OBESITY AND DIET AWARENESS AMONG POLISH CHILDREN AND ADOLESCENTS IN SMALL TOWNS AND VILLAGES

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SUMMARY

Background: In addition to genetic predispositions and environmental factors, healthy lifestyle education is very important for children and adolescents. The purpose of this research was to estimate the number of overweight and obese children and adolescents from small towns and villages and to find out an association between health awareness in children and the risk of becoming overweight or obese.

Methods: The research was conducted in 1,515 healthy children aged 6–18 years from small towns and villages in Poland. Overweight was diagnosed when BMI for age and sex was over the 90th percentile; obesity – when it was over the 95th percentile. The study consisted of a lifestyle interview and anthropometrical measurements. The lifestyle interview was conducted with the use of an anonymous questionnaire form and included questions about food frequency, diet habits and physical activity. The research was analysed using the SAS System for Windows, release 8.02.

Results: Overweight status was diagnosed in 9.0% and obesity in 5.1% of respondents. Excess body mass was statistically more frequently diagnosed in girls than in boys aged 14–18 years. Girls of this age group significantly more frequently chose wholemeal bread, smoked sausages, meat and poultry as products that are believed to keep them fit. Older children substantially more often indicated that stress, smoking cigarettes, consuming fatty meat, sweets, being obese, and a lack of physical activity are factors that damage health. Boys spent more time in front of a computer or TV than girls; in the older group of children, the phenomenon even intensified.

Conclusion: Awareness of healthy lifestyle behaviour is not sufficient to maintain optimal body mass. Knowledge about proper eating habits is better among girls than among boys, especially in the older age groups. However, in older groups, there was less physical activity due to spending more time in front of TV or the computer. High percentage of obese/overweight children and insufficient knowledge of nutrition may consequently result in increased risk of cardio-vascular diseases in adult population.

Key words: nutrition, obesity, life style, children and adolescents

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INTRODUCTION

In Poland, detection and control of cardiovascular risk factors are still insufficient. Knowledge about proper diet and nutritional education among children and adolescents could therefore help reduce cardiovascular risk factors in general.

The main aim of the Polish 400 Cities Project was to decrease the current morbidity and mortality rates caused by cardiovascular diseases among patients from Polish small towns and villages by means of improved detection and effective risk factors treatment.

The Polish population's awareness of healthy lifestyle behaviours and proper diet for children is still not sufficient. There still exists a common belief that an overweight child is "healthy and well nourished" and that it will "grow out of excess weight". Unfortunately, an obese child will most likely grow into an obese adult and face serious consequences of his or her obesity (1–3). The serious risk factor associated with obesity is insulin resistance leading to diabetes and other disorders (4).

The Polish 400 Cities Project consisted of several complementary modules that were previously published (5–7).

The aim of this research was to analyse the following elements of lifestyle:

- knowledge about nutrition factors influencing health in positive and negative ways;
- the number of meals and kind of favourite meals/products;
- ways of spending free time;
- the amount of time spent in front of TV or computer;
- smoking tobacco.

MATERIALS AND METHODS

The research was conducted on a convenience sample consisting of 1,515 healthy children aged 6–18 years. The children were divided into three age groups, 6–9 years: 367, 10–13 years: 468, and 14–18 years: 680 respondents.

Citizens from 8 small towns in three regions of Poland (Pomorskie, Małopolskie and Wielkopolskie) were studied using medical and social research methods. Information about the study was disseminated through the media (newspaper, TV, radio) as

well as displayed posters. The study was performed in specially organized points by trained medical personnel. Parents gave written informed consent for each child participating in the study.

We used an anonymous, self-designed, modified questionnaire based on FFQ (Food Frequency Questionnaire) (8). The questionnaire consisted of questions regarding age, food frequency, diet habits, way of spending leisure time, and physical activity. The questionnaire comprised 30 multiple-choice questions; it was completed by the child with the parent/guardian.

In addition, anthropometric measurements were also carried out (body weight and height).

The measurement of body weight (precision ± 0.5 kg) was made without shoes, in light clothing, using certified personal scales (TEFAL 79442). Height was measured using stadiometers (precision ±0.5 cm). BMI was calculated from equation: BMI = body weight/height^2 [kg/m^2].

In the presented study, excessive body weight among the population at developmental age was evaluated with the use of centile nets of the BMI value for gender and age, according to the Polish recommendations (9).

Overweight status was diagnosed when BMI for the identified age and sex was over the 90th percentile, and obesity was diagnosed when it was over the 95th percentile.

Statistical Analysis

The data are expressed as means ± SD (statistical deviation). Significant differences were defined as $p < 0.05$ and were evaluated with nonparametric statistics.

All data from the study were archived in the electronic database and were analysed using the SAS System for Windows, release 8.02.

RESULTS

In the study sample, 9.0% of all children were overweight and 5.1% were obese. Among girls aged 14–18 years, there was a significantly higher percentage of excess body mass than in boys of the same age group ($p = 0.005$) (Fig. 1).

Children most often (83.0% of all respondents) denoted smoking cigarettes as a negative risk factor (Fig. 2). The next most often identified negative factors were alcohol and drugs. Stress was mostly denoted by older children. Differences between the group aged 14–18 years, 10–13 years and 6–9 years were statistically significant (14–18 yr. vs. 6–9 yr., $p<0.001$; 14–18 yr. vs. 10−13 yr., $p < 0.001$). Girls stated stress significantly ($p = 0.0069$) more often than boys.

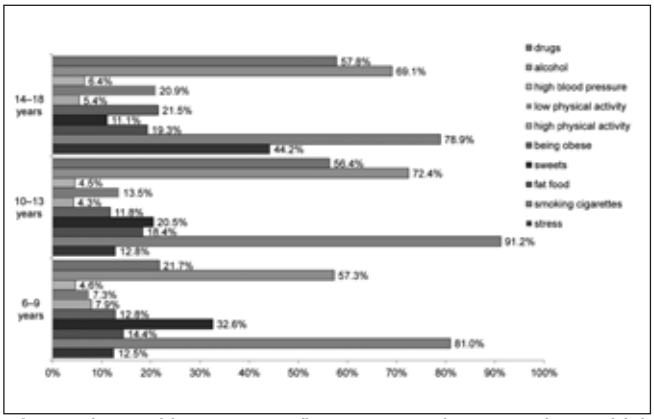

Fig. 2. *The positive answers (in percentage) on question "Which products should be eaten to be healthy?" in studied population.*

Though girls from the oldest age group more often indicated the answers "eating fatty meat" ($p = 0.0066$) and "eating sweets" ($p = 0.0093$) as negative factors, we observed tendency that the children from older age groups rarely noted "sweets" as a negative health risk factor (6–9 yr. vs. 10–13 yr., $p < 0.001$; 10–13 yr. vs. 14–18 yr., $p < 0.001$; 6–9 yr. vs. 14–18 yr., $p < 0.001$).

Children in the 14−18 age group compared to other age groups more often indicated "being obese" and "not being enough physically active" as negative risk factors (14–18 yr. vs. 6–9 yr., $p = 0.0005$; 4–18 yr. vs. 10–13 yr., $p < 0.001$).

Fig. 3 shows the answers to the question "Which products should be eaten to be healthy?"

The analysis shows that approximately 91.0% of all respondents indicated vegetables and fruit as healthy products. Over 84.0% of children and adolescents chose milk and dairy products. The children from the oldest age group more often indicated wholemeal bread, fish and fish products, and plant fat as healthy products (14–18 yr. vs. 6–9 yr., $p < 0.05$; 14–18 yr. vs. 10–13 yr., $p < 0.05$).

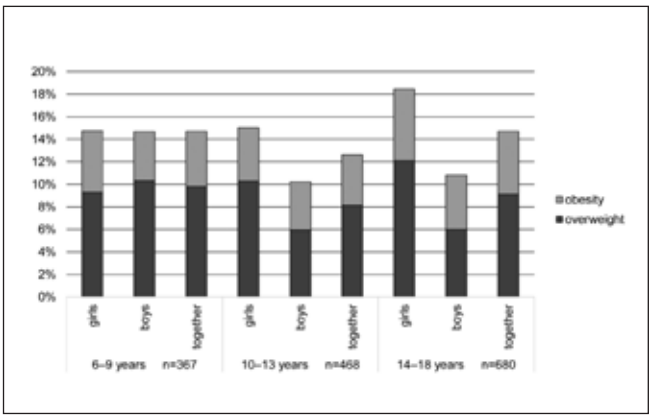

Fig. 1. *The percentage of overweight and obesity in studied groups.*

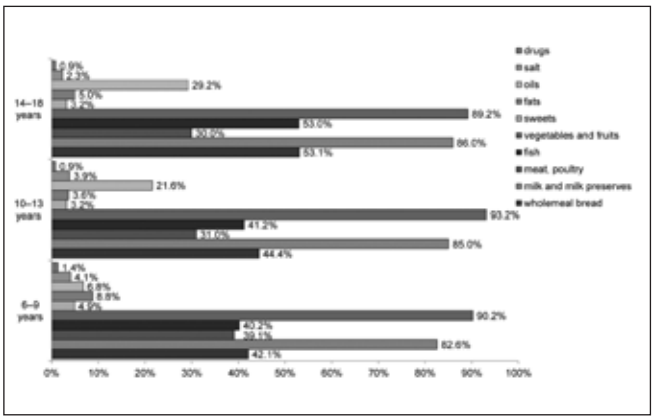

Fig. 3. *The positive answers (in percentage) on question "What are the negative factors influencing health?" obtained in studied population.*

In the 14–18 age group, children who were not overweight more often indicated dairy products as good for health than overweight or obese children. Wholemeal bread was more often chosen by overweight children in the 6–9 and 10–13 age groups ($p < 0.05$).

Girls aged 14−18 years more often chose wholemeal bread than boys in the same age group ($p = 0.0171$). At the same time, girls aged 10–13 and 14–18 designated sweets as products good for health less often than boys of the same age groups (10–13 yr. old girls vs. boys, $p = 0.019$; 14–18 yr. old girls vs. boys, $p = 0.0068$).

Favourite Meals and Food Products

Of the meals and food products listed in the questionnaire, children aged 6–13 years most often chose sweets and vegetable salads as favourite food products; in both cases it was approximately 37.0% of respondents. The next most popular products were meat/fried pork and sandwiches (bread with butter and ham or cheese) with 32.0% and 10.0% of children choosing each product, respectively. Children aged 6–9 years, more often than children aged 10–13 years, pointed at soup as their favourite dish ($p = 0.0012$).

Boys aged 6–9 years chose fried pork and meat more often than girls of the same age ($p = 0.0283$). Girls aged 6–13 years more often indicated vegetable salads (girls 6–9 yr. vs. boys 6–9 yr., $p = 0.0399$; girls 10–13 yr. vs. boys 10–13 yr., $p = 0.0224$).

As Poland has seen a large intake of the fried pork, in the questionnaire were questions concerning not only intake of meat but intake of the fried pork as well. From the nutritional point of view the fried pork is more caloric and contains more fat than other meat dishes.

Frequency of Eating Meals

The following meals were listed in the questionnaire: breakfast, second breakfast, lunch, afternoon snack, and dinner. Separate question also concerned eating between main meals. The study shows that approximately 38.0% of all children aged 6–18 years usually eat three meals a day, and 55.0% eat more than three meals a day. Six percent consume only two meals a day. Overweight and obese children aged 6–9 years eat significantly fewer meals than children without excess body mass ($p = 0.0162$). A similar relation was observed in the 14–18 age group (overweight and obese children vs. non overweight/obese children $p = 0.0004$). Proportion of answers to the question "Do you eat breakfast before going to school?" was as follows: 73.0% stated "always or almost always", 16.0% stated "sometimes", and 10.0% stated "never or almost never".

Way of Spending Leisure Time

The next questions in the questionnaire were about respondents' ways of spending free time. The analysis shows that 24.0% of children aged 6–9 years and 10–13 years spend most of their free time in front of TV and PC, 18.0% read books, and only 16.0% of children prefer outdoor physical activity.

Girls aged 6–9 years and 10–13 years spent significantly more free time reading books and playing with toys or drawing than boys from the same age group. Boys preferred playing football and riding bikes.

Analysis of the questionnaire shows that children from small towns and villages spend on average 2 hours a day in front of TV and approximately 1.5 hours on the computer.

Respondents from the 10–13 and 14–18 age groups spend a significantly longer time watching television than younger children (6–9 yr. vs. 10–13 yr., $p < 0.001$; 6–9 yr. vs. 14–18 yr., $p < 0.001$).

Additionally, the older children spend more time on the computer (6–9 yr. vs. 10–13 yr., $p < 0.001$; 6–9 yr. vs. 14–18 yr., $p < 0.001$; 10–13 yr. vs. 14–18 yr., $p < 0.001$). In each of the age groups, boys spend a significantly longer time on the computer (Table 1). It has not been noticed that overweight and obese children spend significantly more time in front of the computer or TV than those who are not overweight and obese.

Physical Activity

The physical activity of children and adolescents was assessed. Analysis shows that 37% of respondents think of themselves as very active, and 53% think of themselves as being moderately active. Answers to the question "Beside PE (physical education) classes, how often do you exercise?" were as follows: 36.7% everyday, 50.5% at least once a week and 12.8% more rarely than once a week.

Boys aged 10–13 and 14–18 significantly more often than girls in the same age groups were engaged in sports at least once a week (10–13 boys > girls $p = 0.0183$; 14–18 boys > girls $p < 0.001$). Respondents aged 10–13 were more often engaged in sports than 6–9 and 14–18 years old (6–9 yr. vs. 10–13 yr., $p = 0.0009$; 14–18 yr. vs. 10–13 yr. $p < 0.001$).

Smoking Cigarettes

Of all the children, 5.72% of children aged 6–9 years, 11.99% of children aged 10–13 years and 50.07% of children aged 10–14 years gave a positive answer to the question: "Have you ever smoked a cigarette?"

The older children were more likely to positively answer the question about smoking, and the differences were statistically significant (6–9 yr. vs. 10–13 yr., $p = 0.0019$; 6–9 yr. vs. 14–18 yr., $p < 0.001$; 10–13 yr. vs. 14–18 yr., $p < 0.001$). Boys aged 10–13 years and 14–18 years significantly more often confirmed smoking a cigarette at least once in their lifetime compared to girls in the same age group (10–13 yr. old boys vs. girls, $p = 0.0051$; 14–18 yr. old boys vs. girls, $p = 0.001$). In the group aged 14–18 years, approximately 18% of girls and 28% of boys confirmed smoking more than once in their lifetime.

Table 1. *The hours spent in the front of the TV*

	Girls	Boys	p
6–9 years	0.5223	0.9925	<0.001
10–13 years	0.8862	1.4074	<0.001
14–18 years	1.2921	1.8859	<0.001

Data are presented as means (hours per one day)

DISCUSSION

According to data from the International Obesity Task Force (IOTF) (10) approximately 10% of children worldwide are overweight. It is difficult to compare the results of Polish authors because of different criteria used in the research, but it is reported that, in Poland, there is an increasing number of obese children (10–13). In our study, 5.1% children were found to be obese. Other authors show that the biggest problem of obesity among children occurs in the US, but dramatic increase in the number of children with overweight or obesity is observed in the European Union as well (14).

Smoking cigarettes, drinking alcohol and drug use are very dangerous risk factors that negatively influence health. As shown in our research, knowledge about the negative influence of smoking on health does not mean that young people do not try smoking or even start smoking regularly. A high percentage of adolescents believe that smoking helps people when they get nervous (30%), helps people to stay slim (24%) and establishes self-confidence (15).

Proper eating habits are an important element of a healthy lifestyle. The knowledge that children gain about healthy and unhealthy products was high in the studied group of schoolchildren (16). It seems that girls from the oldest group had a thorough knowledge of healthy, balanced diet, but at the same time, they more often had excess body mass in comparison with boys of the same age group. Overweight and obese children more often indicated that they eat wholemeal bread and more rarely eat fast food. Some authors have stated that children with excess body mass have a wider knowledge of diet. These children are most likely interested in diet, but it does not influence their eating habits. On the other hand, according to Triches et al., children with less knowledge and worse eating habits were five times more likely to be obese (17). The data from this study confirms that higher intakes of milk and dairy products were associated with proper body mass in children. Other authors suggest that skipping breakfast and, in effect, eating fewer diary products is correlated to higher calorie intake in other daily meals (for example, by eating high-calorie snacks) (18, 2). Low milk intake also correlated with children's higher intake of sweet fizzy drinks (19). Polish research by Woynarowska et al. shows that 41% of adolescents did not drink milk every day (20). In our study 91% of all studied children chose vegetables and fruit, and 48% chose wholemeal bread as products that should be eaten often to be healthy.

Niklas et al. noticed that regular breakfast intake helps to keep a proper body mass by limiting the number of high-calorie and fatty snacks (21). Children who eat breakfast eat more cereal and dairy products and fruit (12). The same author reported a decreased number of meals per day, and an increase in the number of meals eaten away from home. Data analysis showed that a decreased number of meals may lead to overweight status in children. A small number of meals each day may be correlated with higher caloric intake in each meal, but this hypothesis needs further research (22). In our study, it was observed that only 55% of children and adolescents consumed proper number of meals (three main + snacks).

These studies suggested that children often have rather good knowledge but to no avail and that children with bad eating habits are in need of early nutritional education (16–22).

Analysis of our results, similarly to Woynarowska et al. showed that respondents spend daily approximately 3.5 hours in front of TV and/or computer (23). Watching television and playing computer games resulted in decreased physical activity level. In Slovakia, similarly to our study, 35.8% children (aged from 6.3 to 15.9 years) do not perform physical activity even once a week and spend on average over 2 hours watching TV and playing PC games (24). On top of it, children watch TV advertisements of unhealthy food products such as sweets (20, 23, 25). In our study 37% of children selected sweets as products they like the most of all.

Koksal et al. described the negative influence of sweet eating on dental health of Turkish school children – in their study 66.1% of overweight/obese children had dental caries (26). The next health problem in overweight/obese children is insulin resistance. Pastucha et al. suggested that insulin sensitivity assessment should be used in paediatric practice (4).

In 2003, WHO (the World Health Organization) together with FAO (the Food and Agriculture Organization of the United Nations) officially announced that food advertisements for children may be a cause of the increased number of obese children in the population (27).

The obtained results as well as results of other surveys may be subject to error associated with the completion of the questionnaires. Although the number of children tested was large (n = 1,515), it is advisable to conduct further studies that allow to verify our data.

The interpretation of our results should be cautious, however, they indicate that although the knowledge schoolchildren have about healthy lifestyle is large, it is still insufficient. Therefore, the most desirable is the introduction of educational programmes aimed at promotion of healthy lifestyle among children and adolescents during their school years.

CONCLUSIONS

- Obesity was observed in 5.1% and overweight in 9.0% of studied population.
- Among children aged 14–18 years, there was a statistically significant higher proportion of children with excess body mass among girls than among boys.
- Over 50% of respondents in each age group ate more than 3 meals a day.
- Products that were indicated as healthy were vegetables, fruit, milk, dairy products, and wholemeal bread.
- Older children significantly more often indicated stress, smoking cigarettes, obesity, and a lack of physical activity as factors with negative impact on health.
- Knowledge about proper eating habits is better among girls than among boys, especially in the older age groups.
- Although children have knowledge about healthy lifestyle behaviour, they do not apply it in everyday life. Intensive health education for children and adolescents is therefore needed.
- High percentage of obese/overweight children and insufficient knowledge of nutrition will consequently increase the risk of cardio-vascular diseases in adult population.

Acknowledgement

The results were obtained from Polish 400 Cities Project.

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Received July 5, 2012
Accepted in revised form December 3, 2013