in their spare time; and significantly more in boys than in girls. Serving previous results with the results of this study showing that as many as 58.7% students go to physical education classes and manage such a vision of physical activity, which is positive in relation to previous research. Positive habits and going to physical education classes were declared by students in the author's study (Cacić, 2021) where as many as 97% students stated that they loved physical education and went to classes of the same. In the work of the author (Lučan, 2019), the overall result of physical activity is projected on the basis of the arithmetic average of the responses received, and the highest average result was shown by students in a variable that assesses the level of physical activity on the hour of body and health culture 4.2%. In addition to nutrition and physical activity as separate areas, this paper examined the relationship between eating habits (consumption of fruits, vegetables, soft and sugary drinks and fast

food) with physical activity (physical activity 60 minutes/day, walking or cycling and going to physical education classes). Nutrition habits of fruit consumption have shown statistical connectivity in all these physical activities, and the greatest association has shown physical activity 60 minutes/day with fruit consumption. The results show that there is a significant mean positive association between fruit consumption and physical activity 60 minutes/day  $\gamma=0,403$ , by which we can say knowing the score of one of the variables we can predict the other with 40% more accuracy. Similar results were obtained by the author (Jurašinović, 2021) where the largest share of daily fruit intake is associated with the highest low physical activity while there is no significant difference between the two levels of lower body activity ( $p(\text{low and high level})=0,005$ ;  $p(\text{medium and high level})=0,003$ ). Our results coincide with the results of many other research that state that children with the highest levels of physical activity bring the most fruits and vegetables (Manz et al, 2019; Katzmarzyk et al, 2019; Wadalowska, 2016). Another such research was conducted by (Wadolowski and assoc, 2016) among the girls' pattern (13–21 years old) in Poland, whose results have shown that girls who practice more physical activity ("in school activity", "active recreation" and "garden activities") consume the largest amounts of fruits and vegetables. Also, the eating habits of consuming vegetables have shown strong statistical association in physical activities 60 minutes/day  $\tau b=0.320$  ( $p<0.05$ ) while other physical activities have not shown statistical association with food habits of consuming vegetables, non-alcoholic and carbonated drinks ( $p>0.05$ ).

## 5. CONCLUSION

The results show that respondents consume fruit and vegetable over six days, while consumption of soft and carbonated drinks and fast food is reduced from one to three days. Physical activity is practiced 60 minutes/day for more than six days, while for other forms of activity students are equally responsible. Within the question related to the time period spent sitting after school activities, 50.4% students replied to spend one to three hours. The relationship of nutrition habits of fruit consumption has shown statistical connectivity with all forms of physical activity. The mean strength of the connection concerned the nutrition habit of fruit consumption and physical activity 60 minutes/day, while the nutrition habits of consuming vegetables in physical activities 60 minutes/day showed a strong statistical connectivity. Proper recommendations and constant education of all factors in the chain of proper nutrition should be constant and frequent, both in kindergartens and schools, and in institutions in the wider community. The care of the proper diet should be taken as part of responsibility for one's own health, proposing constant life education on nutrition and physical activity. Awareness of the importance of adequate nutrition and good health for all school children should be strengthened and the involvement of parents and the community in securing meals at school should be encouraged. Also, there is a need for prevention programs, especially those of primary prevention, where the primary goal is to adopt a healthy lifestyle, which is most demanding, because it is a universal approach, which must have continuity to have positive results.

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