Selected nutritional behaviors and physical activity among elementary school children

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ABSTRACT

Introduction: Proper nutrition and physical activity are very important elements in the proper functioning and development of children. The lack of daily, systematic physical effort in younger and younger age groups is a public health problem.
Purpose: To evaluate the nutrition and physical activity of children attending primary school.
Materials and methods: The study was conducted among 707 pupils form randomly selected elementary schools using the authors' own questionnaire in the school year 2013/2014. The questionnaire included questions on selected dietary habits and physical activity as well as the socio-economic conditions of the families.
Results: Among the studied children, 88.6% consumed 4 or 5 meals a day. There was a statistically significant relationship between the number of meals consumed and the age of the children. Breakfast was consumed by 86.4% of children, more often residents of the city than the village (88.0% vs. 81.7%, $p < 0.05$). Daily consumption of second breakfast was declared by 71.5% of boys and 74.2% of girls. The vast majority of the studied students (86.8%) have always taken part in physical education classes. Outdoor leisure time was declared by 75% of the surveyed children. Rural students showed greater involvement in outdoor activities than students from the city (86.1% vs. 70.2%, $p < 0.001$). A total of 62.2% of boys and 51.8% of girls ($p < 0.05$) participated in sports activities.
Conclusions: Inappropriate nutrition and lack of physical activity affected both girls and boys, and the abnormalities were dependent on where they lived and were age-related.
Keywords: Nutrition, physical activity, children

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INTRODUCTION

Proper nutrition and physical activity are among the most important environmental factors affecting the health of a child. The developmental age is conducive to shaping and preserving health behaviors. Nutrition is influenced by many factors, including the home and school environment, as well as access to sources of knowledge for systematic health education [1,2].

During the early school period, the child learns to decide what and when to eat. A student's eating disorder may include lack of breakfast before going to school, skipping a second breakfast or replacing it with sweets or salty snacks, eating in front of a TV or computer, not having lunch or combining it into a big meal - dinner, irregular consumption, and little varied mix of meals. Civilization and technical progress has reduced the activity of children and adolescents in favor of sedentary behavior [3-5]. They appear attractive and competitive in relation to physical activity. Therefore, leisure time is often quite passive.

During childhood, an abnormally balanced diet and physical activity deficiencies can cause disturbed growth and puberty, and can lead to developmental disorders, weight disorders, and related emotional difficulties [6-10].

Proper nutrition and appropriate physical activity of children should be considered as an investment in their healthy development, as shaping positive health behaviors among the youngest will result in their maintenance in the future. Positive health behaviors introduced later in life are unable to compensate for the loss and ensure the smooth functioning of the body and proper physical and mental development of children and adolescents.

The purpose of the study was to evaluate the nutrition and physical activity of children attending elementary school.

MATERIALS AND METHODS

The study was conducted among 707 students from randomly selected primary schools by using the authors' own questionnaire in the school year 2013/2014.

The questionnaire contained 24 questions on selected dietary habits and physical activity, as well as metrics that included age, sex, place of residence, and the socio-economic conditions of the families.

The study was conducted with the approval of the management of each facility. Prior to the test, the parents / carers of the children were informed about the objectives and methods of the study. Parents / carers agreed to participate in the study in a specially prepared form. Participation in the study was anonymous.

The appropriate study was preceded by a pilot study on a group of 20 people. The research was approved by the Bioethics Committee of the Medical University of Bialystok.

The obtained data was encoded and entered into a computer database. Statistical analyses were conducted using R (Statsoft). In order to determine statistically significant differences between the distinctive features in the children's subgroups, the Pearson $\chi 2$ independence test was used for qualitative variables. For quantitative variables, *t*-student test and ANOVA variance analysis with Tukey post hoc test were used to compare two groups. In the case of more than two groups, the relationship between the two quantitative variables was assessed using Pearson's correlation coefficient. The significance level for all calculations was $p < 0.05$.

RESULTS

Girls accounted for 54.3% (384 people), boys 45.7% (323 people). A total of 75.5% of the children lived in a city and 25.5% lived in the countryside. The examined children were aged 6-14 years. The proportion of mothers of the surveyed children with primary education was 11.1%, while the fathers' rate was 12.2%. Mothers with a vocational education accounted for 16.0% and fathers for 35.0%. Secondary education was recorded for 42.5% of mothers and 35.2% of fathers. A total of 30.4% of women and 17.6% of men had higher education. The socio-economic conditions of the families were assessed as very good by 30.2% of the respondents, as good by 68.2%, and bad by 1.6%. The financial situation was assessed as very good by 18.0% of the respondents' families, good 48.7%, average 30.6%, bad 2.0%, and very bad 0.4%.The vast majority of studied students (88.6%) consumed 4 or 5 meals a day. Three meals were consumed by 40.2% of boys and 37.2% of girls. The amount of food consumed by children in rural and urban areas was similar (Table 1).

Table 1. Number of meals consumed depending on sex and place of residence of the respondents

		Number of meals				p*
		2	**3**	**4**	**5**	
Boys	N	2	41	130	152	0.421
	%	0,6	12,7	40,2	47,1	
Girls	N	3	40	143	201	
	%	0,8	10,4	37,2	52,3	
Rural area	N	1	26	65	89	0.468
	%	0,6	14,5	36,1	49,4	
Urban area	N	4	81	208	353	
	%	0,8	11,4	38,6	50,1	

*Pearson $\chi 2$ test

Table 2. Number of meals consumed and age of respondents

Number of meals	N	Mean	Std. Deviation	Min	Median	Max	p*	p**			
								2	3	4	5
2	6	11.20	1.789	8	12.00	12	<0.001		0.971	0.608	0.383
3	74	10.70	1.765	7	11.00	13		0.971		0.053	0.001
4	278	10.09	1.685	7	10.00	14		0.608	0.053		0.303
5	349	9.82	1.732	6	10.00	13		0.383	0.001	0.303	
In total	707	10.03	1.734	6	10.00	14					

*ANOVA test; **Tukey's post hoc test

A statistically significant relationship was found between nutrition and the age of the respondents. Younger students statistically significantly more often consumed 5 meals. Older students consumed 3 meals per day (Table 2).

First breakfast was consumed by 87% of boys and 85.9% of girls, more often urban residents than rural residents (88.0% vs. 81.7%, $p < 0.05$). Daily consumption of 2nd breakfast was declared by 71.5% of boys and 74.2% of girls. Almost all students in the study group ate lunch (98.8% boys and 98.2% girls) and dinner (97.5% and 96.9%, respectively).

During school time, 80% of the studied pupils consumed food brought from home. Almost half of them had meals in the school cafeteria, and more than a quarter of the children claimed to have bought a meal in the school store. Most of the surveyed students (63.9%) snacked between meals. The snacked products included: fruit (71.7%), sweets (58.0%), yogurt (50.5%), sandwiches (46.5%), sweet bread, cake, cakes (39.3%), crisps and salty sticks (24.9%). Less children preferred vegetables (19.0%) and dried fruits and nuts (12.2%). Children in the rural areas more often consumed sandwiches (55.6% vs. 43.5%, $p < 0.05$) and vegetables (23.3% vs. 17.5%, $p < 0.05$). In the city, children snacked on fruit and nuts more often than children living in rural areas (13.5% vs. 8.3%, $p < 0.69$).

The vast majority of the respondents (86.8%) have always participated in physical education classes regardless of sex, place of residence, and age (Table 3, Table 4).

Table 3. Participation in physical education classes depending on the sex and place of residence of the respondents

		PE classes attendance			p*
		always	irregularly	no	
Boys	N	288	29	6	0.241
	%	89.2	9.0	1.8	
Girls	N	326	51	7	
	%	84.9	13.3	1.8	
Rural area	N	453	63	11	0.637
	%	85.0	12.0	2.1	
Urban area	N	161	17	2	
	%	89.4	9.4	1.2	

* Perason $\chi 2$ test

Table 4. Participation in physical education classes according to the age of the respondents

PE classes	N	Mean	Std. Deviation	Min	Median	Max	p*
always	614	10.03	1.739	6	10.00	14	0.668
irregularly	80	10.13	1.633	7	10.00	13	
no	13	9.40	2.302	7	10.00	12	
In total	707	10.03	1.734	6	10.00	14	

*ANOVA test

The number of days per week in which children spent at least 60 minutes on physical activity was analyzed. Girls declared fewer days of physical activity than boys. Rural children spent statistically significantly more days on 60 minutes of physical activity than urban children (Table 5).

Table 5. Days devoted to physical activity by sex and place of residence of the respondents

	N	Mean	Std. Deviation	Min	Median	Max	p*
Boys	323	5.58	1.607	1	6.00	8	0.16
Girls	384	5.41	1.685	1	5.00	8	
Rural area	180	5.92	1.640	2	6.00	8	<0.001
Urban area	527	5.34	1.630	1	5.00	8	

*t-student test

A correlation between age and number of days of physical activity of the subjects (between two quantitative variables) in the parametric Pearson correlation was shown (correlation coefficient r = 0.13, p = 0.001).

More than ¾ of the surveyed children claimed to spend their free time outdoors. A total of 62.2% of boys and 51.8% of girls (p <0.05) participated in sports activities. Rural students showed greater involvement in outdoor activities than students from the city (86.1% vs. 70.2%, p <0.001). The study also confirmed passive spending of free time by children (watching TV 51.2%, using a computer 50.4%, and learning 35.1%). Students in the rural areas were less likely to watch television (43.3% vs. 53.9%, p <0.05) and use of the computer (40.0% vs. 53.9%, p <0.05) than in the city. In turn, children in the city more often spent their free time devoted to learning (40.2% vs. 20.0, p <0.05).

DISCUSSION

The study was designed to assess the nutrition and physical activity of elementary school students. The results of our own research indicate the existence of many deficits in the nutrition and physical activity of children.

Children and school students repeat and establish most of the nutritional errors learned in the family home. And many school and non-school duties make it difficult to follow regular and varied diets. The abnormal eating habits of early school children examined by us included skipping breakfast, skipping school meals, snacking on high calorie snacks. In addition, it has been shown that children of developmental age eat fewer meals during the day. Bad eating habits of children who started their education were also observed in other authors' research [11-15].

In our own study, first breakfast was consumed by 87.0% boys and 85.9% girls. Children skipped breakfast in rural areas more often than those in the city. According to Sadowska, more than 75% of the studied students in the youngest classes declared daily consumption of first breakfast. However, only half of them ate it at home. In addition, it was noted that as a result of age, the percentage of students consuming a first breakfast was decreasing with age. And most of the children, especially the girls, ate breakfast after leaving the house [16].

Our own study found that second breakfast was consumed by 71.5% of boys and 74.2% of girls. A similar percentage was noted in the Wojtyla-Buciora study [12]. Children remain in school on average between 4 and 8 hours and should eat a meal every 3-4 hours. Meanwhile, every 3rd student came to school without breakfast. And every 4th did not eat any meal at all during their time in school [17]. In our own study, school meals were most often brought from home (about 80%), nearly 50% of students consumed meals in the school cafeteria, and about 25% in school shops. Snacking between the main meals concerned 2/3 of the studied students. Among the products under consideration were fruits, sandwiches, yogurts, sweets, and sweet bread. Malczyk et al. showed that the products most often snacked on by school children and adolescents were sweet or salty appetizers, which are an important source of energy, sugar, salt, and saturated fatty acids and trans isomers of fatty acids [18].

Apart from nutrition, one of the essential conditions for health and harmonic development of the child is physical activity, and its limitation is an important risk factor for the development of many diseases. According to the World Health Organization (WHO), children between the ages of 5 and 17 should spend at least 60 minutes daily on moderate or intense physical activity [19].

In the study, the level of physical activity of the children was analyzed. Girls declared less physical activity than boys. Rural children spent statistically significantly more days on 60 minutes of physical activity than urban children. The level of physical activity decreased with age, which is confirmed by our research as well as by other authors [20]. In the case of physical education classes, over 80% of children attended them, approximately 10-20% attended almost always, and the percentage of children practicing in half of the classes and non-exercising ones ranged between 1-2%. Participation in physical education classes is essential to maintaining the recommended level of physical activity.

The Supreme Audit Office (NIK) Report on Physical Education in Schools in 2013 highlights the declining trend of active participation of pupils in physical education classes. The results of the survey indicate that active participation in physical education classes for children and adolescents has declined during subsequent stages of education [21]. However, the Central Statistical Office (GUS) data from 2014 indicate that 98% of children attending school attended physical education classes, and even every second child regularly practices a physical activity outside of physical education classes (54% of boys and about 45% of girls) [22].

Mandatory physical education at school is only 1/3 of the recommended time spent on physical activity. Extracurricular physical activity could and should be a supplement to physical activity during school activities. According to the study by Mańczak et al., the participation of children in additional physical activity is usually reduced to 1-2 lessons per week [23].

Schoolchildren are increasingly characterized by sedentary lifestyles, and time spent on various sedentary activities is cumulative. Our own study found that over 50% of children spent their free time in front of the TV or computer screen. Passive forms of spending time were more often observed in students living in cities than in rural areas. According to the GUS data, children spent an average of 2.2 hours a day in front of a screen (TV, computer, tablet, or smartphone), boys slightly more than girls. Every fourth child spent an average of 1 hour a day, every third 2 hours, every 5th three hours, and every eighth child up to 4 hours. In the study by Stankiewicz et al., children aged 6-13 years indicated watching television as the most preferred form of leisure activity (24%) [24]. Szadonska-Szlachetka's research indicated that children use the computer frequently: 22% 1 to 2 hours a day, and 10% of respondents more than 3 hours a day. In addition, it was demonstrated that with age, the time spent at the computer was prolonged [25]. Spending time watching television shows may involve adverse nutritional behaviors, including an increase in the overall energy supply of the diet [26,27].

CONCLUSIONS

1. Studies show that unfavorable nutritional behaviors and decreased motor activity were correlated with the age of the examined children.
2. Dietary errors of children consisted of skipping basic meals (I and II breakfast) and eating sweet snacks.
3. The paper shows over 80% attendance at physical education classes at school. Among boys, involvement in physical activity was greater than among girls.
4. Passive forms of spending leisure time such as using a computer or watching television are more common in the city than in the countryside.
5. Encouraging children to do physical activity at home, at school and with friends will help shape healthier behaviors and develop a habit of active rest in children.

Conflicts of interest

The authors declare no conflicts of interest.

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