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Weight status related to eating behaviors of school aged children in Warsaw

Stan odżywienia a nawyki żywieniowe wśród dzieci w wieku szkolnym z Warszawy

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Summary

Introduction. Formation of proper eating habits is the main factor deciding about proper nutrition of a child. Less healthy dietary habits and poor food choices may be responsible for prevalence of overweight among children and adolescents.

Aim. This work was aiming to examine the impact of eating habits on the weight status of children aged 11-13.

Methods. A survey was conducted during the school year 2009/2010 in five primary schools, selected at random, in the area of Warsaw. A questionnaire on selected eating habits was answered by 380 pupils of the 5th and the 6th forms, and measurements of their weight and their height were taken.

Results. It was found that among children eating at least 3 meals a day ($p < 0.001$; ANOVA) as well as eating meals with the family at least 5-6 times a week ($p < 0.001$) prevalence of obesity was significantly lower. Consumption of fruits and vegetables at least 1-2 times per day significantly decreases prevalence of obesity. Stronger association was found if the consumption of fruits and vegetables was 3-5 times a day ($p = 0.007$). The group consuming sweet drinks every day has significantly higher BMI than the others ($p = 0.001$; ANOVA).

Conclusions. Selected eating habits appear to be associated with anthropometric characteristics in Polish primary school children. Prevention of overweight and obesity among school aged children shall include a broad spectrum of educational activities at school, as well as dietary education of parents.

Key words: children, eating habits, school, parents

Streszczenie

Wstęp. Podstawowym czynnikiem, decydującym o prawidłowym sposobie żywienia dziecka jest kształtowanie odpowiednich nawyków żywieniowych. Nieprawidłowe nawyki żywieniowe mogą prowadzić do występowania nadwagi i otyłości wśród dzieci i młodzieży.

Cel. Celem pracy było zbadanie wpływu nawyków żywieniowych na stan odżywienia dzieci w wieku 11-13 lat.

Materiał i metody. Badanie przeprowadzono w roku szkolnym 2009/2010 w pięciu losowo wybranych szkołach podstawowych na terenie Warszawy. Wśród 380 uczniów klas V i VI przeprowadzono ankietę dotyczącą wybranych nawyków żywieniowych oraz pomiary masy i wysokości ciała.

Wyniki. Stwierdzono, że dzieci spożywające przynajmniej 3 posiłki ($p < 0,001$; jednoczynnikowa ANOVA) oraz spożywające posiłki z rodziną minimum 5-6 razy w tygodniu ($p < 0,001$) miały istotnie niższe BMI od pozostałych. Przed wystąpieniem nadmiernej masy ciała może chronić spożywanie warzyw i owoców przynajmniej 1-2 razy dziennie; jeszcze silniejszym czynnikiem ochronnym może być spożywanie warzyw i owoców 3-5 razy dziennie ($p = 0,007$; test χ^2). W grupie dzieci spożywających słodkie napoje codziennie znacznie częściej występowała otyłość niż w grupach pozostałych ($p = 0,001$; ANOVA).

Wnioski. Nieprawidłowe nawyki żywieniowe mogą wpływać na występowanie nadwagi i otyłości wśród badanych dzieci w wieku szkolnym. Prewencja nadwagi i otyłości u dzieci w wieku szkolnym powinna uwzględniać szeroko zakrojone działania edukacyjne na terenie szkoły oraz edukację żywieniową rodziców.

Słowa kluczowe: dzieci, nawyki żywieniowe, szkoła, rodzice, otyłość

INTRODUCTION

Obesity has a negative impact on health and growth not only in the childhood, but also in the adult life, in-

creasing the risk of chronic non-infectious diseases and disabilities. Therefore, it is particularly important to prevent obesity already in the childhood.

Formation of human eating habits is a comprehensive process which starts in the early childhood. Many various factors impact eating habits of children; first of all children's families, then their school and the surrounding environment: peers, fashion, commercials, etc. Eating habits impact nutrition, and hence, the weight status, both in the childhood and in the adult life (1). The overruling of bad eating habits and regular exercise seem to be the most effective way of overweight/obesity prevention.

AIM OF THE STUDY

This work was aiming to examine impact of selected eating habits of primary school children on occurrence of overweight and obesity in Warsaw.

MATERIAL AND METHODS

A survey was conducted in the school year 2009/2010 in five primary schools, selected at random, in the area of Warsaw. It addressed 380 pupils aged 11-13, including 187 girls and 193 boys. The survey tool was a questionnaire, filled in by the children, with questions on the number of meals per day, the frequency of common meals with family, soft drinks, fruit and vegetables, the eating of breakfasts and fast food.

On the day when the survey was conducted, children were weighted and measured in the consulting room. The attendance rate on the survey day was at 80%.

It was found out that 11 children (2.89%) were underweight, 56 children (14.74%) were overweight, while 31 children (8.16%) were obese. The assessment was made according to the percentile chart of Body Mass

Index developed by Palczewska and Niedźwiecka in the Institute of Mother and Child (IMD) in Warsaw.

RESULTS

It was found out that the majority of children had 4-5 meals per day. Only 13 children (3.4%) declared they had less than 3 meals per day. Children with proper weight declared less frequently that they had less than 3 meals per day as compared to children with overweight and obesity (1.4% vs 5.4% and 16.1% respectively) (tab. 1).

The average BMI related to the number of meals (5 categories) was statistically significant ($p < 0.001$; one way ANOVA). Groups which had at least 3 meals had significantly lower BMI than other groups (post-hoc Tukey test) (fig. 1). The number of meals affected BMI; that was not a linear correlation; a significantly lower BMI occurred on condition that 3 meals were eaten per day.

It was found out that 201 pupils (52.9%) had common meals with their families every day or almost every day. Children with proper weight declared more frequently that they had common meals with their families every day or 5-6 times per week as compared to children with overweight and obesity (58.9% vs 35.7% and 25.8% respectively, $p < 0.001$; Pearson chi-square test). Statistically significant differences were found out between average BMIs depending on the frequency of common meals with family (6 categories) ($p < 0.001$; one way ANOVA). The group that did not have common meals with family had a significantly higher BMI from other groups, while children who had common meals with family at least 5-6 times per week had a significantly lower BMI than other groups (Tukey post-hoc test) (fig. 2).

Table 1. Weight status and related eating behaviors among school-aged children from Warsaw.

	Obesity ≥ 95 centile (N = 31)	Overweight ≥ 85-95 centile (N = 56)	Normal ≥ 5-85 centile (N = 282)	Underweight < 5 centile (N = 11)	p
The number of meals					p < 0.001
<3 (%)	16.1	5.4	1.4	9.1	
≥3 (%)	83.9	94.6	98.6	90.9	
Eating common meals with family					p < 0.001
everyday/5-6 x week (%)	25.8	35.7	58.9	63.6	
more rarely (%)	74.2	64.3	41.1	36.4	
Consumption of sweet drinks					p = 0.01
everyday (%)	29.0	8.9	9.6	9.1	
more rarely than everyday (%)	71.0	91.1	90.4	90.9	
Consumption of fruit and vegetables					p = 0.007
more rarely than everyday (%)	64.5	35.7	33.7	18.2	
1-2 x day (%)	25.8	41.1	42.5	27.3	
3-5 x day (%)	9.7	23.2	23.8	54.5	
Consumption of breakfast					p = 0.308
everyday (%)	77.4	80.4	72.0	90.9	
more rarely (%)	22.6	19.6	28.0	9.1	
Consumption of fast food					P = 0.827
everyday/several days per week (%)	3.2	3.6	5.3	9.1	
more rarely(%)	96.8	96.4	94.7	90.9	

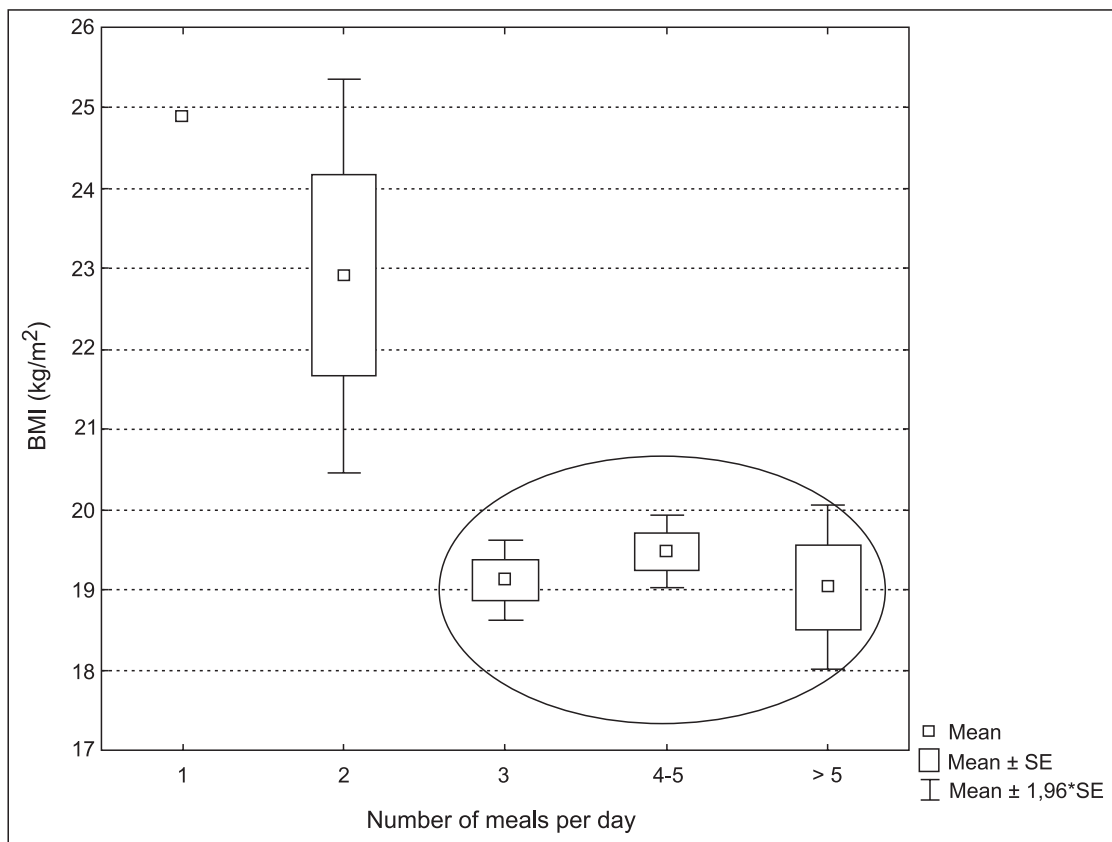


Fig. 1. Number of meals per day and BMI.

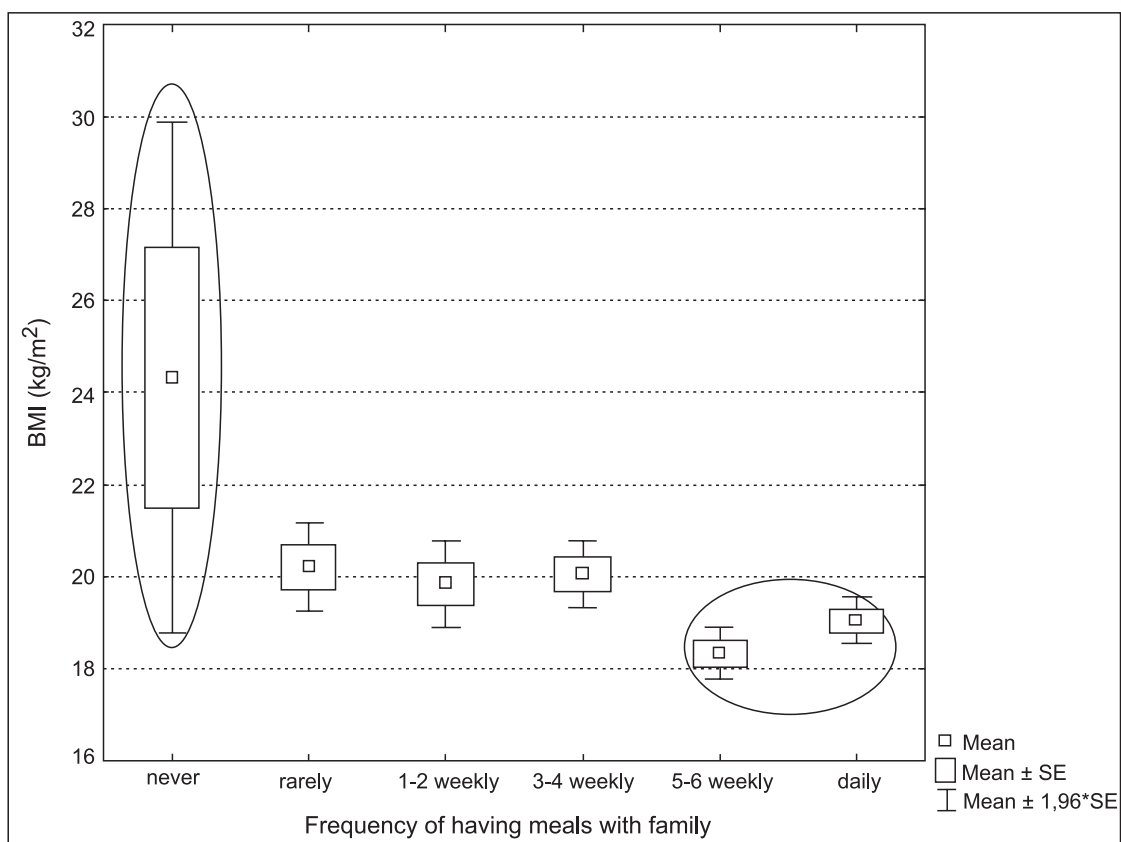


Fig. 2. Frequency of having meals with family.

The value of BMI was decreasing together with the growing number of common meals with family; it seems hence beneficial to have common meals with family at least 5-6 times per week; lack of such meals increases the risk of overweight.

It was found out that 136 pupils (35.8%) did not eat fruit and vegetables every day, 89 pupils (23.4%) ate fruit and vegetables 3-5 times per day, while 154 pupils (40.5%) ate fruit and vegetables 1-2 times per day. A significant difference in the weight status was found out in relation to consumption of fruit and vegetables ($p = 0.007$; Pearson chi-square test) (tab. 1). Children with obesity more frequently declared that they did not eat fruit and vegetables as compared to children with proper weight (64.5% vs 33.7%). The frequency of consumption of fruit and vegetables (5 categories) was significantly affecting BMI (continuous variable), ($r = 0.500$; $p < 0.001$; Spearman correlation coefficient). Differences between average BMIs depending on the frequency of consumption of fruit and vegetables were significant ($p < 0.001$; one way ANOVA) (fig. 3). Children who ate fruit and vegetables 3-5 times per day had significantly lower BMI as compared to children who ate fruit and vegetables 1-2 times per day, while those children had lower BMI than other (Tukey post-hoc test).

It was hence established that the frequency of consumption of fruit and vegetables had significant impact on BMI; it was a linear correlation. Children can be

protected from obesity with consumption of fruit and vegetables at least 1-2 times per day; consumption of fruit and vegetables 3-5 times per day is a stronger protection factor.

It was found out that 42 pupils (11%) drink soft drinks every day. Children with obesity drink soft drinks, like cola, ice tea or orangeade, more often than children with proper weight (29.0% vs 9.6%). The difference between groups related to the frequency of consumption of sweet drinks (every day vs. others) was statistically important ($p = 0.01$; Pearson chi-square test). The average BMI depending on the frequency of consumption of sweet drinks (5 categories) was statistically different ($p = 0.001$; one way ANOVA). The group that consumed sweet drinks every day had a significantly higher BMI than other ones (Tukey post-hoc test) (fig. 4).

Results of the survey have therefore revealed that the frequency of consumption of sweet drinks had significant impact on the value of BMI; the correlation was close to linear, but a significant risk of overweight was linked to the everyday consumption of sweet drinks only.

In the questionnaire 19 pupils (5%) declared that they ate fast food every day or several times per week. No difference was found out between children with proper weight and children with overweight in relation to consumption of fast food (every day/several times per week vs. other

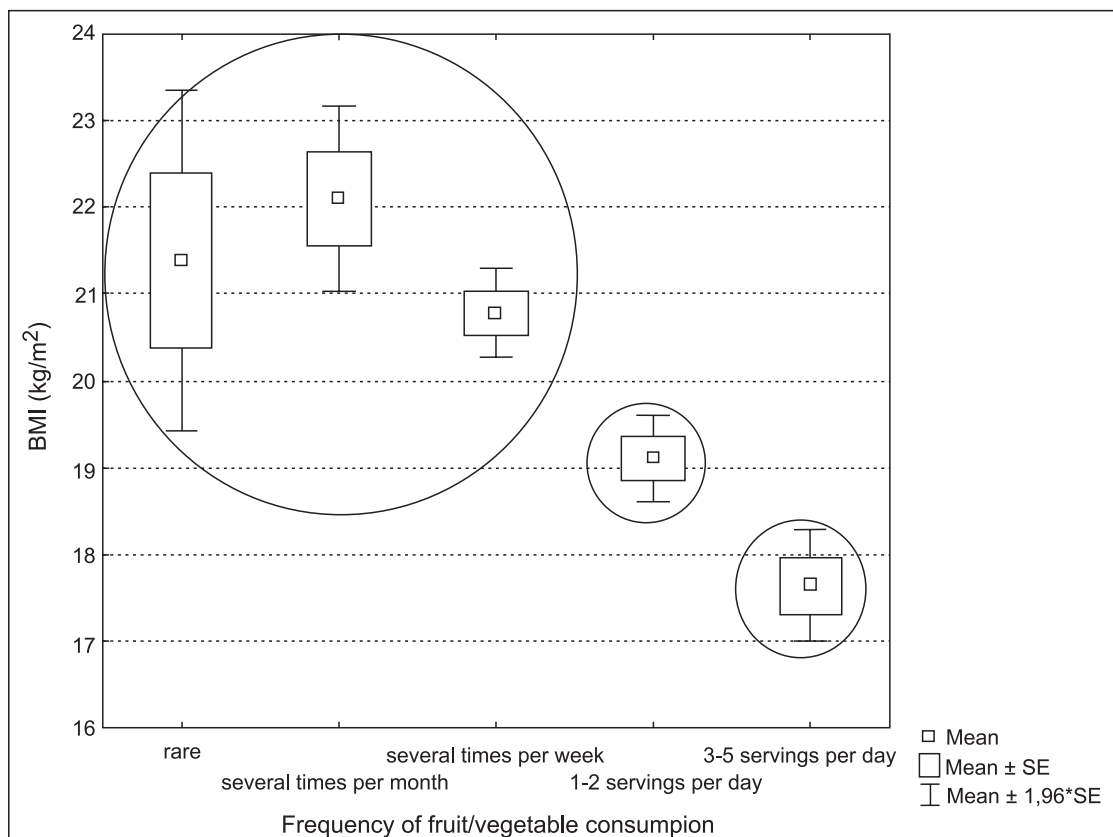


Fig. 3. Frequency of fruit/vegetable consumption.

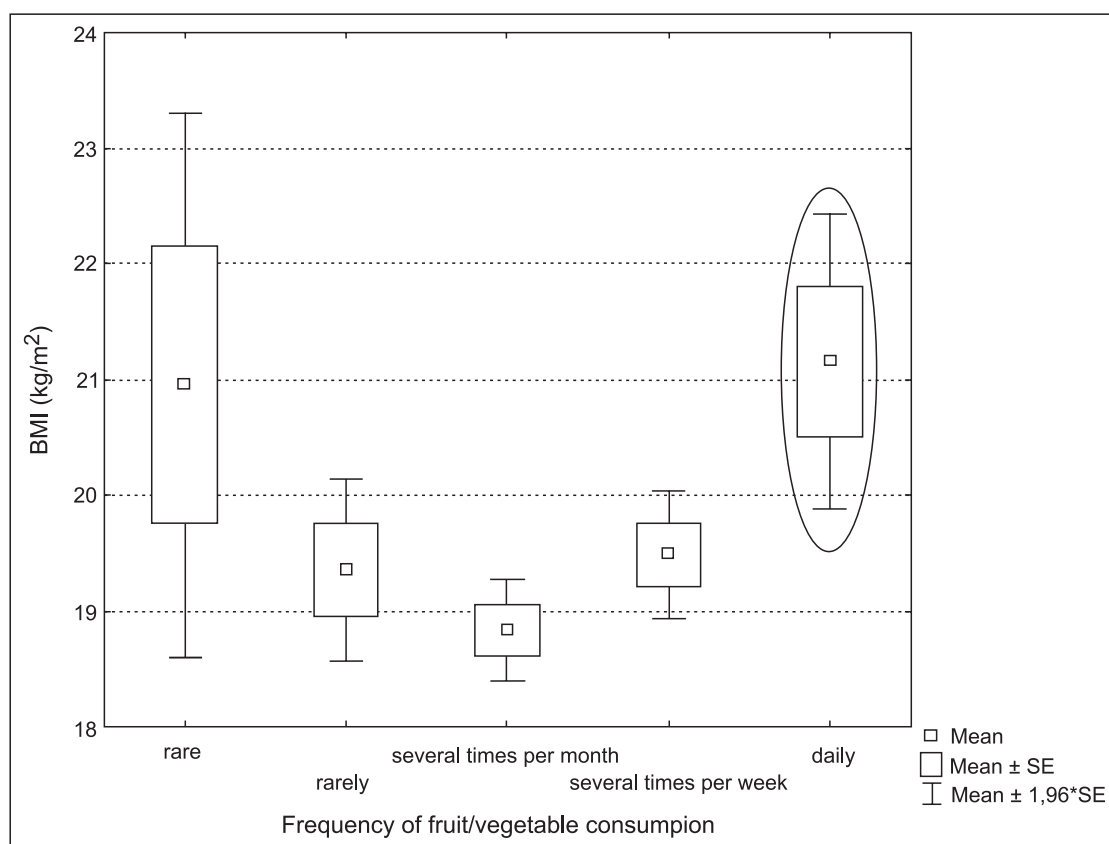


Fig. 4. Frequency of sweet drink consumption.

ones); ($p = 0.308$; Pearson chi-square test). Differences between the average BMI related to the frequency of consumption of fast food (5 categories) were also insignificant ($p = 0.240$; one way ANOVA). The frequency of consumption of fast food did not significantly impact BMI.

It was found out that 98 pupils (25.8%) did not eat breakfast every day before going out. Breakfast skipping had not significant impact on the occurrence of overweight and obesity among the surveyed children (tab. 1). No significant statistical differences were revealed between the average BMI and the frequency of eating breakfasts (4 categories); ($p = 0.593$; one way ANOVA).

DISSERTATION

A rational diet during one's childhood is inter alia a condition for the optimal body build and for a proper intellectual and emotional development. In the recent years, the increasing occurrence of overweight and obesity among children has been observed. In the year 2007, the research programme OLAF was started in Poland under which 17.5 thousand children and teens aged 7-18 years were surveyed (2). According to OLAF, 14% of girls and 18% of boys were overweight or obese. A survey conducted by Charzewska et al. revealed that in Warsaw during the last 30 years there was a threefold increase in obesity among boys aged 11-15 and a tenfold increase in obesity among girls aged 11-15 (3). A report by the Institute of Mother and

Child of 2010 shows that overweight and obesity in Poland affect 16% of girls and 24% of boys aged 13 (4).

A condition for proper nutrition of a child is inter alia formation of good eating habits since the early childhood. Parents and guardians should be aware that it is them who determines dietary choices of their children, and hence, their health and proper growth (5, 6).

Main bad eating habits observed among children are: frequent breakfast skipping, too frequent consumption of sweets and soft carbonated drinks, as well as purchase of unhealthy products in food stores at school. A survey by Charzewska et al. conducted among Warsaw teens in the years 2005-2006 shows that only 12% of schools menu were properly designed. The same survey shows other nutritional irregularities: no school meals at all, and a poor popularity of school lunches (7).

Breakfast, an important meal in the everyday menu of a child, should be consumed every day before the child goes out to school. The first breakfast is not eaten by nearly 26% of school children. Many surveys show that breakfast is skipped especially by teens. A survey by Czezelewski, covering 2758 pupils aged 10-12 shows that over 11% of children go out without breakfast. Only 43% of boys and 53% of girls take their second breakfast away from home (8). The older is the child, the more often he/she resigns from that meal. A survey by Bucholc et al. shows that 69.8% of girls aged 13-15 declared they had breakfast while the remaining 30.2% skipped their breakfast (9). A survey by

Mędreli-Kudel conducted among 100 girls aged 15, selected by random, 50% of girls declared they ate breakfast before going out to school, 60% were taking their second breakfast away from home (10). These findings are confirmed by HBSC report, prepared in Poland by the Institute of Mother and Child, on the lifestyle of school teens (11). Many surveys point out to the correlation between breakfast skipping and overweight (12, 13, 14). This survey, however, has not revealed such correlation.

A rational diet should optimally consists of 5 meals per day. The body requires regular supplies of energy which is used up during the whole day. Long intervals between meals make children feel hungry, diminish their ability to concentrate and participate in activities. Moreover, the skipping of balanced meals leads to bad eating habits: the child is more tempted by undesirable snacks, such as sweets, crisps, fast food. Regularity and frequency of meals have got an impact on eating habits of children, and hence, on the occurrence of overweight and obesity.

A rational diet should optimally consists of 5 meals per day. The body requires regular supplies of energy which is used up during the whole day. Irregular eating favours accumulation of the adipose tissue. During excessively long intervals between meals the body reduces the pace of metabolism and starts accumulating required energy reserves from the coming meals. Many surveys have shown positive impact of bigger frequency of meals on the body weight, while the same energy value of the diet was maintained. Excessively long intervals between meals lead to reduction of the level of glucose in blood which diminish concentration, physical endurance, and hence, diminish the child well being (15).

Many surveys have shown positive impact of bigger frequency of meals on the body weight, while the same energy value of the diet was maintained (16). This survey has established that significantly lower BMI occurred on condition that at least 3 meals were eaten. A survey conducted by Institute of Mother and Child on the group of pupils aged 13-15 have shown that the group of obese teens skipped meals more often as compared to the control sample; they also ate meals less regularly every day, both on school days and during weekends (17).

Another factor that may impact the weight status is regular consumption of fruit and vegetables. Fruit and vegetables should be a fixed component of the everyday diet of children due to benefits arising from their consumption. They are the main source of vitamins, minerals, fiber and natural antioxidants. Consumption of fruit and vegetables reduces the risk of many diseases, i.e. diabetes, obesity, hypertension, ischemic heart disease and some tumors (18, 19).

This survey has shown that fruit and vegetables are not consumed everyday by 35.8% of pupils in surveyed Warsaw schools. According to the report by the Institute of Mother and Child, only every 6th child aged 13

eats fruits twice a day or more often. The percentage of children who eat fruit sporadically (never or once a week) among pupils in rural areas is twice as big as compared to urban areas.

The correlation between frequency of consumption of vegetables and the weight status is statistically significant in boys. In the group of boys and girls who eat vegetables at least twice a day, occurrence of the overweight is the most rare (4).

Similar results obtained in this survey may suggest that consumption of fruit and vegetables at least 1-2 per day may protect children from obesity while consumption of fruit and vegetables 3-5 times per day could be a very strong protection factor.

Bad eating habits of children include consumption of soft drinks, crisps, fast food. This survey has not established any correlation between consumption of fast food and the weight status probably because only a small group of children (5%) declared they consumed fast food. The report of the Institute of Mother and Child has not established such correlation as well (4). The survey of Komosińska et al. established that as regards such snacks, teens usually chose fries, burgers and hot-dogs (20). According to *Diagnozy stanu odżywienia i aktywności fizycznej w Polsce* (A diagnosis on the weight status and the amount of exercise in Poland), a big group of teens from all types of settings (both urban and rural) preferred to buy the following products in food stores at schools: burgers, hot-dogs, sandwiches, sweet buns (21). In the United States some 42% of children regularly eat fast food, mainly as snacks between meals (22).

Another bad eating habit is consumption of sweet drinks by children. Results of surveys are not uniform as regards the correlation between consumption of soft drinks and the weight status, however, with no doubt sweet drinks consumed by school children are an important source of useless calories (19). In this survey, 11% of boys and girls consumed soft drinks, such as coca cola, orangeade, etc., every day. The group that consumed sweet drinks every day had a significantly higher BMI than other ones.

American surveys show that 56-85% of children (boys drinks biggest quantities) consume at school at least one soft drink (23). Within that group 20% of children consume 4 or more soft drinks. Such habit is correlated with 60% bigger risk of obesity (24). Surveys conducted in the UK by James et al. on the impact of reduction of carbonated soft drinks on BMI, established correlation between consumption of these drinks and the weight status of children (25). Other surveys also show the impact of consumption of soft drinks on the occurrence of children's overweight and obesity (26). A survey by Szczepańska et al. established that 17.3% pupils both in rural and urban areas consumed soft drinks several times per day, while 12% and 27% respectively consumed soft drinks once a day. Only 4% of children in urban areas and 3.7% of children in rural areas did not drink soft drinks (27). Although there

was no statistically significant correlation between consumption of soft drinks and the weight status among children. The survey of the Institute of Mother and Child did also not established a statistically significant correlation between consumption of soft drinks and the weight status among children aged 13 (4).

Good eating habits mean also good choices of food products. School children make such choices not only at home, under surveillance of their parents, but also at school, during after-classes, during trips and in many other situations, where the choice depends on them. A survey by Woynarowska established that products available to children during their stay at school are in most cases carbonated soft drinks, various sweets, buns and sandwiches (28). The majority of schools have not engaged in prevention of overweight and obesity, as their pupils can buy products which increase risk of both everyday. Every third school has done nothing to reduce that risk. The range of products offered by food stores at schools still leaves a lot to be desired. Availability of unhealthy snacks make children choose such products rather than healthy meals.

A survey by Waśkiewicz established that pupils who buy food in food stores at schools usually buy sweets, sweet buns, cold pizza, soft drinks and crisps. Fruit and vegetable juices are ranked only just as the 5th (29).

Another important factor for the formation of eating habits are common meals with family. According to this survey 52.9% of children eat common meals with their families everyday or 5/6 days per week. Long absences of both parents and children at home does not make it easy to organize a common meal. However, it is a very important aspect of nutritional education both for children and for their parents. Surveys show that common meals are more frequent in families where children have got a good weight status. According to the report by the Institute of Mother and Child, among

13-year old boys those who regularly eat dinners with their parents have more often a good weight status while girls with the excessive weight eat dinners with their parent most rarely.

Teens with overweight and obesity are a group which most rarely declares that they eat family dinners (4). Bigger frequency of family dinners is related to a better quality of the diet (30). Such family meal is a good opportunity for parents to show their own dietary choices to children and to eat a balanced meal. Dietary choices of parents, their attitude towards food products, their way of eating as well as behavior at the table will be duplicated by the children. Apart from health-related aspects, family meals positively impact on relations between family members. Children willingly take part in such meals, as they create the sense of belonging and enhance family ties. It has been established that consumption of common meals with family is correlated with smaller consumption of sweet drinks (31).

Epidemiological surveys have shown that there are many environmental factors which suspend the risk of overweight and obesity, i.e. factors related to good eating habits. The diet of children requires special attention, as it is in the period of childhood that their eating habits take roots. These habits will determine their future health status as adults.

CONCLUSIONS

Selected eating habits (number of meals, sweet drink consumption, vegetable and fruit consumption, eating common meals with family) appear to be associated with anthropometric characteristics in Warsaw primary school children. Prevention of overweight and obesity among school aged children shall include a broad spectrum of educational activities at school, as well as dietary education of parents.

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