

ASSESSMENT OF NUTRITIONAL BEHAVIOURS OF CHILDREN AGED 7-12 ATTENDING TO PRIMARY SCHOOLS IN BIALA PODLASKA, POLAND

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ABSTRACT

Background. Children and youth constitute a group that is particularly prone to the effects of improper diet. In the puberty period, numerous significant lifestyle choices are made, for instance regarding particular nutritional behaviours which may be repeated later in life and may determine the state of health.

Objective. The aim of the study was to assess nutritional behaviours of children aged 7-12 attending to primary schools in Biala Podlaska county (Eastern Region of Poland).

Material and methods. The study included 1643 children aged 7-12 from primary schools in Biala Podlaska county. The research was carried out in 2015. The questions included in the questionnaire prepared by the authors regarded the number and regularity of meals, the types of products (mainly fruit and vegetables, sweets, fizzy drinks, fast food, milk and dairy products) and the frequency of consuming them during these meals and between them. Differences between the responses to the questions in groups divided according to gender were analysed with the use of χ^2 test (G function).

Results. It was revealed that 672 girls (81.7%) and 633 boys (71.9%) had at least four meals a day, while as many as 23% of the girls and boys did not have breakfast before going to school and 33.5% of the girls and 37.4% of the boys did not take lunch to school. The main meal (dinner) was eaten every day by 652 girls (78.5%) and 605 boys (74.5%). Products most commonly eaten between the main meals were fruit and vegetables (51% of the girls and 42.4% of the boys), while sweets were consumed 2-3 times a week by 37.2% of the girls and 36.1% of the boys. The consumption of dairy products (milk, natural yoghurt and/or kefir) once a week or less frequently was declared by 53% of the girls and boys.

Conclusions. Assessment of nutritional behaviours revealed numerous mistakes which may negatively affect the development of the study participants. In the light of the above findings, it seems necessary to provide children and their parents with nutritional education in order to develop proper nutritional behaviours and correct the mistakes.

Key words: *nutritional behaviours, frequency of consumption, children*

STRESZCZENIE

Wprowadzenie. Dzieci i młodzież to grupa szczególnie podatna na skutki niewłaściwego żywienia. W okresie dojrzewania dokonuje się wiele istotnych wyborów dotyczących stylu życia, w tym określonych zachowań żywieniowych, które utrwalone mogą funkcjonować w późniejszym okresie życia i decydować o stanie zdrowia.

Cel pracy. Celem badań była ocena zachowań żywieniowych dzieci w wieku 7-12 lat ze szkół podstawowych powiatu białskiego.

Material i metody. Badaniem objęto grupę 1643 dzieci w wieku 7-12 lat ze szkół podstawowych powiatu białskiego. Badania zrealizowano w 2015 roku. Pytania w autorskiej ankiecie wykorzystanej w badaniach dotyczyły liczby i regularności spożywania posiłków, rodzaju i częstości spożywania produktów spożywanych podczas tych posiłków oraz między posiłkami, w tym przede wszystkim spożycia warzyw i owoców, słodczy, napojów gazowanych, produktów typu fast-food oraz mleka i produktów mlecznych. Analizę różnicowania odpowiedzi udzielonych w ankiecie w grupach wyodrębnionych na podstawie płci przeprowadzono testem χ^2 w postaci funkcji G.

Wyniki. Wykazano, że 672 dziewcząt (81,7%) i 633 chłopców (71,9%) spożywało co najmniej cztery posiłki w ciągu dnia, przy czym aż 23% dziewcząt i chłopców wychodząc do szkoły nie spożywało I śniadania, a 33,5 i 37,4% odpowiednio: dziewcząt i chłopców nie zabierało do szkoły II śniadania. Główny posiłek – obiad – spożywało codziennie 652 dziewczęta (78,5%) i 605 chłopców (74,5%). Najczęściej spożywanymi produktami pomiędzy głównymi posiłkami były owoce i warzywa; spożywało je 51% dziewcząt i 42,4% chłopców, natomiast po słodczy od dwóch do trzech razy w tygodniu

The study was conducted within the county health prevention and promotion programme titled "Together for heart" aimed at reducing cardiovascular diseases morbidity and mortality rate and financed from the resources of the Norwegian Financial Mechanism 2009-2014 and the national budget.

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sięgało odpowiednio 37,2% dziewcząt i 36,1% chłopców. Spożycie produktów mlecznych (mleka, jogurtu naturalnego i/ lub kefiru) raz w tygodniu lub rzadziej deklarowało 53% dziewcząt i chłopców.

Wnioski. Ocena zachowań żywieniowych wykazała liczne błędy, które mogą wpłynąć negatywnie na rozwój badanych dzieci oraz ich stan zdrowia obecnie i w przyszłości. W świetle powyższych spostrzeżeń koniecznym wydaje się prowadzenie edukacji żywieniowej wśród dzieci, ale również ich rodziców w celu kształtowania odpowiednich zachowań żywieniowych i korygowania popełnianych w tym zakresie błędów.

Słowa kluczowe: zachowania żywieniowe, częstotliwość spożycia, dzieci

INTRODUCTION

Children and youth constitute a group that is particularly prone to the effects of improper nutrition. In the puberty period, numerous significant lifestyle choices are made, for instance regarding particular nutritional behaviours which lead to many disorders and diseases at school age and, when repeated later in life, may determine the state of health.

Epidemiology studies conducted in recent years in the population of children and youth [2, 9, 12, 15, 17, 18] have pointed to numerous nutritional mistakes such as leaving home for school without breakfast, not taking lunch to school, too few meals eaten a day, irregular consumption of meals and not diversified composition of meals. Avoiding the main meals as well as their irregularity may lead to the consumption of high-calorie products with low nutritional value between these meals. The research results indicated that leaving home without breakfast and at the same time eating products with low nutritional value between meals are factors which increase the risk of overweight and obesity [18]. On the other hand, apart from health effects, not eating the main meals has consequences regarding everyday functioning, e.g. fatigue, apathy or disorders of cognitive processes, which may lead to difficulties in concentrating and worse school results [20].

The aim of the study was to assess nutritional behaviours of children aged 7-12 from primary schools in Biała Podlaska county.

MATERIAL AND METHODS

The research included 1643 children, i.e. 831 girls (50.6%) and 812 boys (49.4%), aged 7-12 from 16 primary schools from 13 towns of Biała Podlaska county (Konstantynów, Rossosz, Drelów, Janów Podlaski, Leśna Podlaska, Wisznice, Terespol, Szóstka, Dołha, Miedzyrzec Podlaski, Małaszewicze, Woskrzenice Duże, Swory) situated in the northern part of Lubelskie Province. The study was conducted in 2015 within the county health prevention and promotion programme titled "Together for heart" aimed at reducing cardiovascular diseases morbidity and mortality rate and financed from the resources of the Norwegian Financial Mechanism 2009-2014 and the national budget. A questionnaire prepared by the authors was applied in the study. The questions

included in the questionnaire concerned the frequency and number of consumed meals, types of products eaten between meals and the frequency of consuming fruit and vegetables, sweets, fizzy drinks, fast food as well as milk and dairy products (natural yoghurt, kefir, cottage cheese). Differences between the responses to the questions in groups divided according to gender were analysed with the use of χ^2 test (G function).

RESULTS

Table 1. includes data regarding the number and regularity of eating meals. The obtained data revealed that 672 girls (81.7%) and 633 boys (77.9%) had at least 4 meals a day. Three meals a day were eaten by 127 girls (15.3%) and 151 boys (18.6%), while a maximum of two meals were eaten by 32 girls (3.9%) and 28 boys (3.4%). Differences between girls and boys regarding the declared number of meals per day were statistically significant ($G=7.31$; $p\leq 0.05$). The data also revealed that 640 girls (77%) and 626 boys (77.1%) had breakfast before going to school, while the remaining 191 girls (23%) and 186 boys (22.9%) did not have breakfast at all. Similarly, lunch was taken to school every day by 553 girls (66.5%) and 508 boys (62.6%), while 278 girls (33.5%) and 304 boys (37.4%) did not take lunch to school. The main meal, i.e. dinner, was eaten every day by 652 girls (78.5%) and 605 boys (74.5%). In turn, 3.0% of the girls and 4.2% of the boys had dinner only at the weekend and no more than once a week. The declared consumption of dinner in a week differed significantly between the girls and boys ($G=4.43$; $p\leq 0.05$). Having supper every day was declared by 736 girls (88.6%) and 741 boys (91.3%). Supper was not eaten regularly by 95 girls and 71 boys, which constituted 11.4% and 8.7% of the subjects, respectively.

Table 2 demonstrates data regarding the types of products eaten between the main meals. The respondents could choose more than one answer, so the calculated percentage results do not add up to 100%. Fruit and vegetables were eaten between meals by 424 girls (51%) and 344 boys (42.4%). Sweets and ice-cream were considerably less popular, as they were eaten by 24.7-25.5% of the study participants. Crisps and salty breadsticks were eaten least frequently, i.e. by 72 girls (8.7%) and 79 boys (9.7%). Differences between the girls and boys were statistically significant ($G=4.89$; $p\leq 0.05$).

Table 1. Number and regularity of meals

Question	Categories	Girls n [#] =831		Boys n [#] =812		G function
		n ^{##}	%	n ^{##}	%	
How many meals do you have a day?	More than 5 meals	51	6.1	49	6.0	7.31*
	5 meals	324	39.9	271	33.4	
	4 meals	297	35.7	313	38.5	
	3 meals	127	15.3	151	18.6	
	Fewer than 3 meals	32	3.9	28	3.4	
Do you have breakfast before going to school?	Yes	640	77.0	626	77.1	0.00
	No	191	23.0	186	22.9	
Do you take lunch from home?	Yes	553	66.5	508	62.6	2.85
	No	278	33.5	304	37.4	
How often do you have dinner?	Every day	652	78.5	605	74.5	4.43*
	5-6 times a week	86	10.3	102	12.6	
	2-4 times a week	68	8.2	71	8.7	
	Only at the weekends	9	1.1	11	1.4	
	Once a week	16	1.9	23	2.8	
Do you have supper every day?	Yes	736	88.6	741	91.3	3.28
	No	95	11.4	71	8.7	

Note: * $p \leq 0.05$ – statistically significant differences between the number of responses provided by girls and boys (χ^2 test – G function); #number of interviews, ##number of declared responses

Table 2. Types of products consumed between the main meals

Question	Categories	Girls n [#] =831		Boys n [#] =812		G function
		n ^{##}	%	n ^{##}	%	
What products do you eat between meals?	Fruit and vegetables	424	51.0	344	42.4	4.89*
	Sweets, ice cream	205	24.7	207	25.5	
	Crisps, salty breadsticks	72	8.7	79	9.7	

Note: * $p \leq 0.05$ – statistically significant differences between the number of responses provided by girls and boys (χ^2 test – G function); #number of interviews, ##number of declared responses; respondents were allowed to choose more than one answer or not to choose any answer at all, so the percentage results do not add up to 100%

Data concerning the frequency of consuming sweets, fizzy drinks and fast food are presented in Table 3. It was revealed that most respondents had sweets 2-3 times a week. It was declared by 309 girls (37.2%) and 293 boys (36.1%). Every day sweets were consumed by 19.4% of the girls and 17% of the boys, while once a week or less frequently they were eaten by 15.5% of the girls and 18.3% of the boys. Sweet fizzy drinks were consumed more than 4 times a week by 426 girls (51.3%) and 408 boys (50.3%). In turn, 184 girls (22.1%) and 193 boys (23.8%) had sweet fizzy drinks once a week or less frequently. The consumption of fast food once a week or less frequently was declared by 557 girls (67%) and 502 boys (61.8%). However, 139 girls (16.7%) and 138 boys (17%) had it at least four times a week, while 135 girls (16.2%) and 172 boys (21.2%) consumed fast food products

2-3 times a week. The declared consumption of fast food differed significantly between the girls and boys ($G=7.14$; $p \leq 0.05$).

Table 4 illustrates data on the frequency of consuming fruit and vegetables. According to the data, 162 girls (19.5%) and 120 boys (14.8%) had vegetables every day. The consumption of vegetables no more than once a week was declared by 199 girls (23.9%) and 235 boys (28.9%). Differences between the girls and boys regarding the consumption of vegetables were statistically significant ($G=9.25$; $p \leq 0.05$). Everyday consumption of fruit was declared by 290 girls (34.9%) and 225 boys (27.7%). In turn, 73 girls (8.8%) and 108 boys (13.3%) had fruit no more than once a week. Differences between the girls and boys concerning the consumption of fruit were statistically significant ($G=14.95$; $p < 0.05$).

Table 3. Frequency of consuming sweets, fizzy drinks and fast food

Question	Categories	Girls n [#] =831		Boys n [#] =812		G function
		n ^{##}	%	n ^{##}	%	
How often do you eat sweets (chocolate, cakes, candies)?	Every day	161	19.4	138	17.0	3.42
	4-6 times a week	232	27.9	232	28.6	
	2-3 times a week	309	37.2	293	36.1	
	Once a week or less frequently	129	15.5	149	18.3	
How often do you have sweet fizzy drinks?	Every day	215	25.9	206	25.4	0.62
	4-6 times a week	211	25.4	202	24.9	
	2-3 times a week	221	26.6	211	25.9	
	Once a week or less frequently	184	22.1	193	23.8	
How often do you have fast food?	Every day	50	6.0	51	6.3	7.14*
	4-6 times a week	89	10.7	87	10.7	
	2-3 times a week	135	16.2	172	21.2	
	Once a week or less frequently	557	67.0	502	61.8	

Note: *p≤0.05 – statistically significant differences between the number of responses provided by girls and boys (χ^2 test – G function); #number of interviews, ##number of declared responses

Table 4. Frequency of consuming fruit and vegetables

Question	Categories	Girls n [#] =831		Boys n [#] =812		G function
		n ^{##}	%	n ^{##}	%	
How often do you eat vegetables?	Every day	162	19.5	120	14.8	9.25*
	4-6 times a week	219	26.4	211	26.0	
	2-3 times a week	251	30.2	246	30.3	
	Once a week or less frequently	199	23.9	235	28.9	
How often do you eat fruit?	Every day	290	34.9	225	27.7	14.95*
	4-6 times a week	278	33.5	285	35.1	
	2-3 times a week	190	22.9	194	23.9	
	Once a week or less frequently	73	8.8	108	13.3	

Note: *p≤0.05 – statistically significant differences between the number of responses provided by girls and boys (χ^2 test – G function); #number of interviews, ##number of declared responses

Table 5 presents data regarding the frequency of consuming milk, natural yoghurt, kefir and cottage cheese. According to the data, everyday consumption of milk, natural yoghurt and kefir was declared only by 78 girls (9.4%) and 71 boys (8.7%), while 444 girls (53.4%) and 436 boys (53.7%) had these products once a week or less frequently. The consumption of cottage cheese at least six times a week was declared by 25 girls (3%) and 27 boys (3.3%). In turn, 415

girls (49.9%) and 422 boys (52%) had cottage cheese once a week or less frequently. The consumption of Swiss cheese 2-3 times a week was declared by 333 girls (40.1%) and 307 boys (37.8), while only 74 girls (8.9%) and 80 boys (9.9%) had it every day. No statistically significant differences between the girls and boys regarding the consumption of milk and dairy products were revealed.

Table 5. Frequency of consuming milk and dairy products

Question	Categories	Girls n [#] =831		Boys n [#] =812		G function
		n [#]	%	n [#]	%	
How often do you have milk, natural yoghurt and/or kefir?	Every day	78	9.4	71	8.7	1.17
	4-6 times a week	91	11.0	79	9.7	
	2-3 times a week	218	26.2	226	27.8	
	Once a week or less frequently	444	53.4	436	53.7	
How often do you have cottage cheese?	Every day	25	3.0	27	3.3	1.72
	4-6 times a week	109	13.1	91	11.2	
	2-3 times a week	282	33.9	272	33.5	
	Once a week or less frequently	415	49.9	422	52.0	
How often do you have Swiss cheese?	Every day	74	8.9	80	9.9	1.13
	4-6 times a week	213	25.6	217	26.7	
	2-3 times a week	333	40.1	307	37.8	
	Once a week or less frequently	211	25.4	208	25.6	

Note: *p≤0.05 – statistically significant differences between the number of responses provided by girls and boys (χ^2 test – G function); #number of interviews, ##number of declared responses

DISCUSSION

Rational diet allows for making full use of genetically determined potential of physical and mental development. The first years of life are a period of many changes in a child's nutrition. These changes are closely related to the dynamic development of children and their achievement of subsequent development stages [1]. Thus, it is crucial to meet nutrition needs, not only in terms of quantity but also quality, i.e. the number and regularity of meals a day and the frequency of consuming certain products.

The analysis of the collected material regarding the number and regularity of meals produced similar results to previous studies [3, 4]. The rule of having 4-5 meals a day was not followed in the same manner by the study participants (Table 1). Although the majority of the respondents had four or more meals a day, it was noted that girls had them more regularly than boys (81.7% vs. 77.9%, respectively). Moreover, it was revealed that gender was an important differentiating factor in terms of the number of meals consumed. A significant value of G function (G=7.31; p<0.05) was determined mainly by the differences between the girls and boys regarding the consumption of three (15.3% vs. 18.6%) and five (39.9% vs. 33.4%) meals a day. The study also revealed that 77% of the girls and boys went to school without breakfast, while 33.5% of the girls and 37.4% of the boys did not take lunch to school (Table 1). These findings are alarming due to the risk of an insufficient amount of nutrients in a daily

diet of these individuals. A similar pattern of nutrition was noted among lower-secondary school students from Szczecin [6], primary school pupils and lower-secondary school students from Bialostockie region [15], primary school pupils from Kalisz county [18] and 6-year pupils from several primary schools from Warsaw and Zamosc [5].

Eating between meals was a common phenomenon among primary school pupils from Biala Podlaska county. Despite the fact that fruit and vegetables were the most commonly chosen products (declared by 51% of the girls and 42.4% of the boys), sweets, ice cream, crisps and salty breadsticks were also popular. Such products were included in a daily menu of 33.4% of the girls and 35.2% of the boys (Table 2). Eating between meals (in particular highly processed food such as fast food or sweet fizzy drinks), which is becoming a serious nutritional problem, has been observed in Poland in the last few years [13, 16]. Our research revealed that 37.2% of the girls and 36.1% of the boys had sweets 2-3 times a week, and a further 47.3% of the girls and 45.6% of the boys consumed them 4-6 times a week (Table 3). The consumption of sweet fizzy drinks and fast food was equally high. Sweet fizzy drinks were consumed more than 4 times a week by 51.3% of the girls and boys, while fast food was eaten at least once a week by 67% of the girls and 61.8% of the boys. However, 6% of the girls and 6.3% of the boys had it every day. The research conducted by *Jeżewska-Zychowicz* [8] among slightly older youth revealed that 4-12% of 13-15-year-olds had hamburgers, hot-dogs or chips at least once a day, and

40-60% of these individuals had sweet fizzy drinks. In turn, *Kośmider* and *Gronowska-Senger* [11] revealed that, depending on the place of living, the consumption of fast food 1-2 times a week was declared by between 40 and over 80% of the youth up to 14 years of age.

Products which should be consumed by children and youth every day include fruit and vegetables. They facilitate maintaining proper body mass and make it possible to supplement potential deficits of vitamins, minerals and fibre [19]. The research indicated that as many as 23.9% of the girls and 28.9% of the boys had vegetables once a week or less frequently (Table 4). However, fruit was consumed every day more often by girls (19.5%) than boys (14.8%).

In turn, *Stefańska* et al. [15] noted that the recommended frequency of consuming raw vegetables was declared by 15% of the girls and 12% of the boys aged 10-12 and 13% of the girls and 7% of the boys aged 13-15. Another significant observation, made only in a younger age group, was a significantly lower consumption of raw vegetables by boys than girls.

Fruit consumption among children was much higher (Table 4). More girls than boys had fruit every day (34.9% vs. 27.7%). Its consumption once a week or less frequently was reported by 13.3% of the boys and 8.8% of the girls. These findings are in line with the results of the study by *Wojtyła-Buciora* et al. [18], who revealed that 10% of the examined primary school pupils declared having fruit once a week or less frequently. Different results were revealed by *Głębocka* and *Kęska* [5] in their research on children from Warsaw and Zamosc. The consumption of fruit by boys from Warsaw did not differ significantly from the consumption of fruit by girls from this city. However, male pupils from Zamosc declared much higher consumption of fruit than their female counterparts (41% vs. 26%, $p < 0.05$).

Intensive growth of a young body requires everyday consumption of milk or dairy products due to their high nutritional value and digestibility and because of the fact that they include easily absorbed nutrients [14]. Children from Biala Podlaska county consumed milk, natural yoghurt and/or kefir less frequently than recommended [19]. The consumption of these products once a week or less frequently (Table 5) was declared by 53.4% of the girls and 53.7% of the boys, which, combined with the fact that only 9.4% of the girls and 8.7% of the boys had them every day, may lead to such diseases as osteoporosis, arterial hypertension or coronary artery disease [14]. Equally alarming observations were made by *Stefańska* et al. [15], who revealed that 19.6% of the girls and 20.5% of the boys from primary schools in Bialystok had milk less frequently than 2-3 times a week. In turn, *Wojtyła-Buciora* et al. [18] found out that milk and dairy products were consumed no more than once a week by 10% of the 5th- and 6th-year primary school pupils from Kalisz town and county.

A negative trend was also noted regarding the frequency of consuming cottage cheese and Swiss cheese (Table 5). The highest percentage of children (49.9% of the girls and 52.0% of the boys) had cottage cheese once a week or less frequently. Swiss cheese was consumed 2-3 times a week by 40.1% of the girls and 37.8% of the boys. Slightly different results were obtained by *Jeżewska-Zychowicz* and *Łyszkowska* [7] and *Kollajtis-Dolowy* et al. [10], who revealed that milk, milk drinks and cottage cheese were consumed every day by more than a half of the respondents. Similar results were obtained in the study on children and youth from primary and lower-secondary schools in Bialystok by *Stefańska* et al. [15], who revealed that most respondents had Swiss cheese 2-3 times a week and differences between younger and older girls were statistically significant. A low consumption of milk and dairy products noted in our study is a particularly unfavourable phenomenon due to a low supply of e.g. calcium, as the aforementioned products are a significant source of this element. Such a diet may result in problems connected with improper bone build. As research revealed, reaching peak bone mass within the first 20 years of life constitutes a significant factor that reduces the risk of osteoporosis in the future [20].

CONCLUSIONS

1. The research revealed that, regardless of gender, children consumed certain meals irregularly, i.e. they left home without breakfast, did not take lunch to school or did not have supper.
2. A considerable percentage of children had sweets, fizzy drinks and fast food every day, while a relatively low percentage of children had vegetables, fruit, milk, natural yoghurt and/or kefir every day.
3. The development of bad nutritional habits may lead to their continuation in adult life and may exert a negative influence on the proper development as well as current and future health state.
4. In the light of the aforementioned conclusions, it seems necessary to provide children and their parents with nutritional education in order to develop pro-health nutritional behaviours.

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Conflict of interest

The authors declare no conflict of interest.

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