

Dietary patterns of primary school pupils according to their sex

Zachowania żywieniowe dziewcząt i chłopców uczęszczających do wybranych szkół podstawowych

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ABSTRACT

Introduction: Nutrition is one of the most important environmental factors affecting human health. The frequency, as well as the quality and quantity of consumed foods are significant. Regular and rational dietary habits and correct meal composition ensure good health and fitness, whereas poor dietary habits in childhood account for an early risk of overweightness and obesity. The aim of this study was to evaluate the dietary patterns of girls and boys attending primary schools in Poland, and to identify any associations between the pupils' dietary patterns and their sex.

Materials and methods: The study was carried out in spring 2017. It covered a total of 1138 primary school pupils. A proprietary questionnaire specially designed for the study was used to investigate the pupils' dietary patterns. The findings were then analysed with the use of MS Excel 2010 and Statistica 12.0 software.

Results: According to the survey, 67.36% of the female respondents and 55.4% of the male respondents ate the recommended number of meals each day. Among the respondents 72% of the girls and 73.27% of the boys reported eating breakfast daily.

Fruits and vegetables were eaten several times per day by 60.38% and 43.11% of girls, respectively, v. 50.44% and 32.39% of boys, respectively. The frequency of milk and natural yoghurt consumption was adequate in 20.07% and 10.12% of girls, respectively, v. 20% and 11.5% of boys. Sweets and salty snacks were excluded from the diet of 2.97% and 2.27% of girls, respectively, v. 3.19% and 2.12% of boys, respectively. Sweetened carbonated drinks were consumed by 11.17% of girls and 6.55% of boys. Fast food and instant foods were eliminated from the daily diet of 7.16% and 45.03% of girls, respectively, v. 6.02% and 43.19% of boys, respectively.

Conclusions: Some incorrect dietary habits were identified both in girls and boys, however girls generally reported more beneficial habits. Statistically significant associations were found between the majority of dietary patterns in the studied population and the respondents' sex. The results of the study indicate a need for more intense nutritional education among primary school pupils, diversified for boys and girls.

Keywords: dietary patterns; pupils; primary schools.

ABSTRAKT

Wstęp: Żywnienie należy do najważniejszych elementów mających wpływ na zdrowie człowieka. Znaczenie ma zarówno częstość spożywania poszczególnych produktów spożywczych, jak i ich skład jakościowy oraz ilościowy. Nawyki regularnego i racjonalnego żywienia oraz prawidłowo zestawione posiłki zapewniają dobrą kondycję oraz zdrowie, zaś niewłaściwe żywienie w czasie dzieciństwa jest wczesnym czynnikiem ryzyka nadwagi i otyłości.

Celem pracy była ocena zachowań żywieniowych dziewcząt i chłopców uczęszczających do szkół podstawowych oraz stwierdzenie, czy istnieją zależności pomiędzy zachowaniami żywieniowymi uczniów i ich płcią.

Materiały i metody: Badanie przeprowadzono wiosną 2017 r. Wzięto w nim udział 1138 uczniów uczęszczających do szkół podstawowych. Do oceny posłużył autorski kwestionariusz ankiety. Wyniki analizowano przy pomocy programów MS Excel 2010 i Statistica 12,0.

Wyniki: Spożywanie zalecanej ilości posiłków zadeklarowało 67,36% dziewcząt i 55,4% chłopców. Codzienne spożywanie śniadania zaznaczyło 72,2% dziewcząt oraz 73,27% chłopców.

Kilkukrotne spożycie owoców i warzyw w ciągu dnia wykazało odpowiednio 60,38% i 43,11% dziewcząt oraz 50,44% i 32,39% chłopców. Zalecaną częstość spożycia mleka i jogurtów naturalnych zadeklarowało odpowiednio 20,07% i 10,12% dziewcząt oraz 20% i 11,5% chłopców. Eliminację z diety słonych przekąsek i słodczy zadeklarowało odpowiednio 2,97% i 2,27% dziewcząt oraz 3,19% i 2,12% chłopców. Wykluczenie słodzonych napojów gazowanych zaznaczyło 11,17% dziewcząt i 6,55% chłopców. Wykluczenie z diety produktów typu fast food oraz instant zadeklarowało odpowiednio 7,16% i 45,03% dziewcząt oraz 6,02% i 43,19% chłopców.

Wnioski: W zachowaniach żywieniowych dziewcząt i chłopców stwierdzono występowanie nielicznych nieprawidłowości, przy czym korzystniejsze zachowania zaobserwowano u dziewcząt. Stwierdzono występowanie istotnych statystycznie zależności pomiędzy większością zachowań żywieniowych uczniów i ich płcią. Wyniki badań wskazują na potrzebę prowadzenia edukacji żywieniowej wśród uczniów uczęszczających do szkół podstawowych, zróżnicowanej dla chłopców i dziewcząt.

Słowa kluczowe: zachowania żywieniowe; uczniowie; szkoły podstawowe.

INTRODUCTION

Adequate nutrition, optimal in regards to the quantity and quality of the consumed food, is a prerequisite for proper functioning of the human body. In the case of adolescents and young children, adequate nutrition plays an especially important role as it affects their proper development and should address the changing needs of the young body [1]. Proper nutrition implies consumption of foods which satisfy the body's energy needs adequately for a given person's age, sex and level of physical activity. Diet should be varied and contain sufficient amounts of protein, fat, carbohydrates, vitamins, minerals and water. The distribution of meals throughout the day also plays a significant role [2]. According to the norms established by the Polish National Food and Nutrition Institute (Instytut Żywności i Żywienia), at a moderate physical activity level, children aged 7–9 years old exhibit daily energy expenditure of 1800 kcal, whereas among children aged 10–12 years old expenditure is 2350 kcal for boys, v. 2100 kcal for girls [3].

Deficient nutrition, either in regard to the quantity or quality of the consumed food, has a detrimental effect on health, including impaired immune function and bone development and decreased cardiovascular and respiratory function. Irregular meals as well as poorly balanced diet increase the risk of diet-related diseases, such as atherosclerosis, obesity, osteoporosis and cancer [4, 5].

Family is the primary factor that influences children's dietary patterns, with school being nearly as important in shaping pupils' awareness surrounding health-promoting behaviours. Proper education is crucial, yet it must involve both children and their parents, as children are known to acquire and imitate the dietary patterns and entire nutrition models of their parents [6, 7, 8]. Unless promptly addressed, the multitude of dietary mistakes made by children may lead to a decreased quality and comfort of life in older age, in extreme cases even shortening lifespan [2, 5, 9].

MATERIALS AND METHODS

The study was performed in spring 2017, and covered a total of 1138 students attending primary schools, including 573 (50.4%) girls and 565 (48.6%) boys. The detailed characteristic of the studied group are shown in Tables 1 and 2.

A dedicated survey questionnaire was used in the study, which consisted of a demographic section and the survey proper, containing questions regarding dietary patterns and the intake frequency of certain foods, consumed within the 30 days preceding the survey. The obtained results were then analysed with Microsoft Excel 2010 and statistical analysis was performed using Statistica 12.0 (Statsoft, Inc.) software. For the purpose of the statistical analysis, various response options in the questions concerning the frequency of food product consumption were pooled together, with the following options distinguished: every day, several times a week, several times a month, occasionally and/or never. The χ^2 test was

TABLE 1. Characteristic of the studied group

Feature	n	%	
Sex	girls	573	50.4
	boys	565	48.6
Class	IV	339	29.8
	V	420	36.9
	VI	379	33.3
Voivodeship	śląskie	483	42.4
	małopolskie	333	29.3
	opolskie	322	28.3
Total	1138	100.0	

TABLE 2. Age of the studied group

	n	Median	Minimum	Maximum	Lower quartile	Upper quartile
Girls	573	12	10	14	11	13
Boys	565	12	9	14	11	13
Total	1138	12	9	14	11	13

used to analyse the significance of the relationship between the respondents' sex and their dietary patterns and the frequency of consumption of given foods. For all analyses, the level of statistical significance was set at $p < 0.05$.

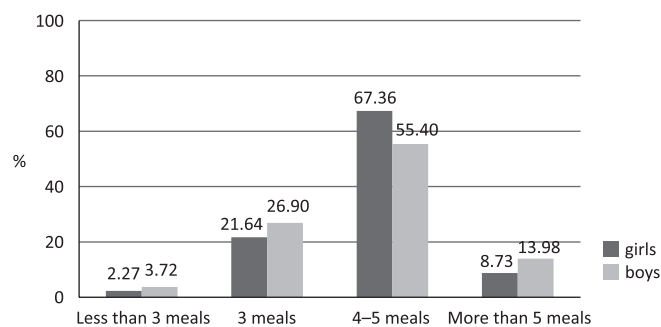
RESULTS

Select dietary patterns among primary school pupils have been shown in Figures 1, 2, and 3.

The recommended 4–5 daily meals were eaten by 67.36% of girls v. 55.4% of boys. Breakfast was eaten at home daily by 72.2% of girls v. 73.3% of boys. An adequate amount of water was drunk daily by 28.1% of girls v. 33.1% of boys.

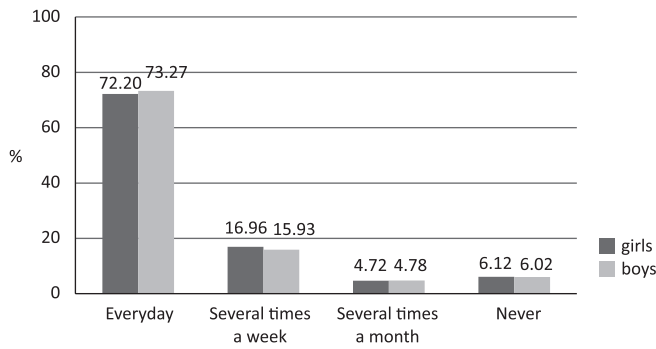
A significant correlation between the respondents' sex and the number of meals eaten daily was identified ($p < 0.01$; $V = 0.13$), whilst no significant correlation was determined between the respondents' sex and the frequency of eating breakfast ($p = 0.97$) or the amount of water drunk daily ($p = 0.97$) – Figures 1, 2, and 3. The intake frequency of select foods is shown in Tables 3, 4, 5, and 6.

Analysis of the frequency with which plant-based products are eaten demonstrated that 17.2% of girls v. 17.7% of boys eat



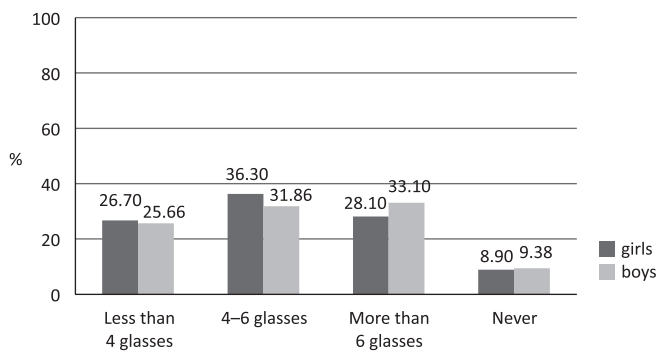
p value based on χ^2 test; V – value V-Cramer

FIGURE 1. The number of meals eaten daily, according to the respondents' sex ($p < 0.02$; $V = 0.13$)



p value based on χ^2 test

FIGURE 2. Breakfast eaten at home, according to the respondents' sex ($p = 0.97$)



p value based on χ^2 test; V – value V-Cramer

FIGURE 3. The number of glasses of water drunk daily, according to the respondents' sex ($p = 0.24$)

wholemeal bread several times per day. Fruit and vegetables are eaten several times per day by 60.38% and 43.11% of girls, respectively, v. 50.44% and 32.39% of boys, respectively (Tab. 3).

A significant correlation between the respondents' sex and the frequency of fruit ($p < 0.01$; $V = 0.11$) and vegetable ($p < 0.01$; $V = 0.14$) intake was found. The findings suggest that fruits and vegetables are eaten much more frequently by girls than boys.

Analysis of the intake frequency of animal-based products showed that milk and natural yoghurts were consumed daily by 20.07% and 10.12% of girls, respectively, v. 20% and 11.5% of boys, respectively. Cottage cheese was eaten by 13.26% of girls v. 17.35% of boys. Rennet-based and processed cheeses were eaten by 37.5% girls v. 31.68% of boys. Fish and meat were consumed several times a week by 29.84% and 35.43% of girls respectively, v. 29.38% and 28.14% boys, respectively.

A significant correlation was identified between the respondents' sex and the frequency of natural yoghurt intake ($p = 0.01$; $V = 0.12$) and cottage cheese intake ($p = 0.01$; $V = 0.10$). The obtained results suggest that the consumption frequency is lower in girls than in boys (Tab. 4).

Analysis of the intake frequency of snacks and sweetened carbonated drinks among primary school students indicated that 2.97% and 2.27% of girls, respectively, v. 3.19% and 2.12% of boys, respectively, eliminated salty snacks and sweets from their diet.

A significant correlation was demonstrated between the respondents' sex and the frequency of salty snack consumption ($p < 0.01$; $V = 0.12$) and sweetened carbonated drink consumption

TABLE 3. Frequency of intake of plant-based foods, according to the respondents' sex

Group of food products	Frequency of intake of selected foods	Sex			
		girls		boys	
		n	%	n	%
Wholemeal bread	several times a day	99	17.28	100	17.70
	once-a-day	108	18.85	72	12.74
	several times a week	124	21.64	127	22.48
	several times a month	72	12.57	85	15.04
	occasionally	79	13.79	75	13.27
	never	91	15.88	106	18.76
Fruits	several times a day	346	60.38	285	50.44
	once-a-day	138	24.08	143	25.31
	several times a week	70	12.22	100	17.70
	several times a month	11	1.92	20	3.54
	occasionally	5	0.87	7	1.24
	never	3	0.52	10	1.77
Vegetables	several times a day	247	43.11	183	32.39
	once-a-day	180	31.41	171	30.27
	several times a week	104	18.15	136	24.07
	several times a month	15	2.62	38	6.73
	occasionally	16	2.79	19	3.36

($p < 0.01$; $V = 0.22$). The obtained results indicate that the intake of these foods is lower among girls than boys (Tab. 5).

Analysis of the frequency of consumption of products not recommended for children's diet has shown that fast food and instant foods were eliminated from the diet of 7.16% and 45.03% of girls, respectively, v. 6.02% and 43.19% of boys, respectively.

A significant correlation between the respondents' sex and the frequency of fast food ($p < 0.01$; $V = 0.19$) and instant food ($p < 0.01$; $V = 0.10$) intake was identified, indicating the frequency of eating these products to be lower among girls than boys (Tab. 6).

Analysis of the sources of nutritional information has shown that children acquire knowledge from parents and teachers – 61.08% of girls and 53.45% of boys, from the internet – 14.49% of girls and 14.34% of boys, from television programs – 11.52% of girls and 11.33% of boys. Among the respondents 1.22% of girls and 0.53% of boys don't acquire nutritional knowledge from any sources (Tab. 7).

DISCUSSION

Nutrition is one of the major environmental factors affecting human health and quality of life. Children's diets should be composed of good quality products, and be properly balanced,

TABLE 4. Frequency of intake of animal-based foods, according to the respondents' sex

Group of food products	Frequency of intake of selected foods	Sex			
		girls		boys	
		n	%	n	%
Milk	several times a day	115	20.07	113	20.00
	once-a-day	164	28.62	175	30.97
	several times a week	163	28.45	144	25.49
	several times a month	52	9.08	40	7.08
	occasionally	37	6.46	30	5.31
	never	42	7.33	63	11.15
Natural yoghurt	several times a day	58	10.12	65	11.50
	once-a-day	87	15.18	99	17.52
	several times a week	174	30.37	140	24.78
	several times a month	125	21.82	91	16.11
	occasionally	64	11.17	77	13.63
	never	65	11.34	93	16.46
Cottage cheese	several times a day	38	6.63	38	6.73
	once-a-day	76	13.26	98	17.35
	several times a week	155	27.05	130	23.01
	several times a month	132	23.04	96	16.99
	occasionally	72	12.57	82	14.51
	never	100	17.45	121	21.42
Cheese (hard or processed cheese)	several times a day	74	12.91	111	19.65
	once-a-day	157	27.40	143	25.31
	several times a week	215	37.52	179	31.68
	several times a month	56	9.77	50	8.85
	occasionally	28	4.89	30	5.31
	never	43	7.50	52	9.20
Fish	several times a day	15	2.62	25	4.42
	once-a-day	33	5.76	42	7.43
	several times a week	171	29.84	166	29.38
	several times a month	196	34.21	188	33.27
	occasionally	96	16.75	92	16.28
	never	62	5.45	52	9.20
Meat	several times a day	98	17.10	154	27.26
	once-a-day	218	38.05	212	37.52
	several times a week	203	35.43	159	28.14
	several times a month	27	4.71	23	4.07
	occasionally	15	2.62	12	2.12
	never	12	2.09	5	0.88

TABLE 5. Frequency of intake of snacks and sweetened carbonated drink, according to the respondents' sex

Group of food products	Frequency of intake of selected foods	Sex			
		girls		boys	
		n	%	n	%
Salty snacks	several times a day	30	5.24	56	9.91
	once-a-day	62	10.82	87	15.40
	several times a week	169	29.49	164	29.03
	several times a month	176	30.72	144	25.49
	occasionally	119	20.77	96	16.99
	never	17	2.97	18	3.19
Sweets	several times a day	76	13.26	90	15.83
	once-a-day	127	22.16	129	22.83
	several times a week	187	32.64	173	30.62
	several times a month	96	16.75	94	16.64
	occasionally	74	12.91	67	11.86
	never	13	2.27	12	2.12
Sweetened carbonated drinks	several times a day	30	5.24	64	11.33
	once-a-day	32	5.58	61	10.80
	several times a week	113	19.72	135	23.89
	several times a month	149	26.00	169	29.91
	occasionally	185	32.29	99	17.52
	never	64	11.17	37	6.55

TABLE 6. Frequency of fast food and instant food intake

Group of food products	Frequency of intake of selected foods	Sex			
		girls		boys	
		n	%	n	%
Fast food products	once-a-day	15	2.62	38	6.73
	several times a week	52	9.08	95	16.81
	several times a month	187	32.64	210	37.17
	occasionally	278	48.52	188	33.27
	never	41	7.16	34	6.02
"Instant" food products	several times a day	12	2.09	13	2.30
	once-a-day	13	2.27	28	4.96
	several times a week	46	8.03	63	11.15
	several times a month	85	14.85	100	17.70
	occasionally	159	27.75	117	20.71
	never	258	45.03	244	43.19

i.e. include all nutrients to fulfil bodily needs [10]. With age, children become increasingly independent in their dietary choices, especially when eating outside the home. Hence the importance of establishing correct dietary patterns from a very young age

TABLE 7. Sources of nutritional knowledge

Source of knowledge	Sex			
	girls		boys	
	n	%	n	%
From parents/teachers	350	61.08	302	53.45
From the internet	83	14.49	81	14.34
From newspaper/magazine	21	3.66	11	1.95
From television programmes	66	11.52	64	11.33
Other	7	1.22	3	0.53
From age-mates	15	2.62	18	3.19
I don't deepen my knowledge	31	5.41	86	15.22

and continuous surveillance of children's diet to monitor and eliminate any dietary mistakes [11, 12].

According to the principles of proper nutrition, 4–5 daily meals are recommended for school-aged children, spaced out at appropriate time intervals. This ensures proper distribution of energy supply, thus reducing the risk of obesity, hypertension, atherosclerosis and diabetes [10]. In our study, more girls were found to eat the recommended number of daily meals than boys. The results of the study by Jonczyk et al., which covered pupils of primary schools in Piekary Śląskie, Poland, differed from ours. According to the authors, who evaluated e.g. the dietary patterns and physical activity levels of the pupils, a comparable proportion of boys and girls ate the recommended number of meals per day [13].

Breakfast is known to be the most important meal of the day, as it guarantees proper energy supply, and neglecting it may cause fatigue and concentration problems [14, 15]. In our study, 72.2% of girls v. 73.27% of boys reported eating breakfast daily. Similar results were obtained by Jonczyk et al. in their study [13]. Wawrzyniak et al., on the other hand, reported less favourable results in their study evaluating breakfast consumption in a population of students in the Mazowieckie Voivodeship. According to that study, as little as 59% of students ate breakfast at home daily [2].

Water is crucial for proper functioning of the human body. It also provides necessary mineral elements. Among the students participating in our study, the amount of water drunk daily was insufficient, as confirmed by studies performed in other Polish voivodeships. In a study by Wojtyła-Bucior et al., conducted in 2015, only 48% of pupils reported drinking water daily [4]. This may be due to the fact that children prefer sweetened carbonated drinks to water. It may also be associated with parents' inadequate knowledge about the importance of drinking water and the actual needs of children regarding daily water intake, as demonstrated by Wyka et al., who evaluated the dietary knowledge of parents of school-aged children. They found that as few as 10 out of 195 parents participating in their study were able to select the correct answer regarding the amount of water that children should drink daily [16].

Fruits and vegetables are rich sources of vitamins and other nutrients. They also contain considerable amounts of fibre and natural anti-oxidants [8, 17]. According to the principles of a healthy diet, fruits and vegetables should be eaten as often as

possible, in the largest possible quantities [3]. The results of our study suggest a greater intake of fruits and vegetables among girls than boys. Different results, however, were obtained in a survey carried out in 38 randomly selected primary schools from 4 voivodeships as a part of the "Fruit in school" programme. The voivodeships included were Mazowieckie, Podkarpackie, Pomorskie and Wielkopolskie. According to the findings of that survey, fruit and vegetable intake was significantly higher among boys than girls [8].

Milk and dairy products, in turn, are abundant sources of protein and calcium. Throughout childhood, optimal bone mass and mineral density are developed. Calcium, most readily available in milk and dairy products, is essential for the prevention of osteoporosis [6, 18]. Children are recommended to drink 3–4 glasses of milk daily, or replace milk with adequate amounts of other dairy products, e.g. yoghurt, kefir, or cottage cheese [6, 9, 16]. In our study, milk and dairy intake was found to be inadequate, with boys found to consume natural yoghurt and cottage cheese more frequently than girls. The results are similar to those obtained by Jonczyk et al., who found that 49.61% of girls v. 56.7% of boys in their study drank milk or ate dairy daily [13]. In recent years, the prevalence of overweightness and obesity in children has soared, a fact associated with high-calorie diets and insufficient levels of physical activity in children, resulting in food intake disproportionate to actual energy expenditure, thus leading to an increase in body weight [19, 20]. High-calorie products, such as sweets, sweetened carbonated drinks and salty snacks have in many cases replaced milk, dairy products, fruits and vegetables in children's daily diet [21]. This dietary trend is also known to contribute to the development of caries [8, 22]. The findings of many studies confirm that the frequent consumption of these products by children is a common problem [1, 4, 13, 23, 24]. In our study, no correlation was identified between the respondents' sex and their intake of sweets. Szeja et al., on the other hand, assessing dietary patterns of girls and boys in sports-profiled schools or classes, found girls to eat sweets more frequently than boys [25]. In our study, salty snacks and sweetened carbonated drinks were consumed more frequently by boys. Similar results, indicating higher intake of these products among boys, were also demonstrated by Vanderlee et al. and Wuenstel et al. [26, 27].

Our study has also shown that boys ate fast food and instant foods more frequently than girls. Similar results were obtained in a study conducted by Jonczyk et al. in Piekary Śląskie. According to their findings, 59% of boys v. 5.08% of girls ate fast food meals at least on a weekly basis, and 27.78% of boys v. 23.44% of girls – less than once a week [13]. A study conducted among parents of pupils from the Śląskie and Opolskie Voivodeships yielded different results, with the parents' answers indicating that 83% of children ate out at fast food restaurants less frequently than once a month, 11.98% of boys and 11.40% of girls less than once a week, and only 3.23% of boys and 4.66% of girls – at least once a week [1].

The growing prevalence of overweightness and obesity in children as a result of unhealthy dietary patterns warrants

continuous surveillance of children's diets. Despite increasing nutritional awareness and knowledge of the possible consequences of inadequate nutrition, more comprehensive nutritional education is necessary, adjusted to the needs of young consumers and their caregivers, as indicated by numerous researchers in the field [5, 7, 9, 28, 29].

CONCLUSIONS

1. Some unhealthy dietary patterns have been identified among both school-aged girls and boys, with girls found to have more favourable dietary patterns.
2. Statistically significant correlations have been identified between the majority of dietary behaviours and the respondents' sex.
3. The results of the study indicate a need for more intense nutritional education among primary school pupils, diversified for boys and girls.

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