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BODY MASS INDEX AND NUTRITIONAL HABITS OF ADOLESCENTS IN THE CITY OF GOSTIVAR

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Abstract

Healthy nutrition is a basic need and the main pillar of human development. To achieve optimal physical growth and development, especially in adolescents, it is required to consume proper food, have good eating habits, and be physically active to continue being healthy at all stages of life. The study was conducted through a questionnaire by students of two high schools in the city of Gostivar, where the main objective was to take care of the BMI, consumption of the main food groups, bad nutritional habits, and food intake at main meals. The results showed that most adolescents have a normal BMI, but of concern are those who are overweight with 11.02%. When it comes to consuming the main food groups, most adolescents consume bread and similar products, then fruits and vegetables, as well as milk and dairy products. A significant percentage of adolescents consume fast food and coffee but do not consume alcohol. Most adolescents consume lunch regularly, but about a quarter of adolescents skip breakfast and dinner. There were statistically significant differences only in coffee and alcohol consumption, as $\chi 2$ was higher than the critical value (df), while the P value was lower than the significance $P < 0.05$. It is recommended to consume less fast food and not skip the main meals.

Keywords: adolescents, BMI, nutritional habits, main meals.

1. Introduction

Nutrition represents one of the main factors in the protection and development of the health of human beings and future generations. Optimal and balanced nutrition is essential for the good health of everyone, especially children and adolescents. Healthy nutrition is a notion that we come across daily. However, what does this notion imply? Does it mean that food is divided into healthy and not healthy food, thus avoiding unhealthy food and consuming healthy food (Dimitrovska et al., 2012)?

The period of adolescence is influenced by the social, economic, and cultural conditions of everyone. Therefore, the nutritional status of adolescents needs to be monitored closely as they constitute the next generation of parents (Venkaiah et al., 2002). Adolescence is a particularly unique period in life because it is a time of intense physical, psychosocial, and cognitive development. Good habits, such as exercise and a healthy diet, are likely to bring many benefits, including improved performance in school (Doku et al., 2013). Increased nutritional needs during this period relate to the fact that adolescents gain up to 50% of their adult weight, more than 20% of their adult height, and 50% of their adult skeletal mass during this period. Caloric and protein requirements are maximal. Increased physical activity, combined with poor nutrition habits and other considerations, e.g., menstruation and pregnancy, contribute to accentuating the potential risk for adolescents of poor nutrition (Shahid et al., 2009).

Therefore, unfavorable healthy eating habits can lead to the emergence of health problems, such are anemia, obesity, malnutrition, and dental caries, while healthy eating habits can prevent health problems such are cancer, ictus, high blood pressure, and osteoporosis (WHO, 2003; Grujic, 2003). In addition to this, bad habits that are developed during childhood and teenage years will remain with the person when they grow up

(Zdravković, 2001). Also, numerous studies on body mass index (BMI) estimates are fundamental to the prevention of obesity in children and adolescents, as a BMI above 25.00 kg/m2 significantly increases the risk for morbidity and mortality (Bellizzi and Dietz, 1999; Himes and Dietz, 1994). This led to the fact that children in developing countries suffer from double risk regarding nutrition; the urban children suffer from problems related to being overweight, whereas the children from rural environments and poor neighborhoods suffer from the effects of being underweight. (Chatterjee, 2002).

In 1994, the USDA's School Meals Initiative for Healthy Children was developed in part to lower the fat and saturated fat content of school menus by following the USDA Dietary Guidelines for Americans in menu planning (USDA, 2006).

Regarding the issue of proper nutrition, experts and WHO promote the nutritional pyramid. The pyramid of healthy food is meant to provide visual cues for all people (Smith – Fullerton, 2008). However, in 2005 was published a well-known pyramid for a healthy diet under the supervision of the American Dietic Association, (ADA, 2006).

According to WHO, in European countries that are covered by this organization, including Macedonia, 50 percent of the population exhibit moderate problems regarding weight, and 20 percent have obesity problems (WHO, 2007).

The purpose of this study was to determine the impact of nutrition habits on high school adolescents on their health, through statistical analysis of body mass index, consumption of staple foods, bad nutrition habits, and intake of daily meals.

2. Materials and methods

To obtain information on the nutritional habits of adolescents aged 15-17 years old, more precisely on what food they consume, how often they consume unhealthy food, and many other issues, one performed this study based on the criteria of WHO. As an instrument for the research on the primary data, one used the survey questionnaire and the BMI calculation. Body mass index (BMI) was calculated based on self-reported weight and height, according to international BMI cut-off points (WHO, 2006). Based on the BMI of the surveyed person, we divided them into four groups as follows: underweight (BMI<18.5); normal (18.51 – 24.99); overweight (25.00 - 29.99), and obese (BMI>30).

The research was conducted as a transversal study to identify the life habits of young people related to body mass index and nutritional habits. A questionnaire built specifically for this research was used as a research tool.

The questionnaire was distributed to one hundred and twenty-seven adolescents, of whom 61 were male and 66 females. The questionnaire was conducted in two high schools in the municipality of Gostivar: The Municipal High School - Gostivar and the Municipal Medical High School - Gostivar.

The results that are obtained from the statistical analysis of the gathered data and the evaluation with the participants are presented in tables and graphs, by evaluating the importance of the variables based on the percentages and absolute numbers. The changes are done in the form of a change in the percentage for both genders in the study and the comparison of the findings indicates the change between variables. The criterion to judge significance is the Chi-square test ($\chi 2$) with a value of $P<0.05$. The data thus collected were analyzed with the help of the Statistical Package for Social Sciences (SPSS 16).

3. Results and discussion

Statistical analyzes performed for BMI are presented in Table 1. We can very clearly see that the body mass index (BMI) of all adolescents surveyed was 23.42±2.57 kg/m2, higher in males than in females. Being underweight in adolescence is associated with a variety of conditions including musculoskeletal, respiratory, intestinal, adverse pregnancy outcomes, and psychiatric disorders (Han et al., 2010; McDonald et al., 2013),

as well as stunting, pubertal delay, and a weakened immune system (Vasunilashorn and Martinson, 2013). In our case, a total of 4.73% of adolescents were underweight, most of them female. In terms of overweight a total of 11.02% of adolescents, which is worrying, because weight gain in childhood and adolescence can lead to overweight and obesity throughout life, and it is associated with greater risks for early onset of chronic disorders such as psychological and type 2 diabetes (Lobstein et al., 2004). Regarding obese adolescents, the total was 3.94%, of which 2.36% were male.

Table 1. BMI category by gender according to WHO classification

BMI		Underweight	Normal	Overweight	Obese	Total
Male	n	2	48	8	3	61
	Mean±SD	17.76±0.74	23.31±1.36	26.22±1.35	31.39±0.53	23.90±2.59
	Percentage (%)	1.57	37.79	6.30	2.36	48.02
Female	n	4	54	6	2	66
	Mean±SD	18.07±0.23	22.62±1.11	26.88±0.83	31.03±0.29	22.97±2.48
	Percentage (%)	3.15	42.52	4.73	1.57	51.97
Total	n	6	102	14	5	127
	Mean±SD	17.81±0.52	22.94±1.27	26.51±1.16	31.25±0.44	23.42±2.57
	Percentage (%)	4.73	80.32	11.02	3.94	100

Table 2 presents the basic food groups and adolescents' habits regarding their intake. Regarding the consumption of fruits and vegetables, both sexes have consumed at most a total of 65.4%, where the male gender has consumed more than the female gender. Three times a week they consumed a total of 28.3%, with a higher consumption among females, and once a week a total of 6.3%. $\chi 2$ was 1.414 which means that it is smaller than the critical value and with it, there are no statistically significant differences between theoretical and empirical values. P value was 0.493 which means that it is higher than the significance $P < 0.05$ therefore it can be proved that there is no statistically significant difference.

When it comes to bread and flour products, as is customary in our country, these products are consumed a lot, where the total daily consumption was 89.8%. These results are much higher than the study done by Alkoly et al., 2011, where daily consumption was 72.25%. $\chi 2$ was 0.531, which means that there is no statistically significant difference because it is less than the critical value (df), whereas the P value was 0.466, and there was no statistically significant difference since it doesn't fulfill the significance $P < 0.05$.

There are several pieces of advice regarding the use of milk and dairy products. Dietary advice all over Europe recommends that dairy products be consumed daily as a part of a healthy diet and during all stages of life. International institutions recommend the consumption of dairy products as an important part of a healthy and balanced diet (Regulation (EC) No 1924/2006). Many people in Europe do not comply with dietary recommendations and guidelines for dairy intake, in particular adolescent girls, young women, and frail elderly people (the latter representing a growing proportion of the population in the EU) (Vissers et al., 2011). In our study, it was observed that both genders had consumed a total daily consumption of 64.6%, while three times a week they consumed a total of 26.8% of adolescents. Even here, $\chi 2$ and P values had no statistically significant difference.

Table 2. Basic food groups consumptions among male and female adolescents

Food Groups		Once per week	Three times a week	Every day	Total	χ2	df	P-value
			Fruits and vegetables					
	Count	3	15	43	61			
Male	Exp. Count	3.8	17.3	39.9	61.0			
	% of Total	2.4	11.8	33.9	48.0			
	Count	5	21	40	66			
Female	Exp. Count	4.2	18.7	43.1	66.0	1.414	2	0.493
	% of Total	3.9	16.5	31.5	52.0			
	Count	8	36	83	127			
Total	Exp. Count	8.0	36.0	83.0	127.0			
	% of Total	6.3	28.3	65.4	100.0			
			Bread and similar products					
	Count	-	5	56	61			
Male	Exp. Count	-	6.2	54.8	61.0			
	% of Total	-	3.9	44.1	48.0			
	Count	-	8	58	66	0.531	1	0.466
Female	Exp. Count	-	6.8	59.2	66.0			
	% of Total	-	6.3	45.7	52.0			
	Count	-	13	114	127			
Total	Exp. Count	-	13.0	114.0	127.0			
	% of Total	-	10.2	89.8	100.0			
			Milk product					
Male	Count	4	16	41	61			
	Exp. Count	5.3	16.3	39.4	61.0			
	% of Total	3.1	12.6	32.3	48			
Female	Count	7	18	41	66			
	Exp. Count	5.7	17.7	42.6	66.0	0.740	2	0.691
	% of Total	5.5	14.2	32.3	52.0			
Total	Count	11	34	82	127			
	Exp. Count	11.0	34.0	82.0	127.0			
	% Of Total	8.7	26.8	64.6	100.0			
			Meat product					
Male	Count	6	14	41	61			
	Exp. Count	6.7	15.9	38.4	61.0			
	% of Total	4.7	11.0	32.3	48.0			
Female	Count	8	19	39	66			
	Exp. Count	7.3	17.1	41.6	66.0	0.898	2	0.638
	% of Total	6.3	15.0	30.7	52.0			
Total	Count	14	33	80	127			
	Exp. Count	14.0	33.0	80.0	127.0			
	% of Total	11.0	26.0	63.0	100.0			

In the use of meat and meat products, it is noticed that every day they have consumed a total of 63.0% of adolescents, but the male gender consumed a little more than the female gender. Three times a week they consumed a total of 26.0%, while once a week they consumed a total of 11.0%. Even here, $\chi 2$ and P values had no statistically significant difference.

Table 3. Some of the bad nutritional habits of adolescents

Food Groups		Every day	Once up to three times per week	Less than once per week	Total	$\chi 2$	df	P-value
How often do you consume baked food?								
Male	Count	25	30	6	61	1.612	2	0.446
	Exp. Count	21.6	33.1	6.2	61.0			
	% of Total	19.7	23.6	4.7	48.0			
Female	Count	20	39	7	66			
	Exp. Count	23.4	35.9	6.8	66.0			
	% of Total	15.7	30.7	5.5	52.0			
Total	Count	45	69	13	127			
	Exp. Count	45.0	69.0	13.0	127.0			
	% of Total	35.4	54.3	10.2	100.0			
How often do you consume fast food?								
Male	Count	26	28	7	61	1.312	2	0.518
	Exp. Count	23.5	31.2	6.2	61.0			
	% of Total	20.5	22.0	5.5	48.0			
Female	Count	23	37	6	66			
	Exp. Count	25.5	33.8	6.8	66.0			
	% of Total	18.1	29.1	4.7	52.0			
Total	Count	49	65	13	127			
	Exp. Count	49.0	65.0	13.0	127.0			
	% of Total	38.6	51.2	10.2	100.0			
How often do you drink coffee?								
Male	Count	32	21	8	61	8.533	2	0.014
	Exp. Count	24.0	25.9	11.0	61.0			
	% of Total	25.2	16.5	6.3	48.0			
Female	Count	18	33	15	66			
	Exp. Count	26.0	28.1	12.0	66.0			
	% of Total	14.2	26.0	11.8	52.0			
Total	Count	50	54	23	127			
	Exp. Count	50.0	54.0	23.0	127.0			
	% of Total	39.4	42.5	18.1	100.0			
How often do you consume alcohol?								
Male	Count	-	9	52	61	5.507	3.84	0.019
	Exp. Count	-	5.3	55.7	61.0			
	% of Total	-	7.1	40.9	48.0			
Female	Count	-	2	64	66			
	Exp. Count	-	5.7	60.3	66.0			
	% of Total	-	1.6	50.4	52			
Total	Count	-	11	116	127			
	Exp. Count	-	11.0	116.0	127.0			
	% of Total	-	8.7	91.3	100.0			

Table 3 lists some of the adolescents' bad nutritional habits. When asked how often they consumed baked goods, most adolescents consumed one to three times a week with a total of 54.3%, whereas females with 30.7% had a higher percentage than males with. A large percentage was in the daily consumption of a total of 35.4%, where males had consumed more than females. While less than once a week consumed a total of 10.2% of adolescents. $\chi 2$ was 1.612 and there was no statistically significant difference. P value was 0.446, and there was no statistically significant difference as it was higher than the significance $P<0.05$.

In terms of fast-food consumption, there is a high percentage of daily consumption of 38.6% of the total, where males consumed more than females. One to three times a week have consumed a total of 51.2% whereas females have consumed more than males. Less than once a week consumed a total of 10.2% of adolescents. Even here $\chi 2$ had no statistically significant difference as well as P-value.

When it comes to drinking coffee, it is noticed that a large part of adolescents with a total of 39.4% have consumed coffee every day, where the dominant gender is the male gender with 25.2%. The female gender has consumed significantly more than the male, one to three times a week and less than once a week. $\chi 2$ was 8.533 and higher than the critical value, which means that there is a statistically significant difference, while the P value was 0.014, i.e., lower than the significance $P <0.05$ which means that there is a statistically significant difference.

Regarding alcohol consumption, all respondents answered negatively about its daily use. One to three times a week have consumed a total of 8.7%, with males dominating with 7.1%. While less than once a week we have the majority of adolescents with a total of 91.3%. $\chi 2$ was higher than the critical value indicating that there is a statistically significant difference. P value was lower than the significance $P <0.05$ indicating that there is a statistically significant difference.

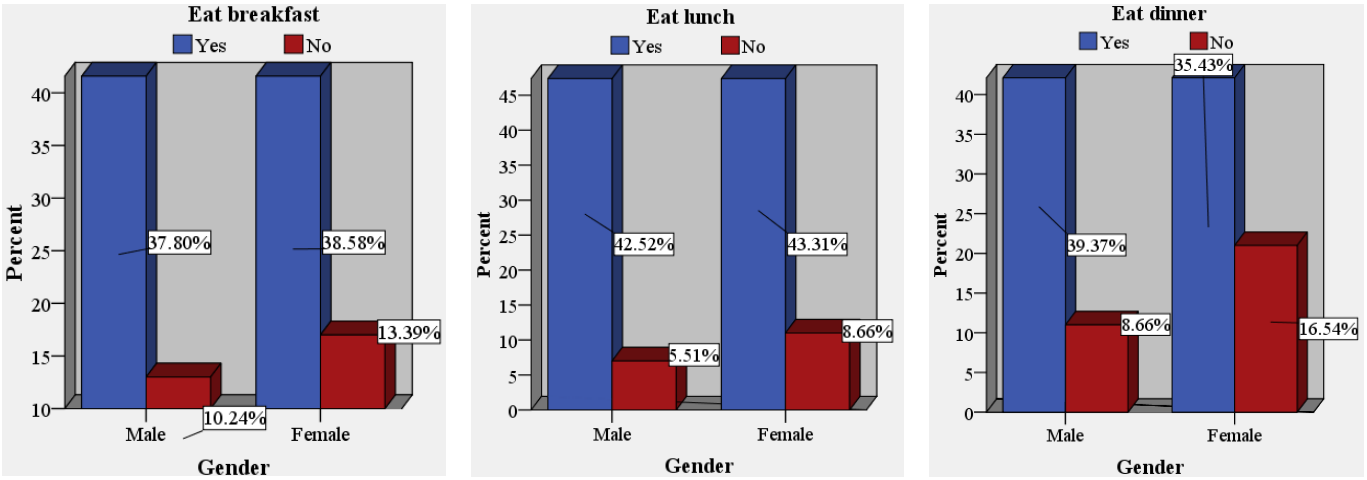

Fig1. Adolescent nutrition habits about eating through meals

An extremely important habit in adolescent nutrition is the intake of food in the three main meals, which, according to the recommendations should be taken regularly. Figure 1 has shown that a large percentage of adolescents skip main meals. In terms of breakfast, a total of 23.6% did not consume it, and $\chi 2$ and P values had no statistically significant difference. A total of 85.8% had consumed lunch where both sexes were similar. $\chi 2$ was 0.702 and there was no statistically significant difference. P value was 0.402 and there was no statistically significant difference. A considerable percentage of the total 25.2% did not consume the dinner meal, where it was dominated by females with 16.54%. $\chi 2$ although it was 3.196, there was no statistically significant difference. The P-value was 0.074, and there was no statistically significant difference. These data differ significantly from the study of Gill et al., 2016, who in their study report that 92.1% of adolescents had habits of regular consumption of main meals.

4. Conclusions

From the results obtained and from what was said above, it can be concluded that most adolescents have BMI in the normal range, but overweight with 11.02% is worrying, where the highest percentage was male. The main food groups are consumed by most adolescents every day, where bread and similar products predominate, followed by fruits and vegetables as well as milk and dairy products. A significant percentage of adolescents had bad nutritional habits after consuming a total of 39.4% coffee and 38.6% fast food per day, dominated by males, while almost rarely or not consuming alcohol at all. Most adolescents consume lunch regularly, but ¼ of adolescents do not consume breakfast and dinner, where the female percentage is higher. There were statistically significant differences in coffee and alcohol consumption as $\chi 2$ was higher than the critical value (df), while the P value was lower than the significance $P < 0.05$.
Recommendation - reduce the consumption of some fast foods and skip daily meals, because they are a prerequisite for increasing BMI and with it the appearance of various diseases.

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