EATING HABITS OF MALE ADOLESCENTS IN RELATION TO BMI-FOR-AGE AND PLACE OF RESIDENCE

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Summary

Introduction: It has been proven that girls have better eating habits, and therefore the aim was to assess dietary behavior of boys, taking into account BMI-for-age and place of residence observed as urban or rural, in the Canton of Sarajevo.

Material (participants) and methods: The study included 60 adolescent boys from rural and 264 from urban areas of the Canton of Sarajevo, aged 13-15. Methods that were used: anthropometric measurements (measurement of body weight and body height in order to calculate the BMI-for-age percentile) and a purpose-designed questionnaire about eating habits by which eating pattern was graded as proper or improper. Data were statistically analyzed by using SPSS 13.0 programme.

Results: The majority of participants were normal weighted (urban *vs.* rural 58.30%:70.00%), followed by overweight (urban *vs.* rural 24.20% 20.00%) and obese (urban *vs.* rural 14.40%:10.00%). Category of underweight was only present in adolescents from urban areas with 3.00%. Statistical significance of adolescents' nutritional status from urban areas was found for the number of daily meals ($p=0.039$), regular consumption of breakfast ($p=0.009$), diverse diet ($p=0.049$) and consumption of snacks ($p=0.037$). In adolescents from rural areas, the statistical significance was found between their nutritional status and consumption of carbohydrate foods ($p=0.024$).

Conclusion: Although no statistical significance of BMI-for-age in relation to the place of residence was found, higher percentage of adolescents from rural areas have normal weight, while both groups have high percentage of overweight. Eating habits need to be studied further, with additional factors to examine in the default settings.

Keywords: eating habits, adolescents, nutritional status, urban, rural

Introduction

Dietary habits and nutritional status as the characteristics of health depend on the period of life and life circumstances. Options vary upon the stage of life because each period has its advantages, disadvantages and challenges. Adolescence is a particularly challenging period of life with respect to the physical and cognitive growth and development, and the perception of events within and around them. Adolescence is also considered as a deadline for the correction of all the bad habits acquired, including food preference carried further into adulthood. Tracking the eating pattern among students is important to prevent the emergence of health problems in adulthood, and it is particularly important to track other factors, not just health (taste, cultural norms, socio-economic status, food availability, etc.), which affect eating behaviour (Brady et al., 2000; Harnack et al., 1997). Place of residence is also influencing factor. The differences between rural and urban cognition of food, dietary patterns and physical activity are due to different lifestyle (Woodward et al., 2000). Research results are mixed. In recent years, the trend of increased consumption of energy-dense foods, and reduced physical activity are described in many rural areas in the world. This is most likely the reason why obesity and its complications ubiquitous in rural areas, in developed and developing countries (Popkin, 2001; Liebman et al., 2003). Changes in lifestyle including changes in eating habits are more pronounced among adolescents in urban areas. They quickly accept innovations and are exposed to commercial messages and market (Esposito et al., 2009). In a study conducted in Croatia consumption of fast food, soft drinks and alcohol is more widespread and more associated with eating behaviors in urban than in rural areas (Colić-Barić et al., 2004).

Subjects and methods

The study was conducted in the Canton of Sarajevo which was defined for the purpose of this study as urban and rural upon current Urbanistic plan (Zavod za planiranje razvoja Kantona Sarajevo, 2006). There were 324 participants, adolescent boys aged 14-15 years. 60 boys from rural and 264 boys from urban area who participated voluntarily and the number is proportional to the population distributions in the Canton of Sarajevo (Federalni zavod za statistiku, 2013). Eating habits were examined with specially designed Food Frequency

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Questionairre (FFQ) which included questinos regarding consumption frequency and portion (amount) of consumed food. Results were defined as proper (i.e. healthy/recommended) or improper (i.e. unhealthy) eating pattern for the purpose of writing this paper. Body weight and height were measured and used to calculate BMI-for-age percentiles. Height was measured with portable stadiometer and weight with medical digital balance (OT 150 FWEB Gorenje). Percentage distribution of children in relation to the standards of the World Health Organization by percentiles was defined and the nutritional status of children according to the WHO reference values (de Onis et al., 2007). Statistical analysis was performed using the statistical software package SPSS 19.0. (SPSS Inc, Chicago, Illinois, USA). Significant difference was considered at the level of $p<0.05$.

Results and discussion

Results for nutritional status show the highest prevalence of normal weight in both areas (rural *vs.* urban 70.0%:58.3%) and is followed by overweight and obesity (Table 1). There are more overweight and obese boys in urban area of the Canton of Sarajevo, but also underweight category is only present in that area (3.0%).

Table 1. Nutritional Status

Place	Nutritional Status	N	%	Valid Percent
Rural	Normal weight (5th – 85th percentile)	42	70.0	70.0
	Overweight (85th - 95th percentile)	12	20.0	20.0
	Obesity (≥ 95th percentile)	6	10.0	10.0
	Total	60	100.0	100.0
Urban	Underweight (<5th percentile)	8	3.0	3.0
	Normal weight (5th – 85th percentile)	154	58.3	58.3
	Overweight (85th - 95th percentile)	64	24.2	24.2
	Obesity (≥ 95th percentile)	38	14.4	14.4
	Total	264	100.0	100.0

In the study by Suliga (2006) overweight and obesity were rare in children from rural areas aged 10.5 years, and they have higher risk of being underweight, especially among boys. On the other hand, in urban areas, in both boys and girls aged 13.5 years overweight and obesity were more common.

Table 2. The number of daily meals in relation with adolescents' BMI-for-age from urban and rural area

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	1	1	0
	Improper	%	-	50.0	50.0	0.0
Urban		N	1	21	6	5
		%	3.0	63.6	18.2	15.2
Rural		N	-	47	7	4
	Proper	%	-	81.0	12.1	6.9
Urban		N	7	184	26	14
		%	3.0	79.7	11.3	6.1

In rural area, BMI-for-age was not related with the eating pattern, reflected in the number of daily meals (should be at least three meals per day), $p=0.349$. Nevertheless, 81.0% of adolescents within normal weight follow the pattern of proper diet and consume more than three meals a day (Table 2). Also, 6.9% obese consume more than three meals a day. In urban area, BMI-for-age is correlated with the form of proper nutrition, reflected in the number of daily meals, $p=0.039$. Smaller percentage of obese (6.1%), and a higher percentage of normal weight (79.7%) adolescents have more than three meals a day and follow the form of proper nutrition (Table 2). In the project conducted in Bjelovar-Bilogora County (Bertić, 2013) participants were 6th grade students and the majority of them (39%) during school day have three meals daily, one meal (9%), two meals (8%), four meals (28%), five meals (13%) and more than five (3%). According to a survey conducted in Sarajevo (Hodžić and Smajić, 2012), 49.6% of

adolescents (13-15 years old) consumed three meals a day, while four meals consumed 31.0% of respondents. It points out that 10.3% of adolescents consumed just two meals a day.

Table 3. Relation between breakfast consumption and adolescents' BMI-for-age from urban and rural area

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	14	3	0
	Improper	%	-	82.4	17.6	0.0
Urban		N	1	51	13	8
		%	1.4	69.9	17.8%	11.0
Rural		N	-	34	5	4
	Proper	%	-	79.1	11.6	9.3
Urban		N	7	153	19	10
		%	3.7	81.0	10.1	5.3

In rural area, BMI-for-age was not correlated with the regular consumption of breakfast, $p=0.675$. Higher percentage of adolescents with normal weight (82.4%) and overweight (17.6%) do not follow the recommended eating pattern (do not eat breakfast regularly). In urban area, BMI-for-age was correlated with the regular consumption of breakfast, $p=0.009$. Smaller percentage of obese (5.3%) and overweight (10.1%) and a higher percentage of normal weight (81.0%) adolescents regularly consume breakfast (Table 3). Study examining eating habits of school children in Croatia (11, 13 and 15 years of age) found that only 56.0% of them always eat breakfast during weekdays, while 80.0% of them always eat breakfast on Saturdays and Sundays (Ministarstvo zdravlja R. Hrvatske, 2013).

Table 4. Relation between adolescents' BMI-for-age and the type of breakfast

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	41	7	3
	Improper	%	-	80.4	13.7	5.9
Urban		N	5	148	20	13
		%	2.7	79.6	10.8	7.0
Rural		N	-	7	1	1
	Proper	%	-	77.8	11.1	11.1
Urban		N	3	54	12	6
		%	4.0	72.0	16.0	8.0

In rural area, BMI-for-age was not correlated with the type of breakfast (cereals, eggs, fruit as a proper pattern) $p=0.814$. Nevertheless, a higher percentage of normal weight (80.4%) and overweight adolescents (13.7%) make improper choice of food at breakfast and not the recommended, such as cereals, eggs and fruit (Table 4). While a higher percentage of obese (11.1%) make the correct choice. In urban area, BMI-for-age was not correlated with the type of breakfast, $p=0.412$. Almost the same percentage among all categories does (not) make proper selection of foods for breakfast.

Table 5. Relation between adolescents' BMI-for-age and fruit consumption

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	27	2	2
	Improper	%	-	90.0	6.7	3.3
Urban		N	3	88	13	7
		%	2.7	79.3	11.7	6.3
Rural		N	-	20	6	3
	Proper	%	-	69.0	20.7	10.3
Urban		N	5	115	19	12
		%	3.3	76.2	12.6	7.9

In rural area, BMI-for-age was not correlated with the consumption of fruits, p=0.057. Nevertheless, a higher percentage of normal weight adolescents (90.0%) follow an improper eating pattern, while the highest percentage of overweight (20.7%) and obese (10.3%) follow proper eating pattern and consume at least two servings of fruit per day (Table 5). In urban area

nutritional status was not correlated with the consumption of fruits, p=0.694. Almost equal percentage across all categories follow/don't follow the pattern of proper nutrition. According to Hodţić and Smajić (2012) the daily habit of eating fruit developed 29.4% of students (twice a day), and a similar percentage (28.7%) consumed fruit three times a day.

Table 6. Relation between adolescents' BMI-for-age and vegetables consumption

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	35	4	2
	Improper	%	-	85.4	9.8	4.9
Urban		N	5	119	17	13
		%	3.2	77.3	11.0	8.4
Rural		N	-	13	4	2
	Proper	%	-	68.4	21.1	10.5
Urban		N	3	84	15	6
		%	2.8	77.8	13.9	5.6

In rural area, nutritional status was not correlated with the consumption of vegetables, p=0.133, nor in urban area, p=0.968 (Table 6). In Croatia, 66.0% of pupils do not eat fruit every day, and as much as 76.0% do not eat

vegetables every day (Ministarstvo zdravlja R. Hrvatske, 2013). In the Canton of Sarajevo, 37.8% of adolescents consumed fruits once a day and vegetables (37.2%) twice a day (Hodţić and Smajić, 2012).

Table 7. Relation between adolescents' BMI-for-age and food diversity

			BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	16	1	3
	Improper	%	-	80.0	5.0	15.0
Urban		N	2	69	18	7
		%	2.1	71.9	18.8	7.3
Rural		N	-	32	7	1
	Proper	%	-	80.0	17.5	2.5
Urban		N	6	135	14	12
		%	3.6	80.8	8.4	7.2

In rural area nutritional status was not correlated with the diversity of food, p=0.824. In urban area nutritional status was correlated with food diversity, p=0.049. Among adolescents who have

diverse diet every day, the highest percentage is of those in the category of normal weight (80.8%), and a smaller percentage of those being overweight (8.4%) (Table 7).

Table 8. Relation between adolescents' BMI-for-age and the type of diet

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	26	5	2
	Improper	%	-	78.8	15.2	6.1
Urban		N	3	116	17	10
		%	2.1	79.5	11.6	6.8
Rural		N	-	21	3	2
	Proper	%	-	80.8	11.5	7.7
Urban		N	4	84	14	8
		%	3.6	76.4	12.7	7.3

In rural area, nutritional status was not correlated with the type of diet in relation to the contribution of macronutrients, $p=0.889$ nor in urban area, $p=0.976$ (Table 8). Four options were given as macronutrient describing: high protein, high fat, high carbohydrate and diverse diet. High protein and diverse diet were regarded as proper pattern.

Table 9. Relation between adolescents' BMI-for-age and the type of consumed fluid

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	21	3	2
	Improper	%	-	80.8	11.5	7.7
Urban		N	5	114	13	13
		%	3.4	78.6	9.0	9.0
Rural		N	-	25	5	2
	Proper	%	-	78.1	15.6	6.3
Urban		N	3	86	18	6
		%	2.7	76.1	15.9	5.3

In rural area, nutritional status was not correlated with the type of fluid consumed, $p=0.844$, nor in urban area, $p=0.586$ (Table 9). Proper eating pattern was demonstrated in the answers: spring water and fresh juices.

Table 10. Relation between adolescents' BMI-for-age and daily consumption of fluid

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	10	1	0
	Improper	%	-	90.9	9.1	0.0
Urban		N	1	31	5	4
		%	2.4	75.6	12.2	9.8
Rural		N	-	38	7	4
	Proper	%	-	77.6	14.3	8.2
Urban		N	7	169	27	15
		%	3.2	77.5	12.4	6.9

In rural area, nutritional status did not correlate with the recommended daily consumption of fluids (1-1.5 liters), $p=0.301$, nor in urban area, $p=0.620$ (Table 10).

Table 11. Relation between adolescents' BMI-for-age and daily consumption of milk/yoghurt

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	5	2	0
	Improper	%	-	71.4	28.6	0.0
Urban		N	1	27	3	1
		%	3.1	84.4	9.4	3.1
Rural		N	-	34	4	2
	Proper	%	-	85.0	10.0	5.0
Urban		N	7	159	26	13
		%	3.4	77.6	12.7	6.3

In rural area, nutritional status was not correlated with the daily consumption of milk/yogurt (1-2-times per day and 3-4 times per day), $p=0.443$, neither in urban area, $p=0.428$ (Table 11). According to Hodţić and Smajić (2012) 32.2% of respondents consumed milk twice, while 30.3% consumed milk three times a week. According to Tognarelli et al. (2004) milk is consumed regularly by only 42.0% of children ($p=0.503$ for urban compared to rural).

Table 12. Relation between adolescents' BMI-for-age and daily consumption of carbohydrates

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	15	0	0
	Improper	%	-	100.0	0.0	0.0
Urban		N	1	37	7	5
		%	2.0	74.0	14.0	10.0
Rural		N	-	32	8	4
	Proper	%	-	72.7	18.2	9.1
Urban		N	6	150	19	13
		%	3.2	79.8	10.1	6.9

In rural area, nutritional status was correlated with the consumption of 250 grams of carbohydrate foods such as rice, pasta, potatoes, once or twice a week, *p*=0.024 (Table 12). In urban area, nutritional status was not correlated with the consumption of carbohydrate foods, *p*=0.238.

Table 13. Relation between adolescents' BMI-for-age and weekly consumption of sweets

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	27	5	1
	Improper	%	-	81.8	15.2	3.0
Urban		N	3	116	15	7
		%	2.1	82.3	10.6	5.0
Rural		N	-	20	3	3
	Proper	%	-	76.9	11.5	11.5
Urban		N	5	86	17	12
		%	4.2	71.7	14.2	10.0

In rural area, nutritional status was not correlated with the consumption of sweets, *p*=0.561, neither in urban area, *p*=0.182 (Table 13). Proper eating pattern is reflected in the answers never or 1-2 times per week. Similar data were obtained in the survey by Hodžić and Smajić (2012) among adolescents in the city of Sarajevo, where 58.1% of respondents said they consumed sweets once a day. Dinarević et al. (2011) found that 65.5% eat sweets every day, and the rest of students from time to time. Bertić (2013) points out that 31.0% eat sweets every day, 28.0% several times a week, 27.0% up to two times a week and 14.0% rarely.

Table 14. Relation between adolescents' BMI-for-age and weekly consumption of snacks

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	22	4	1
	Improper	%	-	81.5	14.8	3.7
Urban		N	4	99	12	5
		%	3.3	82.5	10.0	4.2
Rural		N	-	26	4	3
	Proper	%	-	78.8	12.1	9.1
Urban		N	4	99	20	14
		%	2.9	72.3	14.6	10.2

In rural area, nutritional status was not correlated with weekly consumption of snacks, *p*=0.736. In urban area, nutritional status was correlated with weekly consumption of snacks, *p*=0.037. Boys who follow proper eating pattern, either do not consume snacks or consume them minimally (once or twice a week) and 72.3% of them is of normal weight. On the other hand, the majority of boys with improper dietary pattern who consume snacks more often fall into normal weighted group (82.5%) (Table 14). This result is entirely unexpected due to the fact that snacks represent empty calories that increase the risk of obesity and diseases. Proper eating pattern is reflected in the answers never or 1-2 times per week. The frequency of consumption of snacks among adolescents in the city of Sarajevo was 47.5%, once a day (Hodžić and Smajić, 2012). Eating snacks (sticks, chips, etc.) is very popular. Most adolescents

(46.0%) consume snacks several times a week, and there are plenty of those (23.0%) who consume them every day, very rarely (30.0%), while only 1.0% of adolescents do not consume snacks (Bertić, 2013).

In rural area, nutritional status was not correlated with weekly consumption of meat products (salami, hot dogs, sausages), $p=0.736$, neither in urban area, $p=0.512$ (Table 15). Proper eating pattern is reflected in the answers never or 1-2 times per week.

According to Hodţić and Smajić (2012) 28.4% of adolescents consumed processed meats twice a week, while 8.8% do not consume these products. According to Bertić (2013) consumption of processed meats is highly abundant among adolescents in Bjelovar-Bilogora County (Croatia) and several times per week are consumed by 37.0%, 4.0% never eat them,, 23.0% eat them rarely, 23.0% up to two times per week, and 13.0% every day.

Table 15. Relation between adolescents' BMI-for-age and weekly consumption of meat products

Place	Pattern		BMI-for-age			
			Underweight	Normal weight	Overweight	Obesity
Rural		N	-	22	4	1
	Improper	%	-	81.5	14.8	3.7
Urban		N	3	122	18	8
		%	2.0	80.8	11.9	5.3
Rural		N	-	26	4	3
	Proper	%	-	78.8	12.1	9.1
Urban		N	5	82	14	11
		%	4.5	73.2	12.5	9.8

USDA recommendations (2010) for the studied population recommend five ounces per day of red meat, poultry and fish. One ounce is 28.34 grams, so daily intake of meat, poultry and fish should be 141.7 grams, a small steak of meat or a small fish. On a weekly basis, the recommended amount of protein food group would have been seven such steaks or smaller fish. It is known that restaurant' portion of meat is 250 grams, so this was taken into account in the design of FFQ, so the recommended amount would be 3-4 times a week of combined consumption of red meat, poultry and fish. The analysis for place of residence did not show statistical significance for poultry consumption (rural $p=0.470$, urban $p=0.595$), consumption of red meat (rural $p=0.687$, urban $p=0.307$), or fish consumption (rural $p=0.336$, urban $p=0.149$) (Table 16).

Table 16. Relation between adolescents' BMI-for-age and weekly consumption of poultry, red meat, and fish

	Place	Pattern		BMI-for-age			
				Underweight	Normal weight	Overweight	Obesity
POULTRY	Rural		N	-	34	4	3
		Improper	%	-	82.9	9.8	7.3
	Urban		N	8	137	23	13
			%	4.4	75.7	12.7	7.2
	Rural		N	-	14	4	1
		Proper	%	-	73.7	21.1	5.3
	Urban		N	0	63	9	6
			%	0.0	80.8	11.5	7.7
RED MEAT	Rural		N	-	37	6	3
		Improper	%	-	80.4	13.0	6.5
	Urban		N	6	151	22	13
			%	3.1	78.6	11.5	6.8
	Rural		N	-	9	2	1
		Proper	%	-	75.0	16.7	8.3
	Urban		N	2	47	10	6
			%	3.1	72.3	15.4	9.2
FISH	Rural		N	-	44	6	4
		Improper	%	-	81.5	11.1	7.4
	Urban		N	7	178	31	17
			%	3.0	76.4	13.3	7.3
	Rural		N	-	3	2	0
		Proper	%	-	60.0	40.0	0.0
	Urban		N	1	24	0	2
			%	3.7	88.9	0.0	7.4

Hodžić and Smajić (2012) point out that poultry is consumed by 66.5% of adolescents, while there's considerably lower consumption of red meat (17.3%) and fish (15.6%). Bertić (2013) showed that most students consume fish very rarely (45.0%), do not eat fish (17.0%), eat fish once a week (30.0%) or more times a week (8.0%). Although Croatia is a Mediterranean country, the presence of fish on the menu is very poor.

Conclusions

Although there is no statistical significance between BMI-for-age in relation to the place of residence, there is still higher percentage of adolescents from rural area with normal weight, and both groups have a high percentage of overweight. Statistical significance was found for more observed determinants of eating patterns for urban boys (the number of daily meals, regular consumption of breakfast, the diversity of diet and eating snacks) but looking at the percents, clear border between urban and rural eating patterns in this population can not be underlined. Eating patterns are complexed and needed to be studied in more details and with additional factors examined in the default settings.

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