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EATING BEHAVIORS AND PHYSICAL ACTIVITY IN CHILDREN AGED 7–10 YEARS

ZACHOWANIA ŻYWIENIOWE I AKTYWNOŚĆ FIZYCZNA DZIECI W WIEKU 7–10 LAT

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Abstract: The aim of the present study was to assess eating behaviors and leisure time physical activity in children aged 7–10 years.The survey was conducted in a group of 107 parents of children attending grades 1–3 of primary school. A self-designed questionnaire was used as a research tool. Statistical analyses were carried out with the use of Spearman's correlation test and Mann-Whitney U-test, with adopting α = 0,05 as showing significance. The study showed that 65% of children ate breakfast on a daily basis. The majority of pupils ate 4 meals a day. Current recommendations regarding vegetables consumption were followed by 25% of children, regarding fruits – by 32% and regarding fish – only by 10% of children. Over a half of pupils ate sweets at least once a day. Participation in leisure time physical activity on a daily basis was recorded only in 16% of children, whilst 48% of children were engaged in physical activity 2–3 times a week. As the results of the study indicated, children's eating behaviors were mostly improper. Participation in leisure time physical activity was found to be low. These factors could adversely affect children's development.

Keywords: schoolchildren, eating behaviors, food frequency, physical activity.

Streszczenie: Celem podjętych badań była ocena wybranych zachowań żywieniowych oraz pozaszkolnej aktywności fizycznej dzieci w wieku 7–10 lat. Badania zostały przeprowadzone w grupie 107 rodziców dzieci uczęszczających do klas 1–3 szkoły podstawowej. Narzędzie badawcze stanowił autorski kwestionariusz ankiety. Analizę statystyczną materiału empirycznego przeprowadzono na podstawie testu na istotność współczynnika korelacji Spearmana oraz testu U-Manna Whitneya, przy poziomie istotności α = 0,05. Stwierdzono, że 65% dzieci spożywało codziennie śniadanie. Większość dzieci zjadała 4 posiłki dziennie. Zalecenia dotyczące konsumpcji warzyw realizowane były przez 25% dzieci, odnośnie do owoców – przez 32% dzieci, zalecenia zaś dotyczące spożycia ryb wykonywało jedynie co dziesiąte dziecko. Ponad połowa uczniów co najmniej raz dziennie spożywała słodycze. Codzienną pozaszkolną aktywność fizyczną odnotowano u 16% dzieci, podczas gdy 48% dzieci uprawiało aktywność fizyczną 2–3 razy w tygodniu. Badania wykazały, że zachowania

żywieniowe dzieci były w większości nieprawidłowe, a poziom aktywności fizycznej był niski, co mogło wpłynąć niekorzystnie na rozwój dzieci uczestniczących w badaniach.

Słowa kluczowe: dzieci w wieku szkolnym, zachowania żywieniowe, częstość spożycia żywności, aktywność fizyczna.

1. INTRODUCTION

Appropriate nutrition and physical activity are among the most important environmental factors determining human health status. Well balanced diet in childhood is necessary to optimize normal growth and development, to promote cognition and school performance and to reduce the risk of non-communicable diseases. It is also well known that eating habits established in childhood track into adulthood [Academy of Nutrition and Dietetics 2014]. Regrettably, studies have indicated that the majority of Polish schoolchildren do not meet nutritional recommendations specific to this age group [Boniecka et al. 2009; Marcysiak et al. 2010; Krenc and Wosik-Erenbek 2011; Pitucha and Metera 2013]. One of the biggest nutritional mistakes made by children and adolescents is skipping breakfast which is reported to be increasing in prevalence. This is of particular concern because breakfast consumption has number of positive effects such as improvement in dietary adequacy, decreased risk of overweight and obesity, and also enhancement of cognitive function [Cooper, Bandelow and Nevill 2011].

The aim of the present study was to assess eating behaviors and leisure time physical activity in children aged 7–10 years.

2. MATERIAL AND METHODS

The survey was conducted in the spring of 2011 among 107 parents of children aged 7–10 years living in Reda which is a town located in the northern Poland. The population of children, studied on the basis of the information obtained from the parents, consisted of 55 girls and 52 boys. A self-designed questionnaire contained questions on children's eating behaviors such as number of meals eaten daily, frequency of breakfast and school lunch consumption, frequency of snacking between meals and consumption of selected food products. Data on the frequency of participation in leisure time physical activity in children were also collected from the parents. Statistical analyses were carried out with the use of Spearman's correlation test and Mann-Whitney U-test, with adopting $\alpha = 0.05$ as showing significance.

3. RESULTS AND DISCUSSION

According to the national dietary guidelines, schoolchildren should consume 4–5 meals a day at fixed times [National Food and Nutrition Institute 2016]. Irregular eating may promote the accumulation of body fat and may adversely affect learning as low glucose levels result in fatigue and lowered concentration. The current work showed that the majority of pupils ate 4 meals a day (Tab. 1). No significant differences were noted between boys and girls (Z = 1.014). Similar results were obtained by Hamułka and Gronowska-Senger [2000] in the study conducted among children living in the south-eastern Poland. As the analysis of the diet showed, the majority of pupils ate 4 meals a day, however, in contrast to our results, the number of meals eaten daily depended strongly on gender-girls ate more meals a day as compared to boys.

Table 1. Number of meals eaten daily [%]

Tabela 1. Liczba posiłków spożywanych w ciągu dnia [%]

Number of meals	Total	Girls	Boys
2 meals a day	2	2	2
3 meals a day	21	24	19
4 meals a day	44	47	40
5 meals a day	33	27	39

Breakfast consumption is considered an important determinant of a healthy lifestyle. In spite of this, skipping breakfast is a very common mistake made by children and adolescents [Affenito 2007]. As the National Health and Nutrition Examination Survey (NHANES) data indicated, approximately 20% of American children skipped breakfast [Academy of Nutrition and Dietetics 2014]. In our study, two thirds of children ate breakfast on a daily basis, whilst 7% never had this meal (Tab. 2).

Table 2. Frequency of breakfast consumption [%]

Tabela 2. Częstość spożycia śniadania [%]

Frequency	Total	Girls	Boys
on a daily basis	65	65	65
often	14	10	17
seldom	14	16	12
never	7	9	6

Similar results were presented by Sadowska and Zakrzewska [2010] and by Hamułka et al. [2000] in papers on energy value and frequency of breakfast consumption in schoolchildren. Both studies showed that about three quarters of children were regular breakfast eaters, but in contrast to our study, the first one did not find any child who never ate this meal. In addition, the authors of the second work observed the tendency to decrease the frequency of breakfast consumption with children's age.

It is recommended to eat meals at regular intervals not longer than 3 hours. In this respect, pupils should consume school lunch. The current research showed that only 60% of children ate this meal every school day (Tab. 3). Among the most frequently consumed food products, were sandwiches, fruits and yoghurts. Statistical analysis found significant gender differences in the consumption of sandwiches ($Z = 2.013$). More boys than girls ate sandwiches at school (Fig. 1). Slightly better results on the frequency of school lunch consumption were demonstrated in the study conducted by Zielińska et al. [2014] where 73% of children and adolescents regularly ate lunch and among the most commonly consumed food products, were sandwiches, fruits and vegetables, sweets and buns.

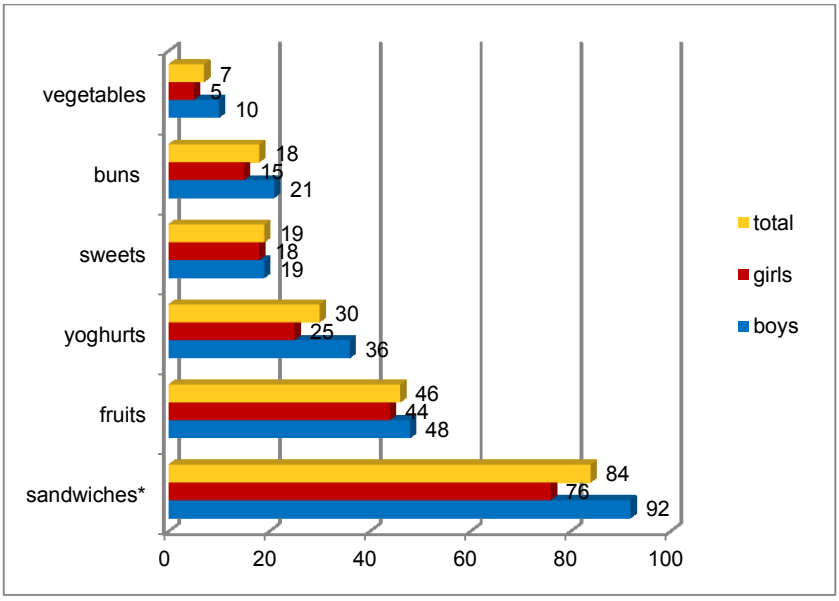

Fig. 1. Food products eaten for school lunch [%]
multiple-choice question (the sum of percentages > 100)
*statistically significant differences between girls and boys

Rys. 1. Produkty spożywane w szkole w ramach drugiego śniadania [%]
pytanie wielokrotnego wyboru (suma procentów >100)
*istotne statystycznie różnice pomiędzy chłopcami i dziewczynkami

Table 3. Frequency of school lunch consumption [%]

Tabela 3. Częstość spożycia drugiego śniadania w szkole [%]

Frequency	Total	Girls	Boys
every school day	60	59	62
often	28	31	25
seldom	11	9	13
never	1	2	0

It has been found that frequent snacking between meals is associated with increased energy intake and higher body weight in children. Snacks are readily available to almost all children and adolescents, and energy-dense snacks have been linked to decreased satiating effect. Higher consumption of sweetened beverages and salty snacks and increased portion sizes of snacks have been shown as potential contributors to daily food consumption. Therefore, snacking has been considered as a risk factor for overweight and obesity [Piernas and Popkin 2010]. We have not examined whether the frequency of snacking influences weight status, however, in keeping with previous studies [Kołłajtis-Dołowy, Matysiak and Boniecka 2007; Kostecka 2014; Kotyrba and Wróblewska 2014], our results demonstrated that snacking between meals was very common in children. By analyzing the frequency of snacking, it was found that almost the same proportion of children snacked with different frequency – very often, often and seldom, whereas only 1% of pupils never snacked (Tab. 4).

Table 4. Frequency of snacking between meals [%]

Tabela 4. Częstość pojadania pomiędzy posiłkami [%]

Frequency	Total	Girls	Boys
very often	34	35	33
often	31	29	33
seldom	34	36	32
never	1	0	2

It seems obvious that snacking is more frequent in children eating daily insufficient number of meals, but our research did not confirm such an association. There were no statistically significant differences ($r = 0.063$) in the frequency of snacking between children eating daily different number of meals. The examined children who consumed 2 and 3 meals a day snacked with the similar frequency as children having 4 or 5 meals a day. These results showed that the reasons for snacking could be different in children having 4–5 meals a day and in children eating 2–3 meals a day who could be more likely to snack because of hunger than for the other reasons (Fig. 2).

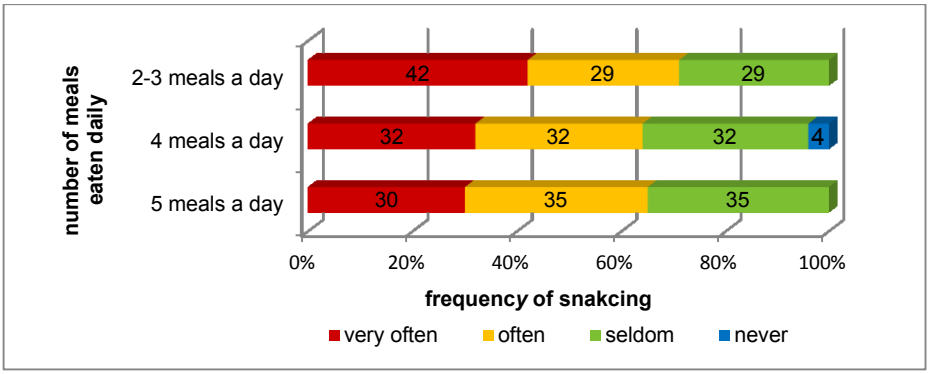

Fig. 2. Relationship between the number of meals eaten daily and frequency of snacking [%]

Rys. 2. Zależność pomiędzy liczbą spożywanych posiłków a częstością pojadania [%]

The results of studies on children's and adolescents' nutrition have indicated insufficient consumption of fruits and vegetables [Boniecka et al. 2007; Krenc and Wosik-Erenbek 2011; Stefańska, Falkowska and Ostrowska 2012; Szczepańska et al. 2014]. The present study confirmed such a trend. Guidelines on frequency of fruits consumption were followed by one third of pupils, whilst only quarter of children met recommendations on vegetables consumption. Similar results were obtained by Marcysiak et al. [2010]. According to their study on eating behaviors and physical activity in children living in the Ciechanów district, every fifth child ate 5 serves of fruits and vegetables a day. Another study, conducted by Pitucha and Metera [2013], showed that 67% of children aged 7–9 years ate vegetables almost every day, whilst 18% ate them at least once a week or never. The frequency of consumption of fruits and vegetables, and the other food products has been presented in Table 5.

According to the current dietary guidelines, an important source of energy in well balanced children's diet should be grain products, including especially whole-meal bread and groats. Those products should be consumed several times a day [National Food and Nutrition Institute 2016]. In our study, the frequency of whole grain products consumption was consistent with current recommendations in one fifth of children, whilst every tenth child never ate those products. Lower results were demonstrated in the study on health behaviors of children aged 7–10 years [Bednarek and Bednarz 2013] where most pupils ate grain products such as pasta, groats and cereal 2–3 times a week and the reason for avoiding grain products by children, who declared that they never had those products, was finding them untasty.

Fish, especially oily fish such as salmon, herring and mackerel, containing omega-3 fatty acids EPA and DHA, is an essential element of well balanced diet and according to the current guidelines, should be consumed by children at least 2 times a week [National Food and Nutrition Institute 2016]. Yet, fish consumption in

Poland is far below recommendations [Kołodziejczyk 2007]. The current study demonstrated that only 10% of examined children had fish several times a week, whilst most of them ate fish once a week. Dissatisfying results were also seen by Bielaszka et al. [2014] who assessed food preferences in children aged 7–10 years. They found that 17% of pupils ate fish a few times weekly and 6% never had fish. Different results were obtained by Dymkowska-Malesa, Walczak and Zakrzewski [2014] who showed that almost 10% of children aged 11–13 years ate fish 3 times a week and 44.52% had fish 1–2 times a week.

The consumption of sweets should be as low as possible, but as the analysis of the data showed, over a half of pupils ate them at least once a day and there was not any child who never had sweets. The similar problem has been noted by the other authors [Kostecka 2014; Krenc and Wosik-Erenbek 2011; Marcysiak et al. 2010]. While evaluating the fast-food consumption, it was found that the majority of children ate such products once a month. Different results have been presented by Boniecka et al. [2009]. According to their research, 48% of children ate fast-food once a month and 16% – several times a month, but there were over 3 times more children who never ate such products than observed in our work (17% vs. 5%, respectively). Another study, carried out by Kołłajtis-Dołowy, Matysiak and Boniecka [2007], demonstrated that about half of pupils aged 11–12 years seldom ate fast-food and 14% consumed such products quite often. Powell and Nguyen [2013] showed that children consuming fast-food had higher intake of energy, fat, saturated fatty acids and sugar than those who did not.

Mineral water and 100% fruit juice were found to be the most popular beverages consumed by pupils, where 78% and 54%, respectively, did so daily. In contrast to the results obtained by Boniecka et al. [2009], who reported that almost 80% of pupils aged 7–9 years drank sweetened beverages every day and a half of children – 2 to 3 times a week, our research showed that one third of children never drank such beverages. Consumption of sweetened beverages is definitely not recommended for children and adolescents. As Wuenstel et al. [2015] showed in their study, frequent consumption of sweetened beverages was strongly related to increased prevalence of overweight in adolescents aged 13–19 years.

It has been highlighted that physical inactivity is prevalent worldwide [Kohl et al. 2012]. This situation is very worrisome because regular physical activity improves cardiorespiratory and muscular fitness, bone health, mental health, and cardiovascular and metabolic health biomarkers, and also prevents weight management problems. According to the World Health Organization recommendations, children and adolescents aged 5–17 years should accumulate at least 60 minutes of moderate- to vigorous- intensity physical activity daily to achieve health benefits [WHO 2011].

Table 5. Frequency of consumption of selected food products [%]

Tabela 5. Częstość spożycia wybranych produktów spożywczych [%]

Whole grain products	**T**	**G**	**B**	**Vegetables**	**T**	**G**	**B**
a few times a day	19	9	29	a few times a day	25	22	29
once a day	17	20	14	once a day	38	38	38
a few times a week	26	31	21	a few times a week	27	30	21
once a week	17	18	15	once a week	8	6	12
a few times a month	9	6	13	a few times a month	1	2	0
once a month	2	2	2	once a month	0	0	0
never	10	14	6	never	1	2	0
Fruits	**T**	**G**	**B**	**Dairy products**	**T**	**G**	**B**
a few times a day	32	27	37	a few times a day	52	55	50
once a day	46	51	40	once a day	34	34	33
a few times a week	19	20	19	a few times a week	10	9	11
once a week	1	0	2	once a week	1	0	2
a few times a month	2	2	2	a few times a month	1	2	0
once a month	0	0	0	once a month	2	0	4
never	0	0	0	never	0	0	0
Fish	**T**	**G**	**B**	**Sweets**	**T**	**G**	**B**
a few times a day	0	0	0	a few times a day	13	16	10
once a day	0	0	0	once a day	43	31	56
a few times a week	10	9	12	a few times a week	28	33	23
once a week	58	53	63	once a week	11	11	11
a few times a month	18	25	9	a few times a month	3	5	0
once a month	10	9	12	once a month	2	4	0
never	4	4	4	never	0	0	0
Fast-food products	**T**	**G**	**B**	**Mineral water**	**T**	**G**	**B**
a few times a day	0	0	0	a few times a day	67	63	72
once a day	1	2	0	once a day	11	13	8
a few times a week	6	7	6	a few times a week	9	11	8
once a week	18	18	17	once a week	1	0	2
a few times a month	17	11	23	a few times a month	4	4	4
once a month	53	55	52	once a month	1	0	2
never	5	7	2	never	7	9	4
100% fruit juices	**T**	**G**	**B**	**Sweetened beverages**	**T**	**G**	**B**
a few times a day	28	20	37	a few times a day	5	7	2
once a day	26	27	25	once a day	5	9	0
a few times a week	26	31	19	a few times a week	15	13	17
once a week	7	11	4	once a week	12	9	15
a few times a month	9	5	13	a few times a month	21	33	8
once a month	1	2	0	once a month	11	7	15
never	3	4	2	never	31	22	43

Where: T – total, G – girls, B – boys.

Regrettably, as shown in Figure 3, participation in leisure time physical activity on a daily basis was recorded only in 16% of examined children, whilst a half of was engaged in physical activity 2–3 times a week and almost every tenth child did not participate in leisure time physical activity. Different findings were presented by Ćwirlej, Walicka-Cupryś and Gregorowicz-Cieślik [2005]. According to their research, 33.7% of children aged 10 years took part in different forms of after-school physical activity 6–7 times a week, 39.5% – 4 to 5 times weekly, 23.3% – 2 to 3 times weekly and 3.5% once a week or never. Much worse results were demonstrated by Kostecka [2014] who assessed that 40% of children aged 7–12 years did not engage in any form of leisure time physical activity. Furthermore, the present study found no statistically significant gender differences in participation in leisure time physical activity at significance level of $\alpha = 0.05$ ($Z = -1.655$). However, statistical analysis taking into account higher significance level ($\alpha = 0.10$) showed that boys were engaged in leisure time physical activity more frequent than girls.

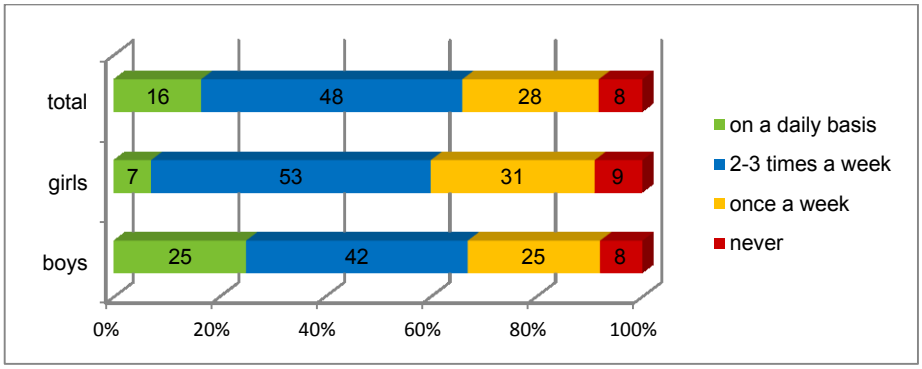

Fig. 3. Frequency of participation in leisure time physical activity [%]

Rys. 3. Częstość podejmowania aktywności fizycznej w czasie wolnym [%]

4. CONCLUSIONS

1. Children's eating behaviors were improper in terms of frequency of breakfast and school lunch consumption and frequency of snacking between meals, and also in terms of consumption of fruits, vegetables, fish, whole grain products and sweets.
2. Participation in leisure time physical activity was found to be low. Physical inactivity could adversely affect children's development.
3. Children should participate in various forms of nutritional and health education, including education directed at promoting physical activity.

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