ASSESSMENT OF THE EATING HABITS OF A SELECTED GROUP OF SCHOOL AGE CHILDREN

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ABSTRACT

The purpose of the research was to assess the eating habits, nutritional status and level of physical activity of a selected group of children.

Empirical study was conducted with the use of an authorial questionnaire – survey in May 2013 in a group of 100 parents of children aged 6–9 years attending grades 1–3 of primary school in Gdynia.

Eating habits of children were found to be beneficial in terms of regularity and the number of meals consumed, consumption of the first breakfast at home and a second breakfast at school and the lack of snacking in the course of time spent in front of a computer and a TV. As unbeneficial were considered eating habits of children in terms of snacking between main meals during the day and too short time of consumption of last meal before bedtime. It was found that the structure of consumption of individual food products is not compatible with the recommendations of the Institute of Food and Nutrition on low consumption of fruits and vegetables, whole grain products, leguminous plants, fish and high consumption of sweets. This trend may be the cause of shortage of nutrients such as vitamins, minerals, fiber and polyunsaturated fatty acids omega-3.

Keywords: eating habits, the structure of the consumption of food products, nutritional status, physical activity, children.

INTRODUCTION

Rules of proper nutrition of children

Proper nutrition of children is an essential factor for their harmonious development, ageing, growing and physical fitness, the ability to perform school duties and extracurricular activities [29].

To sustain the vital functions and the current activity of the body it is necessary to ensure regular supply of energy. Rational nutrition should optimally include five meals during the day, which should be consumed at fixed hours and in appropriate proportions. Irregular consumption of meals can lead to a shortage of nutrients, as well as to the risk of reducing the energy expenditure of the body which promotes cumulation of body fat. In connection to the recommended frequency of consumption from 4 to 5 meals a day and their regularity every 3–4 hours, consumption of second breakfast or lunch at school is of high importance. Students who remain in school up to 6 hours should eat at least one meal, and student who remains in school over 6 hours – two meals. Too long breaks between meals lead to a significant drop in blood glucose levels, which contributes to a reduction in physical and mental efficiency, as well as to reduction of the ability of concentration, irritability, etc. Children very often purchase sweets, salted snacks and sugary fizzy drinks while at school. Consumption of those products suppresses the feelings of hunger, but does not provide the body with the right amount of nutrients. Children forgo drinking healthy juices and milk drinks (milk, kefir, yoghurt) and instead choose sweet carbonated beverages, which prevent the supply of vitamin C and calcium [28].

Health consequences of childhood overweight and obesity

The Problem of overweight and obesity affects not only adults, but also children and young people [6]. Overweight is the relation of the excess of body weight to its height. This term is often confused with obesity, which is a systemic, chronic metabolic disease resulting from abnormal energy homeostasis, manifested by the increase of the amount of fat in the body. More than 90% of cases of obesity existing at the age of development is simple obesity also called alimentary obesity which is arising from a positive energy balance. Other cases concern secondary obesity, which is the result of damages to the systems which control the intake and expenditure of energy and/or disturbed metabolism [17].

According to data published in 2009, the prevalence of simple obesity concerned about 5–8% of the population of children and adolescents in Poland [14].

Obesity in developmental age not only increases the size of the fat cells (adipocytes), but also their number. This is especially dangerous, as the excessive number of fat cells in childhood (hyperplasia), is reversible and can contribute to the development of obesity in adulthood [23].

It is estimated that a child who enters the stage of adolescence with overweight, has only 25% chances to achieve proper weight in adulthood, and the child who enters the stage of adolescence with obesity, the likelihood of a reduction of body weight to normal decreases to 3% (Center for Promotion of Child's Health and Fitness 2007) [18].

Obesity is a serious condition that causes a number of early and long term health complications (Table 1).

Table 1. Early and long term complications of obesity in children

Endocrine complications: • insulin resistance and metabolic syndrome • diabetes type II • precocity • growth hormone deficiency • menstrual disorders and polycystic ovarian syndrome in girls • hypogonadism in boys	Cardiovascular complications: • dyslipidemia • hypertension • hypertrophy of the left ventricle of the heart • early atherosclerotic changes
Pulmonological complications: • sleep apnea • bronchial asthma • physical exercise intolerance • increased risk of anaesthetic	Gastrointestinal complications: • fatty liver disease • cholecystolithiasis • gastro-oesophageal reflux
Cancer complications • increased risk of cancer of the colon and breast	Complications of the immune system: • elevated level of inflammation
Kidney complications: • *glomerulosclerosis* – hardening of the kidney glomeruli	Complications of the locomotor system: • syndrome of the hip and knee joints overload • slipped capital femoral epiphysis • Blount's disease (tibia clubfoot) • knee valgus • flat feet • varicose veins of the lower limbs • gout
Skin complications: • Acanthosis Nigricans • skin stretch marks • hirsutism	Psychosomatic complications: • low self esteem and depressive states • social isolation • increased number of hospitalizations

Source: developed on the basis of: Fichna and Skowrońska 2006, p. 223–228 [5]; Fichna and Skowrońska 2008, p. 269–278 [6]; Fichna, Skowrońska 2010, p. 46–54 [7]; Koehler et al. 2002, p. 504 [12]; Malinowski 2010 [15]; Urban and Adamczyk 2007, p. 87, 92–93 [26]; Zachurzok-Buczyńska 2005, p. 13–20 [30].

It is estimated that the obese child has, on average, 3-times higher risk of developing high blood pressure compared with their peers with normal body weight [26] and 10-times higher risk of developing diabetes of the second type [6]. Non-alcoholic fatty liver disease (NAFLD) may refer to at least 3% of the population of children in general, and even up to 50% of obese children [27].

Other disorders resulting from obesity, both early and distant, include, inter alia: sleep apnea, ophthalmic complications - the development of glaucoma, orthopedic complications, complications of genital tract during adulthood and psychological complications [17, 1].

Children affected by obesity are characterized by a lack of faith in their own abilities, very low self-esteem and isolation from the social environment [31].

Discriminated obese children suffer from emotional disorders, depressive states and very often during adolescence suffer from anorexia nervosa and bulimia [19].

The aim of the work was to assess eating habits, nutritional status and level of physical activity in a selected group of children.

1. EXPERIMENTAL

1.1. Materials and methods

The study was conducted in May 2013 in a group of 100 parents of children aged 6–9 years attending grades 1–3 in one of the elementary schools in Gdynia.

The study had an indirect form because set aim of the research was carried out on the basis of the information provided by the parents of the tested group of children.

Scope of the study included an assessment of eating habits, estimation of the time spent by children on a wide range of multimedia entertainment and their level of physical activity. In addition, an assessment of the nutritional status of children and their parents was carried out.

Evaluation of eating habits of children was based on questions concerning: the number of consumed meals, daily consumption of breakfast before leaving for school and a second breakfast at school, the nature of the products consumed within the second breakfast at school, the pattern of consumption of selected foods, regular consumption of meals, the habit of snacking between meals, the time of consumption of the last meal before bedtime, the habit of eating while watching TV or in front of the computer.

Estimation of the time spent by children on a wide range of multimedia entertainment and their level of physical activity was based on questions concerning: having a TV and/or computer in the room, time during the day spent on watching television and on computer-related entertainment, amount of extracurricular physical activity.

Test results of the research were presented under consideration of the factors of variability, such as: gender of the children and level of education of their parents. Parents were assigned to two groups. The first group were the parents with primary, secondary and vocational schooling (50% of the subject group parents), and the other group of parents with college and higher education (50% of the subject group of parents). In case of children, who were examined indirectly, the variability factor was gender (Table 2).

On the basis of weight and height of children there was calculated their body mass index rate (BMI), and then taking into account the age and gender of the child, using growth charts designed for children up to 18 years their nutritional status was

calculated by matching received values of the BMI index to the corresponding ranges: underweight – BMI index value < 5 centile, the correct body mass – BMI index value between 5 and 85 centile, overweight – BMI index value ≥ 85 centile, obesity – BMI index value ≥ 95 centile) [24].

Table 2. Characteristics of the tested group children and their parents

Researched feature		Percentage of received responses (%)
Parents		
education	primary	1%
	vocational	20%
	secondary	29%
	college	11%
	higher	39%
financial situation	very good	11%
	good	41%
	average	48%
nutritional status	underweight	6%
	correct body weight	67%
	overweight	24%
	obesity of 1st level	3%
Children		
gender	girls	50%
	boys	50%
nutritional status	underweight	13%
	correct body weight	66%
	overweight	20%
	obesity of 1st level	1%
overweight and obesity in family	mother	6%
	father	11%

Source: own development.

2. RESULTS AND DISCUSSION

The regularity of consumption of 4–5 meals during the day is a very important aspect of proper nutrition. Irregular consumption of meals promotes the accumulation of fatty tissue and can cause some nutrient deficiencies [10, 11]. According to data from year 2010, only 26% of children living in the Ciechanów County consumed regular meals [16]. The results of own research are more favourable, because the consumption of 4 to 5 meals per day was verified in 75% of children (Table 3).

Table 3. The evaluation of eating habits [%]

Eating habits	Gender		
	G	B	Total
Number of meals consumed during the day			
Two	2	2	2
Three	26	20	23
Four	50	40	45
Five	22	38	30
Daily consumption of the first breakfast			
Yes	62	68	65
Rather yes	10	16	13
Probably not	18	12	15
No	10	4	7
Daily consumption of the second breakfast			
Yes	58	62	60
I think so	30	24	27
Probably not	10	14	12
No	2	0	1
Food products eaten in school as a second breakfast			
Sandwiches	74	92	83
Yogurt	46	18	32
Fruit	40	48	44
Vegetables	6	8	7
Sweets	18	20	19
Cookies	14	20	17
Salted snacks	2	0	1
Second breakfast purchased in the school shop	4	8	6
Not consume	4	2	3
Eating the last meal			
2–3 hours before bedtime	26	32	29
< 2 hours before bedtime	52	38	45
> 3 hours before bedtime	22	28	25
Just before bedtime	0	2	1
Snacking between meals			
Yes	48	32	40
Rather yes	34	46	40
Probably not	20	16	18
No	0	4	2

Source: own development; Gender: G – girls, B – boys.

One of the most important meals of the day is breakfast [10]. That meal consumed by children allows their appropriate focus and concentration at school, and thus obtaining better results in learning. Consumption of first breakfast is of great importance, although not without significance is the quantity and quality of

products consumed during breakfast [8, 22]. According to data from 2010, 63% of the school pupils residing in Ciechanów County consumed first breakfast daily [16] and 79,6% of children aged 4 to 8 years [13]. The results of own research confirm that trend, because the daily consumption of the first breakfast was confirmed in 65% of the examined children (Table 3).

It is recommended that the meals were consumed at regular intervals not longer than 3–4 hours. Second breakfast is a meal that should be consumed by children in school [22]. Data from 2009 proved that almost 70% of children aged 7–9 years living in Warsaw consumed second breakfast at school [2]. The results of own research are less favourable, since the intake of the second breakfast at school was confirmed in 60% of children (Table 3).

According to the research carried out by The Public Opinion Research Center from year 2006 children most often ate sandwiches in school as a second breakfast (84,7% of children) and/or fruit (52,4% of children). About 25% of children receive money from parents to buy their second breakfast, 17,8% eat sweets, and nearly 7% consume salted snacks [10]. The results of own research are similar in case of consumption of sandwiches by children as second breakfast (83% of children) and sweets (19% of children), but lower by 8,4% in case of consumption of fruit (44% of children ate fruit for second breakfast at school), and 6% of children purchased their second breakfast in the school shop. In addition, in the range of structure of consumption of products for second breakfast there was very low consumption of vegetables, because only 7% of children consumed them (Table 3).

Another factor that could affect the development of overweight in children consuming 4–5 meals a day, could be snacking between meals. Carried out analysis showed that the same percentage of children snacked (40%) and rather snacked between meals (40%) (Table 3). This eating habit have influenced energy balance disorder towards positive and may have led to overweight.

Last meal should be eaten 2–3 hours before bedtime, because such behaviour allows to use the provided energy during the day and ensures peaceful, restorative sleep [10]. According to data from year 2010 last meal before bedtime at the recommended interval of 2–3 hours was consumed by 43% of students from Ciechanów County, and as many as 18% of children consumed dinner/supper just before bedtime, which is considered to be definitely unfavourable [16]. Analysis of the results of the research showed that 29% of tested children consumed their last meal in accordance with the recommendations 2–3 hours before bedtime, 1% just before bedtime, and the remaining part of children (70%) in time shorter than 2 hours or longer than 3 hours before going to sleep (Table 3).

Numerous publications indicate the relationship between the nutritional status of the parents, and nutritional status of their children. Cases of overweight and obesity of children are associated with obesity of their parents and are derived from dietary behaviours specific for individual families [25]. In 2002 there were published the results of the 4-year study, on the basis of which an attempt was made to

demonstrate the impact of different factors, including parents obesity on obesity rates in children aged 5–7 years. The authors of these studies found no presence of a strong relation between diagnosed parents obesity and the occurrence of obesity in their children.

It has been proven, however, that the body mass index (BMI) of a child was more closely related to body mass index (BMI) of the mother than of the father [4].

On the basis of the results of the research, it was found that there is a strong relation between the nutritional status of parents and their children. Children (vast majority of children -81%) of parents (67% of the tested group) who were not overweight or obese had proper body weight. However, in families where parents were overweight or obese (27% of the tested group) it was found that 50% of children were overweight, 4,2% were obese, 37,5% of children had correct body mass, and 8,3% were underweight. Children of parents who were found to have low body weight (6% of the tested group) also had too low body weight for their age and gender (67% of children).

Socioeconomic status of the family has an impact on the prevalence of overweight and obesity in children. Low level of education of parents (especially mothers) and the low level of income are all factors which encourage the development of overweight and obesity in children [21].

On the basis of the results of research, it was found that the problem of overweigh concerned, to a greater extent, children (27%) living in families whose parents declared income at a low level (48% of families). In families with a declared very good (11%) and good (41%) level of income it was found that 16% of children were overweight.

The number of consumed meals is related to a number of indicators of nutritional and health status [10]. The largest percentage of children with correct weight were children who consumed 4 meals a day (50% of children with correct weight) and 5 meals a day (25,8% of children with correct weight).

However, the same relation was found in overweight children who consumed 4 meals a day (40% of overweight children) and 5 meals a day (35% of overweight children). The inverse relation from obtained in own studies present other authors, who found that overweight and obesity occurred in children consuming significantly less meals a day than their peers who were not diagnosed to be overweight [20].

Considering the structure of the consumption of foods with consideration of the recommendations of the Institute of Food and Nutrition [9] it was found that children consumed too few fruits and vegetables. Only 18% of children consumed fruits and 26% vegetables in total quantity of 5 servings a day. Found low level of fruit and vegetable consumption may be associated with a low supply of provitamin A, vitamin C, folic acid, calcium, magnesium, sodium and potassium and fiber. In addition, definitely unpropitious phenomenon was too low level of consumption of wholegrain cereal products being a source of complex

carbohydrates, fiber, B vitamins and minerals such as iron, zinc, phosphorus, magnesium, potassium and copper. Only 9% of children consumed whole grain products 5 times a day, and 13% a few times a week. Furthermore, low intake of fish, which may be associated with shortage of polyunsaturated fatty acids omega-3, iodine, fluorine, and balanced protein was found. To the group of products, which are a source of complex carbohydrates, B vitamins and iron, calcium and phosphorus belong seeds of leguminous plants. It was found that the rate of consumption of these products was low, as many as 46% of children consumed them only a few times a month (Table 4).

Table 4. The frequency of consumption of selected food products [%]

Food products	Gender		Several times a day		Once a day		Few times a week		Once a week		Few times a month		Once a month		Or more rarely	
	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B
Vegetables	**100**	**100**	**22**	**30**	**36**	**40**	**32**	**20**	**6**	**10**	**2**	**0**	**0**	**0**	**2**	**0**
Fruits	100	100	26	38	50	40	22	18	0	2	2	2	0	0	0	0
Cereal products	100	100	8	28	22	12	30	22	18	16	6	14	2	2	14	6
Dairy products	100	100	54	52	36	30	8	12	0	2	2	0	0	4	0	0
Fish	100	100	0	0	0	0	10	12	28	64	28	8	10	12	4	4
Seeds of leguminous plants	100	100	0	0	0	0	20	6	10	14	42	50	10	10	18	20
Sweets	100	100	16	10	30	58	32	20	10	12	6	0	4	0	0	0
Salted snacks	100	100	0	0	6	2	32	14	12	22	14	26	32	32	4	4
Fast-food products	100	100	0	0	2	0	8	6	20	18	12	22	50	52	8	2

Source: own development; Gender: G – girls, B – boys.

A favourable trend was discovered in case of consumption of milk and milk products which are a source of calcium and balanced protein and poultry meat. 53% of the children consumed 3–4 servings of milk and milk products and 68% of children consumed poultry meat several times a week. Moreover, to the beneficial eating habits was attributed too low consumption of fast-food products (51% of children consumed fast-food snacks once a month) and salted snacks (32% of children consumed them once a month). Unfortunately, high intake of sweets was found, because as much as 44% of children consumed them at least once a day (Table 4).

Further analysis of the factors that may have led to the development of overweight in children consuming the recommended number of 4–5 meals a day showed that the same number of kids did physical exercises daily (26%) and 2–3 times a week

(26%) and 9% of children did not take any physical activity. On the basis of the obtained results, it can be assumed that children who consumed 4–5 meals a day and cultivated sports every day or 2–3 times a week consumed meals with a high energy density, but performed systematic exercises did not allow them to spend the excess calories. In other children overweight could result from too low level of physical activity (Table 5).

A common obstacle in leading an active lifestyle by children is too long time spent on media entertainment and watching TV programmes. In 2004, a congeneric assessment of this form of recreation by children under 11 years of age was presented. It has been demonstrated that having a TV in the bedroom of the child significantly increases the time that is spent on entertainment associated with the computer and watching TV. At the same time, the authors pointed out the fact that a higher level of education of parents was associated with more rare existence of the TV in child's room and reduction of the time spent on multimedia entertainment [3]. On the basis of own research, it was found that the children spent in front of the computer or TV 1–2 hours a day (41% of the tested group) and 2–3 hours a day (26%) (Table 5).

Table 5. Physical activity of children [%]

Parametr	Gender		
	G	B	Total
Extracurricular physical activity			
Daily	8	26	17
2–3 times a week	56	40	48
1 time a week	26	26	26
Not involved at all	10	8	9
Taken form of physical activity			
Swimming	54	44	49
Martial arts	6	14	10
Dance	40	12	26
Football / Basketball	6	60	33
Cycling	60	76	68
Inline skating	56	38	47
Fun with peers	42	58	50
other	20	14	17
I do not practice	4	0	2
Time spent on entertainment media			
< 1 hours a day	22	10	16
1 – 2 hours a day	44	38	41
2 – 3 hours a day	18	34	26
3 – 4 hours a day	10	18	14
> 4 hours a day	6	0	3

Source: own development; Gender: G – girls, B – boys.

It was found that the proportion of overweight or obese children was high (21%). Overweight children accounted for 20% of the total of the surveyed children, and obese children accounted for 1%. This is the result close to the data submitted by

other authors, who claimed the occurrence of overweight and obesity in 18% of the tested pupils living in the County of Ciechanów [16]. The results of the research showed that in the group of tested children with diagnosed overweight majority constituted boys – 57% and girls 43%.

A very worrying phenomenon is the lack of knowledge of the parents of the tested group of children on their own nutritional status. Parents, who, on the basis of the calculated body mass index BMI, were found overweight or obese, did not reveal during the course of research, that the problem of excessive weight concerned themselves. It was found that parents with higher education, to a greater extent (28% of the tested group), than the parents with basic, vocational or secondary education (15,4% of the tested group), admitted that they were overweight or obese.

CONCLUSIONS

1. Eating habits of children were found to be beneficial in terms of regularity and the number of meals consumed, consumption of the first breakfast at home and a second breakfast at school and the lack of snacking in the course of time spent in front of a computer and a TV.
2. As unbeneficial were considered eating habits of children in terms of snacking between main meals during the day and too short time of consumption of last meal before bedtime.
3. It was found that the structure of consumption of individual food products is not compatible with the recommendations of the Institute of Food and Nutrition on low consumption of fruits and vegetables, whole grain products, leguminous plants, fish and high consumption of sweets. This trend may be the cause of shortage of nutrients such as vitamins, minerals, fiber and polyunsaturated fatty acids omega-3.
4. Proportion of children affected by overweight in the tested group was high.
5. It was proved that low impact of physical activity and too small number of consumed meals were direct causes of overweight or obesity in children in the tested group.

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