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INFLUENCE OF NON-DIETARY FACTORS ON THE PREVALENCE OF ABDOMINAL OBESITY AS A MAJOR COMPONENT OF THE METABOLIC SYNDROME AMONG 17-18-YEAR-OLD YOUTH

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ABSTRACT

Background. Youth nutrition and their nutritional status are conditioned by many factors, some of the main ones being: economic, social, climatic, cultural, and psychological factors as well as nutritional knowledge. With the growing problem of overweight and obesity among children and young people, the incidence of the metabolic syndrome is also increasing.

Objective. The aim of the study was to assess the impact of demographic, sociological and psychological factors on the incidence of obesity among 17–18-year-old adolescents from Wroclaw and vicinity as a major risk factor for the development of the metabolic syndrome.

Material and Methods. The study was conducted in three upper-secondary schools in Wroclaw, Poland. In the surveyed group (17-18 years old, n = 269) girls accounted for 59.5% and boys constituted 40.5%. Majority of young people were Wroclaw citizens (72.9%). Centile charts elaborated by the Children's Memorial Health Institute were adopted for the evaluation of anthropometric parameters. Evaluation of the impact of non-dietary factors on the manner of nutrition was carried out using own questionnaire.

Results. Based on the tests, abdominal obesity was determined among 34.5% of adolescents aged 17 years and among 65.5% of these aged 18 years. Obesity was more common in girls carrying genetic burden of the disease. Youth with the largest waist circumference most often declared to use slimming diets - 6.7%, and the lowest hunger sensation in stress - 3.4%. In addition, 30.5% of the adolescents with the smallest waist circumference and 11.5% with the largest waist circumference declared to be non-smoking. Occasional alcohol consumption was declared by 30.1% of young people with the smallest waist circumference, and 13.4% with the largest waist circumference.

Conclusions. Youth with abdominal obesity significantly more likely than those with normal waist circumference applied slimming diets. Significant impact on the formation of abdominal obesity among girls had inherited disease burden.

Key words*: adolescents, abdominal obesity, socioeconomic status, psychological factors, poor nutritional behaviours*

STRESZCZENIE

Wprowadzenie. Sposób żywienia młodzieży i ich stan odżywienia są uwarunkowane przez wiele czynników, a główne z nich to: czynniki ekonomiczne, klimatyczne, kulturowe, psychologiczne i społeczne oraz wiedza żywieniowa. Wraz z rosnącym problemem nadwagi i otyłości wśród dzieci i młodzieży narasta problem rozwoju zespołu metabolicznego.

Cel. Celem badań była ocena wpływu czynników demograficznych, socjologicznych i psychologicznych na częstość występowania otyłości brzusznej wśród 17-18 letniej młodzieży z Wrocławia i okolic jako głównego czynnika ryzyka rozwoju zespołu metabolicznego.

Materiał i metody. Badania zostały przeprowadzone w trzech wrocławskich szkołach ponadgimnazjalnych. W grupie badanych uczniów w wieku 17-18 lat (n= 269) dziewczęta stanowiły 59,5%, natomiast chłopcy 40,5% ogółu badanych. 72,9% badanych pochodziło z Wrocławia. Do oceny parametrów antropometrycznych przyjęto opracowane w Instytucie Pomnik-Centrum Zdrowia Dziecka siatki centylowe. Ocena wpływu czynników pozażywieniowych na sposób żywienia została przeprowadzona za pomocą autorskiego kwestionariusza opracowanego w Katedrze Żywienia Człowieka Uniwersytetu Przyrodniczego we Wrocławiu.

Wyniki. Stwierdzono występowanie otyłości brzusznej wśród 34,5% nastolatków w wieku 17 lat i wśród 65,5% młodzieży 18-letniej. Otyłość występowała częściej u dziewcząt obciążonych dziedzicznie tą chorobą. Dziewczęta istotnie częściej niż chłopcy zwracały uwagę na swój wygląd i były bardziej krytyczne w stosunku do swojej masy ciała. Zadowolenie ze swojego wyglądu istotnie częściej deklarowały osoby o najmniejszym obwodzie talii. Młodzież z największym obwodem

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talii najczęściej deklarowała stosowanie diet odchudzających - 6,7%, i najmniejsze odczuwanie głodu w stresie - 3,4%. Niepalenie papierosów deklarowało 30,5% młodzieży z najmniejszym obwodem talii i 11,5% z największym obwodem talii. Okazjonalne spożywanie alkoholu deklarowało 30,1% młodzieży z najmniejszym obwodem i 13,4% z największym obwodem talii.

Wnioski. Młodzież z otyłością brzuszną istotnie częściej niż osoby z prawidłowym obwodem talii stosowała diety odchudzające. Wśród czynników pozażywieniowych istotny wpływ na powstawanie otyłości brzusznej wśród dziewcząt miało dziedziczne obciążenie tą chorobą.

Słowa kluczowe*: młodzież, otyłość brzuszna, status socjoekonomiczny, czynniki psychologiczne, niewłaściwe zachowania żywieniowe*

INTRODUCTION

Youth nutrition has to ensure the proper physical and mental development and utilization of the genetically-determined developmental potential. A properly designed diet should prevent typical diseases of the adolescence period as well as reduce the risk of development of food-related diseases [2].

Nutrition is conditioned by many factors, some of the main ones being: economic, climatic, cultural, psychological and social factors as well as nutritional knowledge. Socioeconomic status reflects the diversity of society. It specifies where individuals or groups are located in the social structure. It is determined by a corresponding level of income, education, occupational status, family structure, and place of residence. These relationships have been frequently addressed in both national [1, 11, 15, 16, 24, 29] and foreign [8, 9, 19, 21, 27] studies in recent years.

Adequate nutrition during childhood and adolescence determines the state of health in adulthood. Among 50-80% of children and youth, overweight and obesity persist into adulthood [6]. These disorders represent a growing social problem in recent years. There are many reasons for this including lifestyle change, low physical activity, stress or irregular eating habits. Until recently, majority of overweight or obese people were adults, while at present, this group is growing in young people and children. Worldwide, 66% of adults are overweight, and 34% are obese. In Europe, 50% of the population is overweight and 30% is obese [9]. In Poland, according to the WOBASZ study (Nationwide Multicenter Study on the State of Polish Population Health), conducted in the years 2003-2005, 27.9% of women and 40.4% of men were overweight, while 22.4% of women and 21.2% of men were obese [4, 12]. According to the report of International Obesity Task Force (IOTF), 155 million children and young people in the world are overweight or obese, and this includes 30-45 million of children and young people [10]. In Europe 16-22% of children and youth are overweight or obese, and 4-6% of them are obese [27].

In Poland, according to the National Institute of Food and Nutrition (IZZ) in Warsaw, 11.1% of girls and 15.9% boys are overweight, and 3.4% of girls and 4.0% of boys are obese [2]. With the growing problem of overweight and obesity among children and young people, the incidence of the metabolic syndrome is also increasing, and its main components are: abdominal obesity, hypertension, and abnormal lipid and carbohydrate metabolism. Identification of factors constituting the metabolic syndrome at the age of development offers the possibility of early initiation of treatment and reducing the risk of developing a full-blown metabolic syndrome.

The aim of this study was to assess the influence of demographic, sociological and psychological factors on the incidence of abdominal obesity among 17-18-year-old youth from Wroclaw and vicinity as a major risk factor for the development of the metabolic syndrome.

MATERIAL AND METHODS

Characteristics of the study group

The study was conducted between November 2010 and May 2011 in three upper-secondary schools in Wroclaw, participating in the "Health-Promoting School" program. The group of students (n = 269) consisted of 160 girls and 109 boys aged 17-18 years, enrolled in the first and second classes. Girls accounted for 59.5% and boys 40.5% of the surveyed students. First grade students accounted for 54.0% of the study group (146 persons), and second graders constituted 46.0% (123 persons). Most students attended specialized secondary schools (147 persons), constituting 54.6% of the total, followed by a technical secondary school students (101 persons, 37.5%), and a vocational school (21 persons, 7.8%). 72.9% of participants were from Wroclaw, 11.1% lived in towns, while 15.2% in rural areas. The largest group (69.9%) in the young people investigated was this with complete families - living only with their parents or with additional siblings. 30.1% of the surveyed students came from incomplete families including 27.4% of single-parent families, 1.5% declared that they

lived only with siblings, and 1.1% with a person from extended family. The inclusion criteria were as follows: age of students, the consent given by the parents and young people to carry out the study, and participation of students in a complete cycle of tests.

Ethical aspects

Parents, guardians or students who were of age, provided written informed consent to the study. In a statement provided guarantees covering confidentiality. The study was approved by the Research Ethics Committee of the Medical University in Wroclaw (KB-376/2009) which is affiliated with the Council for National Research Ethics in Poland.

METHODS

Anthropometric analysis

In the studied group of young people, body mass and height were measured using a medical scale equipped with a stadiometer (medical mechanical column scale ADE) without shoes and upper clothing. Measurements of waist circumference and hip circumference were performed using a measuring tape. Hip circumference measurements were performed at the level of the iliac crest, while the waist measurement was made midway between the superior iliac crest and the lower margin of the iliac arch. Centile charts developed at the Children's Memorial Health Institute were adopted for the evaluation of anthropometric parameters [14] at the following cut-off points: waist circumference > 95th percentile - abdominal obesity (central) (17–18-year-old girls > 80 cm, 17-year-old boys > 90 cm, 18-year-old boys > 91 cm), BMI > 85th percentile – overweight (17–18-year-old girls 23.9-26.6 kg/m^2, 17-year-old boys 24.9-27.4 kg/m^2, 18-year-old boys 25.5-28.2 kg/m^2), and BMI > 95th percentile – obesity, 17-18-year-old girls > 26.6 kg/m^2,17-year-old boys > 27.5 kg/m^2, 18-year-old boys > 28.2 kg/m^2.

Analysis of non-dietary factors

Evaluation of the impact of non-dietary factors on the manner of nutrition was carried out using own questionnaire developed at the Department of Human Nutrition at Wroclaw University of Environmental and Life Sciences. The questionnaire contained questions about gender, age, family structure of the young people, parents' education, place of residence, metabolic diseases in the family, self-evaluation of weight, paying attention to weight, satisfaction with appearance, cigarette smoking, alcohol consumption as well as general knowledge of nutrition and influence of advertisings on food choices. The questionnaire was validated on a group of 50 personal. Nutritional knowledge was tested by a questionnaire.

Statistical analysis of the results

All the results were subjected to statistical analysis using StatSoft software Statistica 10. Accordance of continuous anthropometric data with normal distribution was checked with the *Shapiro-Wilk* test. Parametric tests to assess the impact of non-dietary factors on selected anthropometric parameters of the study group could not be used due to the absence of accordance with the normal distribution. In order to characterize the group of young people examined, median (Me), quartile deviation (Q), and the 75th and 95th percentile values of selected anthropometric indicators were calculated. Significant correlations between discontinuous non-dietary factors and selected anthropometric parameters were calculated using multi-way tables and the relationships were shown with the *Chi*-square test. Level of significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

The youth surveyed in this study was divided into three groups according to waist circumference:
Group 1 (n = 131 - G = 62, B = 69) – waist circumference < 75th percentile
Group 2 (n = 80 - G = 57, B = 23) – waist circumference 75-95th percentile
Group 3 (n = 58 - G = 41, B = 17) – waist circumference > 95th percentile

The relationship between age and waist circumference is shown in Figure 1.

Based on the tests performed, abdominal obesity was determined among 34.5% of young people aged 17 years and among 65.5% of these aged 18 years. *Cook* et al. [3] reported the presence of abdominal obesity among 9.8% of the group in a study conducted among American adolescents (n = 2430) aged 12-19 years. *Cruz* et al. [4] reported the presence of abdominal obesity among 62% of the group in a study conducted among Spanish young people (n = 126) aged 8-13 years. The study *of Firek- Pędras* et al. [7] showed the presence of abdominal obesity among 63% of the group including 64 children aged 6-18 years. Different conditions of the studies, various group sizes and different cut-off point confirming the presence of abdominal obesity were the main reasons for disparity of results. However, most studies point to the spreading problem of obesity among increasingly younger population.

The non-dietary factors that increase the risk of obesity include cigarette smoking and alcohol consumption. In our study, the highest percentage of young people, re-

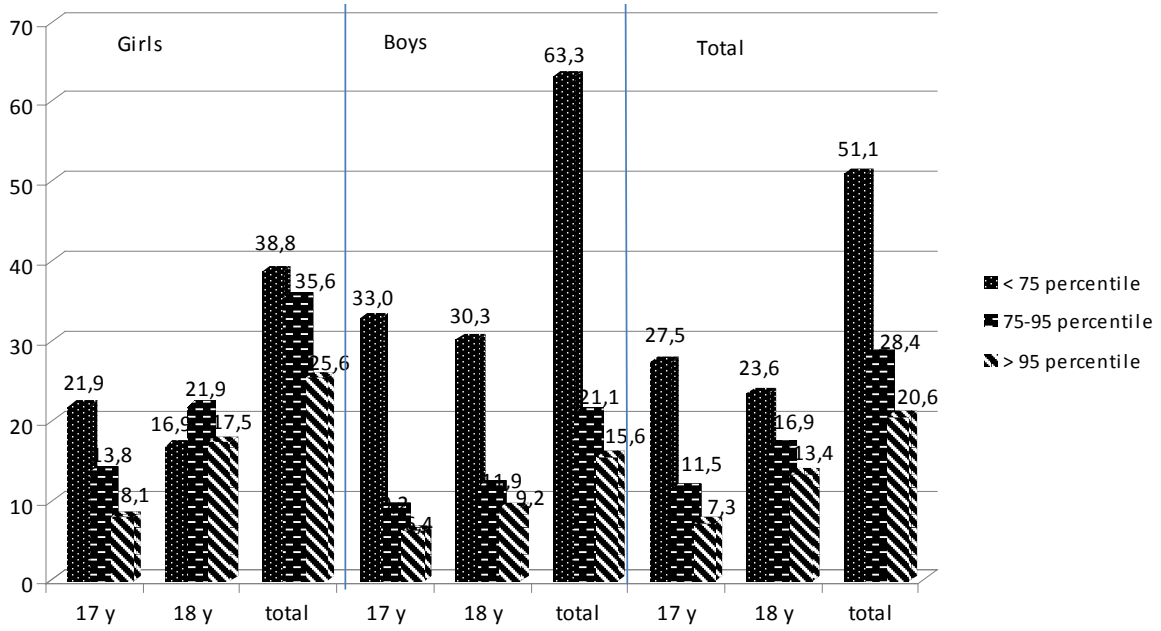


Figure 1. The effect of age on the incidence of obesity among the young people in the study

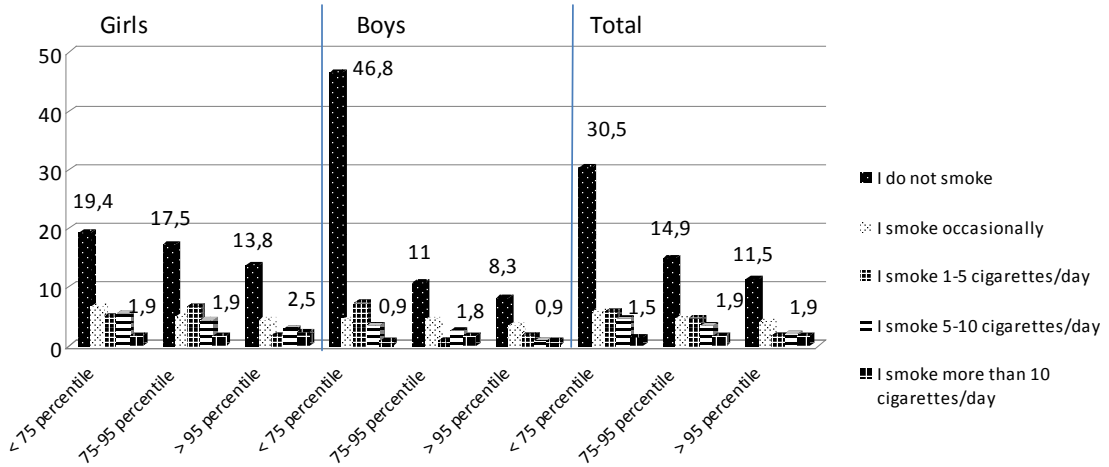


Figure 2. Prevalence of smoking among the young people in the study in relation to waist circumference

gardless of gender and waist circumference, declared to be non-smoking. Among youth with the smallest waist circumference, smoking was 30.5%, while among those with the largest waist circumference 11.5% declared to be smoking (Figure 2). The study of *Szczerbiński* et al. [26] found 26.5% of their study group to be regular smokers, while in the study of *Myers and Kelly* [18] 75% of young people were habitual smokers, and 61% had smoked 10 or more cigarettes a day. The study by *Sygit* et al. [25] carried out on 300 people aged 15-19 years from Western Pomerania showed that 21% of young people were overweight and 86.9% of young people with obesity regularly smoked cigarettes. In our study over 10% of students with abdominal obesity declared to be smokers. In this study occasional alcohol consumption was declared by 30.1% of young people with waist circumference < 75th percentile, 21.6% of the group with waist circumference within 75th and 95th percentile, and 13.4% of the group with waist circumference above 95th percentile (Figure 3). The study of *Sygit* et al. [25] showed that 48.6% of overweight youth and 43.5% with obesity, regularly consumed alcohol. *Szczerbiński* et al. [26] in a study conducted among 17–19-year-old youth from the Sokółka county showed that alcohol consumption was declared by 80.4% of young people studied, and 17.3% of these teenagers were at least once in their lifetime in a state of intoxication.

Metabolic diseases that occur most frequently in the immediate family of the young people from the study are shown in Figure 4.

Our results showed a statistically significant correlation between the incidence of obesity in the family, and diabetes and obesity occurring together in specified subgroups of girls and waist circumference (Figure 4). Diabetes was significantly more frequent among parents of boys whose waist circumference was below the 75th

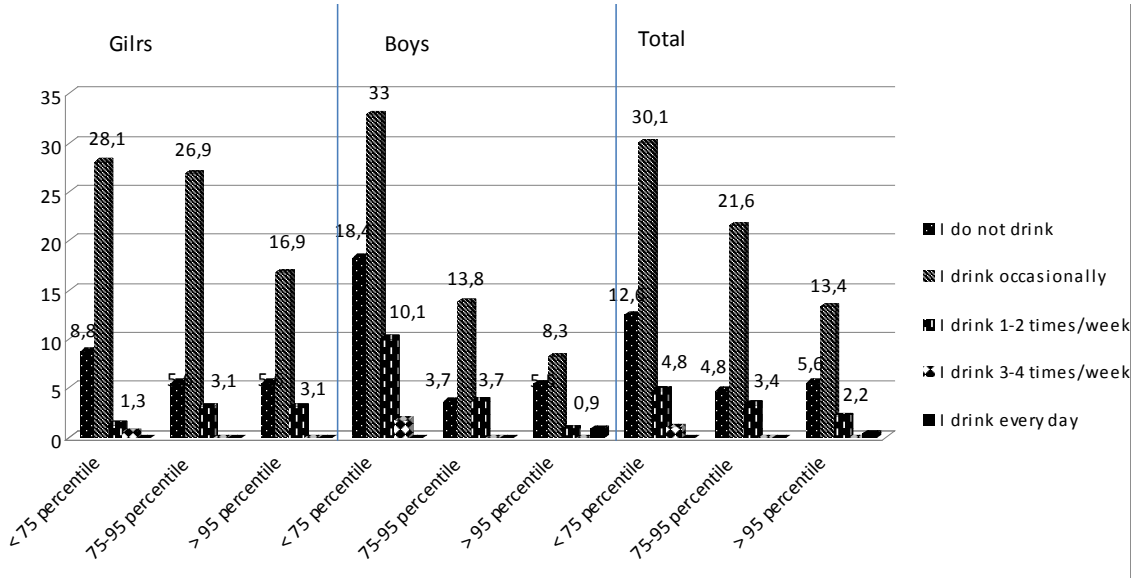


Figure 3. Prevalence of alcohol consumption among the young people in the study in relation to waist circumference

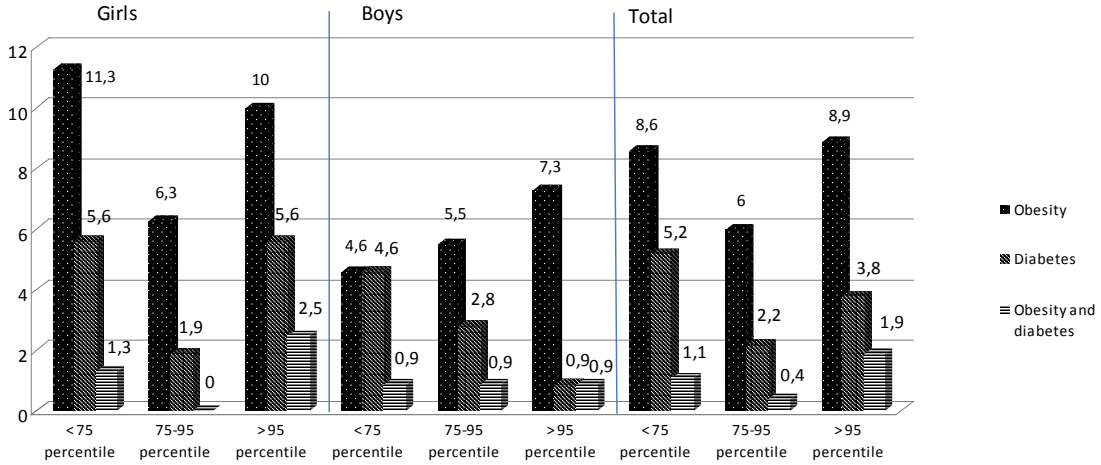
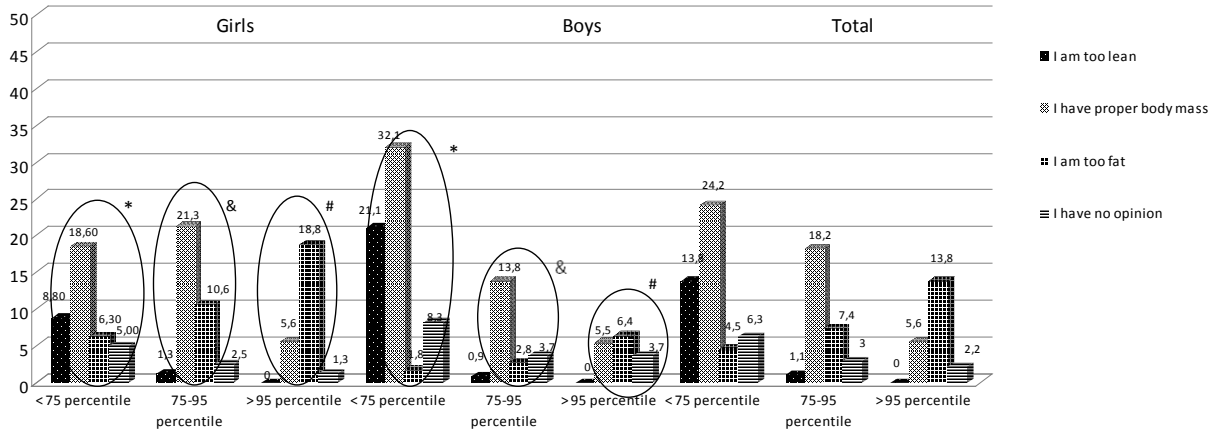


Figure 4. The occurrence of diseases in the immediate family in relation to the waist circumference

percentile. Obesity and diabetes occurring together were significantly more common among parents of girls with the largest waist circumference, similarly as obesity was significantly more frequent among parents of boys with abdominal obesity (Figure 4). *Wada* et al. [28] found that family history of diabetes was associated with impaired glucose metabolism manifesting already at an early age. *Maddah* [17] conducted a study among children aged 6-17 years showed that the prevalence of overweight and obesity have been more frequent, if their parents had type 2 diabetes.

Equally significant influence, as the burden of genetic metabolic diseases and abnormal lifestyle, on the occurrence of obesity among young people, was played by psychological aspects. Selected factors are shown in Table 1 and in Figure 5.

The results obtained indicate that the greatest attention to appearance was paid by the persons with the smallest waist circumference – 20.8% (Table 1). Significantly more young people with a waist at < 75th percentile considered it a proper body mass, while young people with abdominal obesity significantly more often believed that they are too fat. Girls and boys from subgroup 1 were most satisfied with their appearance – 37.2%, but at the same time they most often felt stress and the associated hunger before going to school (Table 1). Boys with a normal waist circumference below 75th percentile were less critical in the self-assessment of body mass than girls as 32.1% of them believed their mass is appropriate, while only 18.6% of girls in this subgroup considered their weight to be normal (Figure 5). Youth of the largest waist circumference, greater than 95th percentile, was significantly more likely to declare the use of weight loss diets – 6.7% of the group, while their sensation of hunger in stress was lowest – 3.4% (Table 1). Approximately 19% of girls with abnormal waist circumference thought they were too fat, while the percentage of boys in this subgroup was 6.4% (Figure 5).



*, &, # - Statistically significant differences between gender in percentile groups

Figure 5. Estimation of own body weight vs. actual waist circumference

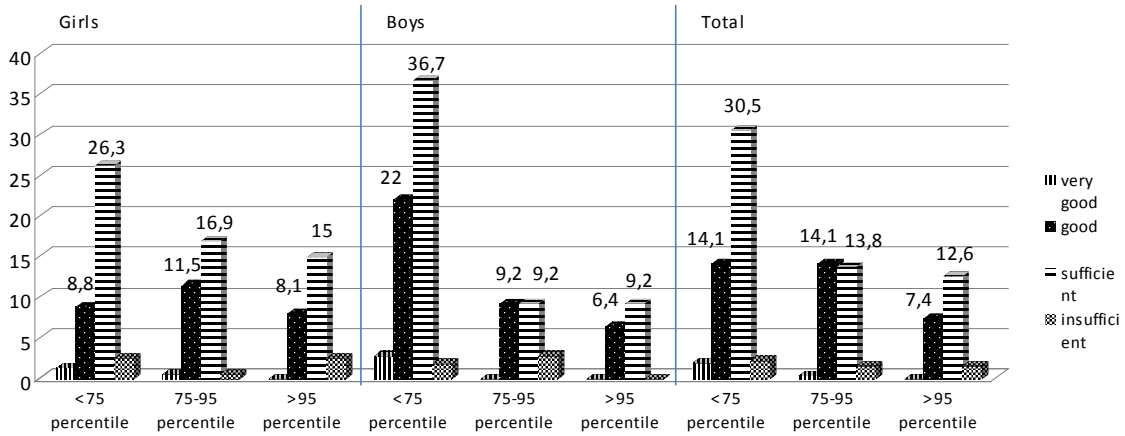


Figure 6. Subjective evaluation of nutritional knowledge among the young people in the study in relation to waist circumference

The study of *Korzycka-Stalmach* et al. [13] conducted on a group of 561 people aged 13 years and their parents, showed statistically significant differences between their own assessment of their body mass and the actual value, and this effect was gender-dependent. Almost 4% of girls and nearly 11% of boys with overweight/obesity evaluated their body mass as normal. *Piotrowska* et al. [22] found that girls with excessive body mass often felt that they are too fat (6.6%) than considered their body mass as normal (4.2%), while those with normal body weight significantly more often (36.9%) have paid attention to their appearance than teens with malnutrition (5.4%). The girls who were overweight, applied a weight loss diet significantly more

Table 1. Selected psychological factors in groups with diverse waist circumference

Waist circumference	Paying attention to own body weight (%)	Satisfaction with appearance (%)	Feeling of stress before going to school (%)	Feeling of hunger in stress (%)	Use of weight loss diet (%)
	Yes	Yes	Yes	Yes	Yes
Group 1 (n=131)	20.8[1]	37.2[1]	6.3[1]	13.8[1]	3.4[1]
<75th percentile					
Group 2 (n=80)	14.9[1]	21.2[2]	5.2[1]	6.0[1]	3.0[1]
<75th-95th> percentile					
Group 3 (n=58)	12.6[1]	12.6[3]	6.0[1]	3.4[1]	6.7[2]
>95th percentile					
Whole group (n=269)	48.3	71.0	17.5	23.1	13.1

1, 2, 3 - homogeneous groups. Statistically significant differences between homogeneous groups in response to particular questions.

likely than the girls with normal body mass. *Wojtyła-Bucior* et al. [30] in their study asked approximately 1,000 teenagers from the Kalisz county, whether they are satisfied with their appearance. Approximately 65% of them declared dissatisfaction, giving excessive body mass as the main cause. Girls were twice as likely as boys to declare that they do not accept their figure and that they are dissatisfied with excessive body mass.

The evaluation of nutritional knowledge of students included in the study is shown in Figure 6.

The young people in our study, regardless of gender and the circumference of the waist, most often declared that their nutritional knowledge was sufficient (Figure 6). Differences in the frequency of correct answers were statistically significant within gender. The study of *Owoc* et al. [20] conducted among 150 students aged 16-19 years from Warsaw secondary schools, found no statistically significant difference in responses to questions about nutritional knowledge, but more correct answers were given by girls and boys attending secondary schools of general education.

CONCLUSIONS

1. Significant impact on the formation of abdominal obesity among 17-18 girls had inherited disease burden.
2. Youth with abdominal obesity significantly more likely than those with normal waist circumference applied slimming diets.
3. Satisfaction with appearance was significantly more often reported by young people with the smallest waist circumference.

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Conflict of interest

The authors declare no conflict of interest.

REFERENCES

1. *Bujko J., Nitka I., Wunderlich S.*: Wskaźnik zdrowego żywienia HEI (Healthy Eating Index) u studentów SGGW w zależności od warunków socjalno-bytowych. Żyw Człow 2006, 1, 18-27.
2. *Charzewska J., Rychlik E., Wolnicka K.*: Zasady prawidłowego żywienia. Dzieci i młodzież. W: *Jarosz M., Bułhak-Jachymczyk B.* (red.) 2008. Normy Żywienia Człowieka. Podstawy prewencji otyłości i chorób niezakaźnych. Wydawnictwo Lekarskie PZWL 2010, Warszawa (in Polish).
3. *Cook S., Weitzman M., Auinger P., Nguyen M., Dietz W. H.:* Prevalence of a metabolic syndrome phenotype in adolescents. Arch Pediatr Adolesc Med, 2003, 157, 821-827
4. *Cruz M. L., Weigensberg M. J., Huang T. K., Ball G., Shaibi G. Q., Goran M. I.:* The metabolic syndrome in overweight Hispanic youth and the role of insulin sensitivity. J Clin Endocrinol Metab, 2004, 89, 108-113.
5. *Czajka K., Kochan K.:* Zachowania zdrowotne dzieci i młodzieży związane z postrzeganiem własnych proporcji ciała. Rocz Panstw Zakl Hig 2011, 62(1): 101-107
6. *Falkowska A., Stefańska E., Ostrowska L.*: Ocena sposobu żywienia dzieci w wieku 10-12 lat o zróżnicowanym stopniu odżywienia. Endokrynol Otyłość, 2011, 7 (4), 222-228.
7. *Firek- Pędras M., Małecka- Tendera E., Klimek K., Zachurzok- Buczyńska A.*: Wpływ rozmieszczenia tkanki tłuszczowej na zaburzenia metaboliczne u dzieci i młodzieży z otyłością prostą. Endokrynol Diabetol 2006, 12, 1, 19-24.
8. *Firel S., Walsh O., McCarthy D.*: The irony of a rich country: issues of financial access to and availability of healthy food in the Republic of Ireland. J Epidemiol Community Health 2006, 60, 1013-1019.
9. *Hanson M. D., Chen E.*: Socioeconomic status and health behaviors in adolescence: A review of the literature. J Behav Med. 2007, 3, 263-285.
10. International Obesity Task Force and The European Association for the study of obesity. EU Platform on Diet, Physical Activity and Health. Obesity in Europe. Brussels, 2005
11. *Jastrzębska-Mierzyńska M.,Ostrowska L., Hady H.R., Dadan J.:* Dietary habits of obese patients qualified for bariatric procedures. Rocz Panstw Zakl Hig 2014, 65(1): 41-47
12. *Kłosiewicz-Latoszek L.*: Otyłość jako problem społeczny, zdrowotny i leczniczy. Probl Hig i Epidemiol 2010; 91(3):339-343.
13. *Korzycka-Stalmach M., Mikiel- Kostyra K., Jodkowska M., Oblacińska A.*: Samoocena masy ciała 13-latków w zależności od wskaźnika masy ciała rodziców. Endokrynol Otyłość, 2012; 8(2):53-58.
14. *Kułaga Z., Kułaga Z., Litwin M., Zajączkowska M.M., Wasilewska A., Morawiec-Knysak A., Różdżyńska A., Gajda A., Gurzkowska B., Napieralska E., Barwicka K., Świąder S.*: Porównanie wartości obwodów talii i bioder dzieci i młodzieży polskiej w wieku 7-18 lat z wartościami referencyjnymi dla oceny ryzyka sercowo-naczyniowego- wyniki wstępne projektu badawczego OLAF (PL0080). Stand Med. 2008; 5:473-485.
15. *Kwiatkowska E.*: Wpływ wykształcenia rodziców na częstotliwość spożywania warzyw i owoców przez ich dzieci. Roczn Państw Zakł Hig, 2010; 61(2):179-182.

16. *Leszczyńska T., Bieżanowska-Kopeć R.*: Ocena sposobu żywienia w gospodarstwach domowych prowadzonych przez osoby z wyższym wykształceniem. Żywność. Nauka. Technologia. Jakość 2005;4:151-161.
17. *Maddah M.*: Association of parental diabetes with overweight In Iranian children and adolescents. Int J Cardiol 2008; 12:126-128.
18. *Myers M.G., Kelly J.F.*: Cigarette smoking among adolescents with alcohol and other drug use problems. Alcohol Res Health 2006; 29(3): 221-227.
19. *Nelson M., Dick K., Holmes B.*: Food budget standards and dietary adequacy in low-income families. Proc Nutr Soc 2002;4: 569-577.
20. *Owoc A., Maliszewska D., Bojar I., Pawełczak-Barszczowska A.*: Ocena poziomu wiedzy młodzieży warszawskich szkół średnich na temat wybranych czynników ryzyka chorób układu krążenia. Med Ogólna 2010; 16 (45), 4:581-594.
21. *Piko B. F., Fitzpatrick K. M.*: Socioeconomic Status, Psychosocial Health and Health Behaviours among Hungarian Adolescents. Eur J Public Health, 2007;4:353-360.
22. *Piotrowska E., Żechałko-Czajkowska A., Biernat J., Mikołajczak J.*: Ocena wybranych cech stylu życia kształtujących stan zdrowia 16-18-letnich dziewcząt. Cz. I. Stosowanie różnych diet, aktywność fizyczna, palenie papierosów i picie alkoholu. Rocz Państw Zakl Hig 2009;60(1):51-57.
23. *Przybylska., Kurowska M., Przybylski P.*: Otyłość i nadwaga w populacji rozwojowej. Hygeia Public Health 2012;47(1):28-35.
24. *Stefańska E., Ostrowska L., Radziejewska I., Kardasz M.*: Zwyczaje żywieniowe studentek Uniwersytetu Medycznego w Białymstoku w zależności od sytuacji ekonomiczno-społecznej. Rocz Panstw Zakl Hig 2011; 62(1): 59-63.
25. *Sygit K., Kołłątaj W., Goździewska M., Sygit M., Kołłątaj B., Karwat I.D.*: Lifestyle as an import and factor in control of overweight and obesity among schoolchildren from the rural environment. Ann Agricul Environ Med 2012;19(3):557-561.
26. *Szczerbiński R., Karczewski J., Szpak A., Karczewska Z.*: Zachowania zdrowotne młodzieży szkół ponadgimnazjalnych w powiecie sokólskim. Cz. II. Palenie papierosów i picie napojów alkoholowych. Rocz Panstw Zakl Hig 2007, 58(3), 525-532.
27. *Von Rueden U., Gosch A., Rajmil L. et al.*: Socioeconomic determinants of health related quality of life in childhood and adolescence: results from a European study. J Epidemiol Community Health 2006, 2, 130-135.
28. *Wada K., Tamakoshi K., Yatsuja H., Otsuka R., Murata C. Zhang H., Takefuji S., Matsushita K., Sugiura K. Toyoshima H.*: Association between parental histories of hypertension, diabetes and dyslipidemia and the clustering of these disorders in offspring. Prev Med 2006, 42, 358-363.
29. *Waluś A., Wądołowska L., Cichon R.*: Stan odżywienia 16-letniej młodzieży z regionu suwalskiego o różnym statusie ekonomicznym. Żyw Człow 2003, 1/2, 209-214.
30. *Wojtyła-Buciora P., Marcinkowski J.T:* Sposób żywienia, zadowolenie z własnego wyglądu i wyobrażenie o idealnej sylwetce młodzieży licealnej. Probl Hig Epidemiol 2010, 91 (2), 227-232.

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