

Risk Factors Determining the Occurrence of Obesity among Women in the Zamość County

**Tomasz Derewiecki, Krzysztof Mroczek, Małgorzata Mroczek, Marta Duda,
Danuta Chmiel-Derewiecka**

University of Management and Administration in Zamość, Poland

Piotr Majcher

Medical University of Lublin, Poland

Abstract

The progress of civilization in Europe and many countries throughout the world has contributed to changing the way of life for entire societies. It has caused a dramatic increase in the rate of obesity. Overweight and obesity make a timeless problem. The twenty-first-century man, apart from deriving a hedonistic pleasure from eating, avoids any physical effort, which causes decreasing physical fitness and increasing of body mass. The goal of the present paper is the analysis of risk factors determining occurrence of obesity among women. An author's survey was conducted on a sample of 604 women in Zamość county, Poland. The results were statistically analyzed, on the level of significance of $p < 0,05$. 22,52% of the studied group distinguished themselves with a BMI index from 25 to 30 (overweight), whereas 7,95% had a $BMI > 30$, indicating obesity. The analysis of results showed that the most exposed to being overweight and obesity are women over 65 years old, with primary education or vocational training and a sedentary nature of work. Their place of dwelling had no effect on their body weight. Promoting an active way of life would be appropriate, oriented for maintaining a proper body mass. Society should be made aware of the importance of this problem and consequences of lack of knowledge on it.

Keywords: obesity, risk factors, Body Mass Index (BMI), women

Introduction

The progress of civilization in Europe and many countries throughout the world has contributed to changing the way of life for entire societies. It has caused a dramatic increase in the rate of obesity. According to the WHO, obesity is defined as a chronic disease, never subsiding spontaneously. Its symptoms are determined by such outside factors as stress, improper nutrition, and lack of physical activity; as well as by inside factors, such as genetic, metabolic and deterioration processes. Being overweight and obesity make timeless problems, because a typical twenty-first-century person delights in eating, at the same time avoiding all kinds of physical effort, which results in reducing fitness and increasing body mass (Makara-Studzińska, Buczyjan, and Morylowska 2007; Ogińska-Bulik 2004, 7–8).

Despite the fact that obesity is considered a problem of developed societies, it begins to concern also underdeveloped regions (Lee and Pratley 2005). Epidemiological research delivers proofs for increasing frequency of obesity cases, in Poland as well as throughout the world. According to the data, about 30% of Americans suffer from obesity, which, including overweight cases, makes up 67% of the population. In Europe about 50% of the population is overweight, apart from 22% of women and 15% of men with already diagnosed obesity. Similar proportions were observed among adult Poles. Within the research by POL-MONICA Bis, conducted among Warsaw residents in age 20–74, obesity was found in 26% of men and 24% of women (Lee and Pratley 2005; Ogińska-Bulik 2004, 7–8; Pupek-Musialik and Kujowska-Łuczak 2006; Rywik et al. 2003; Szostak-Węgierek 2007).

Being overweight and obesity are caused by cooperating metabolic, environmental and biological factors, such as sex and genetic predispositions. The appearance of obesity is in great measure conditioned by environmental factors, such as easy access to cheap, highly processed food, with a high fat and simple carbohydrates content; socio-economic state, education, living conditions, type of job and a great reducing of daily physical activity. The next factors are genetic predispositions, as a tendency to improperly accumulate and store fat tissue or slowing of the basal metabolism. The conducted research proved that obesity occurs in 2/3 of children if both parents are obese; in 1/2, if only one parent is obese; and in 9%, when both parents are slim. Obesity is passed on not only by one gene—the genes responsible for it occur in different combinations (Liu et al. 2003; Maniecka-Bryła, Bryła, and Drygas 2005; Pac-Kożuchowska, Kozłowska, and Chrząstek-Spruch 2003; Saczuk et al. 2011; Shuldiner and Munir 2003; Supranowicz, Miller, and Urban 2000; Zięba and Obuchowicz 2011).

Among simple methods enabling us to determine whether we are dealing with normal weight, overweight or obesity, are anthropometric methods, including measurements of the body mass index (BMI), circumference of the belly, and thickness of a subcutaneous tissue fold (Kardjalik, Bryła, and Maniecka-Bryła 2012; "Obesity: Preventing..." 2000; Tatoń, Czech, and Bernas 2007, 33–35). Epidemiological research has proven unambiguously that obesity exerts a significant influence on general mortality. It causes the increase of incidence for the following illnesses: type 2 diabetes, respiratory system, digestive tract, bone and joint problems; increased risk of cancer, cardio-vascular diseases, cardiac ischemia and arterial hypertension. Research conducted on American women pointed out that more than half (53%) of the death rate in persons with the $BMI > 29$ was directly caused by their obesity. Moreover, obesity carried with it serious social and psychological consequences, in self-perception, influence on experiencing emotions, interpersonal relations, i.e. the entire emotional and social function of a person (Makara-Studzińska, Buczyjan, and Morylowska 2007; Pupek-Musialik and Kujowska-Łuczak 2006).

1 Purpose

The aim of the present paper is the analysis of factors bound up with the occurrence of obesity in women. Research tasks:

- To estimate the level of BMI in the women in the study sample.
- To determine whether the kind of work performed by these women influenced their body mass.
- To determine whether their dwelling place, age and education influenced the rate of obesity among the sample.
- To examine the statistically significant interdependence between the factors mentioned above and an unhealthy body mass in women.

2 Materials and methods

The survey included 604 women from Zamość county, age 18–88, whereas the average age was 37,12 years. 343 women dwelled in a town, and 261 in a rural area. Within the tested group, 3,15% of them had primary education, 5,79%—vocational, 56,46%—secondary, whereas 34,60% held the higher educational level.¹ As a research tool, an author's questionnaire was used. The results were statistically analyzed, using the program Statistica 10. Assumed was the level of significance of $p < 0,05$.

3 Results

In the tested population 22,52% of the women distinguished themselves with BMI 25–30 (overweight), whereas 7,95% had a $BMI > 30$ (obesity). More detailed results are shown in table 1.

1. [In the journal (in both Polish and English texts) European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style). Furthermore in the International System of Units (SI units), fixed spaces rather than commas are used to mark off groups of three digits, both to the left and to the right of the decimal point.—Ed.]

The analysis of results showed that women dwelling in towns are more often overweight or obese. In the respective group 24,78% were overweight, whereas 8,16% were obese. Among those dwelling in the country, 19,54% were overweight and 7,66% obese, respectively. Nevertheless, there was found no statistically significant interdependence between the place of dwelling and frequency of being overweight and obesity ($p > 0,05$). The detailed results are shown in table 2.

Weight and obesity problems are much more frequent in white-collar workers. 35,23% of that group suffered from being overweight and 9,84% from obesity. In the group of manually working women 24,19% were overweight and 1,61% were obese. The influence of the kind of work on body mass in women was statistically confirmed ($p = 0,033$). Those results are shown in table 3.

Being overweight and obesity were decidedly more frequent in women with vocational education. 34,29% of women from that group were overweight and 31,43% were obese. Regarding the statistical significance level ($p < 0,05$), the hypothesis assuming a bond between educational status and frequency of being overweight and obesity in women can be accepted. More detailed results were collected in the table below (tab. 4).

Least affected by weight or obesity problems were the youngest women. In the age group 18–35 9,88% women were overweight and 1,80% obese. On the other hand, within the group of women 65 and over, 37,50% members of that group were overweight and 40,63% were obese. Nevertheless, this hypothesis wasn't statistically confirmed ($p > 0,05$). More detailed results are shown in the table below (tab. 5).

Tab. 1. Dispersion of surveyed women according to BMI level

BMI	n	%
Underweight < 19	72	11,92
Normal weight 19–25	348	57,62
Overweight 25–30	136	22,52
Obesity > 30	48	7,95

Tab. 2. The influence of dwelling place on BMI level

BMI	Town		Country	
	n	%	n	%
Underweight	39	11,37	33	12,64
Normal weight	191	55,69	157	60,15
Overweight	85	24,78	51	19,54
Obesity	28	8,16	20	7,66

p-value for chi-square statistic: 0,463

Tab. 3. The influence of the kind of work on the level of BMI

BMI	White-collar workers		Manual workers	
	n	%	n	%
Underweight	14	7,25	6	9,68
Normal weight	92	47,67	40	64,52
Overweight	68	35,23	15	24,19
Obesity	19	9,84	1	1,61

p-value for chi-square statistic: 0,033

Tab. 4. The influence of educational level on the level of BMI

BMI	Essential		Vocational		Secondary		Higher	
	n	%	n	%	n	%	n	%
Underweight	4	21,05	3	8,57	40	11,73	25	11,96
Normal weight	6	31,58	9	25,71	206	60,41	127	60,77
Overweight	5	26,32	12	34,29	79	23,17	40	19,14
Obesity	4	21,05	11	31,43	16	4,69	17	8,13

p-value for chi-square statistic: < 0,0001

Tab. 5. The influence of age on the value of BMI

BMI	18–35 years		36–50 years		51–65 years		above 65 years	
	n	%	n	%	n	%	n	%
Underweight	65	19,46	4	3,28	3	2,59	0	0,00
Normal weight	230	68,86	74	60,66	37	31,90	7	21,88
Overweight	33	9,88	38	31,15	53	45,69	12	37,50
Obesity	6	1,80	6	4,92	23	19,83	13	40,63

p-value for chi-square statistic: < 0,0001

4 Discussion

Being overweight and obesity pose a great health risk in Poland as well as in the majority of developed countries throughout the world (Jarosz and Respondek 2009; Lewitt, Mądro, and Krupienicz 2007). Despite the fact that every day many people try to reduce their weight. In Poland nearly 60% of people 50 and over have problems with being overweight, whereas the excess of fat tissue is well known as a risk factor of many civilizational diseases, such as arterial hypertension, cardiac ischemia, hyperlipidemia, Type 2 diabetes or the majority of malignant tumors. Moreover, it intensifies many muscle-skeletal complaints, which results in a growing number of absences from work due to sick leaves or earlier retirement, which in turn causes increasing social-economic costs (Braulio et al. 2010; Cyganek, Katra, and Sieradzki 2007; Savastano et al. 2010; Verdich et al. 2011).

In epidemiological research, for estimation of a correct bodyweight, widely used is an evaluation of the BMI indicator (Socha, Karmińska, and Chwałczyńska 2010). In the tested group of women 22,52% of respondents had a BMI between 25 and 30 (overweight), whereas 7,95% of respondents had a BMI > 30. For the time being, the research confirmed an interdependence between the BMI growth in obese people and the growth of frequency of arterial hypertension, cardiac ischemia and hypercholesterolemia (Derkacz, Chmiel-Perzyńska, and Marczewski 2010). The shortage of that method, however, is that it doesn't differentiate between fat tissue content and fatless body mass. That's why a high level of BMI might be caused either by high fat content or a high share of fatless body mass in relation to the general body weight (Socha, Karmińska, and Chwałczyńska 2010).

The analysis of results showed that town-dwelling women more often suffer from being overweight and obesity. In the tested group of town-dwellers 24,78% were overweight, whereas 8,16% were obese. Among the country-dwellers detected were the following proportions: 19,54% and 7,66%, respectively. Gajewska, Goryński and Wysocki obtained similar results, examining the major causes of hospitalization. According to their calculations, in 2008 Polish hospitals more often treated town-dwellers than country-dwellers (19,9 vs 14,4 among 100 000 treated for obesity regarding obesity and 115,8 vs 109,3 among 100 000 regarding Type 2 diabetes) (Gajewska, Goryński, and Wysocki 2011).

The epidemiological data from the past 20 years has pointed out that the frequency of obesity cases has doubled. In European countries more than 50% of inhabitants were overweight, whereas in 30% obesity was detected (Andreyeva, Michaud, and van Soest 2007; Elmadafa 2009). The most widespread is the problem in Greece, where 51% of men and 37% of women suffer from being

overweight, whereas 28% of men and 38% of women are obese. Also in Poland weight problems and obesity occur quite often. The research conducted in 2000 by the Food and Nutrition Institute proved that 41% of men and 28.7% of women were overweight, whereas obesity was detected in 15.7% of men and 19.9% of women (Jarosz 2006; Szponar et al. 2003).

The weight and obesity problem is much more frequent in women performing sedentary work. Among white-collar workers 35,23% were overweight and 9,84% obese, whereas in manual workers the analogical proportions were 24,19% and 1,61%, respectively. The influence of the kind of work on being overweight and obesity frequency was statistically confirmed ($p = 0,033$).

Being overweight and obesity occurred decidedly more often in the group of women with vocational education. In that group 34,29% women were overweight and 31,43% were obese. Similar data were collected by Waśkiewicz and Sygnowska. Their research results proved that the frequency of obesity (BMI 30) went down together with the growth of the educational level. In women with primary education 39% detected obesity, whereas in a group with secondary education—25% and with higher education—16%, respectively. At the same time proven was a significant influence of educational level on lifestyle and nutrition (Waśkiewicz and Sygnowska 2006).

Within the tested age group the weight and obesity problem to the lowest degree affected the youngest women. In the age group from 18 to 35 9,88% were overweight and 1,80% obese. On the other hand, in the age group 65 and over 37,50% of the women were overweight and 40,63% obese. The value of the statistically significance level confirms the hypothesis about the interdependence between age and body mass problems ($p < 0,05$). Corresponding research pointed out that the obesity problem concerned every age group. According to the research conducted by the Food and Nutrition Institute, it was estimated that in the years 1991–2000 the obesity rate in the entire under 60 population grew by about 5%. Intensification of weight problems and obesity occurrence in children and youth also has become a serious problem. On the basis of research conducted by the Food and Nutrition Institute it was estimated that 15,9% of boys and 11,1% of girls are overweight, whereas analogical rates of obesity cases amounted to 4,0% and 3,4%, respectively (James 2008; Kłosiewicz-Latoszek 2010; Obesity and Overweight 2006).

Society should be made aware that taking care to maintain a proper body mass is bound not only with aesthetic advantages or better physical state. It can also significantly reduce the risk of many diseases and increase the chance of recovery in those already existing. Kubsik and Kowalski pointed out a link between obesity and asthma. According to them, obesity increases the risk asthma, whereas reducing the body mass can also reduce the intensity of asthma symptoms (Kubsik and Kowalski 2010). If so, the battle against obesity should be treated as one of the priorities of contemporary medicine.

Conclusions

The main risk factor intensifying the obesity rate in women are the following: a sedentary kind of work, vocational education and age over 65. Obesity causes many civilizational diseases such as diabetes, arterial hypertension, cardiac ischemia and cancers. Society should have been made aware of the range of the problem and consequences resulting from lack of knowledge. Appropriate would be promoting an active life style, aimed at maintaining a proper body mass.

References

- ANDREYEVA, T., P.C. MICHAUD, and A. VAN SOEST. 2007. "Obesity and Health in Europeans Aged 50 Years and Older." *Public Health* no. 121 (7): 497–509. doi: 10.1016/j.puhe.2006.11.016.
- BRAULIO, V.B., V.C. FURTADO, M. SILVEIRA, M.H. FONSECA, and J.E. OLIVEIRA. 2010. "Comparison of Body Composition Methods in Overweight and Obese Brazilian Women." *Arquivos Brasileiros de Endocrinologia & Metabologia* no. 54 (4): 398–405.
- CYGANEK, K., B. KATRA, and J. SIERADZKI. 2007. "Porównanie pomiarów tkanki tłuszczowej u otyłych pacjentów z zastosowaniem metody bioimpedancji elektrycznej i densytometrycznej." *Diabetologia Praktyczna* no. 8 (12): 473–478.

- DERKACZ, M., I. CHMIEL-PERZYŃSKA, and K. MARCZEWSKI. 2010. "Otyłość jako interdyscyplinarny problem medyczny. (Część II). Wpływ otyłości na zdrowie człowieka." *Medycyna Ogólna i Nauki o Zdrowiu* no. 16 (2): 175–183.
- ELMADFA, I. 2009. "Health and Lifestyle Indicators in the European Union." *European Nutrition and Health Report* 2009 no. 62:157–201.
- GAJEWSKA, M., P. GORYŃSKI, and M.J. WYSOCKI. 2011. "Otyłość i cukrzyca typu 2 jako główne przyczyny hospitalizacji w polskich szpitalach w 2008 roku." *Problemy Higieny i Epidemiologii* no. 92 (1): 132–136.
- JAMES, W.P. 2008. "The Epidemiology of Obesity. The Size of the Problem." *Journal of Internal Medicine* no. 263 (4): 336–52. doi: 10.1111/j.1365-2796.2008.01922.x.
- JAROSZ, M. 2006. *Otyłość, żywienie, aktywność fizyczna, zdrowie Polaków. Diagnoza stanu odżywienia, aktywności fizycznej i żywieniowych czynników ryzyka otyłości oraz przewlekłych chorób niezakaźnych w Polsce (1960–2005)*. Warszawa: Instytut Żywienia i Żywienia.
- JAROSZ, M., and W. RESPONDEK. 2009. "Rola żywienia i aktywności fizycznej w profilaktyce otyłości i przewlekłych chorób niezakaźnych." In *Żywienie człowieka a zdrowie publiczne*. t. 3, edited by J. Gawęcki and W. Roszkowski. Warszawa: Wydawnictwo Naukowe PWN.
- KARDJALIK, K., M. BRYŁA, and I. MANIECKA-BRYŁA. 2012. "Zachowania zdrowotne związane z odżywianiem oraz występowanie nadwagi i otyłości w grupie studentów." *Problemy Higieny i Epidemiologii* no. 93 (1): 71–79.
- KŁOSIEWICZ-LATOSZEK, L. 2010. "Otyłość jako problem społeczny, zdrowotny i leczniczy." *Problemy Higieny i Epidemiologii* no. 91 (3): 339–343.
- KUBSIK, B., and M.L. KOWALSKI. 2010. "Astma i otyłość." *Alergia Astma Immunologia* no. 15 (1): 19–25.
- LEE, Y.H., and R.E. PRATLEY. 2005. "The Evolving Role of Inflammation in Obesity and the Metabolic Syndrome." *Current Diabetes Reports* no. 5 (1): 70–75.
- LEWITT, A., E. MĄDRO, and A. KRUPIENICZ. 2007. "Podstawy teoretyczne i zastosowania analizy impedancji bioelektrycznej (BIA)." *Endokrynologia, Otyłość, Zaburzenia Przemiany Materii* no. 3 (4): 79–84.
- LIU, Y.J., S. ARAUJO, R.R. RECKER, and H.W. DENG. 2003. "Molecular and Genetic Mechanisms of Obesity. Implications for Future Management." *Current Molecular Medicine* no. 3 (4): 325–340.
- MAKARA-STUDZIŃSKA, M., A. BUCZYJAN, and J. MORYŁOWSKA. 2007. "Jedzenie — przyjaciel i wróg. Korelaty psychologiczne otyłości. Przegląd piśmiennictwa." *Zdrowie Publiczne* no. 117 (3): 392–396.
- MANIECKA-BRYŁA, I., M. BRYŁA, and W. DRYGAS. 2005. "[The epidemiological situation of cardiovascular diseases in the Lodz region compared to Poland at the beginning of the 21st century] [Article in Polish]." *Przegląd Epidemiologiczny* no. 59 (4): 923–932.
- Obesity and Overweight. 2006. Fact Sheet (311), http://www.mclveganway.org.uk/Publications/WHO_Obesity_and_overweight.pdf.
- "Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Consultation." 2000. World Health Organization Technical Report Series no. 894:1–253.
- OGIŃSKA-BULIK, N. 2004. *Psychologia nadmiernego jedzenia. Przyczyny, konsekwencje, sposoby zmiany*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.
- PAC-KOŻUCHOWSKA, E., M. KOZŁOWSKA, and H. CHRZAŚTEK-SPRUCH. 2003. "Dodatkowe czynniki ryzyka miażdżycy u dzieci i młodzieży z otyością prostą." *Zdrowie Publiczne* no. 113 (3/4): 325–328.
- PUPEK-MUSIALIK, D., and M. KUJOWSKA-ŁUCZAK. 2006. "Otyłość i jej powikłania — poważny problem zdrowotny współczesnych kobiet." *Medycyna po Dyplomie* (22): 20–24.
- RYWIK, S., A. PAJĄK, G. BRODA, D. SZCZEŚNIOWSKA, and T. RYWIK. 2003. "Częstość występowania nadwagi i otyłości w wybranych populacjach Polski — POL-MONICA BIS projekt." *Medycyna Metaboliczna* (7): 8–15.
- SACZUK, J., D. OLSZEWSKA, A. WASILUK, and J. OLSZEWSKI. 2011. "Sprawność fizyczna chłopców z nadwagą i otyością zamieszkujących wschodnie województwa Polski." *Zdrowie Publiczne* (4): 350–354.
- SAVASTANO, S., A. BELFIORE, C. DI SOMMA, C. MAURIELLO, A. ROSSI, G. PIZZA, A. DE ROSA, G. PRESTIERI, L. ANGRISANI, and A. COLAO. 2010. "Validity of Bioelectrical Impedance Analysis to Estimate Body Composition Changes After Bariatric Surgery in

- Premenopausal Morbidly Women." *Obesity Surgery* no. 20 (3): 332–339. doi: 10.1007/s11695-009-0006-5.
- SHULDINER, A.R., and K.M. MUNIR. 2003. "Genetics of Obesity. More Complicated Than Initially Thought." *Lipids* no. 38 (2): 97–101.
- SOCZA, M., K. KARMIŃSKA, and A. CHWAŁCZYŃSKA. 2010. "Porównanie zawartości tkanki tłuszczowej u młodych nieotyłych kobiet i mężczyzn oznaconej metodą bioimpedancji (wersja bi- i tetrapolarna) i metodą fotooptyczną." *Endokrynologia, Otyłość i Zaburzenia Przemiany Materii* no. 6 (1): 18–25.
- SUPRANOWICZ, P., M. MILLER, and E. URBAN. 2000. "Potrzeby uczniów w zakresie edukacji zdrowotnej." *Pediatria Polska* no. 75 (1): 15–23.
- SZOSTAK-WĘGIEREK, D. 2007. "Profilaktyka miażdżycy u dzieci i młodych osób dorosłych." *Pediatria Polska* no. 82 (7): 550–558.
- SZPONAR, L., et al. 2003. *Badania indywidualnego spożycia żywności i stanu odżywienia w gospodarstwach domowych. Sprawozdanie z projektu TCP/POL/8921 (A), Prace IŻŻ*. Warszawa: Instytut Żywności i Żywienia.
- TATOŃ, J., A. CZECH, and M. BERNAS. 2007. *Otyłość. Zespół metaboliczny*. Warszawa: Wydawnictwo Lekarskie PZWL.
- VERDICH, C., P. BARBE, M. PETERSEN, K. GRAU, L. WARD, I. MACDONALD, T.I.A. SØRENSEN, and J.M. OPPERT. 2011. "Changes in Body Composition During Weight Loss in Obese Subjects in the NUGENOB Study. Comparison of Bioelectrical Impedance vs. Dual-Energy X-Ray Absorptiometry." *Diabetes & Metabolism* no. 37 (3): 222–229. doi: 10.1016/j.diabet.2010.10.007.
- WAŚKIEWICZ, A., and E. SYGNOWSKA. 2006. "Wpływ poziomu wykształcenia na zachowania zdrowotne i czynniki żywieniowe związane z powstawaniem otyłości — badanie POL-MONICA bis Warszawa." *Zdrowie Publiczne* no. 116 (2): 227–231.
- ZIĘBA, M., and A. OBUCHOWICZ. 2011. "Wiedza młodzieży szkół ponadgimnazjalnych powiatu nowotarskiego na temat przyczyn i skutków nadwagi i otyłości oraz ich profilaktyki." *Zdrowie Publiczne* no. 121 (3): 253–257.