

NUTRITIONAL STATUS OF THE ELDERLY IN POLAND

Ewa Rychlik¹, Agnieszka Woźniak¹, Katarzyna Stos¹, Maciej Ołtarzewski¹

¹National Institute of Public Health NIH - National Research Institute, Department of Nutrition and Nutritive Value of Food, Warsaw, Poland

This study was carried out as part of the following projects:

- Support to National Dietary Surveys in Compliance with the EU Menu methodology (fifth support). Lot 2 – “The adults’survey”, including subjects from 10 to 74 years old (No OC/EFSA/DATA/2015/03 CT 3);
- Assessment of dietary patterns, nutritional status and selected lifestyle elements of selected population groups in Poland (project of NIPH NIH – NRI FŻ-1/2022).

A financial grant was also awarded by the Polish Ministry of Science and Higher Education to maintain research capacity (No 3876/E-220/S/2018-1).

ABSTRACT

Background. The elderly are at greater risk of underweight and the associated risk of protein and energy malnutrition. On the other hand, the lower energy requirement with an often too high intake from the diet leads to the development of overweight and obesity.

Objective. The aim of the study was to assess the prevalence of underweight, overweight and obesity, including abdominal obesity in Polish elderly.

Material and methods. The study included 300 men and 304 women aged 65 and over from all over the country. The nutritional status was assessed on the basis of anthropometric measurements: body height and weight as well as waist and hip circumferences. Based on BMI (Body Mass Index), the prevalence of underweight (<20.0), overweight (25.0-29.9) and obesity (≥30.0) was assessed. WHR (Waist-to-Hip Ratio) was used to assess abdominal obesity (≥1.0 in men and ≥0.85 in women). Waist circumference was also analysed with regard to increased risk of metabolic complications (≥94 cm in men and ≥80 cm in women).

Results. Underweight was found in 1.3% of men and 4.3% of women. 55.3% of men and 40.1% of women were overweight, 20.3% and 21.7% were obese, respectively. In the case of people with excess body weight, abdominal obesity was observed in 50% of men and 70.1% of women. Waist circumference indicating an increased risk of metabolic complications was found in 44.1% of men and 67.5% of women.

Conclusions. The prevalence of overweight and obesity in Polish elderly was high, especially in men. Overweight and obese people often had abdominal obesity. This type of obesity was more common in women. Elderly people, especially women, often have an increased risk of metabolic complications due to high fat accumulation in the abdomen. It was even found in elderly who were not overweight nor obese. Some elderly, mostly women, were underweight which increased the risk of protein and energy malnutrition.

Key words: *elderly, underweight, overweight and obesity, risk of metabolic complications*

STRESZCZENIE

Wprowadzenie. Osoby starsze są bardziej narażone na występowanie niedoboru masy ciała i związane z tym ryzyko niedożywienia energetyczno-białkowego. Z kolei mniejsze zapotrzebowanie organizmu na energię przy często zbyt wysokim jej spożyciu z diety sprzyja rozwojowi nadwagi i otyłości.

Cel. Celem pracy była ocena częstości występowania niedoboru masy ciała oraz nadwagi i otyłości, w tym otyłości brzusznej, u osób starszych w Polsce.

Material i metody. Badaniem objęto 300 mężczyzn i 304 kobiety w wieku 65 lat i więcej z terenu całego kraju. Ocena stanu odżywienia badanych przeprowadzono na podstawie pomiarów antropometrycznych: wysokości i masy ciała oraz obwodów talii i bioder. Na podstawie wskaźnika BMI oceniono występowanie niedoboru masy ciała (<20,0), nadwagi (25,0-29,9) i otyłości (≥30,0). Wskaźnik WHR służył do oceny otyłości brzusznej (≥1,0 u mężczyzn i ≥0,85 u kobiet). Analizowano również obwód talii związany ze zwiększonym ryzykiem zaburzeń metabolicznych (≥94 cm u mężczyzn i ≥80 cm u kobiet).

Corresponding author: Ewa Rychlik, National Institute of Public Health NIH - National Research Institute, Department of Nutrition and Nutritive Value of Food, Chocimska 24, 00-791 Warsaw, Poland, phone: +48 22 5509821, email: erychlik@pzh.gov.pl

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Wyniki. Niedobór masy ciała stwierdzono u 1,3% mężczyzn i 4,3% kobiet. Nadwagą odznaczało się 55,3% mężczyzn i 40,1% kobiet, a otyłością, odpowiednio 20,3% i 21,7%. W przypadku osób z nadmierną masą ciała u 50% mężczyzn i 70,1% kobiet występowała otyłość brzuszna. Obwód talii wskazujący na zwiększone ryzyko powikłań metabolicznych stwierdzono u 44,1% mężczyzn i 67,5% kobiet.

Wnioski. Wśród osób starszych w Polsce, zwłaszcza wśród mężczyzn, często występowała nadwaga lub otyłość. Osoby z nadmierną masą ciała często odznaczały się otyłością brzuszna. Ten typ otyłości częściej występował u kobiet.

U osób starszych, zwłaszcza kobiet, często występowało zwiększone ryzyko powikłań metabolicznych związane z nadmiernym nagromadzeniem tkanki tłuszczowej w okolicy brzucha. Dotyczyło to nawet osób starszych, u których nie występowała nadwaga ani otyłość.

Niektóre osoby starsze, szczególnie kobiety, odznaczały się niedoborem masy ciała, co zwiększało ryzyko niedożywienia energetyczno-białkowego.

Słowa kluczowe: *osoby starsze, niedobór masy ciała, nadwaga i otyłość, ryzyko powikłań metabolicznych*

INTRODUCTION

In many countries, the life expectancy of the population is increasing. According to WHO, life expectancy worldwide has increased by more than 6 years between 2000 and 2019 - from 66.8 years in 2000 to 73.4 years in 2019 [29]. This is due to, inter alia, the improvement of economic and living conditions, earlier diagnosis and better effectiveness of non-communicable diseases treatment.

Due to this situation, the number of elderly people in the society is increasing. This tendency will also continue in the coming years. The same situation is observed in Poland. According to Statistics Poland, in 2020 the share of people aged 60 and more was 25.6% of the country's population [13]. The projection indicates that their share in 2030 will increase to 29%, and in 2050 to 40.4%.

The elderly people are at greater risk of underweight. On the other hand, the lower energy requirement in case of frequent too high energy intake from the diet leads to the development of overweight and obesity [10].

Underweight indicates the risk of energy and protein malnutrition. It may be accompanied by vitamins and minerals deficiencies in the body. Malnutrition occurs when the diet does not supply the body with sufficient quantity and/or quality of essential nutrients [1].

Malnutrition causes functional disturbance of immune system, increasing disability, limitation of mobility, risk of falls, dependence on help from others, and an increased risk of institutionalization [4, 23]. In extreme cases, it may even lead to cachexia [1].

Moreover, poor nutritional status contributes to a worse response to treatment and increases the incidence of complications, which results in prolonged hospitalization and, consequently, an increase in treatment costs [9, 11].

Main causes of overweight and obesity are overconsumption and low physical activity. However, other factors may also contribute to the development of overweight and obesity. These include chronic stress, sleep disturbances, frequent use of electronic devices, and even environmental pollution [2, 21, 24, 31].

The most common consequences of obesity, especially abdominal obesity, include a high risk of metabolic disorders (hyperinsulinemia, incorrect composition of plasma lipids, hyperuricemia and high blood fibrinogen concentration), type 2 diabetes, hypertension and cardiovascular diseases [15, 20].

Excess body weight affects many aspects of life. Obese elderly people report poor quality of life, including impaired physical function, increased body pain, and a lack of vitality [16].

Some studies seem to indicate that being overweight in old age may offer some protective health benefits (obesity paradox) [20]. However, this may be due to the fact that the actual risk is related to visceral obesity, which is not measured by BMI only and may not reflect the protective physiological effect of higher body fat content in later life [6, 7].

The aim of the study was to assess the prevalence of underweight, overweight and obesity, including abdominal obesity in elderly people in Poland. This assessment will allow to identify the risk of health problems related to improper nutritional status and the need to implement preventive measures in Polish elderly.

MATERIALS AND METHODS

This study was a part of the Nationwide Dietary Survey that was carried out on a representative sample of Polish adolescent and adult population (n=2,432) from July 2019 to February 2020. The sample selection for the study was done by the stratified sampling method using the PESEL (in Polish: Powszechny Elektroniczny System Ewidencji Ludności) system taking into account such demographic details as age, gender and place of residence. The study was approved by the Bioethics Committee at the Institute of Food and Nutrition in Warsaw, Poland (opinion dated 4 June 2018). Participation in the study was voluntary. Written informed consent was obtained from each respondent. For the assessment of the prevalence of underweight, overweight and obesity, including abdominal obesity in elderly people in Poland were included 300 men and

304 women aged 65 and over from all over the country in two age group: 65-74 years and 75 years or more.

Anthropometric measurements were carried out in each of the respondents: body height and weight as well as waist and hip circumferences. Anthropometric measurements were made by qualified personnel with the use of certified devices in appropriate conditions. Based on the results of anthropometric measurements, Body Mass Index (BMI) and Waist-to-Hip Ratio (WHR) were calculated. BMI was calculated as weight divided by height squared, WHR – by dividing waist circumference by hip circumference.

The nutritional status was assessed based on the BMI value. The criteria recommended by WHO were adopted, however, the opinion of experts was taken into account that in the elderly, underweight should be assessed at a higher BMI. The same cut-off points were used as in the NU AGE study: for underweight (<20.0 kg/m²), normal weight (20.0-24.9 kg/m²), overweight (25.0-29.9 kg/m²) and obesity (≥30.0 kg/m²) [19].

The WHR was used to assess abdominal obesity in overweight or obese people (≥1.0 in males and ≥0.85 in females). The risk of metabolic complications in studied subjects was estimated. It was assessed on the basis of the waist circumference as increase

(≥94 cm in males and ≥80 cm in females) and substantially increased (≥102 cm in males and ≥88 cm in females). For waist circumference and WHR, cut-off points developed by WHO were used [30].

Statistical analysis

The results were statistically tested using a computer software PQStat 1.8.2. In order to verify whether the distribution was normal, the *Shapiro-Wilk* test was used. The significance of differences was assessed using *Student's t-test* for normal distribution of data or the *Mann-Whitney U* test for nonparametric data and the chi-square for qualitative data. Relationships between the sex and other parameters were examined using the *Pearson* correlation (parametric data) or *Spearman* correlation (nonparametric data). For all analyses, the significance level $\alpha=0.05$ was assumed.

RESULTS

The mean age of men and women was similar (74.0±5.8 and 74.1±6.1 years, respectively). A significant relationship was observed between sex and body weight ($r=-0.4541$, $p<0.0001$), height ($r=-0.7214$, $p<0.0001$), waist circumference

Table 1. Anthropometric parameters of men and women

Parameter	Men (n=300)			Women (n=304)			M vs W
	X±SD	Median	min-max	X±SD	median	min-max	p*
Age (years)	74±5.8	74.5	65-95	74.1±6.1	74.5	65-96	0.9191
Weight (kg)	82.9±11.5	84	54-120	71.1±11.8	70	45-105	<0.0001
Height (cm)	174.5±5.9	175	155-189	163.3±5.5	164	150-179	0.0001
BMI (kg/m ²)	27.2±3.6	26.9	16.7-38.9	26.6±4.2	26.2	16.1-41	0.0239
Waist circumference (cm)	92.8±13.4	90	59-135	85.5±14.4	85.7	42-138	0.0001
Hip circumference (cm)	97.6±12.3	96	68-148	98.5±15.4	98	45-159	0.188
WHR**	0.95±0.08	0.94	0.72-1.29	0.87±0.09	0.87	0.58-1.21	0.0001

X±SD – mean ± standard deviation, min-max – minimum – maximum, M vs W – men versus women

* *Student's t-test* or *Mann-Whitney U* test, statistically significant difference - $p<0.05$

** respondents with overweight or obesity

Table 2. Assessment of anthropometric parameters of men and women

Parameter	Interpretation	Men		Women		M vs W
		n	%	n	%	p*
BMI	Underweight	4	1.3	13	4.3	0.0004
	Normal weight	69	23.0	103	33.9	
	Overweight	166	55.3	122	40.1	
	Obesity	61	20.3	66	21.7	
WHR**	Without abdominal obesity	111	50	55	29.9	<0.0001
	Abdominal obesity	111	50	129	70.1	
Risk of metabolic complications	Low	165	55.9	95	32.5	<0.0001
	Increased	58	19.7	68	23.3	
	Substantially increased	72	24.4	129	44.2	

M vs W – men versus women; *chi-square test, statistically significant difference - $p<0.05$,

** respondents with overweight or obesity

(rs=-0.2479, p<0.0001) as well as BMI (-0.0919, p=0.0238) and WHR (-0.4379, p<0.0001). The mean values of these parameters were lower in women (Table 1).

Most of the men and women were overweight or obese (75.6% of men and 61.8% of women). Only a few percent of respondents were underweight (1.3% of men and 4.3% of women). A significant relationship was observed between sex and BMI status (rs=-0.0981, p=0.0158). The prevalence of overweight was greater in men than in women (55.3% vs 40.1%) and more women than men had normal body weight (33.9% vs 23.0%) (Table 2).

A significant relationship was also observed between sex and the prevalence of abdominal obesity or the risk of metabolic complications (rs=0.2036, p<0.0001; rs=0.2461, p<0.0001, respectively). Among respondents with excess body weight, the abdominal obesity was much more common in women than men (70.1% vs 50.0%). In a greater percentage of women than men the risk of increased or substantially increased metabolic complications was found (23.3% vs 19.7%, 44.2% vs 24.4%).

Men and women aged ≥75 years had lower height and weight than men and women aged 65-74 years. In women aged ≥75 years lower hip circumference was also observed than in younger group of women (Table 3). In both age groups higher values of anthropometric parameters such as body weight, height, waist circumference and WHR were observed in men compared to women.

In both men and women, the prevalence of underweight, overweight and obesity did not differ significantly between the age groups of 65-74 years and ≥75 years. The differences between the prevalence of abdominal obesity in men aged 65-74 years and 75 years or more were also not significant. Among women, this type of obesity was much more common in subjects aged ≥75. The differences between the percentage of males and females at risk of metabolic complications in two analyzed age groups were not significant (Table 4). In both age groups the prevalence of overweight was greater in men than in women while more women than men had a normal body weight. The percentage of men and women with abdominal obesity in the age group of 65-74 years did not differ but in the age group of ≥75 years the percentage of women with this type of obesity was much higher than men (81.1% vs 47.1%, p<0.0001). In both age groups more women than men at the risk of substantially increased metabolic complications was observed. Furthermore, in the age group of ≥75 years the percentage of women at increased metabolic complications was higher than men.

Increased or substantially increased risk of metabolic complications occurred mainly among overweight and obese people: in 54.7% of males

Table 3. Anthropometric parameters of men and women in the age groups of 65-74 and ≥75 years

Parameter	Men (n=300)				Women (n=304)				M vs W ≥75 years	p*		
	65-74 years (n=150)		≥75 years (n=150)		65-74 years (n=152)		≥75 years (n=152)				M vs W 65-74 years	p*
	X±SD median	min-max	X±SD median	min-max	X±SD median	min-max	X±SD median	min-max				
Weight (kg)	84.4±11.2 85	55-120	81.4±11.6 80	54-120	72.8±11.8 71	45-105	69.3±11.6 69	45-96	0.0113	<0.0001		
Height (cm)	175.4±6.2 176	159-189	173.5±5.4 174.5	155-184	164.3±5 164	152-179	162.4±5.7 162	150-179	0.0017	0.0001		
BMI (kg/m ²)	27.5±3.5 27.1	18.6-37.9	27±3.6 26.7	16.7-38.9	26.9±4.15 26.3	17.8-41	26.3±4.2 26.1	16.1-38	0.1651	0.1082		
Waist (cm)	93.6±13 93	61-135	92.1±13.9 90	59-135	86.1±12.7 87.5	56-120	84.9±15.8 84.5	42-138	0.4539	<0.0001		
Hip (cm)	98.6±12.4 98	73-144	96.7±12.1 95	68-148	100.3±14.1 99	59-140	96.7±16.5 97	45-159	0.0453	0.2759		
WHR**	0.95±0.08 0.95	0.72-1.13	0.95±0.08 0.94	0.72-1.29	0.86±0.09 0.86	0.64-1.21	0.88±0.08 0.89	0.6-1.15	0.129	<0.0001		

X±SD – mean ± standard deviation, min-max – minimum – maximum, M vs W – men versus women, * Student's t-test or Mann-Whitney U test, statistically significant difference - p<0.05, ** respondents with overweight or obesity

Table 4. Assessment of anthropometric parameters of men and women in the age groups of 65-74 and ≥75 years

Parameter	Interpretation	Men						Women						M vs W 65-74 years	M vs W ≥75 years
		65-74 years			≥75 years			65-74 years			≥75 years				
		n	%	p*	n	%	p*	n	%	p*	n	%	p*		
BMI	Underweight	2	1.3		2	1.3		5	3.3		8	5.3		0.0262	
	Normal weight	30	20	0.6735	39	26		49	32.2		54	35.5	0.7271		
	Overweight	86	57.3		80	53.3		63	41.4		59	38.8			
	Obesity	32	21.3		29	19.3		35	23.1		31	20.4			
WHR**	Without abdominal obesity	54	47.8	0.5021	57	52.9		38	40.4		17	18.9		0.2886	
	Abdominal obesity	59	52.2		52	47.1		56	59.6		73	81.1	0.0014		
Risk of metabolic complications	Low	75	51.7		90	60		46	31.5		49	33.5		0.0001	
	Increased	33	22.8	0.2954	25	16.7		27	18.5		41	28.1	0.0736		
	Substantially increased	37	25.5		35	23.3		73	50		56	38.4			

M vs W – men versus women, *chi-square test, statistically significant difference - p<0.05, ** respondents with overweight or obesity

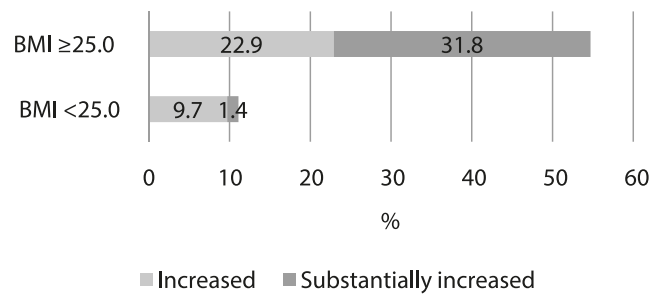


Figure 1. Increased or substantially increase risk of metabolic complications in males according to BMI

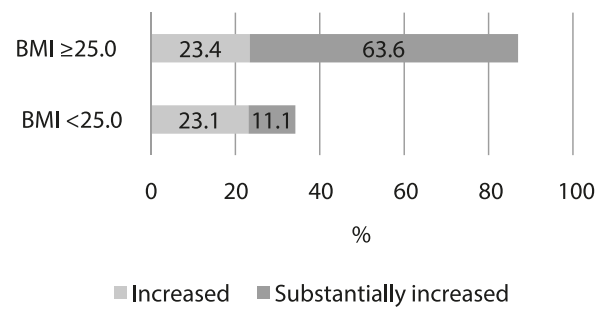


Figure 2. Increased or substantially increased risk of metabolic complications in females according to BMI

(Figure 1) and 87% of females (Figure 2). However, some subjects, especially women, with BMI below 25.0 kg/m² also have increased (9.7% of males and 23.1% of females) or substantially increased (respectively 1.4% and 11.1%) risk of metabolic complications.

DISCUSSION

The analysis of anthropometric measurements of the studied subjects showed that the mean and median BMI in men and women exceeded 25.0 kg/m² – a value indicating the presence of excess body weight. The mean and median WHR values in men were less than 1.0, indicating abdominal obesity. In women, these values exceeded 0.85, the cut-off point for abdominal obesity. The mean and median waist circumference of men exceeded 92 cm, and women – 80 cm, values indicating an increased risk of metabolic complications.

A representative PolSenior 2 study conducted in 2018-2019 [8] showed that the average BMI was 28.5 in men and 29.3 kg/m² in women aged ≥60 years. Waist circumference was respectively: 103.6 and 97.4 cm. Similar trends were noted earlier in a nationwide representative survey carried out in 2000 [27]. Among subjects aged 60 and more, the average BMI was 26.6 in men and 28.4 kg/m² in women, average WHR – 0.94 and 0.85 respectively and average waist circumference – 94.7 and 92.3 cm. High average values of BMI (28.3 in males and 28.8 kg/m² in females) and waist

circumference (103.7 and 96.3 cm respectively) were also noted among the rural elderly from the Oleśnica district, in the Lower Silesia Voivodship (southern region of Poland) [32].

The comparison of data on the nutritional status of older people is difficult due to different criteria for this group used by some authors. WHO has not established recommendations regarding the use of different BMI values in older than younger people [28]. Nevertheless, some authors use higher BMI values as cut-off points for underweight, overweight, and obesity in the elderly [3, 14].

Different criteria relate primarily to the classification of underweight. In our study, we adopted BMI <20.0 kg/m², similar to the NU AGE study [19], assuming that when used at older age, BMI <18.5 kg/m² may not allow for a proper assessment of the problem.

Some studied subjects were underweight, although the percentage was not high (1.3% of males and 4.3% of females). Underweight occurred mainly in women.

Among those surveyed in 2000, underweight was also rare: in 1.8% of men and 1.1% of women, although it was classified at BMI <18.5 kg/m² according to WHO interpretation [27].

Some authors believe that higher BMI values should be used as a cut-off point for underweight. In the study in Drawsko Pomorskie (Poland) no subject was underweight according to WHO interpretation of BMI, while 17% were underweight according to Queensland Government (QG) interpretation (<23.0 kg/m²) [5].

An analysis of data on the nutritional status of all adults participating in the Nationwide Dietary Survey in Poland showed the prevalence of overweight and obesity increased with age [26]. However, the data presented in this manuscript showed that the changes after the age of 75 were not significant.

Excess body weight in studied elderly aged ≥65 years was very common (75.6% of males and 61.8% of females).

In the WOBASZ II study conducted in 2013/14, excess body weight was found in 78.3% of men and 82.6% of women aged 65-74 and respectively in 69.1% and 77.4% of subjects aged ≥75 years [25]. In the PolSenior2 study obesity in people aged 60 and more was found in 31.3% of men and 38.7% of women, while overweight – in 42.4% and 35.1%, respectively. Excess body weight was most common at the age of 65-69, and its prevalence clearly decreased after the age of 85 [8].

High prevalence of overweight and obesity in Poland was also noted in previous years. Survey carried out in 2000 showed that overweight was present in 46.1% of men and 35.5% of women over 60 years of age, obesity in 19.3% and 37.2%, respectively [27].

Changes in obesity with age in Poland are similar to those in Europe, the incidence of obesity increases with age, peaking around 60 years. Subsequently, body weight does not change much and begins to decline in older age [20].

The high prevalence of overweight and obesity in the elderly is also indicated by studies of selected groups from Polish towns. The analysis of nutritional status of the elderly from Drawsko Pomorskie indicated that 29% of examined subjects (males and females) were overweight and 42% were obese [5]. Among the residents of nursing homes and a day-care center in Nysa aged ≥60 years overweight was found in 40% of men and 37.3% of women, and obesity in 30% and 39.2%, respectively [33]. Among patients of the health and rehabilitation centre in Mielno-Uniescice 50% of males and 13% of females were overweight while 50% of males and 79.9% of females had obesity [12]. In studies of elderly people carried out in Lublin 24.7% of men and 43.9% of women were obese [22].

The authors of above-mentioned studies used the same criteria to assess the prevalence of overweight and obesity as in this manuscript.

Abdominal obesity was common among overweight and obese subjects (50.0% of males and 70.1% of females). It was found more often in women. Moreover, in women after the age of 75, the percentage of subjects with abdominal obesity increased significantly.

Among the subjects studied in 2000, the incidence of abdominal obesity was also analysed, but slightly different criteria were adopted (WHR ≥0.95 in males and ≥0.80 in females). Abdominal obesity has been found in 44.6% of overweight or obese men aged 60 or over. Women with excess body weight had it much more often – 84.4% [17].

Accumulation of fatty tissue around the abdomen indicates an increased risk of developing metabolic complications. It is determined by the waist circumference which gives a better prediction of visceral and even total fat and of disease risks than waist to hip ratio [15].

An increased or substantially increased risk of metabolic complications was found in a large group of respondents (44.1% of males and 67.5% of females). Among women, this risk was most often substantially increased. It should be emphasized that an increased or even substantially increased risk of metabolic complications also occurred in subjects whose BMI did not indicate excess body weight.

The frequent occurrence of an increased risk of metabolic complications related to the accumulation of visceral adipose tissue among the elderly was confirmed by the WOBASZ II study from 2013-2014. Increased risk has been found in 23.5% and 25.4% of males aged 65-74 and ≥75 years and in 17.3% and 12.3% of females respectively. There was a very high

percentage of the elderly with a substantially increased risk: 53.7% and 44.4% of men aged 65-74 and ≥ 75 years and in 74.5% and 75.9% of women respectively [25].

In a 2000 study, waist circumference indicating a substantially increased risk of metabolic complications was also found in a large proportion of the elderly population (≥ 60 years): 24.9% of men and 63.1% of women [17].

Regional studies also indicate high risk of metabolic complications. In studies conducted in Lublin nearly 86% of men of 93% of women had too large waist circumference [22].

In the above-mentioned studies, as in the studies presented in this manuscript, the risk of developing metabolic disorders was found more often in women than in men.

Our research confirmed that obesity is a serious problem in the elderly. Decreased physical activity and reduced energy expenditure promote the accumulation of adipose tissue [16]. On the other hand, muscle mass decreases, so BMI may not fully reflect the increase in body fat. Also, lower height resulting from vertebral compression and kyphosis affects the relationship between BMI and adipose tissue [22]. Waist circumference is a better indication of obesity. Therefore, some subjects were found to have too large waist circumference, even though their BMI did not indicate overweight nor obesity.

Underweight among the respondents was much less frequent than excess body weight, but this problem cannot be underestimated. Underweight can lead to malnutrition, which is associated with many serious health problems, especially in old age.

In the elderly, in order to assess the occurrence of malnutrition, it is advisable to conduct detailed assessment, based not only on BMI values. The PolSenior2 study showed that over a quarter of Polish residents aged 60 or more had a poor nutritional status (PNS). The prevalence of risk of malnutrition was estimated at 25.3%, while malnutrition at 2.8% based on the Mini Nutritional Assessment – Short Form. PNS was most often observed in the oldest age group, more often in females than in males [18].

CONCLUSIONS

Overweight and obesity were very common health disorders in Polish elderly. Overweight was more often found in men, but the prevalence of obesity in both populations was similar. Abdominal obesity was common in people with excess body weight. It was more common in women, especially after the age of 75.

Elderly people, especially women, were often at increased or substantially increased risk of metabolic complications due to excessive accumulation of

adipose tissue in the abdomen. It applied not only to overweight and obese persons, but also to some people without excess body weight. Some elderly people, especially women, might be at risk of protein and energy malnutrition related to underweight.

Nutritional status of the elderly should be systematically monitored and therapeutic interventions applied in the event of any irregularities. It is very important to implement health programs to prevent overweight and obesity as well as underweight and possible malnutrition of the elderly. Effective early prevention can significantly improve their quality of life.

Acknowledgements

This work was supported by the European Food Safety Authority (No OC/EFSA/DATA/2015/03 CT 3) and the Polish Ministry of Science and Higher Education (No 3876/E-220/S/2018-1). This study was also performed under the project of the National Institute of Public Health NIH – National Research Institute, Poland (FŻ-1/2022).

Conflict of interest

The authors declare no conflict of interest.

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Received: 15.07.2022

Accepted: 09.08.2022

Published on line first: 12.08.2022