ANTHROPOMETRIC NUTRITIONAL STATUS OF 11-14 YEAR OLD PUPILS OF SOFIA MUNICIPALITY

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Summary

The aim of this study was to assess the nutritional status and extracurricular physical activity of Sofia Municipality pupils depending on school conditions.

Methodology: the height and weight were measured of 123 respondents (boys and girls, with mean age 12.4 ± 0.9 years) from three schools, each of whom was later asked to complete questionnaires that contain questions about age, gender, extracurricular physical activity and dietary intake over the last 24 hours. Based on this information, the following factors were assessed: daily nutritional intake, BMI, nutritional status and physical activity. School conditions: School 1 is in a village type district – there is a mess room, however no Fast food places and Physical education lessons are not held on schedule; School 2 is in a central district – there is a Fast food place, no mess room and Physical education lessons are carried out as planned; School 3 is in a central district – there are four Fast food places, no mess room and Physical education lessons are not held on schedule.

Results: In School 1 was observed the highest percent of pupils with below normal BMI – 15.6%. In School 2 pupils with normal BMI were 70.7%, extracurricular physical activities were performed 2.5 ± 1.9 h/week and it is statistically at a lower rank than the other schools. In School 3 there were 32.4% of pupils with above normal BMI. Discussion: The high percentage of pupils with low BMI in school 1 is in accordance with an earlier national survey.

Conclusions: At School 3 which is with various types of Fast food and not realized Physical education lessons was reported the highest percent of pupils with above normal BMI.

Key words: Nutritional intake, Physical activity

Introduction

Essential physiological, cognitive and social changes take place during adolescence. In this important period the adequate nutritional intake is necessary for normal growth and development of adolescents. During this stage imbalanced diet, malnutrition, nutritional deficiencies, overweight and obesity have impact on the health in both adolescents and mature age. This part of the population is one of the groups at greatest risk related to nutrition (National survey, 2003; National survey, 2011). Nutrition of schoolchildren largely depends on their diet at home, on understanding of nutrition and the financial capabilities of their parents (Golden, 2000). Puberty is a period in which the individual's character independence reflects to the pattern of eating, which often leads to significant differences of pupils' nutrition from that of their parents (McElligott-Tangney, 2001). The type of food places at and around schools has a great impact on the

eating habits of a large number of pupils.

Other essential element for normal growth and development of adolescents is Physical activity. According to international recommendations, children aged 5 to 18 should daily have 1 hour moderate to intense physical activity to maintain good health, normal weight (USDA, 2000; Smithers G. et al., 2000; Vuori, 2001; Corbin et al. 1994) and prevent chronic non-infectious diseases related to nutrition as adults (Bar-or, 2002). A school program of Bulgarian schools for children up to 14 years include 3 lessons of physical education and sport for 45 minutes or a total astronomical time of 2 hours and 25 minutes. This means that for pupils' health and the maintenance of normal body weight it is of great importance the additional extracurricular moderate to intense physical activity (Popivanova, 2001).

Aim and Objectives of the study

The aim of this study was to assess the nutritional status and extracurricular physical activity of Sofia Municipality pupils depending on school conditions.

Methods

Subjects

The study involved 193 students (52 boys and 71 girls) from 5th to 7th class, between 11 to 14 years old. The study was conducted at school time at the end of the school year.

Study design

Randomly were selected three schools from different regions of Sofia Municipality. Schools were conditionally named School 1, School 2 and School 3.

School conditions: School 1 is in a village type district – there is a mess room, however no Fast food places and Physical education lessons are not held on schedule; School 2 is in a central district – there is a Fast food place, no mess room and Physical ed-

ucation lessons are carried out as planned; School 3 is in a central district – there are four Fast food places, no mess room and Physical education lessons are not held on schedule.

The interviewer conducted the survey separately in each class, starting with a detailed explanation of how the pupils would fill in the questionnaire as much as possible.

Anthropometric indicators

Body mass was recorded to the nearest 0,05kg using a portable digital scale with each subject wearing light clothing and no footwear. Height was measured to the nearest 0,5cm.

Nutritional status

Nutritional status was assessed through anthropometric indicators based of measured height and weight. Body Mass Index (BMI = kg/m²) was used.

Table 1. BMI scale for children (WHO 2007).

Age (years)	Boys			Girls		
	Under-weight if BMI is below	Over-weight if BMI is above	Obese if BMI is above	Under-weight if BMI is below	Over-weight if BMI is above	Obese if BMI is above
11	14.8	19.6	22.2	14.7	20.1	23.0
12	15.3	20.3	23.2	15.2	21.0	24.1
13	15.8	21.1	24.1	15.7	21.7	25.0
14	16.3	21.9	24.8	16.2	22.4	26.0

Daily energy intake

The data for Daily energy intake (DEI) were collected using the 24-hour recall method.

Extracurricular physical activity

Information for extracurricular physical activity (ECPA) was collected by a questionnaire (hours/week and times/week of moderate to intensive physical activity)

Statistical analysis

The data are presented as a mean and standard deviation. Criterion for significance was set at $p < 0.05$.

Results

Table 2 presents the nutritional status of the surveyed subjects in terms of Body Mass Index separately for boys and girls in individual schools.

School 1 has the highest percentage of underweight pupils – 15.6, while at School 2 it is only 2.4%. More than 2/3 of schoolchildren at School 2 are with normal body weight. In schools 2 and 3, nearly 1/4 of the persons are overweight. At School 3, the highest percentage of obese people was reported.

Table 2. Nutritional status in terms of BMI.

BMI	School 1 (n=45)	School 2 (n=41)	School 3 (n=37)
Under-weight	15.6%	2.4%	8.1%
Normal weight	55.6%	70.7%	59.5%
Over-weight	24.4%	19.5%	24.3%
Obese	4.4%	7.3%	8.1%

Table 3. Extracurricular physical activity.

Number of times a week	School 1 (n=45)	School 2 (n=41)	School 3 (n=37)
0	20%	24%	11%
1	4%	7%	8%
2	18%	17%	14%
3	7%	15%	19%
4	13%	17%	14%
5	11%	17%	19%
6	7%	2%	3%
7	13%	0%	3%
> 7	7%	0%	11%

The frequency of extracurricular physical activity in the three schools is presented in Table 3. School 2 has the highest percentage of schoolchildren who do not exercise extracurricular physical activity. On this indicator then rank School 1 with 20% and School 3 with 11%, this has the most children trained more than 7 times a week. The majority of pupils are trained on average between 2 and 5 times

a week (49% in School 1 and 66% in Schools 2 and 3). In School 2 there are no individuals reporting that they practice 7 or more times a week.

In terms of extracurricular physical activity, boys are more active than girls and also schoolchildren at School 1 and 3 are more active than this at school 2 (Table 4).

Table 4. Average extracurricular physical activity.

	Boys (n=71)	Girls (n=52)	Total (n=123)	School 1 (n=45)	School 2 (n=41)	School 3 (n=37)
Number of times a week	2.8 ± 2.0 *	3.9 ± 2.7 *	3.2 ± 2.4	3.6 ± 2.6 **	2.5 ± 1.9 **,***	3.6 ± 2.3 ***

*, **, *** – $p < 0.05$

Table 5 shows the average daily energy intake (DEI) compared with recommended daily energy needs (DEN) (National survey, 2003; WHO, 2000) for pupils in the three schools.

DEN of girls from School 3 is closest to the recommended values, and the highest deviation from the norms in the positive direction is in School 1 (nearly 500 kcal/24h). The boys in all three schools have DEN in the recommended values.

Table 5. DEI compared with recommended DEN.

	School 1 (n=45)		School 2 (n=41)		School 3 (n=37)	
	Girls	Boys	Girls	Boys	Girls	Boys
DEI (kcal/24h)	2690 ± 1073	2543 ± 1384	2436 ± 843	2516 ± 817	2267 ± 971	2423 ± 686
DEN (kcal/24h) WHO (2000)	2200	2500	2200	2500	2200	2500

Discussion

For the assessment of BMI-based nutritional status and the risk of overweight in adolescents, the WHO criteria used for the determination of overweight and obesity, age and gender differentiation based on a reference population (Cole et al., 2000) were applied. Analysis of BMI data by schools (Table 8) reported the highest percentage of pupils with BMI under the norm in School 1 (15.6%). This school is located on the territory of village district,

while School 2 and School 3 are located in residential complexes on the urban part Sofia Municipality. In National survey 2003, also reported a higher percentage of BMI individuals below the norm amongst rural residents than those in the city boys and girls aged 10–14 years.

In School 2, where the physical education lessons are carried out as planned, we report the highest percentage of children with normal BMI (70.7%).

In School 3, where the choice of food is restricted to fast food restaurants offering mainly fried foods, dinners, sandwiches and burgers, was reported the highest percentage of overweight and obese individuals, respectively 24.3% and 8, 1% – a total of 32.4% (almost 1/3 of the surveyed persons).

In School 1, where the food offered in the school area is a mess room, was accounted the smallest percentage of obese children – 4.4%.

The proportionality of the results of our study coincides with that in National Survey 2003, where the percentage of non-training girls and boys aged 10–14 is 11.2% and 4.5% respectively, but the values are twice lower. For those who train 7 or more times a week – girls are less than boys, respectively 8.7% and 17.0%.

Comparing the frequency of weekly extracurricular physical activity (Table 4), in individual schools (School 1, 2 and 3) with BMI was found that:

- in School 3, which has the lowest percentage of untrained (11%), a high percentage of people with frequency of ECPA between 2 and 5 times a week (66%) and 14% of people with 7 or more times we report the highest percentage of people with overweight and obese (a total of 32.4%). But this is the school where, at school time, the choice of children's food is limited to fast food;

- In School 2, where physical education lessons are held with the planned physical activity, there are no pupils who have marked that they practice 7 or more times ECPA. Here is also the highest percentage of those who do not train or train only once a week (31%) although this is the school with the highest percentage of normal BMI.

Perhaps this is due to the actual physical activity lasting 2 hours and 25 minutes weekly (3 lessons of physical education x 45 minutes).

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