FOOD INTAKE, LEISURE TIME ACTIVITIES AND THE PREVALENCE OF OBESITY IN SCHOOLCHILDREN IN SLOVAKIA

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SUMMARY

Aim of the study: In 2006–2008 a survey analyzing food patterns, intake of main food items and leisure time activities of 5,410 schoolchildren was carried out.

Methods: The study was performed in 13 randomly selected regions of Slovakia. 5,410 elementary school children (2,848 girls and 2,562 boys) aged from 6.3 to 15.9 years, mean age was 11±2.6 years, were included. The data collected by questionnaire concerned nutrition and leisure time activities.

Results: Noteworthy results are that only 63% of participants eat breakfast regularly. Almost all of the children eat lunch during workdays regularly and 60.9% prefer a cooked (hot) dish for supper. Although dairy products are a substantial part of child nutrition, in general their consumption in our sample was low. Only 50.1% of children consume these daily and 62% of children drink milk daily, more often boys than girls. A striking observation is that only 65.5% of interviewed pupils eat fruit every day and 30.9% of them eat vegetables daily. The frequency of consumption of poultry and pork in our sample was almost the same, however, the analysis showed that only 14% of children consume fish once per week. Moreover, only 12.6% of subjects prefer wholegrain bread. In our sample 56.8% of children eat sweets daily, 32% prefer a salty snack almost 2 times per week. Within the group of pupils 35.8% do not attend physical trainings even once a week. Almost every child is used to watch TV and 64% of them play PC games daily. While both girls and boys watched TV on average over 2 hours, boys spend more time on PC per day than girls (girls 0.72 hours per day vs. boys 1.13 hours per day, $p<0.001$). The food patterns and leisure time activities of children older than 11 years and rural pupils were less favourable.

Conclusions: According to results of our analysis we recommend to increase the consumption of dairy products, fresh fruits and vegetables in Slovak schoolchildren and spare no effort in making children to take breakfast regularly. It is necessary to promote daily moderate physical activity. Nutritional and lifestyle education should begin already in childhood.

Key words: meal patterns, food consumption, leisure time activity, children, obesity, prevention, Slovakia

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INTRODUCTION

Prevalence of obesity and its complications has been increasing over the past decades. It is a consequence of contemporary lifestyle and an imbalance between energy intake and energy expenditure. The results of large epidemiological surveys from Europe reveal negative facts about current eating habits in children (1). Studies performed recently in the Czech and the Slovak Republic also indicate that nutrition of children is excessive in terms of quantity, moreover, neither the quality of food nor the content of individual nutrients is optimal (2, 3). At the same time, less physical activity is a part of leisure time of children (4, 5). The aim of our study was to analyze current food patterns, consumption of main food items, the composition of leisure time activities of schoolchildren and to obtain baseline information for both nutritional recommendations and obesity prevention. The paper also evaluates the prevalence of overweight and obesity in schoolchildren in Slovakia.

SUBJECTS AND METHODS

The presented study involves data from 5,410 elementary school children (2,848 girls and 2,562 boys) from randomly selected regions of Slovakia (Komárno, Nové Zámky, Nitra, Levice, Bardejov, Prešov, Stará Ľubovňa, Žiar nad Hronom, Čadca, Prievidza, Dolný Kubín, Bratislava and Banská Bystrica). The study includes regions from diverse parts of the country and subjects with different socio-economic background. Of the total number of examined subjects, 48.6% of respondents lived in urban areas, the rest of the children resided in the rural parts of Slovakia. The average age of the study group was 11±2.6 years (from 6.3 to 15.9 years, median 10.9 years of age).

The participation rate was 84.5%. All potentially eligible parents were informed through a letter explaining that a study was being conducted at the elementary school. Participation in the project was voluntary and it was conditioned by signing an informed consent by the child's legal representative.

Data concerning dietary habits and physical activity were obtained by questionnaires. Their distribution was facilitated by trained research assistants from Regional Offices of Public Health. The questionnaire consisted of 9 questions on meal patterns and 31 questions on the intake of food items that are a common part of a typical diet in the country. The subjects were required to indicate how often (per day, week or month – as appropriate) they consume the respective foods. Most of the questions were of multiple choice type, however, part of them were openended questions. Frequencies ranged from several times per day to never. The final part of the questionnaire included 6 questions concerning leisure time activities.

Body weight was measured using a scale with accuracy of 0.5 kg and the height using a wall metre with accuracy of 0.5 cm. Body mass index (BMI) was calculated by the formula: body weight (in kg)/height (in m²). The percentile values of BMI from the last national anthropometric survey performed in 2001 (6) were used for comparison of trends. Subjects were ranked as overweight if their BMI values were between 90th and 97th percentile and as obese if their BMI was over 97th percentile for a given age and gender.

Data were evaluated by χ^2 test (Chi square) in contingency tables. Quantitative data in case of comparing two groups were evaluated by two tailed t- test, or by Mann-Whitney dependent on data distribution. When comparing more than two groups, one-factor distribution analysis (ANOVA) was used in case of normal data distribution, or Kruskal-Wallis test in case of non-normal distribution. The results at the level of $p<0.05$ were considered as statistically significant. Results were analyzed depending on gender, place of residence and age of the children.

The project was approved by the Ethical Committee of the Children's Faculty Hospital in Bratislava. The survey was performed from the year 2006 to 2008.

RESULTS

Food Patterns

The results concerning food patterns and consumption of selected food items are summarized in Table 1 and Table 2.

Only 63% of children eat breakfast regularly, 16% do not consume it at all. Breakfast is eaten more regularly by boys (66.3% of boys vs. 58.7% of girls, $p<0.001$). Almost all of the interviewed children eat lunch during workdays regularly. A cooked (hot) dish for supper has been preferred by 60.9% of children, the prevailing consumption of cold (uncooked) dishes for supper is stated by 32.3% of the examined subjects. Additionally, 33% prefer as second supper mostly fruit, vegetables or dairy products and almost 20% consume sweets, nuts or bread at this time of the day. Moreover, 9% of examined subjects prefer to buy mid morning snack and 4.3% purchase their afternoon snack in a buffet (fast food).

Consumption of Main Food Items

Although **dairy products** should compose a substantial part of child nutrition, in general their intake was low in our sample. Only half of the subjects (50.1%) consume them daily, 1.4 servings on average and 62% of interviewed children drink milk daily, 3.4

Table 1. *Meal patterns*

Breakfest	regularly 63%	irregularly 21%	not eating 16%
Lunch during work days	in the canteen 55.8%	at home 39.4%	not eating 4.8%
Supper consumption	regularly hot dish 60.9%	regularly cold dish 32.3%	irregular intake 6.8%
Second supper consumption	fruits, vegetables, dairy products 33%	sweets, nuts, bread 19.8%	not eating 47.2%
Buffet (fast food) consumption	mid morning snack 9%	afternoon snack 4.3%	

Table 2. *Consumption of main food items*

Dairy products	daily 50.1%	>1 time/week 44.9%	<1 time/week 5%
Milk consumption	daily 62%	>1 time/week 23,3%	<1 time/week or not drinking 14,7%
Fruits	daily 65.5%	>1 time/week 30%	<1 time/week 4.5%
Vegetables	daily 30.9%	>1 time/week 48.1%	<1 time/week 21%
Meat	poultry 2/week	pork 1.8/week	beef 2/month
Fish	1 time/week 14%	<1 time/week 52.8%	<1 time/month 33.2%

deciliters on average. Everyday consumption of milk has been indicated more often by boys than girls (59.1% girls vs. 65.3% boys, p<0.001). It is remarkable that 14.7% of subjects drink milk less than once a week or even do not drink milk at all (8.1% of girls and 6.2% of boys almost never drink milk).

Fresh fruits and vegetables represent significant items in healthy nutrition in childhood. Only 65.5% of children eat fruits every day, the rest only several times a week or even less than once a week. Analysis of vegetables consumption also revealed noteworthy results. Only 30.9% of children eat vegetables daily, however, 21% of them even less than once a week, the rest several times per week.

Out of the individual types of meat, children consume most often poultry (2 times per week on average both girls and boys). Pork is consumed almost 1.8 times per week, beef to 2 times per month. Analysis showed that most children (52.8%) consume fish less than once a week, only 14% of children consume fish at least once per week.

Children in our sample mostly alternate various types of bread (72%) and pastries (69.6%). Wholegrain bread is preferred only by 12.6% and pastries of this kind by 6.6% of the interviewed children.

Food for children is mostly prepared by using plant oil (93%), lard or hydrogenated fats are used only rarely (7%), more often in rural families. Similarly, plant margarines are used by 65% of interviewed children.

We also enquired about the type of liquids that the pupils prefer in their choice. Almost one third of children (27%) prefers sweet drinks, mostly fruit juices and sweet carbonated beverages.

Unhealthy Food Choices

Salty snacks and sweets are a less desirable components of the diet. The regular consumption of salty snack in 32% of the children, almost 2 times per week, is considered to be a negative feature. The daily consumption of sweets was indicated by 56.8% of children, 38.2% of subjects consume sweets 4-6 times per week.

Leisure Time Activities

In the group of interviewed pupils 35.8% do not attend any physical training even once per week. However, almost 93% of them participate in unorganized physical activity (sport games with peers) at least once per week, more often boys (95.8% boys vs. 89.1% girls, p<0.001).

Almost every child within the group watches TV every day (98.5%) and 64% of them play PC games daily. Girls watch TV on average 2.31 hours per day, while boys watch it for slightly shorter time (2.21 hours per day). Boys spend more time on PC per day than girls (girls 0.72 hours per day vs. boys 1.13 hours per day, p<0.001).

Selected Food Patterns, Leisure Time Activities in Different age Groups

Children younger than 11 years of age eat breakfast more regularly and also more often consume their lunch in a school canteen, whereas older children consume fried meat more often, their daily menu less frequently includes dairy products and fruits. They drink sweetened carbonated beverages and fruit juices more often in comparison to younger children. Regardless of their age children watch TV with the same frequency, but the younger individuals play PC games less often. Results are summarized in Table 3.

Selected Food Patterns, Leisure Time Activities and Place of Residence

As displayed in Table 4, contrary to rural pupils, their urban peers eat breakfast more regularly, more often consume lunch in the school canteen. There is however an adverse factor since rural households use margarines (hydrogenated sorts of fats containing trans fatty acids) or lard for the preparation of meals more often. Significantly lower percentage of rural children consume vegetables and dairy products on a daily basis. We also observed small differences in the number of urban and rural children who spend their free time participating in unorganized physical activities (89% of urban pupils vs. 94.5% of rural pupils).

Prevalence of Overweight and Obesity

In the sample 85.6% of children had normal BMI, almost 10% of of them were overweight and 4.5% of children suffered obesity.

DISCUSSION

In accordance with general interest in nutrition and lifestyle of children this paper presents recent data concerning dietary habits and daily leisure time activities of Slovak schoolchildren. The results illustrate main meal patterns, frequency of consumption of nutritionally most valuable food types and leisure time activities.

As the breakfast is an important part in the child's menu, we emphasize that almost 1/3 of the interviewed pupils skip breakfast. This result corresponds with previous findings (11, 12). We ob-

Table 3. *Selected food patterns, leisure time activities in different age groups*

	Regular breakfast	Lunch in school canteen	Preference of fried meat	Daily consumption of dairy products	Daily consumption of fruits	Preference of sugared beverages	Daily PC use
<11 years	67.9%	67.6%	17.9%	53.5%	68.5%	22.9%	57.8%
>11 years	56.8%	43.1%	25.1%	46.5%	62.3%	30.7%	70.5%
	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001

Table 4. *Selected food patterns and leisure time activities by place of residence*

	Regular breakfast	Lunch in school canteen	Use of hydrogenated fat or lard	Daily consumption of vegetables	Daily consumption of dairy products
Urban children	66.1%	69.9%	4%	34.6%	53.2%
Rural children	59.1%	42%	9.8%	27.4%	47.2%
	p<0.001	p<0.001	p<0.001	p=0.001	p<0.001

served a less regular consumption of breakfast by girls which may be due to their effort to control their body weight (9, 13). It has been shown that regular consumption of breakfast may improve cognitive functions related to memory (8) and is associated with more balanced diet composition (9). Futhermore children who skip breakfast tend to overeat in evening hours which increases the risk of obesity (10). Lunch is in our region the main dish and according to recommendations it should cover 1/3 of the daily energy intake. We observed that it is consumed regularly during workdays by majority of children, which corresponds with results of other studies (14). Over ½ of children in our sample take lunch in the school canteen and thus receive a meal that can be considered a suitable alternative to home lunch because it is prepared according to established standards. In rural children lower attendance at school lunch was found which is probably due to financially more advantageous lunch consumption at home. A satisfactory consumption of supper was observed in our sample that is in agreement with other papers (15). Moreover, considering the age category, we do not see eating of second supper as an unusual phenomenon; however, the choice of foods is questionable. Almost 1/5 of children usually eats energy-dense foods at this time which we don't find proper for consumption in late evening hours, especially in the context of effort to prevent the increase of obesity prevalence. Also balanced mid-morning or afternoon snack may contribute significantly to an adequate daily intake of nutrients. We would like to point out that almost 10% of children used to buy mid-morning snack in the buffet which we consider to be nutritionally less valuable choice.

Besides analysing basic meal patterns this study also focused on the intake of particular food items. Daily consumption of dairy products, fruits and vegetables has been suggested as an indicator of a healthy diet. Unfortunately, the intake of milk and dairy products does not meet the recommendation, specifically in the group of girls (20) in our sample. Low milk consumption in children from developed countries including Slovakia was shown also in previous surveys (14, 21). We underline this finding because of the key role of calcium for the normal development of bone tissue and in osteoporosis and obesity prevention (20).

An adequate proportion of vegetables and fruit in the diet is important from the aspect of obesity and chronic non-communicable diseases prevention (19), as they are a significant source of vitamins and trace elements. Moreover, vegetables have a low energy value and due to high fibre content support the feeling of satiety. In context with the recommendation to consume at least 5 pieces of fresh fruit and vegetables per day (21), the intake of these food items in the study group is insufficient, which corresponds with findings of other studies (3, 21–23).

Meat of high quality is an important source of proteins and iron, another essential trace element for proper healthy development. The preference of meat and meat products with a lower fat content (lean meat) is an important step towards the restriction of saturated fatty acid consumption (16). Thus, we would like to point out that the frequency of consumption of poultry and pork in our sample was almost the same. In older and rural Slovak children higher use of lard and fried dishes was observed and it is desirable to focus more attention on the choice of fat and method of food preparation, otherwise children may be exposed to the adverse effects of high content of saturated and trans fatty acids. Moreover, current recommendations for children suggest to consume two fish meals per week (19). We can thus only note insufficient intake of fish food in the sample. We emphasize this finding because intake of food made of fish at least once per week significantly decreases prevalence of hypertension even in children as it is a source of omega 3 unsaturated fatty acids, which play a major role in cardiovascular disease prevention.

We further revealed that the majority of our subjects consume diverse types of bread and pastries, only a small proportion of them prefer wholegrain sorts. Whole-grain foods should be included in the diet more often because of the high content of fibre, which has a positive effect on the metabolism of lipids and obesity prevention (16).

Daily caloric intake may be significantly increased when salty snacks and sweets are regularly eaten as it was found in Slovak children. It has been shown in some studies that surprisingly almost 1/3 of the daily energy consumption comes from salty snacks (25, 26), thus they replace the nutritionally more valuable food commodities from the menu (25). In our sample their consumption does not appear to be so high, however, if an adverse increasing trend will continue, negative consequences can be expected, since beside extra fat and energy they simultaneously provide excessive amounts of salt and food additives (in the case of salty snack consumption).

Finally, we focused on fluid intake. While in the middle of the past century the daily consumption of sweetened carbonated beverages was 192 ml, in the 90's it increased to 591 ml (27) and is still increasing at the present time (26, 27). Excessive drinking of sweetened beverages leads to excessive intake of simple carbohydrates and thus also of calories (26) and supports the accumulation of adipose tissue (28). Children often substitute milk by these beverages (26). In comparison with data from developed countries, where 2/3 of adolescents drink this kind of beverages (26), 30% of Slovak pupils drink mostly fruit juices and sweetened carbonated beverages.

As well as adequate nutrition also moderate physical activity has a positive impact on the health of children and helps to prevent accumulation of adipose tissue. The results of our study confirm that Slovak schoolchildren make adverse choices as to their leisure time activities. It seems that they similarly follow preferences of

their foreign peers to spend free time in sedentary activity (29). We emphasize that a change of food patterns in combination with an appropriate daily dose of moderate physical activity and reduction of passive free time spending is the most effective step towards lifestyle improvement and obesity treatment (30).

Consistently with available data (31), more problems occurred in older children in our sample. Their adverse food patterns and preferred sedentary activities may increase the risk for storage of adipose tissue with all its consequences. Moreover, we regard the food patterns of rural citizens less advantageous as compared to the urban participants of our study. Other studies also pointed to an inadequate composition of leisure time of rural children similar to activities of their urban peers (33), which we also observed in the studied group. Perhaps, it might be caused partially by lower awareness of the population in rural parts of Slovakia, in spite of the massive campaign for healthy lifestyle. Several papers point out not only to insufficient awareness of the rural population regarding nutrition but also to insufficient availability of professional assistance for subjects suffering from obesity when attempting to reduce body weight in rural regions of western countries (32).

Prevalence of overweight and obesity in our sample corresponds with the results of the last national anthropometric survey from 2001 (6). Our indicators of prevalence do not reach such dimensions as in other countries of Western Europe and USA; nevertheless, it is necessary to see the adverse trends abroad as a warning. Although the main goal of our study was not to evaluate prevalence of obesity, we would like to point that some of the above-mentioned food patterns and the lack of regular physical activity observed in Slovak schoolchildren may support increasing prevalence of excess weight. Any obesity prevention programme should be based on up-to-date information. Thus, in general, it is desirable to perform surveys of lifestyle and dietary habits in regular intervals.

In the presented study we did not evaluate answers in groups of children with normal weight, overweight and obesity separately because obese individuals tend to perceive their own eating habits with distortion, which leads to bias in statistical analyses (7), however, we suggest that more surveys concerning nutrition of obese children should be carried out. This paper also does not focus on the influence of the parent's education on the family diet. Thus it is desirable to perform further studies in order to obtain information about the parents'education impact on children's food habits and lifestyle.

CONCLUSIONS

According to our results concerning the dietary habits and lifestyle of Slovak schoolchildren we summarize implications for practice and recommend to:

- motivate children for more regular breakfast consumption
- support regular food intake in children (especially in girls)
- consume at least 5 pieces of fresh fruit and vegetables per day
- increase intake of dairy products to 2–3 servings per day (especially in girls)
- decrease the proportion of red meat including pork in favour of lean meat and fish
- include more whole-grain foods in the diet
- avoid beverages with a high content of sugar and prefer natural water
- promote daily moderate physical activity and reduce sedentary activities
- adopt preventive measures as well as interventions especially within the group of rural and older children
- perform systematic nutritional education from early childhood (23, 34).

Acknowledgement

This work was supported by grant VEGA 1/4278/07 in cooperation with trained research assistants from Regional Offices of Public Health of regions: Komárno, Nové Zámky, Nitra, Levice, Bardejov, Prešov, Stará Ľubovňa, Žiar nad Hronom, Čadca, Prievidza, Dolný Kubín, Bratislava and Banská Bystrica. The authors are very grateful to all participating families and schools as well as Jakub Wimmer and RNDr. Soňa Wimmerová for professional assistance with statistical analysis.

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Received February 2, 2010
Accepted in revised form October 4, 2010