

STUDIES TO DETERMINE NUTRITION BEHAVIOUR AMONGST MIDDLE SCHOOL PUPILS LIVING IN THE BORDER AREAS OF POLAND AND THE CZECH REPUBLIC

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ABSTRACT

Background. In childhood and adolescence, adequate nutrition is vital for ensuring correct physical, mental and emotional development as well as effective learning ability. Thus, the acquiring of such healthy lifestyle behaviour is also important later in adult health.

Objectives. To assess and compare the dietary habits of pupils attending middle school in Poland and the Czech Republic, who live in the border regions between these countries.

Material and methods. The study tool was a nutrition questionnaire divided into a section on socio-economic status and one on detailed dietary habits. Subjects were 202 pupils recruited from Poland and 202 from the Czech Republic. Statistical analyses were performed by the Statistica Ver. 9.0 software, where the Chi^2 test was used to evaluate the significance of differences between the data, taking $p \leq 0.5$ as the critical value.

Results. There were 47% of pupils eating 4-5 meals daily and 49% and 50% ate breakfast and lunch respectively. Milk or dairy drinks were daily drunk by 24% pupils daily and 14% ate hard or processed cheese. Fish was consumed 1-2 times weekly by 46% subjects and fruit and vegetables were daily eaten by 49% and 36% of pupils respectively.

Conclusions. Pupil's dietary habits were found to be unfavourable in both countries. There were significant differences between the countries tested, especially in how frequently breakfast and lunch were eaten, as well as in the intakes of milk and dairy products and in the consumption of fast-food and sugary drinks.

Key words: *nutrition, dietary habits, middle school students*

STRESZCZENIE

Wprowadzenie. Sposób żywienia w okresie dzieciństwa i młodości determinuje rozwój psychofizyczny i emocjonalny, efektywność w procesie uczenia oraz wpływa na stan zdrowia w życiu dorosłym.

Cel. Celem badań była ocena i porównanie nawyków żywieniowych gimnazjalistów z Polski i Czech.

Materiał i metoda. Materiał do badań stanowiły ankiety badające nawyki żywieniowe. Analizę statystyczną wykonano z wykorzystaniem programu StatSoft, Inc. STATISTICA version 9.0. Do oceny różnic pomiędzy badanymi cechami wykorzystano test niezależności Chi^2 . Za istotny statystycznie przyjęto poziom $p \leq 0,05$.

Wyniki. 47% gimnazjalistów spożywało 4-5 posiłków dziennie, 49% spożywało codziennie pierwsze a 50% drugie śniadanie. 24% gimnazjalistów codziennie piło mleko lub napoje mleczne, 14% jadło sery żółte lub topione. 1-2 razy w tygodniu ryby spożywało 46% uczniów. Owoce codziennie spożywało 49% badanych uczniów natomiast warzywa 36% badanych.

Wnioski. Nawyki żywieniowe badanej grupy gimnazjalistów są niekorzystne. Porównanie nawyków żywieniowych gimnazjalistów zamieszkałych w Polsce i w Czechach wykazało występowanie istotnych różnic. Różnice te dotyczyły w szczególności częstości spożycia pierwszego i drugiego śniadania, mleka i przetworów mlecznych oraz posiłków typu *fast-food* i napojów słodzonych.

Słowa kluczowe: *odżywianie, nawyki żywieniowe, gimnazjaliści*

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INTRODUCTION

It is recognised that a proper diet is fundamental to human health. Adequate nutrition in childhood and adolescence ensures that physical, mental and emotional development are appropriate and that learning ability is effective. It also affects the health status in later adult life [27, 28]. An improper diet amongst children and adolescents leads to subclinical and latent nutrient deficiencies being acquired, which although being mostly mild, are often non-specific and difficult to diagnose. For given individuals, they may consequently present with a delay in growth and maturation, impaired mental and physical development, and/or with a compromised immune system. In later adult life, various diseases may then arise related an improper diet. Middle school pupils constitute a particularly vulnerable group, in being exposed to a quite heightened pace/stress of life due do intensive study and learning as well as in doing extracurricular activities. They often also have to commute long-distances to school. Pupils are commonly exposed to and affected by advertising, youth magazines and the internet which frequently promote/provide insufficient or false information for eating a proper diet. In this age group, there is a naturally growing need for independence and food is regularly consumed outside the home, thereby leading to less parental control over their offspring's diet.

The aim of this study was to evaluate and compare the dietary habits of middle school pupils living in the border areas of Poland and the Czech Republic.

MATERIAL AND METHODS

Subjects were 404 middle school pupils living in the border areas of Poland (Rogów, Wodzisław Śląski) and the Czech Republic (Bohumín, Šilheřovice); 202 pupil coming from each country. The study tool was a two parts questionnaire as follows: (i) part one, asked questions on socio-economic status; and (ii) part two, had questions on dietary habits, including the number of meals per day and how often were items from each group of foodstuff products consumed. A pilot study was first conducted to check that the survey was properly understood, accurate and effective. All statistical calculations were performed by the STATISTICA 9.0 software (StatSoft, Inc., Tulsa, OK, USA). The Chi^2 (χ^2)

test was used to assess the significance of differences between the categorical variables, adopting a critical value of $p < 0.05$ as demonstrating significance.

RESULTS

Socio-economic characteristics

Of the 202 Polish pupils, 105 were girls and 97 boys; ie. respectively 52% and 48%. For Czech pupils, the corresponding breakdown was 53% girls and 47% boys. Over half of the study subjects lived in the countryside from both countries; (54% of Polish and Czech pupils). It was found that 29.7% of the pupils' mothers were unemployed, (35.1% from Poland and 24.3% from the Czech Republic). However, unemployed fathers accounted for 6.9% overall, consisting of 11.9% from Poland and 2% from the Czech Republic. Normal body weight was found in about 77% of the total subjects; (77.7% Polish and 76.2% Czech pupils).

Dietary habits

In all, 47% of pupils ate 4-5 meals per day, (45.5% Polish and 48.5% Czech pupils), whereas 14% ate more than 5 meals per day. (9% Polish and 18% Czech pupils). Breakfast was always eaten by 49% pupils before leaving home, (55% Polish and 42.6% Czech pupils). It was however disturbing to find that as many as 16% of all pupils, always skipped breakfast before going to school, (13% Polish and 16% Czech pupils). Lunch was eaten by a total of 50% pupils at school, with more Czech pupils doing so than Polish, (ie. 60.9% vs 39.1%); Table 1.

A sizeable number of Polish pupils ate white bread, (68.5%), whereas 49% of their Czech counterparts ate mixed grain bread. Only 6.2% of all pupils however ate whole-grain cereal bread or brown bread. Butter was mainly used for spreading on bread; 75% pupils in all, of which 75.7% were Polish and 74.3% Czech.

Table 2 compares the frequency of food consumption, according to selected food type categories, between Polish and Czech pupils. More Polish pupils consumed milk or dairy drinks than Czechs, (33.2% vs 14.9% respectively), with the overall value being 24% whereas 6% of all pupils didn't drink milk at all. Each day, 4% of all students ate cottage cheese, nevertheless 13% of all pupils, (9.4% Polish and 16.8% Czech), didn't eat any cottage cheese whatsoever. Hard cheese and processed cheese were consumed 1-2 times weekly by

Table 1. Consumption habits for breakfast and lunch observed in Polish and Czech pupils

Meals eaten	Polish pupils (%)			Czech pupils (%)		
	Always	Sometimes	Never	Always	Sometimes	Never
Breakfast	55.0	32.0	13.0	42.6	41.4	16.0
Lunch	39.1	43.9	17.0	60.9	37.1	2.0

Table 2. Foodstuffs consumption habits observed in Polish and Czech students

Food product groups consumed	Frequency of consumption (%)									
	Polish pupils					Czech pupils				
	Never ate	Occasionally	1-2 times Weekly	3-4 times Weekly	Daily	Never ate	Occasionally	1-2 times Weekly	3-4 times Weekly	Daily
Milk or dairy drinks	6.0	18.1	24.6	18.1	33.2	6.0	25.0	28.1	26.0	14.9
Cottage cheese	9.4	30.0	40.6	17.0	3.0	16.8	37.1	24.1	17.0	5.0
Processed cheese	6.9	11.0	31.7	30.0	20.4	4.1	19.0	38.1	32.0	6.8
Poultry	1.0	5.0	22.5	47.5	24.0	0	15.0	34.2	32.7	18.1
Pork	2.0	15.0	35.5	35.5	12.0	7.0	23.0	30.0	31.0	9.0
Fish	4.0	38.5	51.5	5.0	1.0	10.0	42.4	41.6	6.0	0
Fruit	0	1.0	11.3	41.3	46.4	0	3.8	16.4	28.7	51.1
Vegetables	2.5	4.0	19.3	37.1	37.1	1.0	10.0	14.0	41.0	34.0
Fast-food	3.0	50.0	37.6	8.4	1.0	10.6	55.4	28.7	4.3	1.0
Sugary drinks	3.0	15.0	36.7	28.0	17.3	5.0	35.1	27.0	24.0	8.9
Sweets	1.0	10.0	24.1	34.2	30.7	1.0	13.3	21.3	41.1	23.3

38.1% of Czech pupils and 31.7% of Polish, 3-4 times weekly by 30% Polish and 32% Czech pupils and 14% of all pupils daily ate hard cheese and processed cheese. Conversely, 5% of all pupils never ate neither hard cheese nor processed cheeses at all, (6.9% Polish and 4.1% Czech pupils); Table 2.

Most pupils ate poultry 3-4 times per week, (47.5% Polish and 32.7% Czech pupils) and 34.2% of Czech students did so 1-2 times per week. In total, 46% of all students ate fish 1-2 times per week, (51.5% Polish and 41.6% of Czech pupils), however 7% of all studied ate no fish at all eat with more Czech students not eating fish than Polish; (10% vs 4% respectively). Fruit was declared to be daily eaten by 49% of all pupils, (46.4% Polish and 51.1% Czech pupils), and 36% of all pupils declared that they daily ate vegetables (37.1% Polish and 34% Czech pupils). However, 1.8% of pupils said they never ate any vegetables at all, (more Polish than Czech pupils; 2.5% vs 1% respectively); Table 2.

Fast food was found to be occasionally consumed by 53% of pupils, whereas one-third declared eating this more than once or twice weekly, (37.6% Polish and 28.7% Czech pupils). Sugary drinks, (sugar-sweetened beverages), were claimed to be drunk everyday by 13.1% overall, (17.3% Polish and 8.9% Czech pupils), which for example included Coca-Cola, Fanta etc. These beverages were also consumed by 26% of all pupils 3-4 times per week, with more Polish than Czech pupils ie. 28% vs 24% respectively. Sweets were eaten daily by 27% of pupils, (30.7% Polish and 23.3% Czech pupils), and 38% ate sweets 3-4 times weekly, (34.2% Polish and 41.1% Czech pupils); Table 2.

A number of significant differences were thus found between the dietary habits of Polish and Czech middle school students. In summary detail, these are as follows;

- Czech pupils ate more than 4 servings per day, (*Cramer's V*=0.13, *p*=0.01);
- More Czech pupils ate breakfast before leaving home than did Polish pupils, (*Cramer's V*=0.13, *p*=0.04);
- Czech students ate lunch at school more often compared to Polish students, (*Cramer's V*=0.29, *P*<0.00001);
- Polish pupils more frequently ate white wheat bread than did Czech pupils, (*Cramer's V*=0.23, *p*=0.00002);
- Czech pupils more often used margarine to spread on bread compared to Polish students, (*Cramer's V*=0.24, *p*=0.0001);
- Polish pupils drank milk or dairy drinks more often than did Czech pupils, (*Cramer's V*=0.22, *p*=0.0006);
- Polish pupils more frequently ate cottage cheese than did Czech pupils, (*Cramer's V*=0.18, *p*=0.0003);
- Polish pupils consumed both hard cheese and processed cheese more often compared to Czech pupils, (*Cramer's V*=0.19, *p*=0.003);
- More Czech pupils ate poultry occasionally or didn't eat poultry at all compared to Polish pupils, (*Cramer's V*=0.24, *p*=0.0005);
- More Polish pupils ate fast food daily or 3-4 times per week compared with Czech pupils, (*Cramer's V*=0.17, *p*=0.07);
- More Polish pupils drank sugary drinks daily than Czech pupils, (*Cramer's V*=0.25, *p*=0.00002).

DISCUSSION

The study has demonstrated a number of dietary abnormalities in adolescent subjects attending middle

school in both Poland and the Czech Republic that may negatively affect physical, mental and emotional development, together with learning and physical abilities.

It therefore vital, in this vulnerable time, to pay special attention to the regularity and the number of eaten meals, as well as the nutritional value of each meal.

In accordance with the dietary guidelines, adolescents should eat 4-5 meals per day, however the presented study shows that only 47% of students followed such recommendations. *Wojnarowska* obtained similar results [29], on a representative subject group which showed only 47.5% of adolescents, aged 11-15 years, eating the recommended number of meals per day [29]. Moreover, a study on the lifestyle of adolescents living in Vilnius and Grodno, aged 15-17 years, respectively demonstrated that 79.7% and 70.2% of schoolpupils ate 3-4 meals per day [25]. Expert opinion considers breakfast to be the most important meal of the day. Despite this, adolescents often fail to acknowledge this, where as many as 16% of pupils/students admit to skipping breakfast altogether, and about one-third eat breakfast irregularly. This disturbing observation is also confirmed by the results presented by *Szpakov* et al. [25] and by the international report, entitled 'Health Behaviour in School-aged Children', (HBSC) [8]. Similar results were found from a study on the frequency of breakfast consumption and its nutritional value amongst German children and adolescents. In addition, this aforementioned study found that the increase in the frequency of regular breakfast consumption occurs with progressing age [2]. Another study on adolescents from 10 European countries, showed that only half ate breakfast regularly [7]. Eating the lunchtime meal is equally important, given the considerable length of time spent at school everyday. The current study showed that as many as 20% Polish pupils didn't eat lunch at school, in contrast to only a small fraction (2%) of Czech pupils who also didn't eat school lunches. *Wołowski* et al. analysed the nutritional behaviour of adolescents and in fact reported that 25% of students don't eat any type of school meal at all [26].

Only 6.2% of the studied pupils declared eating brown bread or whole-grain bread. *Skemiene* et al. have highlighted a similar problem in which the eating habits of 329 students were analysed in Kaunas and Raseiniai, Lithuania, where only 22% of the students had been found to eat brown bread [22]. It is seen that children and adolescents who do consume adequate amounts of milk and dairy products will have the recommended daily calcium intake entirely covered. The presented study showed that daily, only 24% of the pupils drank milk, 4% ate cottage cheese and 14% ate hard and processed cheese. Another study by *Szczepanska* et al., demonstrated similar findings where everyday 14% of subjects drink milk, 9% and 24% respectively ate

cottage cheese or hard and processed cheese [23]. The international HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) study has also indicated that adolescents daily consume less than two-thirds of the recommended quantity of milk and dairy products. In similar fashion, others have also reported low consumption rates of milk and dairy products in families of pupils from elementary school in Letovice from the Czech Republic [11]. Nevertheless, higher frequencies of milk and dairy products consumption were observed amongst adolescent groups from Mexico [19] and Germany [15].

Nutritional Experts recommend eating at least 2 servings of fish per week. In spite of this, *Kołodziejczyk* has pointed out that consumption of fish is low in Poland, where it is stated that Polish people do not sufficiently appreciate the beneficial effects of fish on the human body/health [14]; this study showing that only 46% of pupils ate 1-2 servings of fish per week. Indeed, *Gacek* and *Fiedor* reported an even lower fish consumption in high school students [6], and likewise did a study by *Kollajtis-Dolowy* et al. on the eating habits of middle school pupils [13].

Vegetables and fruits should accompany each meal. According to the latest guidelines, 5 servings of vegetables and fruits per day should be eaten. The current study however showed that everyday, 49% of pupils ate fruit and 35% ate vegetables. The international HBSC report also reported unfavourable effects. It found that only 30.7% of pupils aged 13-14 years and 23.2% aged 15-16 years ate fruit daily; a similar consumption was observed for vegetables at 25.4% and 26.2% respectively [8]. *Molinero* et al. studied health behaviour of Spanish adolescents and showed that as many as 25% of adolescents don't eat any fruit at all [16]. *Nago* et al. also reported similar results, showing that students' diets are low in fruit and vegetables [17]. A study by *Abudayya* et al. demonstrated even lower levels in 944 adolescents, aged 12-15 years, where only 11.6% of boys and 16.2% of girls ate fruit everyday [1]. In a cross-sectional study for evaluating changes in adolescent consumption of fruit and sweets in Greenland, *Niclasen* et al. showed increasing student numbers, who do not consume the recommended amounts of fruit [18]. Another study by *Jakubikova* et al. on fruit and vegetable consumption in Czech children reported that only 22% of children and adolescents eat 5 servings of fruits and vegetables each day [10].

Eating-out at fast food restaurants/outlets is fast becoming more and more popular given the long and often difficult working hours, a constant lack of free time and frequently being absent from home. Fast food products often appear in school cafeterias and adolescents are thus exposed to such daily temptations for buying them. The presented study has shown that one-third of sub-

jects ate 1-2 meals of fast food per week. *Savidge et al.* reported even less favourable trends among Australian adolescents, in that 22% of the studied adolescents daily ate fast food [21]. Nowadays, American scientists pay special attention to the unfavourable effects of fast food on human health, where fast food consumption in the USA is most prevalent, and has resulted in an epidemic of obesity amongst children and adolescents [3, 4, 20]. This has also been confirmed by a study comparing student diets at four schools in the United States and Czech Republic. Here, it was demonstrated that Americans eat more often at fast food restaurants and drink more sugary drinks, (e.g. Coca-Cola, Fanta) than Czechs [9], with such high consumptions of these foods likely leading to overweight and obesity [12]. The current study showed that 13.1% of middle school pupils daily drank sugary drinks/beverages and 26% drank these beverages 3-4 times per week. A study on 350 students aged 10-12 years by *Szczepańska et al.* showed that 37% drank sugary drinks at least once daily [24]. The HBSC report also provides relevant data which indicates that 30.8% of Polish pupils, aged 13-14 years and 27.3% of those aged 15-16 years declared drinking sugary drinks [8]. The presented study also showed high numbers of middle school subjects daily eating sweets or 3-4 times per week; a finding which has been confirmed by other studies [5, 8, 18, 24].

CONCLUSIONS

1. The middle school pupil subjects have bad eating habits. They do not comply with nutritional recommendations specific to this age group.
2. Significant differences were observed in dietary habits between amongst Polish and Czech middle school pupils. These differences are mainly seen in how often were breakfast and lunch eaten, together with the consumption of milk and dairy drinks as well as fast food and sugary drinks, (ie. sugar-sweetened beverages).

Conflict of interest

The authors declare no conflict of interest.

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