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Dietary habits and body image perception among Polish adolescents and young adults – a population based study

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Abstract

Patterns of nutrinal behaviour that are shaped in childhood and during adolescence are mostly continued later on in adult life. The risk of developing many chronic diseases is to a large degree dependent on these patterns.

The aim of this study was to assess the relationship between dietary habits and body image perception among Polish adolescents and young adults. The study group covered 14,511 adolescents/young adults: 10,081 children attending high schools and secondary schools and 4,428 university students.

More than 87% of school children and students admitted that they snacked in between meals everyday, and 1/3 mentioned that they ate meals at night. As many as 41.40% of schoolchildren and 46.70% of students experienced the feeling of overeating at least several times a week. Analysis of the respondents BMI showed that students were considerably more obese and overweight compared to schoolchildren. Fear of gaining weight was mentioned by 9.90% of respondents including 6.90% of those with normal body structure, 1.40% with underweight or overweight and 0.40% of those obese. As many as 54% of the total respondents described their body structure as being normal, 23.7% as slim, 13.9% reported being overweight, 6% thin whilst 1.7% considered themselves obese. A comprehensive analysis of the study data, including attempts at dieting or gaining weight, indicated that approximately ¾ of obese respondents had undertaken attempts in the past to reduce their body weight.

The importance of physical activity and healthy eating habits should be given due attention not only to prevent obesity but also other eating disorders.

Key words

dietary habits, adolescents, adults, body image perception, obesity, public health

INTRODUCTION

Within the last three decades, overweight and obesity at the age of childhood and puberty have become a serious public health problem [1, 2, 3]. A balanced diet during adolescence is indispensable for adequate development of the body and the maintenance of a good state of health in later life. The frequency of consuming individual food products is important, as well as their qualitative composition, the size and frequency of meals. The teenage period is the time when health behaviour is shaped and the majority of these behaviours are maintained throughout the entire life [4, 5].

The primary cause of obesity among children and adolescents is excessive consumption in relation to energy expenditure, which induces so-called simple, (primary) obesity. This type of obesity constitutes approximately 98% of all obesity cases at this age. The International Obesity Task Force Report from 2005 shows that every fifth European child is overweight or obese and that there are approximately 400,000 new cases of childhood overweight and obesity annually [6]. A similar conclusion may be drawn while analysing Polish epidemiological data which indicate that within the last decade the percentage of children with overweight and obesity has considerably increased. In the study conducted during 1994-1995, the percentage of overweight and obese children in the group of 7-8-year-old boys was 4.3% and 1.8%, respectively, whereas among girls in the same age group these percentages were 6.4% and 1.5% [7]. According to population studies conducted by many research centres on a group of Polish children aged 7-9, overweight, (including obesity) occurred in 15% of boys and 15.8% of girls, including 3.6% of boys and 3.7% of girls who were obese [8]. Therefore, it may be presumed that in Poland, about every seventh child at early school age is overweight or obese. Overweight and obesity are also an important health problem in older children. Polish data available for this age group are

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based on differently defined subject groups and dissimilar methodologies and are therefore difficult to compare.

A more frequent incidence of obesity at developmental age is more frequently accompanied with obesity related complications and disorders which have previously been either rare or absent in children. A higher incidence of metabolic syndrome in obese adults is also well documented [9]. At present this syndrome is attracting growing interest, including obese children, where it is closely associated with Type 2 diabetes and cardiovascular disease risk factors through an intensified progression of atherosclerotic changes [10, 11, 12]. Another study on 64 obese children demonstrated that only 35% were free of metabolic disorders but as many as 14% fulfilled the diagnostic criteria of metabolic syndrome [13].

The nutrition mode and nutritional behaviour of adolescents during development exert an effect on the final stage of puberty, on when growth is halted and maintenance of a normal body weight. They are also related to the prognosis of health in adults who are conditioned by continuing nutritional behaviour formed in childhood to that in later life. Having balanced meals of adequate calorific value and nutirional content conditions the body's normal functioning and health in the young thus enabling the developmental tasks to become efficiently performed as well as physical activity and effective education [14]. A rapid pace of growth, especially in 16-18-year-old boys (slightly earlier in girls), and physiological changes related to the puberty require additional energy (calories). Abnormalities arising from an unbalanced diet and irregular mealtimesincrease the risk of diet-related disorders occurring such as obesity, atherosclerosis, osteoporosis and cancer. The trend to adopt various diets at this age, frequently unjustified, in order to lose weight especially amongst girls may also result in direct negative health effects becoming manifest in the distant future.

During puberty nutritional behaviour can however change. Teenagers frequently choose what they eat by themselves most often ignoring the health consequences as they are held in thrall by fashion, adverts or are influenced by peer pressure [15]. In the age of obesity pandemics the need to ensure adequate nutrition and physical activity in children and adolescents has therefore become a priority issue. Bad nutritional habits of eating insufficient healthy products such as fresh fruit, vegetables and protein coupled with the simultaneous consumption of high calories mainly provided by carbohydrates and fats result in high numbers of obese children and adolescents [16].

Puberty causes a number of changes in appearance, body proportions and weight and among other things, an increase in fatty tissue and hip width in girls, whereas in boys – a rapid increase in body height, gradual growth of the scapular belt and loss of fatty tissue. Frequently, these changes are difficult to accept by maturing adolescents and cause a dissatisfaction with one's body image and generally a lack of self acceptance. Growing adolescents tend to attach too much importance to their body image especially in relation to some percieved ideal where the need and search for acceptance by peers and forming one's own identity lies at the root of this type of behaviour [17]. The current image of the ideal figure promoted by the media is that of a very slim silhouette for girls where elements of femininty tend to be lost, (ie. flat chest, narrow hips), and in boys also a slim figure with developed muscles particularly for the chest. Girls undergoing puberty in whom fatty tissue and weight increases percieve this unfavourably as this usually deviates from thei adopted ideal image. It should also be noted that concomitant and temperorary disorders in motor development additionally favour the storage of fatty tissue. For this reason, adolescents perceive the need for and undertake actions biased towards reducing body weight or as in the case of boys, on increasing muscle mass [18].

OBJECTIVE

This was to assess the relationship between dietary habits and body image perception among Polish adolescents and young adults.

MATERIAL AND METHODS

Characteristics of the study population

The test population surveyed was randomly selected from a representative group of adolescents attending high school, secondary school and university students in Poland. The study tool was a questionnaire which was completed by n=14,511 subjects in total of which 10,081 were from high/secondary schools and 4,428 from university. In all 7,825 were female and 6,683 male.

Sample selection – schoolchildren

Samples were chosen from a database at the Ministry of National Education using in paricular 'Identification data concerning schools and educational facilities' according to data from the Educational Information System of 30 September 2010' (No. 2010.09.30/01). Schools were sampled and analysed using Statistica and SPSS software. Pupils attending high/secondary schools were sampled in two stages ie. firstly an appropriate school was chosen by stratified sampling and secondly a suitable class was then selected. Cluster sampling was used; all children from the sected classes were surveyed. The sampling covered 569 schools from 379 provinces in Poland.

Sample selection – students

Students were investigated by means of a questionnaire in electronic form, available on a specified university website. The survey was anonymous; however, additional data was collected concerning the university and place of respondents' residence. This served to stratify the taken samples and allowed corrections to be applied to the detailed composition of single student groups within a group. Corrections were made in two ways; Firstly by randomly removing any exessively analysed subjects and rejecting answered questionnaires containing mistakes and repetitions ie. a strtuctural sampling correction. Secondly, using the all-Polish additional data enabled the individual questionnaires to be ranked and samples to be standardised according to additional variables.

Body weight evaluation criteria

BMI was calculated as weight (kg) divided by height (m) squared. Subjects were classified into 4 BMI categories according to WHO guidelines as follows; underweight, (BMI<18.5 kg/m^2), normal weight (BMI

18.5-24.9 kg/m^2), overweight (BMI 25.0-29.9 kg/m^2), and obese (BMI≥30.0 kg/m^2). Further WHO recommendations, on child standards, were applied and developed based on screening studies in the form of BMI centile nets, (standards up to the age of 19). In centiles, underweight is at the 5th centile, overweight the 85th and obesity at the 95th. The following criteria were adopted based on the WHO 2007 distriibution standards;

- underweight; BMI <5th centile;
- normal body weight; BMI ≥5th centile and <85th centile;
- overweight; BMI ≥85th centile and <95th centile;
- obesity; the BMI ≥95 centile [19].

STATISTICAL ANALYSIS

Statistical analyses was performed using the Statistica 8.1 PL software package. Results were presented in the form of frequency tables, descriptive statistics and contingency tables. Constructing contingency tables and using the Pearson chi-squared test allowed nominal scale data to be analysed.

RESULTS

Snacking in between meals proved to be very popular for schoolchildren with more than 87% admitting to this undesirable dietary habit; there were no differences between boys and girls nor any between urban and rural dwellers. Most frequently the snacks were sweets and fruit (Tab. 1). About 1/3 of all subjects admitted eating meals at nightime with males outnumbering females, (40.1% vs 27.5%). City dwellers also scored the highest (37.1%) compared to those living in towns and the countryside (Tab. 2).

The everyday or nearly every day feeling of hunger was experienced by 13.8% schoolchildren and 19.9% students. This sensation of hunger was also significantly higher in dwellers of large cities, (20.6%) or towns, (16.3%) compared to rural inhabitants, (12.8%). The hunger sensation was also felt by as many as 41.6% schoolchildren and 53.9% students several times per week; more frequently by females than males and by urban than countruside inhabitants. This sensation was however not experienced by 44.6% schoolchildren and 26.6% students (Tab. 3).

Schoolchildren (52%) and students (48.5%) did not report feeling the contrasting sensation of 'being overfed'; neither did 51.9% females nor 49.9% males. Actually feeling overfed everyday or nearly everyday was experienced by 6% of all respondents of whom 3.2% were male and 2.6% lived in the countryside. It is alarming to note however that 41.6% schoolchildren and 46.7% students felt overfed at least several times per week (Tab. 4).

An excessive consumption was reported by 443 respondents with overweight and 175 obese. Fear of gaining weight was mentioned by 9.90% of respondents including 6.90% of those with normal body structure, 1.40% – underweight or overweight and 0.40% of those obese. 2.90% of respondents admitted that they provoked self-vomiting of whom 1.9% had

Table 1. Snacking between meals behaviour

Study population		no	yes	total	p-value
schoolchildren	n	1,281	8,800	10,081	
	row %	12.70%	87.30%	100.00%	
	total %	8.80%	60.70%	69.50%	
students	n	557	3,871	4,428	
	row %	12.60%	87.40%	100.00%	
	total %	3.80%	26.70%	30.50%	**0.046**
total	n	1,838	12,671	14,509	
	total %	12.70%	87.30%	100.00%	
Gender		**no**	**yes**	**total**	**p-value**
female	n	828	6,997	7,825	
	row %	10.60%	89.40%	100.00%	
	total %	5.70%	48.20%	53.90%	
male	n	1,010	5,673	6,683	
	row %	15.10%	84.90%	100.00%	
	total %	7.00%	39.10%	46.10%	**<0.000**
Place of residence		**no**	**yes**	**total**	**p-value**
rural area	n	890	5,524	6,414	
	row %	13.90%	86.10%	100.00%	
	total %	6.10%	38.10%	44.20%	
town<100,000 population	n	546	4,325	4,871	
	row %	11.20%	88.80%	100.00%	
	total %	3.80%	29.80%	33.60%	
city>100,000 population	n	402	2,820	3,222	
	row %	12.50%	87.50%	100.00%	
	total %	2.80%	19.40%	22.20%	**<0.000**

Table 2. Eating meals at nightime behaviour

Study population		no	yes	total	p-value
schoolchildren	n	6,755	3,326	10,081	
	row %	67.00%	33.00%	100.00%	
	total %	46.60%	22.90%	69.50%	
students	n	2,919	1,509	4,428	
	row %	65.90%	34.10%	100.00%	
	total %	20.10%	10.40%	30.50%	0.201
total	n	9,674	4,835	14,509	
	total %	66.70%	33.30%	100.00%	
Gender		**no**	**yes**	**total**	**p-value**
female	n	5,671	2,154	7,825	
	row %	72.50%	27.50%	100.00%	
	total %	39.10%	14.80%	53.90%	
male	n	4,003	2,680	6,683	
	row %	59.90%	40.10%	100.00%	
	total %	27.60%	18.50%	46.10%	**<0.000**
Place of residence		**no**	**yes**	**total**	**p-value**
rural area	n	4,451	1,964	6,415	
	row %	69.40%	30.60%	100.00%	
	total %	30.70%	13.50%	44.20%	
town<100,000 population	n	3,196	1,674	4,870	
	row %	65.60%	34.40%	100.00%	
	total %	22.00%	11.50%	33.60%	
city>100,000 population	n	2,026	1,196	3,222	
	row %	62.90%	37.10%	100.00%	
	total %	14.00%	8.20%	22.20%	**<0.000**

Table 3. Sensation of hunger perceived by respondents

Study population		everyday or nearly everyday	3-4 times a week	1-2 times a week	more rarely, never	total	p-value
school-children	n	1,390	1,542	2,641	4,487	10,060	
	row %	13.80%	15.30%	26.30%	44.60%	100.00%	
	total %	9.60%	10.60%	18.20%	31.00%	69.40%	
students	n	879	938	1,450	1,161	4,428	
	row %	19.90%	21.20%	32.70%	26.20%	100.00%	
	total %	6.10%	6.50%	10.00%	8.00%	30.60%	
total	n	2,269	2,480	4,090	5,647	14,486	
	total %	15.70%	17.10%	28.20%	39.00%	100.00%	**<0.000**
Gender		**everyday or nearly everyday**	**3-4 times a week**	**1-2 times a week**	**more rarely, never**	**total**	**p-value**
females	n	1,245	1,470	2,344	2,754	7,813	
	row %	15.90%	18.80%	30.00%	35.20%	100.00%	
	total %	8.60%	10.10%	16.20%	19.00%	53.90%	
males	n	1,024	1,010	1,746	2,894	6,674	
	row %	15.30%	15.10%	26.20%	43.40%	100.00%	
	total %	7.10%	7.00%	12.10%	20.00%	46.10%	**<0.000**
Place of residence		**everyday or nearly everyday**	**3-4 times a week**	**1-2 times a week**	**more rarely, never**	**total**	**p-value**
rural area	n	817	972	1,725	2,891	6,405	
	row %	12.80%	15.20%	26.90%	45.10%	100.00%	
	total %	5.60%	6.70%	11.90%	20.00%	44.20%	
town <100,000	n	790	876	1,396	1,799	4,861	
	row %	16.30%	18.00%	28.70%	37.00%	100.00%	
	total %	5.50%	6.00%	9.60%	12.40%	33.60%	
city >100,000	n	662	632	969	957	3,220	
	row %	20.60%	19.60%	30.10%	29.70%	100.00%	
	total %	4.60%	4.40%	6.70%	6.60%	22.20%	**<0.000**

Table 4. The sensation of being overfed perceived by respondents

Study population		everyday or nearly everyday	3-4 times a week	1-2 times a week	more rarely, never	total	p-value
schoolchildren	n	660	1,044	3,120	5,236	10,060	
	row %	6.60%	10.40%	31.00%	52.00%	100.00%	
	total %	4.60%	7.20%	21.50%	36.10%	69.40%	
students	n	212	402	1,665	2,149	4,428	
	row %	4.80%	9.10%	37.60%	48.50%	100.00%	
	total %	1.50%	2.80%	11.50%	14.80%	30.60%	
total	n	872	1,445	4,785	7,384	14,486	
	total %	6.00%	10.00%	33.00%	51.00%	100.00%	**<0.000**
Gender		**everyday or nearly everyday**	**3-4 times a week**	**1-2 times a week**	**more rarely, never**	**total**	**p-value**
females	n	411	750	2,596	4,056	7,813	
	row %	5.30%	9.60%	33.20%	51.90%	100.00%	
	total %	2.80%	5.20%	17.90%	28.00%	53.90%	
males	n	461	695	2,189	3,329	6,674	
	row %	6.90%	10.40%	32.80%	49.90%	100.00%	
	total %	3.20%	4.80%	15.10%	23.00%	46.10%	**<0.000**
Place of residence		**everyday or nearly everyday**	**3-4 times a week**	**1-2 times a week**	**more rarely, never**	**total**	**p-value**
rural area	n	372	604	2,059	3,370	6,405	
	row %	5.80%	9.40%	32.10%	52.60%	100.00%	
	total %	2.60%	4.20%	14.20%	23.30%	44.20%	

Table 4 (Continuation). The sensation of being overfed perceived by respondents

Place of residence		everyday or nearly everyday	3-4 times a week	1-2 times a week	more rarely, never	total	p-value
town<100,000	n	311	524	1,636	2,390	4,861	
	row %	6.40%	10.80%	33.70%	49.20%	100.00%	
	total %	2.10%	3.60%	11.30%	16.50%	33.60%	
city>100,000	n	189	317	1,090	1,624	3,220	
	row %	5.90%	9.80%	33.90%	50.40%	100.00%	
	total %	1.30%	2.20%	7.50%	11.20%	22.20%	**0.012**

a normal body structure. Anorexia was reported by 6.60% respondents of whom 5.90% had a normal body weight or were underweight. The phenomenon of alternate binge eating and dieting was noted among 5.90% of respondents (Tab. 5). It is also noteworthy that about 30% of respondents did not eat breakfast including 19.50% of schoolchildren and adolescents with normal body weight and 4.80% of those underweight while more than a half of respondents did not eat second breakfast – including 35.60% of those with a normal body weight and 8.50% – underweight.

Table 5. Evaluation of the BMI vs. respondents' selected nutritional behaviours

EXCESSIVE CONSUMPTION		underweight	normal weight	overweight	obesity	total	p-value
lack of excessive consumption	n	2,255	7,882	1,445	289	11,871	
	row %	19.00%	66.40%	12.20%	2.40%	100.00%	
	total %	15.80%	55.10%	10.10%	2.00%	82.90%	
excessive consumption	n	240	1,583	443	175	2,441	
	row %	9.80%	64.90%	18.10%	7.20%	100.00%	
	total %	1.70%	11.10%	3.10%	1.20%	17.10%	**<0.000**
FEAR OF GAINING WEIGHT		**underweight**	**normal weight**	**overweight**	**obesity**	**total**	**p-value**
lack of fear of gaining weight	n	2,301	8,483	1,693	412	12,889	
	row %	17.90%	65.80%	13.10%	3.20%	100.00%	
	total %	16.10%	59.30%	11.80%	2.90%	90.10%	
fear of gaining weight	n	194	982	195	52	1,423	
	row %	13.60%	69.00%	13.70%	3.70%	100.00%	
	total %	1.40%	6.90%	1.40%	0.40%	9.90%	**0.001**
PROVOKING VOMITING		**underweight**	**normal weight**	**overweight**	**obesity**	**total**	**p-value**
lack of promoting vomiting	n	2,439	9,189	1,828	441	13,897	
	row %	17.60%	66.10%	13.20%	3.20%	100.00%	
	total %	17.00%	64.20%	12.80%	3.10%	97.10%	
provoking vomiting	n	56	276	60	23	415	
	row %	13.50%	66.50%	14.50%	5.50%	100.00%	
	total %	0.40%	1.90%	0.40%	0.20%	2.90%	**0.010**
ANOREXIA		**underweight**	**normal weight**	**overweight**	**obesity**	**total**	**p-value**
no anorexia	n	2,269	8,851	1,803	442	13,365	
	row %	17.00%	66.20%	13.50%	3.30%	100.00%	
	total %	15.90%	61.80%	12.60%	3.10%	93.40%	
anorexia	n	226	614	85	22	947	
	row %	23.90%	64.80%	9.00%	2.30%	100.00%	
	total %	1.60%	4.30%	0.60%	0.20%	6.60%	**<0.000**
BINGE EATING AND DIETING		**underweight**	**normal weight**	**overweight**	**obesity**	**total**	**p-value**
no alternate binge eating and dieting	n	2,413	8,907	1,737	410	13,467	
	row %	17.90%	66.10%	12.90%	3.00%	100.00%	
	total %	16.90%	62.20%	12.10%	2.90%	94.10%	
binge eating and dieting	n	82	558	151	54	845	
	row %	9.70%	66.00%	17.90%	6.40%	100.00%	
	total %	0.60%	3.90%	1.10%	0.40%	5.90%	**<0.000**

The replies to self-reported body structure questions are shown in Table 5. As many as 54.60% of respondents described their body structure as being normal, 23.7% as slim, 13.9% overweight, 6% thin whereas 1.7% considered themselves obese. More than a half of respondents evaluated their body structure as being normal, (55.8% schoolchildren and 51.8% students). More schoolchildren (30.7%) than students (28.9%) evaluated their body structure as slim or thin, while more students (20.7%) than schoolchildren (13.4%) perceived themselves as being overweight or obese. A slim or thin body structure was evaluated more frequently in schoolchildren than students, (30.7% vs 28.9% respectively) but conversely more students than schoolchildren percieved themselves overweight or obese, (20.7% vs 13.4% respectively). The high proportion of overweight students as shown in the graph merits special attention (18.5%).

Adolescents from rural areas more frequently reported a normal body structure compared to those from towns and cities whereas there were no such differences foe being thin or slim. However the reported obesity increased according to increasing urbanisation ie. 1.3% in the countryside, 1.8% towns and 2.4% cities, (Tab. 6).

According to the BMI, (using the WHO centile nets for schoolchildren), students were significantly more obese and overweight, (4.2%, 16.6% respectively), than schoolchilden, (2.8%, 11.7% respectively). A significant gender difference was also seen with around twice as many overweight or obese males, (4.8, 18% respectively) compared to females, (1.9%, 9.1% respectively). As before, obesity increased with increasing urbanisation (Tab. 7).

Further data analysis demonstrated that approximately 3/4 of obese respondents had tried to reduce their weight

Table 6. Respondents' self-reported body structure

Study population		thin	slim	normal weight	overweight	obese	total	p-value
schoolchildren	n	666	434	5,629	1,203	149	10,081	
	row %	6.60%	24.10%	55.80%	11.90%	1.50%	100.00%	
	total %	4.60%	16.80%	38.80%	8.30%	1.00%	69.50%	
students	n	205	1,010	2,293	821	99	4,428	
	row %	4.60%	22.80%	51.80%	18.50%	2.20%	100.00%	
	total %	1.40%	7.00%	15.80%	5.70%	0.70%	30.50%	
total	n	871	3,444	7,922	2,024	248	14,509	
	total %	6.00%	23.70%	54.60%	13.90%	1.70%	100.00%	**<0.000**
Gender		**thin**	**slim**	**normal weight**	**overweight**	**obese**	**total**	**p-value**
females	n	361	1,918	4,139	1,256	150	7,824	
	row %	4.60%	24.50%	52.90%	16.10%	1.90%	100.00%	
	total %	2.50%	13.20%	28.50%	8.70%	1.00%	53.90%	
males	n	509	1,526	3,783	768	98	6,684	
	row %	7.60%	22.80%	56.60%	11.50%	1.50%	100.00%	
	total %	3.50%	10.50%	26.10%	5.30%	0.70%	46.10%	**<0.000**
Place of residence		**thin**	**slim**	**normal weight**	**overweight**	**obese**	**Total**	**p-value**
rural area	n	383	1,532	3,620	795	85	6,415	
	row %	6.00%	23.90%	56.40%	12.40%	1.30%	100.00%	
	total %	2.60%	10.60%	25.00%	5.50%	0.60%	44.20%	
town<100,000	n	293	1,137	2,662	692	86	4,870	
	row %	6.00%	23.30%	54.70%	14.20%	1.80%	100.00%	
	total %	2.00%	7.80%	18.30%	4.80%	0.60%	33.60%	
city>100,000	n	194	775	1,640	536	77	3,222	
	row %	6.00%	24.10%	50.90%	16.60%	2.40%	100.00%	
	total %	1.30%	5.30%	11.30%	3.70%	0.50%	22.20%	**<0.000**

Table 7. Evaluation of respondents' BMI according to group, gender and place of residence

Study population		underweight	normal weight	overweight	obesity	total	p-value
schoolchildren	n	2,112	6,362	1,158	277	9,909	
	row %	21.30%	64.20%	11.70%	2.80%	100.00%	
	total %	14.80%	44.40%	8.10%	1.90%	69.20%	
students	n	383	3,104	731	187	4,405	
	row %	8.70%	70.50%	16.60%	4.20%	100.00%	
	total %	2.70%	21.70%	5.10%	1.30%	30.80%	
total	n	2,495	9,465	1,888	464	14,312	
	total %	17.40%	66.10%	13.20%	3.20%	100.00%	**<0.000**

Table 7 (Continuation). Evaluation of respondents' BMI according to group, gender and place of residence

Gender		underweight	normal weight	overweight	obesity	total	p-value
females	**n**	1,657	5,209	701	150	7,717	
	row %	21.50%	67.50%	9.10%	1.90%	100.00%	
	total %	11.60%	36.40%	4.90%	1.00%	53.90%	
	n	838	4,256	1,188	314	6,596	
males	**row %**	12.70%	64.50%	18.00%	4.80%	100.00%	
	total %	5.90%	29.70%	8.30%	2.20%	46.10%	**<0.000**
Place of residence		**underweight**	**normal weight**	**overweight**	**obesity**	**total**	**p-value**
	n	1,245	4,107	796	162	6,310	
rural area	**row %**	19.70%	65.10%	12.60%	2.60%	100.00%	
	total %	8.70%	28.70%	5.60%	1.10%	44.10%	
	n	812	3,215	619	173	4,819	
town<100,000	**row %**	16.80%	66.70%	12.80%	3.60%	100.00%	
	total %	5.70%	22.50%	4.30%	1.20%	33.70%	
	n	438	2,143	473	129	3,183	
city>100,000	**row %**	13.80%	67.30%	14.90%	4.10%	100.00%	
	total %	3.10%	15.00%	3.30%	0.90%	22.20%	**<0.000**

sometime in the past. It is however alarming to observe that 66.7% respondents with normal body weight and 9% underweight have also tried losing weight in the past. When considering the underweight as many as 15% of these respondents made no past attempts to increase their body weight. A majority of those respondents who were underweight, (14.4%), overweight, (9.5%) or obese, (1.9%) in fact showed acceptance of their current body weight, however it is surprising that 12.4% of all respondents with normal body structure found their body image unacceptable (Tab. 9).

An objective evaluation of the BMI is shown in Table 10 with reference to levels of physical activity done by respondents. Here 24.9% did low amounts including 4.3% of those overweight or obese. It should also be noted that more than half of the respondents with normal body structure reported medium or high levels of physical activity.

Table 8. Evaluation of respondents' BMI according to personal intentions to reduce/increase body weight

DIETING ATTEMPTS		underweight	normal weight	overweight	obesity	total	p-value
	n	1,982	5,641	826	132	8,581	
did not diet	**row %**	23.10%	65.70%	9.60%	1.50%	100.00%	
	total %	13.80%	39.40%	5.80%	0.90%	60.00%	
	n	513	3,822	1,063	332	5,730	
dieted	**row %**	9.00%	66.70%	18.60%	5.80%	100.00%	
	total %	3.60%	26.70%	7.40%	2.30%	40.00%	**<0.000**
ATTEMPT OF GAINING WEIGHT		**underweight**	**normal weight**	**overweight**	**obesity**	**total**	**p-value**
	n	1,664	7,401	1,639	423	11,127	
did not try to gain weight	**row %**	15.00%	66.50%	14.70%	3.80%	100.00%	
	total %	11.60%	51.70%	11.50%	3.00%	77.70%	
	n	831	2,065	249	41	3,186	
tried to gain weight	**row %**	26.10%	64.80%	7.80%	1.30%	100.00%	
	total %	5.80%	14.40%	1.70%	0.30%	22.30%	**<0.000**

Table 9. Evaluation of the BMI and acceptance of own body image by respondents

SATISFACTION WITH BODY IMAGE		underweight	normal weight	overweight	obesity	total	p-value
	n	428	1,780	524	190	2,922	
not satisfied with body image	**row %**	14.60%	60.90%	17.90%	6.50%	100.00%	
	total %	3.00%	12.40%	3.70%	1.30%	20.40%	
	n	2,067	7,680	1,364	274	11,385	
satisfied with body image	**row %**	18.20%	67.50%	12.00%	2.40%	100.00%	
	total %	14.40%	53.70%	9.50%	1.90%	79.60%	**<0.000**

Table 10. Objective evaluation of the BMI vs. respondents' physical activity*

EVALUATION OF PHYSICAL ACTIVITY		underweight	normal weight	overweight	obesity	total	p-value
low physical activity	n	398	1,171	248	77	1,894	
	row %	21.00%	61.80%	13.10%	4.10%	100.00%	
	total %	5.20%	15.40%	3.30%	1.00%	24.90%	
mediocre physical activity	n	456	1,801	356	81	2,694	
	row %	16.90%	66.90%	13.20%	3.00%	100.00%	
	total %	6.00%	23.70%	4.70%	1.10%	35.40%	
high physical activity	n	420	2,078	431	96	3,025	
	row %	13.90%	68.70%	14.20%	3.20%	100.00%	
	total %	5.50%	27.30%	5.70%	1.30%	39.70%	**<0.000**

* In order to determine the level of physical activity among adolescents at this age, the International Physical Activity Questionnaire (IPAQ) was used (described previously [20])

DISCUSSION

According to the WHO epidemics of overweight and obesity is a seriouis challenge facing public health. Nutrition-related health problems often start in childhood and are increasingly significant causes of disability and premature death worldwide. Under-nutrition and low energy intake are however the major problems in developing countries [21]. Polish data from the PONS` study showed that 52% of males and 42% of females were overweight and the prevalence of obesity was 35% in both genders [22]. It is estimated that around 14 million children are overweight in the European Union (EU) representing 18% of the child total including 3 million that are obese, (3.89% of the child total) [23, 24]. The numbers have in fact been rising each year and at present are 10 times higher than they were in the 1970s of the previous century [25]. This increase in child overweight and obesity is continuing despite government action from many countries and the best efforts of international organisations aimed at alerting to this epidemic as well as implementing remedial measures.

Data already published on the prevalence of youth obesity in Poland show a greater level in boys; in schoolchildren aged 10-17.9 years, (n=1719), 25% males were overweight or obese compared to 8% females. A 16.4% level of overweight and obesity was seen in the presented study. A similar trend is observed in Swedish data where overweight and obese males were 19% and 7% respectively compared to 9% and 4% in females [26, 27]. Adolescent obesity was also found to increase for both genders in study survey during 2001/2002 and 2005/2006 (Health Behaviour in Scholl-aged children -HSSC) in countries such as Czech Republic, Latvia, Lithuania, Hungary, and Poland, and among Maltese girls and Slovak boys [28]. Each European country however has different levels of child and adolescent obesity and overweight. In the group of children aged 0-5 years the highest percentage of overweight were observed in the Ukraine: 27 % of boys and 27.3% of girls and in Bosna and Herzegovina – 17.1% of boys and 16.7% of girls. The highest levels of overweight early school-age children of both genders were observed in Spain, (35.2% aged 6-9 yrs), and Portugal, (31.5% aged 7-9yrs), whereas the lowest levels were seen in Slovakia, (15.2% aged 7-9yrs), Switzerland, (19.1% aged 7-9yrs), and Ireland, (18.5% aged 9yrs). Among children at early school-age the highest percentage of overweight children of both genders was noted in Spain – 6-9-year-olds; 35.2%, and Portugal – 7-9-year-olds; 31.5%, whereas the lowest percentage was found in Slovakia – 7-9-year-olds; 15.2%), in France – 7-9-year-olds; 18.1%, Switzerland – 6-9-year-olds; 18.3%), and Island (9-year-olds; 18,5%). Among adolescents the highest percentage of obesity was noted among Irish girls, (27.3% aged 9-12yrs), and Spanish boys, (31.7% aged 10-17yrs). The lowest percentage of obese adolescents was observed in the Czech Republic, (9% aged 14-17yrs) [25].

In Poland, during the school-year 1994-1995, population studies were carried out in order to assess the occurrence of overweight and obesity among children aged 6-17. Overweight was noted in 8.7% of children and adolescents, while 3.4% were obese which confirmed the observed tendency of increased body weight of the young in the general population. In keeping with the all-European trends it was seen that boys showed more excessive weight than girls (ie. twice higher as shown in the present study). This study also confirmed previously reported observations that greater numbers of overweight and obese children live in urban areas [29, 30]. The results of all-Polish studies conducted by the Institute of Food and Nutrition in 2000 indicated that 15.9% of boys and 11.1% of girls aged 1-18 were overweight, and 4.4% and 3.4%, respectively were obese [31]. A 2001 study showed an increase in the percentage of obese children at school age. Overweight, including obesity, was noted in 15.4% of children (15.8% of girls and 15.0% of boys), while obesity was observed in 3.6% of children (3.7% of girls and 3.6% of boys) [8]. It is estimated that the prevalence of obesity among Polish children and adolescents has increased during a 10 year period, (1995-2005) by 4-6% [32]. This tendency is confirmed by the present study.

All similar studies to date in Poland indicate that the younger generation possess inadequate knowledge for making healthy nutritional choices. This level of knowledge is shaped by nutritional habits/practices, socio-economic status of the family in which an adolescent is being raised, as well as the information passed on by the media and press (advertisements, trends, fashionable diets). The most frequent undesirable nutritional behaviour among adolescents,consistent with the present study, are omitting breakfast, snacking between main meals and an insufficient number of daytime meals, (especially marked in girls where less than 3 main meals are eaten and no breakfast). In recent years, an increase has also been noted in the consumption of sweets, sweetened beverages and fast-food types of meals. [14, 33, 34, 35, 36].

In order to discover the opinions of high school adolescents concerning their body image and practices related with

nutritional disorders, an all-Polish study was conducted which covered schoolchildren aged 12-17. The results obtained indicated that adolescents attending junior high schools, in general, accept their body image; however, more than ¼ declared the intention to reduce their body weight, half reporting excessive consumption, 40% feared obesity, 28% experienced anorexia and almost 1/10 provoked self-vomiting. It was also found that 77% adolescents, 87.3% schoolchildren and 87.4% students snacked between meals. The adolescents most frequently snacked on highly calorific food products. A positive outcome is however that during the day the majority of high school children snacked on fruit. Adolescents in fact were aware that highly calorific food products of the fast-food type are not conducive for health, and that one should consume a greater amount of fruit and vegetables. According to their opinions, regular consumption of meals during the day has no significant effect on health and maintenance of a correct body weight [37].

The nutritional habits of university students are also inadequate, as confirmed by studies of 201 students from various faculties at the Medical University in Łódź (127 females and 74 males) aged 19-26 – the study survey being based on a self-designed questionnaire. Students preferred 3-4 meals per day which genearally consisted of breakfast, (daily consumption reported by 71.6% females and 58.1% males), lunch, (74% and 78.4% respectively), and supper/dinner (63.8% and 78.4%). These were generally main meals: first breakfast (everyday consumption was declared by 71.6% of females and 58.1% of males), lunch (74.0% and 78.4%, respectively) and supper (63.8% and 78.4%). Snack meals were consumed less regularly. Every fifth respondent (19.7% of females and 20.3% of males) did not eat second breakfast at all and similar numbers of students, (28.3% and 24.3% respectively), were not in the habit of eating any light afternoon meals. The reasons given for missing meals were chiefly a lack of time, (70.9% females and 64.9% males), and not feeling hungry, (53.5% and 44.6% respectively). Females, (24.4%) also gave dieting as a reason. Despite this, 34.6% of females and 35.1% of males admitted that they snacked every day between meals. The majority of adolescents admitted to having 1-2 fast-food meals per month nevertheless another group was identified to eat 1-2 or even 3-4 fast-food meals per week, (2.4-4.7% females and 5.4-14.9% males depending on the product type) [38].

In preventing obesity among children and indirectly also adults, great importance is ascribed to so-called nutritional programming in the earliest periods of life. According to Baker's hypothesis, malnutrition of the foetus in the 1st and 2nd trimester of pregnancy should be prevented because a baby with intrauterine hypertrophy, in favourable nutritional conditions after birth, will rapidly gain weight which will favour the development of obesity. If obesity occurs at childhood then this excerts a negative effect on health during adulthood [39]. More than 60% of children who are obese before the age of puberty will also be obese in early adulthood which will contribute to a more rapid manifestation of chronic, non-contagious diseases, a decrease in the quality of life and the necessity for treatment during most of a lifetime [25]. Arterial hypertension occurs most frequently and most early. The data available suggest that the incidence of arterial hypertension among the young population in Europe ranges from 2-16.7% [40]. There are also reports of a 2.5-fold increase in mortality due to ischemic heart disease among the population aged 18, with the BMI equal to or higher than 25 kg/m^2, compared to those with a BMI of 9.00-19.99 kg/m^2 [41]. Disorders in the blood lipid profile occurr as follows; an increase in the unhealthy fraction of cholesterol LDL and triglicerides and a decrease in the level of 'good' cholesterol HDL which is responsible for the development of atheroslerosis of the blood vessels [42]. Obesity, hypertension, dyslipidemia and insulin resistance are the elements which accompany the metabolic syndrome, (X syndrome, Raeven's syndrome). Nearly one third of young people with obesity or overweight already possess the features of an early X syndrome [41]. The consequences of this syndrome are cerebral stoke, myocardial infarction and non-alcoholic fatty liver disease [43]. Overweight and obesity also induce urolithiasis, cholelithiasis, sleep apnea and many complications in the functioning of the motor organs: flat feet, body posture defects and degenerative joint disease [42, 43].

SUMMARY

Inadequate nutritional behaviours are conducive for the development of obesity and overweight. An increase in body weight occurs at the moment of distortion of the balance between supply and use of energy [22]. The amount of energy consumed should be adjusted to the needs of the organism associated with its physical activity, age, gender, and a specified physiological status. The covering of energy demand should be performed through the consumption of meals which are balanced from the aspect of ingredients, with consideration of various groups of food products in adequate portions. Studies conducted within the last decade in many countries worldwide showed that, together with an increase in the availability of food of high energy density, there occured a shift in the activity of adolescents towards a sedentary style of life and decrease in physical activity. In the etiology of obesity, nutritional behaviours and physical activity are a set of external, behavioural factors, and are therefore modifiable. Their proper modification is a real chance to help adolescents who are obese or threatened with obesity.

In conclusion, the preventive strategy in overcoming obesity among the youth and adolescents is important. However, weight control strategy and correct education about a healthy body image is necessary in preventing eating problems which might occur among adolescents. The importance of physical activity and healthy eating habits should be given due attention, not only to prevent obesity, but also other eating disorders. For further studies, a more comprehensive research method should be adopted to include such factors as: energy intake, energy expenditure, weight management knowledge, dietary behaviours/practices and physical activity.

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