



Knowledge concerning obesity complications and opinions about its social consequences among students of the Medical University and Maria Curie-Skłodowska University in Lublin, Poland

Wiedza studentów Uniwersytetu Medycznego w Lublinie oraz Uniwersytetu Marii Curie-Skłodowskiej o powikłaniach otyłości oraz ich opinie na temat jej społecznych konsekwencji

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■ Abstract

Introduction. An important element of obesity prophylaxis is an increase in the awareness of health and the social consequences of obesity, as well as an increase in the level of knowledge concerning the relationship between anti-health behaviours and excessive body weight.

Objective. The aim of the study was assessment of knowledge concerning obesity complications among the students of two universities in Lublin, Poland, and recognition of their opinions about the functioning of obese individuals in the society.

Materials and method. The study was conducted during the period November 2017 – March 2018 in a group of 200 students from the selected universities in Lublin by the method of a diagnostic survey, using a questionnaire technique. The research instrument was an author-constructed questionnaire containing 46 items: 23 items referring to knowledge of the health consequences of obesity, 12 – undertaking the scope of problems concerning the stigmatization of obese persons, and 11 – respondents' particulars pertaining to socio-demographic data.

Results. Statistical analysis showed significant relationships between the level of students' knowledge concerning the health effects of obesity and type of university, study specialty and year of study, as well as the place of the respondents' permanent residence according to the number of inhabitants. The correlate of a higher level of knowledge concerning obesity was the presence of an obese person in the respondent's direct social environment. Knowledge of the health consequences of obesity among students of the Lublin universities is unsatisfactory, although students of the Medical University show a better knowledge of this problem,

compared to those from Maria Curie-Skłodowska University (UMCS). In addition, it was confirmed that the respondents paid attention to the problem of stigmatization and social exclusion of obese persons in Polish society.

Conclusions. Health education focused on the dissemination of knowledge about the genesis and effects of obesity remains a constant challenge to public health, and should constitute an integral element of educational programmes at all education levels, and be obligatorily supplemented by multisectoral actions in the area of pro-health policy.

■ Key words

obesity, students, health knowledge, health behaviours, stigmatization

■ Streszczenie

Cel pracy. Celem pracy jest ocena wiedzy studentów lubelskich uniwersytetów o powikłaniach otyłości oraz poznanie ich opinii na temat funkcjonowania osób z otyłością w przestrzeni społecznej.

Materiał i metody. Badanie przeprowadzono techniką ankietowania w okresie od listopada 2017 do marca 2018 roku w grupie 200 studentów lubelskich uczelni, wybranych za pomocą metody sondażu diagnostycznego. Jako narzędzie badawcze posłużył autorski kwestionariusz ankiety zawierający 46 pytań, w tym: 23 – odnoszące się do wiedzy na temat zdrowotnych konsekwencji otyłości, 12 – poruszające problematykę stygmatyzacji osób z otyłością i 11 pytań merytorycznych, dotyczących danych socjodemograficznych.

Wyniki. Analiza statystyczna wykazała statystycznie istotne związki pomiędzy poziomem wiedzy studentów na temat zdrowotnych skutków otyłości a rodzajem uczelni, kierunkiem i rokiem studiów oraz miejscem stałego pobytu respondentów, określanym przez podanie liczby mieszkańców danej miejscowości. Korelatem wyższego poziomu wiedzy na

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temat otyłości była obecność osoby otyłej w bezpośrednim otoczeniu społecznym osób badanych. Wiedza na temat zdrowotnych konsekwencji otyłości wśród studentów lubelskich uczelni jest niesatysfakcjonująca, przy czym studenci uczelni medycznej wykazują większą wiedzę na ten temat niż studenci UMCS. Wykazano ponadto, że badane osoby zwracają uwagę na problem piętnowania i społecznego wykluczania osób z otyłością w polskim społeczeństwie.

Wnioski. Stałym wyzwaniem zdrowia publicznego pozostaje edukacja zdrowotna skoncentrowana na upowszechnianiu

wiedzy na temat genety i skutków otyłości, która powinna stanowić integralny element programów kształcenia na wszystkich poziomach edukacji i obowiązkowo być uzupełniona o wielosektorowe działania w zakresie polityki prozdrowotnej.

Słowa kluczowe

stygmatyzacja, zachowania zdrowotne, studenci, otyłość, wiedza o zdrowiu

INTRODUCTION

Non-communicable chronic diseases (NCD) are the main causes of death worldwide, and consequently one of the greatest challenges in the 21st century. These diseases include obesity, which is an etiologic factor of the cardiovascular system, as well as many cancerous diseases [1]. An inhibition of the trend towards the prevalence of obesity is among nine global health goals which, according to the UN political declaration, should be achieved by 2025 in the light of the *Global action plan for the prevention and control of non-communicable diseases 2013–2020*, also defined as the *Global NCD Action Plan*, adopted during the 66th World Health Assembly [2]. The incidence of obesity is increasing in all countries worldwide, both developed and developing, and concerns all age groups [3]. In 2014, 38% of males and 40% of females worldwide were overweight, whereas 11% and 15%, respectively, were obese [2]. In 1975, the prevalence of obesity among males was 3.2%, while among females – 6.4% [4]. In Poland, in the light of the second Multi-Centre All-Polish Study of the State of Health of Population (WOBASZ II) carried out during 2013–2014, 43.2% of males and 30.5% of females satisfied the criteria of overweight, whereas 24.5% and 25%, respectively, of obesity. While compiling these results with the first WOBASZ study conducted 10 years earlier (2003–2005), a clear upward tendency may be observed in the occurrence of excessive body weight in Polish society [5]. The growing problem of obesity is observed especially in the developing countries, where this problem especially affects women, which is associated with the tendency towards gaining body weight at reproductive age, as well as the possibility to consume a larger amount of food during the preparation of meals [6].

The reports from studies concerning knowledge on the complications of obesity are the element of adoption of the latest guidelines pertaining to diagnosis of obesity, proposed by the American Association of Clinical Endocrinologists (AACE) and American College of Endocrinology (ACE), where emphasis is placed not only on body weight, and weight-to-height index, but primarily on the occurrence of obesity complications (*“complications-based approach”*) [7]. Considering the very high epidemiologic indices describing the prevalence of obesity in Poland, which currently concerns 25% of the adult Polish population [5], the research problem of the social consequences of obesity in the opinions of students of universities in Lublin was undertaken.

OBJECTIVE

The aim of the study was determination of the level of knowledge concerning health and the social consequences of obesity among students of selected universities in Lublin, and recognition of their opinions about the functioning of obese persons in the society.

MATERIALS AND METHOD

The study was conducted during the period November 2017 – March 2018 in a group of 200 students: 100 students of the specialty of medicine at the Medical University in Lublin (50 first-year students and 50 fifth-students), 50 students of the specialty of management at the Maria Curie-Skłodowska University (25 first-year students of licentiate study and 25 second-year students of master study), and 50 students of the specialty of internal security at the Maria Curie-Skłodowska University (25 first-year students of licentiate study, and 25 second-year students of master study). A targeted selection of respondents was applied. The criterion of inclusion into the study was being a student of the above-mentioned specialties, and expression of informed consent to participate in the research project.

The study was conducted by the method of a diagnostic survey using a questionnaire technique. The research instrument was an author-constructed Internet questionnaire containing 46 items: 23 items concerning knowledge of health consequences of obesity, 12 items pertaining to the scope of problems of stigmatization of obesity in Polish society, and 11 on respondents' particulars concerning socio-demographic variables. The questionnaire contained questions testing knowledge on obesity (25 items), and questions about opinions concerning the social effects of obesity (10 items), including stigmatization of obese persons in Polish society. By providing correct answers to all questions pertaining to knowledge of the effects of obesity, the respondent could obtain a maximum of 25 scores. The following criteria of evaluation of students' knowledge were adopted:

- 23–25 scores (>90% correct answers) – high level of knowledge;
- 20–22 scores (80 – 90% correct answers) – moderate level of knowledge;
- 19 scores and less (<80% correct answers) – low level of knowledge.

In statistical analysis, the results obtained by the respondents equivalent to the particular levels of knowledge were referred to the following variables: type of university,

specialty and year of study, respondents' weight-to-height index BMI (Body Mass Index), number of inhabitants in the place of permanent residence, material standard, undertaking attempts to reduce body weight in the past, and presence of an obese person in the respondent's nearest social environment.

The BMI (in kg/m²) was calculated based on anthropometric parameters self-reported by the students, according to the formula: body weight (in kg) divided by the square of the height (in meters). According to WHO classification, BMI values below 18.5 kg/m² are considered as underweight, between 18.5–24.9 as normal weight, between 25.0–29.9 – overweight (pre-obesity), and values between 30.0–34.9 – first degree of obesity [8].

Statistical analysis was performed using the software STATISTICA version 12. Data obtained in own study was expressed in percentages, and also by qualifying the determined levels of knowledge on the effects of obesity into the arbitrarily defined categories of high, moderate, and low levels of knowledge. In order to investigate the differences in the level of knowledge concerning obesity between groups, Pearson's chi-squared test for independence was applied (χ^2). $P < 0.05$ was considered statistically significant.

RESULTS

Table 1 presents the detailed characteristics of the study group. It is noteworthy that nearly 75% of respondents had a normal body weight; however, as many as 59.5% declared undertaking attempts to reduce body weight in the past. This may possibly be associated with the domination of females in the study group (65.5%), under strong social pressure related with appearance and body silhouette. The majority

Table 1. Characteristics of the study group (n=200)

Type of university	Study group (n=200)					
	UMCS n=100 (50%)				Medical University n=100 (50%)	
Study specialty and year of study	Z1 12.5%	B1 12.5%	Z5 12.5%	B5 12.5%	L1 25%	L5 25%
Gender	65.5% – females 34.5% – males					
BMI	8.5% – underweight 74% – normal body weight 16.5% – overweight/preobesity 1% – I degree of obesity according to WHO classification					
Place of residence	38% – city with over 100,000 inhabitants 20.5% – city with 21,000 – 100,000 inhabitants 10.5% – town with up to 20,000 inhabitants 31% – rural area					
Material standard	63% – mediocre 30% – over mediocre 7% – below mediocre					
Undertaking attempts to reduce body weight in the past	59.5% – Yes 40.5% – No					
Presence of obese person in the respondent's social environment	64.5% – Yes 35.5% – No					

Z – management; B – internal security; L – medicine (the number indicates the year of the curriculum)

of respondents (64.5%) reported the presence of an obese person in their direct social environment.

In the study group, respondents (71%) with a low level of knowledge concerning obesity dominated, followed by 17.5% of those who showed a moderate knowledge, and only 11.5% of respondents who had a high knowledge (Tab. 2).

Table 2. Level of knowledge concerning health consequences of obesity in the study group (n=200)

Level of knowledge of the effects of obesity	n	Percentage in the study group
Low	142	71%
Moderate	35	17.5%
High	23	11.5%
Total	200	100%

While analyzing the respondents' replies pertaining to individual aspects of knowledge about obesity, it was observed that only every fifth respondent (21%) was aware of the current prevalence of overweight and obesity in Poland. Nearly 80% of respondents knew the use of the BMI index, and 75% of them correctly provided the formula for its calculation. However, the investigation of more specialist knowledge of diagnosing obesity produced opposite results: 72.5% of students did not possess knowledge of the Waist-to-Hip Ratio (WHR). In addition, it was noted that only slightly more than a half of the students (51.5%) correctly indicated threshold values for waist circumference (>80 cm in females and >94 cm in males), which allow the diagnosis of abdominal obesity.

The majority of respondents (78%) admitted that an excessive body weight may have negative health consequences. While investigating knowledge concerning obesity complications in accordance with the recommendations of experts from the American Association of Clinical Endocrinologists (AAACE) and American College of Endocrinology (ACE) of 2016 [7], it was confirmed that the majority of respondents correctly associated obesity with the occurrence of disorders in lipids levels in blood serum (86%), as well as disorders of glucose homeostasis (82%). Nearly 90% of respondents agreed with the thesis that obesity increases the risk of cardiovascular diseases, such as ischemic heart disease or cerebral stroke. Awareness of the remaining obesity complications, such as infertility (only 1/3 of respondents had knowledge of this problem), or the relationship between obesity and cancer risk, was considerably lower. In the question pertaining to obesity complications which contained 12 correct answers, the respondents most frequently indicated only 1–3 replies, which means that their knowledge of the problem was incomplete. Correct indications most frequently concerned type 2 diabetes (80.5%), non-alcoholic fatty liver (79%), and degenerative disease of the knee joints (75.5%), spine (74.5%) and hip joints (74%). Prediabetes as an obesity complication was indicated by 66.5% of respondents, whereas only a half of the students were able to correctly connect obesity with metabolic syndrome and sleep apnea. A considerably lower level of knowledge was noted regarding the relationship between obesity and infertility (47.5%), and gastro-oesophageal reflux disease (38.5%). Only approximately 30% of respondents correctly identified the relationship between obesity and polycystic ovary syndrome.

In order to grasp the differences between groups concerning the level of knowledge of obesity complications, Pearson's chi-squared test for independence (χ^2) was performed. It was found that the level of respondents' knowledge of the problem of obesity differed according to such variables as: type of university, study specialty, year of study, and permanent place of residence, as well as the presence of an obese person in the social environment. No statistically significant differences in the level of knowledge of obesity were observed according to gender, BMI, respondents' material standard, or attempts undertaken to reduce body weight in the past (Tab. 3).

Table 3. Relationship between selected explanatory variables and level of students' knowledge concerning health consequences of obesity (n=200)

	Pearson's Chi-square test (χ^2)	Number of degrees of freedom	Level of significance
Type of university	21.48	df=2	p=0.000
Study specialty	43.64	df=4	p=0.000
Year of study at Medical University	13.59	df=2	p=0.001
Year of study at UMCS	0.27	df=2	p=0.875
Gender	0.67	df=2	p=0.715
BMI	5.09	df=6	p=0.532
Place of residence	20.28	df=6	p=0.002
Material standard	3.23	df=4	p=0.520
Undertaking attempts to reduce body weight in the past	1.38	df=2	p=0.502
Presence of obese person in the respondent's social environment	11.16	df=2	p=0.004

Statistically significant differences were observed (p=0.000) between the level of students' knowledge and the type of university. Nearly every fifth student of the Medical University showed a high level of knowledge (17.1%), compared to only 2.6% of those who studied at the UMCS (Fig. 1).

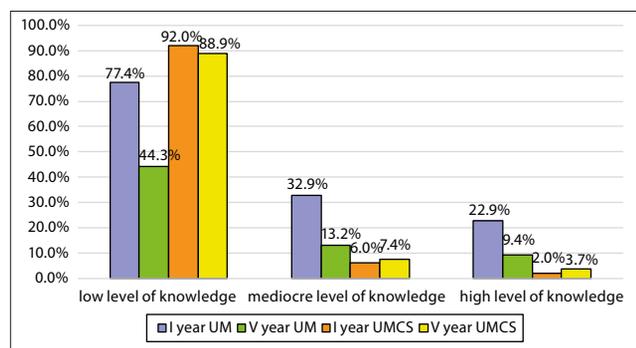


Figure 1. Level of knowledge concerning health consequences of obesity according to the type of university (n=200)

Concerning the specificity of the study specialties considered in the research, the result was not surprising, which indicates that nearly a half (49%) of the students of the specialty of medicine showed a moderate or high level of knowledge concerning the effects of obesity, whereas the majority of students of both specialties at the UMCS demonstrated a low level of knowledge (Fig. 2).

Taking into account students of a particular university, it was demonstrated that at the Medical University fifth-year students showed a higher level of knowledge of obesity,

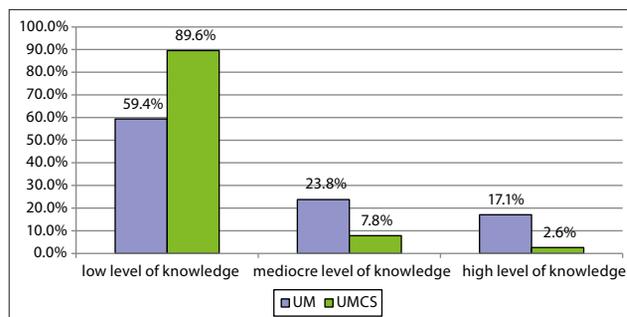


Figure 2. Level of knowledge concerning health consequences of obesity according to the study specialty (n=200)

compared to first-year students (p=0.001). However, no such a relationship was noted with respect to students at the UMCS (Fig. 3). The result obtained at the Medical University was equivalent to the specificity of education at the specialty of medicine, consisting in education in basic medical sciences during the initial period of education, and introduction of the element of clinical education as late as at the further stage of study. Nevertheless, it should be noted that in the group of fifth-year students of the specialty of medicine, as many as 44.3% of students showed a low level of knowledge of obesity complications, which is evidence of insufficient education about this problem during medical studies.

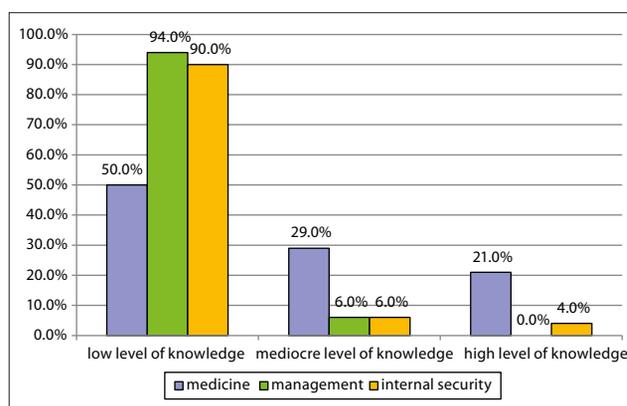


Figure 3. Level of knowledge of health consequences of obesity according to the year of study at individual universities (n=200)

Statistically significant differences were found (p=0.002) while analyzing the level of students' knowledge concerning obesity according to the place of permanent residence, and the number of inhabitants: students from small towns (up to 20,000 inhabitants), and those from rural areas, statistically more frequently showed a lower level of knowledge, compared to those from large cities (over 100,000 inhabitants) (Fig. 4).

It was interesting to discover that the respondents' level of knowledge of health consequences of obesity differed according to the presence of an obese person in their social environment: 16.9% of respondents who had an obese person in their closest environment showed a high level of knowledge, compared to only 1.4% of students who did not have an obese person among their closest ones (p=0.004) (Fig. 5).

The respondents' opinions were also examined concerning the social consequences of obesity, including the problem of stigmatization, discrimination, and social exclusion of obese persons (Tab. 4).

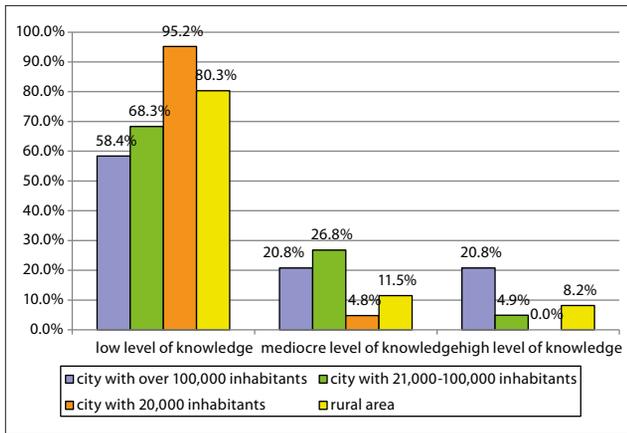


Figure 4. Level of knowledge of health consequences of obesity according to the size of the place of origin (n=200).

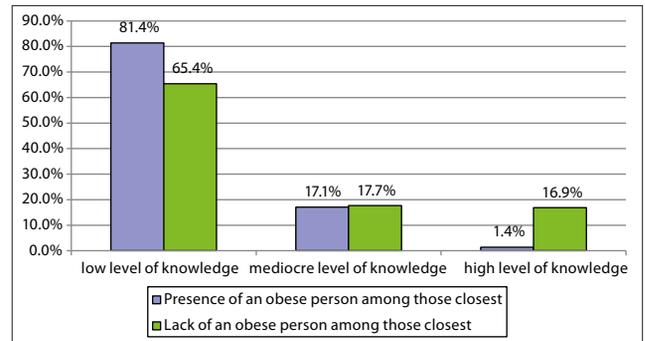


Figure 5. Level of knowledge of health consequences of obesity according to the presence of an obese person in the respondents' social environment (n=200)

Table 4. Students' opinions concerning social consequences of obesity (n=200)

Investigated problems concerning social attitudes towards obese persons	Categories of answers	Percentage of respondents indicating a given answer
Distribution of respondents' opinions concerning the way of treating obese persons in Polish society	Definitely kindly	1%
	Rather kindly	21%
	Neutrally, without interest	30%
	Rather dislike	30%
	Definitely dislike	14%
	Difficult to say	4%
Distribution of respondents' opinions concerning showing respect to obese persons in Polish society	Definitely Yes	4%
	Rather Yes	24%
	Rather No	43.5%
	Definitely No	12.5%
	Difficult to say	16%
Distribution of respondents' opinions concerning discrimination, maltreatment and disregarding obese persons in Polish society	I totally agree	15%
	I agree	47%
	I do not agree	18%
	I totally disagree	1%
	Difficult to say	19%
Distribution of respondents' opinions concerning disregarding and maltreatment of obese children at school age by their contemporaries	I totally agree	37.5%
	I agree	51.5%
	I do not agree	5%
	I totally disagree	0%
	Difficult to say	6%
	Distribution of respondents' opinions concerning behaviours towards obese persons in Polish society (possibility to select 3 answers)	Verbal teasing (e.g. malicious name-calling, offensive remarks, being an object of jokes)
Mocking		50%
Being avoided or ignored		39%
Being an object of gossips		72.5%
Ascribing worse personality traits (lack of strong will, lack of self-control)		59%
Ascribing worse professional qualifications and discrimination on the labour market		24.5%
Distribution of respondents' opinions concerning employment of obese person possessing the required professional competences	Definitely Yes	30%
	Rather Yes	42%
	Rather No	10.5%
	Definitely No	6.5%
	Difficult to say	11%
	Distribution of respondents' opinions concerning stereotypes concerning obese persons exerting an effect on their chances on the labour market (possibility to select any number of answers)	Obese persons take less care about their appearance
Obese persons are more lazy		46.2%
Obese persons are slower		69.2%
Obese persons complain more often		58.5%
Obese persons are less competent		16.9%
Obese persons take sick leaves more frequently		26.2%
Other, what?		9%
Distribution of respondents' opinions concerning relationship between experiences of stigmatizing social responses due to body appearance according to gender of those who experience such reactions		More often obese females
	More often obese males	6%
	Problem concerns both genders to an equal degree	27%
	Difficult to say	4%
Distribution of respondents' opinions concerning the most frequent causes for undertaking attempts to reduce body weight by obese persons (possibility to select 3 answers)	Lack of acceptance of own appearance	70%
	Difficulties with finding employment	9.5%
	Lack of acquaintances	12%
	Difficulties with finding a partner	62.5%
	Problems with finding clothes	7.5%
	Criticism on the part of close ones	42%
	Mocking/humiliation in public places	40%
	Difficulties with mobility/ practicing physical activity	26.5%
	Care for own health	21%
	Doctor's order	9%
Distribution of respondents' opinions concerning whether obese persons experience stress more frequently in relation with their social situation	Yes	77%
	No	3.5%
	I do not know	19.5%

Analysis of respondents' opinions concerning social attitudes towards obese persons in Polish society indicated that only 22% of respondents expressed an opinion that society treats obese persons kindly, whereas 44% admitted that such persons are treated with dislike or great dislike. According to the majority of respondents (56%), obese persons are not respected in Polish society. The subsequent question pertained to the respondents' opinions about maltreatment, discrimination, or disdain for obese persons. The majority of respondents (62%) agreed with this statement. According to 89% of respondents, children with obesity also encounter disdain and maltreatment from their contemporaries. In respondents' opinions, obese persons most often experience such negative behaviours as being an object of gossip (72.5%), or being ascribed negative personality traits (59%). In addition, more than 55% of respondents considered that persons with an excessive body weight experience verbal abuse, such as malicious name-calling, offensive remarks, or being the object of jokes. A half of the respondents admitted that obesity is ridiculed, while nearly 40% of respondents also indicated avoidance or ignorance of persons with an excessive body weight by society; thus, mechanisms conducive to the social exclusion of such persons. The most rarely indicated form of discrimination – by 24.5% of respondents, was ascribing obese persons lower professional qualifications and their discrimination on the labour market. The majority of students (72%), when asked whether they would employ an obese person in the situation when this person would possess qualifications sufficient to be employed at a given workplace, provided a positive answer to this question. Persons who declared an opposite decision (replies: rather not, definitely not) mentioned that obese persons are slow (70%); more than a half (58.5%) considered that such persons complain more often, whereas 46.2% associated obesity with laziness. A considerable percentage of respondents who would not employ an obese person expressed an opinion that obese persons take less care about their appearance (41.5%). The options of answers paying attention to the more frequent use of sick leave by obese persons (26.5%), or a lower level of professional qualifications among such persons (16.9%), were more rarely indicated. Nevertheless, 9% of respondents indicated other explanations for unwillingness to employ an obese person. There occurred such opinions as, for example: 'They discourage customers with their appearance', or: 'If someone is not even able to care to the smallest degree about such a basic thing as own body, I would have doubts about entrusting this person with more serious duties'. With respect to the relationship between discrimination inspired by obesity and the gender of persons included in such social responses, 62.5% of students considered that in Polish society obese females experience various forms of discrimination more often than males.

The respondents were also asked about motivation to undertake attempts at reducing body weight. In the opinions of the largest group of students (70%), obese persons wish to reduce their body weight due to the lack of acceptance of their appearance. It is an interesting fact that a large part of the respondents (62.5%) reported that an important motivation is the difficulty in finding a partner. A similar percentage of respondents indicated criticism on the part of those closest to them (42%), and experiencing negative social reactions in public places (40%). Only every fourth student (26.5%) mentioned that the motivation to reduce body weight for

obese persons are difficulties with mobility, and only every fifth (21%) indicated care of health as an inspiration to reduce body weight. The smallest number of respondents considered that obese persons undertake the struggle with excess of fatty tissue for social reasons (lack of acquaintances – 12%), difficulties with finding employment (9.5%), on physician's order (9%), or due to difficulties with finding clothes that fit (7.5%). The majority of students (77%) asked about their opinions concerning frequent experiencing stress by obese persons in relation with their social situation, agreed with this statement.

DISCUSSION

The respondents' knowledge concerning the problem of obesity seems to be insufficient, with students of the specialty of medicine representing a considerably higher level of knowledge, compared to the remaining respondents. Similar results were obtained by Seń M. et al., who evaluated the level of knowledge of this problem among students of universities in Wrocław (University of Technology, University of Natural Sciences and the Medical University) and demonstrated a higher level of competences concerning obesity among students of medicine [9]. Studies of the level of students' knowledge of health and social effects of obesity have also been conducted in other countries [10, 11]. A study by Awotidebe A. among 175 students of the University in Western Cape, South Africa, aimed at determination of knowledge and attitudes towards obese persons among students of physiotherapy, indicated that the majority of the students (> 80%) perceived obesity as a behavioural problem, while nearly all study participants (97.6%) characterized obese persons as lazy, unattractive, uncertain, and with a lower self-esteem [11]. However, comparison of the results of own study and findings by other researchers who evaluated the level of knowledge of obesity, encounters difficulties resulting from differences in the methodology of research, or different systems of education in the countries where the studies were performed.

While interpreting the results of the reported studies, and other studies of a similar profile concerning the level of knowledge about health and illness, it should be remembered that there is no basis for suggesting a direct translation of knowledge of this profile into health behaviours determining the level of health risk. Behaviours depend on many other factors related with the socio-economic and cultural context of human life, which delineate the chances of individual groups of people and social groups to implement recommendations concerning the care of health into daily life practice [12]. For example, Reiwer-Gostomska M. et al. in their study conducted in a group of 200 sixth-year students of the faculty of Medicine at the Medical University in Gdańsk, Poland, during the academic years 2013–2014 and 2014–2015, evaluated the students' attitudes towards the problem of obesity. The researchers found that in the opinions of 43.5% of respondents, knowledge acquired during medical studies only to a low degree exerted an effect on pro-health behaviours [13]. Also, Szczepańska E. et al., based on the study of a group of 884 pupils from Upper Silesia, Poland, found significant discrepancies between the pupils' knowledge, *nota bene* evaluated as insufficient in the quoted study, and their health behaviours in daily life [14]. While

interpreting these data it should be remembered that the level of knowledge about diet-related prophylaxis among pupils from secondary schools depends on the school profile, and therefore on the extended curriculum followed [15]. If it is assumed that the respondents' education level is also an indicator of the level of knowledge concerning health, valuable data useful for the interpretation of the results of own study are provided by research projects investigating relationships between the level of education and care about health in various cohorts selected from among the total population. Thus, a study in a group of 1,320 workers of the Tadeusz Sędzimir Ironworks in Kraków, Poland, showed a relationship between the respondents' education level and only selected nutritional behaviours. The researchers concluded that a higher level of education, and therefore a higher level of general knowledge and health awareness, are not a guarantee of rational health choices, including nutritional choices [16]. A study of the mode of nutrition of pregnant women and knowledge of the principles of nutrition showed many shortcomings in the level of knowledge, dependent on the level of education of the examined women [17]. The relationships between the level of education and the mode of nutrition were the object of analyses described in a 2016 report by the National Institute of Public Health, which suggested that a more frequent undertaking of nutritional behaviours favouring health is related with the higher level of education of Poles [18].

Relationships between knowledge concerning health and care about health have also been examined by many western researchers. For example, an American study by Andreyev T. et al. indicated that a higher tendency towards undertaking actions in order to reduce body weight by obese persons is related with a higher education level. At the same time, obese persons with a lower level of education more often undertook actions of this profile different from medical recommendations in effect [19]. The research project the CARDIA Study provides data in the light of which the differences in body weight are related with the education level among Caucasian women, while Afro-American women were characterized by a higher-caloric diet and lower level of physical activity [20], which is related with a higher prevalence of obesity in this group of women. According to the data of 2015 in the USA, the prevalence of obesity among Afro-American women was higher than among Caucasian women (56.6% vs. 32.8%). It is suggested that this difference is related with the differences in socio-economic status, including education level, and also socio-cultural effects exerting an effect on the nutritional behaviours and physical activity of women [21]. A Polish study by Kostrzewska-Zabłocka E. et al. is worth quoting, in the light of which persons with diabetes who have a higher level of nutritional knowledge, were characterized by a lower body weight and BMI and WHR indices; as the researchers suggest, these differences are the result of differences in behaviours dependent on the level of knowledge [22]. In turn, Szczepańska E. et al., in a group of patients with obesity qualified for bariatric procedure, confirmed that a satisfactory level of nutritional knowledge is not necessarily translated into correct nutritional behaviours [23]. A study by Duda G. et al., concerning the effect of socio-demographic factors on knowledge of the principles of rational nutrition, did not confirm any effect of gender, age and education on the level of respondents' nutritional knowledge [24]. Bronkowska M. et al. demonstrated that

knowledge of the principles of nutrition among patients with arterial hypertension was not translated into correct nutritional behaviours [25]. Opposite results were obtained by Waśkiewicz A. et al. who evaluated the mode of nutrition and level of health knowledge in patients who had undergone cardiovascular events, and found that the respondents were characterized by insufficient knowledge concerning health, the level of which was reflected by their eating behaviours [26]. Thus, the results of studies are inconsistent concerning the relationship between education level and health behaviours, although inconsistency of the results certainly does not question the justification for carrying out continuous health education in society. However, in accordance with the assumptions of the Ottawa Charter for Health Promotion, attention should also be paid to the importance of pro-health public policy in creating legal and economic circumstances favouring the undertaking of pro-health behaviours [27, 28].

An interesting result obtained in the presented study concerned differences in the level of knowledge about obesity dependent on the place of the respondents' origin – respondents from small towns had a lower level of knowledge of this problem. Such a relationship was also confirmed in a study by Koziński Ł. et al. who found that inhabitants of large cities are characterized by a higher level of knowledge concerning the risk of cardiovascular diseases [29]. It may be presumed that inhabitants of large cities have more opportunities to participate in events popularizing knowledge in the area of preventive medicine; however, the mechanisms of the relationship confirmed in the presented study concerning young adults are not known.

Obesity results in a considerable deterioration of the quality of life regarding its physical and psychosocial aspects. Negative social attitudes towards these persons, consisting in their stigmatization and discrimination in the society, exert a considerable effect on the quality of life of obese persons. Here, attention is paid to the fact that persons with some health problems are considered by society as deviants, which is equivalent to the stigmatization of these persons, and the triggering by society of actions negatively affecting the life chances of such persons. The interpretative concept of deviation co-created by Howard Becker in his famous work *'Outsiders'* of 1963, and, related with it, the labelling theory offers theoretical essentials for the explanation of these processes [30]. This concept pays attention to the critical importance of social response in the creation of deviation and suggests that deviation is not an immanent (qualitative) characteristics of a person or behaviour, but results from the fact that a given act (trait, attribute, etc.) is socially perceived and interpreted as a deviance [30]. In the opinions of the majority of respondents who participated in own study such an opinion was mentioned by 62% of respondents, and in the opinion by 89% of respondents obesity triggers stigmatizing social responses, a phenomenon that also concerns children. This is in accordance with the results of other Polish studies, e.g. a study by Witek A. et al. concerning the ways of perception of obese children, in which 71.42% of the examined junior high school pupils considered that obese children are rejected and not accepted by the environment [31]. A study by Ślusarska B. et al. conducted in a group of 100 students of the Medical University in Lublin and the Jan Kochanowski University in Kielce concerning knowledge and opinions related with obesity, showed that according

to 86% of respondents, the psychosocial effect of obesity is a negative evaluation and opinion by others [32]. According to Michoń P., obese persons experience discrimination while seeking employment, and during promotions and increase in salaries [33]. A stereotypic image of an obese person exerts an effect on the chances of such persons on the labour market. Own study showed that 17% of students would not decide to employ a person with obesity, despite this person possessing appropriate professional qualifications, and 11% had no opinion concerning this problem.

The presented research does have some limitations. The respondents' BMI was calculated based on self-reported data on height and weight. The Internet questionnaire made it possible to obtain only self-reported anthropometric data. Gender-related bias (common in females) cannot be excluded regarding understating of the weight and overstating of the height of the respondents.

Summing up, the health of society may be effectively protected and enhanced when, apart from health education elevating health awareness in the aspects pertaining to NCD (with consideration of health effects of obesity), multisectoral actions are also carried out which change the environment of human life in such a way that it favours undertaking pro-health decisions [28, 34]. Acquisition by individuals of knowledge and skills, without health-conducting changes in the environment, certainly does not guarantee a change in behaviours on a population scale. This principle also concerns the prevention of obesity, where it is considered that individualistic approaches, focused on triggering behavioural (in the area of nutritional behaviours and physical activity), omitting obesogenic effect of the environment with which an individual deals every day, have no potential which would be sufficient to obtain changes on a population scale [35]. Therefore, the actual possibilities of making real health choices depend on factors which are often outside the impact area of an individual. Thus, the acquisition of knowledge and skills in the area of health, without environmental support, does not generate possibilities for an effective care about health [27]. According to the sociological approach, the possibility of control and actions on behalf of the improvement of health require some driving force (agency). This is the essence of empowerment in health issues. Health education and pro-health public policy which construct environmental conditions which favour pro-health choice and health, serve the empowerment of individuals and communities. Here, reference is made to the Ottawa Charter for Health Promotion for understanding health as a combination of educational actions and multi-sector environmental interventions for the empowerment of individuals to care about health [12].

CONCLUSIONS

- 1) Knowledge of health consequences of obesity among students of the Lublin universities, including students of medicine, is insufficient; however, knowledge of students of the Medical University is considerably higher than that of students of the non-medical university.
- 2) It is justifiable to undertake educational actions concerning obesity, focused on imparting knowledge about obesity, especially concerning complications of this disease, in accordance with current medical guidelines.

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