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Obesity: disease and predictor of health complications

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Ожиріння як хвороба та предиктор ускладнень здоров'я

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Introduction

Obesity is a common cause of serious diseases and health complications. It is associated with 236 comorbidities [1]. It negatively affects the body's physiology, reduces the overall quality of life, and thus shortens the average life expectancy. It is a chronic progressive disease (Trnková and Fábryová) [2]. Other authors [3] characterise it as a health risk on a population scale. The amount of stored body fat and its distribution play a significant role in overall health. The waist circumference is a predictor of health risks. If the BMI value falls within the overweight range (BMI = 25.0–29.9 kg/m²), the risk of health complications is lower [3]. BMI values above 30 kg/m2 and waist circumference of ≥ 94 cm in men, and ≥ 80 cm in women represent a higher risk of developing metabolic and circulatory complications [4]. High BMI values represent risk of developing metabolic, cardiovascular and oncological diseases [5]. According to Fabryova [6] and Sucharda [7], obesity is a source of increased load on the musculoskeletal system, hypoventilation, sleep apnea, gastroesophageal reflux, cardiac hypertrophy and arterial hypertension. It represents a global cardiomimetic risk and can result in cerebrovascular morbidity and mortality. Risk signals, besides increased waist circumference, include increased triglycerides, HDL cholesterol in blood serum, arterial hypertension (BP ≥ 130 mmHg and/or diastolic BP ≥ 85 mmHg), and fasting blood glucose above 5.6 mmol/L. These values indicate the risk of heart failure, especially in people with morbid obesity (BMI> 40 kg/m^2) and atrial fibrillation. Ventricular arrhythmias occur more often, and both systolic and diastolic heart function are negatively affected.

Obesity is a risk factor for thromboembolic disease [5; 7]. The risk of recurrent embolism is doubled for people with a BMI>40. In this case, the waist circumference is more significant than BMI. Payer, Jackuliak, Nagyová [8] point out the relationship between obesity and the development of several malignant tumours, especially breast, colon and prostate cancer. Kováčová, Dókuš [9] believe that pregnant women with obesity are also exposed to a greater risk of maternal and perinatal complications, with the risk increasing with increasing BMI. Skin folds on the body that arise in obesity and sweating evoke skin inflammations, fungi and eczema.

Suchard [7] highlights psychosocial complications. Obesity damages interpersonal relationships and sexual health. In men, obesity is linked to hypogonadism, erectile dysfunction, benign prostatic hyperplasia, to prostate cancer, micturition difficulties, and the formation of urinary stone formation. It also adversely affects male fertility [10]. In women, it can cause genital discomfort, urinary incontinence, and recurrent urinary tract infections. Vansač and Kenderešová [29] emphasize ethical issues, which include informational isolation and social isolation, prejudice and discrimination, defamation, and social withdrawal. Therefore, support should be based on three conditions of mutual interaction: acceptance, authenticity, and empathy.

The aim of the research was to evaluate the incidence of health complications in a community of people with obesity.

Object, materials and research methods

The research group (n=244) included men (n=96) and women (n=148) with overweight or obesity BMI ≥ 25 aged 18 to 65, who were treated at an obesity treatment centre. 111 (45.5%) of the respondents had secondary education (Table 2, Table 3, Table 4).

The average body weight of men was with an arithmetic mean (AM) of 117.08 kg, with a standard deviation (SD) of 23.32 kg, and the median weight (Mdn) was 110.2 kg. The min/max values were 80 kg and 221.3 kg.

The average body weight (AM) of women was 92.56 kg, with a standard deviation (SD) being 16.37 kg, and the median weight was Mdn = 89.8 kg. The minimum/maximum values of weight were 66.9 kg and the maximum was 149.3 kg.

The BMI of men ranged from 27.5 to 61.3. The mean BMI was 36.09 (SD = 6.25). The median was Mdn = 34.5.

Based on the BMI classification of obesity [3], our research sample included 9 men in the overweight range

Table 1

Health consequences of obesity

Etiological factor	System/tissue/ functional unit	Comorbidity
mechanical load	respiratory	sleep apnea syndrome, hypoventilation syndrome
	cutaneous	intertriga, mycoses
	musculoskeletal	osteoarthritis of the load-bearing joints (knees, hips, spine), sarcopenia
	gastrointestinal	gastroesophageal reflux, hiatal hernia
disorders of neuro-, endo-, para-autocrine regulation and metabolism	metabolic	impaired glucose tolerance (insulin resistance and hyperinsulinemia), type II diabetes mellitus, dyslipidemia, hyperuricemia, NASH – nonalcoholic steatohepatitis, steatofibrosis, gallstones, pancreatitis and pancreatopathies (dysfunction of pancreatic beta cells with impaired insulin secretion)
	immune	chronic systemic inflammation of low intensity (increased markers – e.g. CRP, TNF-alpha, etc.)
	vascular and lymphatic	endothelial dysfunction, microcirculatory dysfunction, arterial hypertension, dyslipidemia, atherosclerotic changes, procoagulant conditions: deep vein thrombosis with embolization, acute coronary artery occlusions, stroke, chronic venous insufficiency, varicose complexes, hypostatic edema of the lower extremities, lymphedema
	fat	lipodystrophy, lipedema, lipomas
	excretory	microalbuminemia, chronic renal failure
	psychic	depression, anxiety, low self-esteem, stigmatisation, job discrimination
	reproductive	Impaired fertility, irregular menstruation, more frequent anovulatory cycles, hyperandrogen syndrome in women, preeclampsia and gestational diabetes mellitus during pregnancy; hypogonadism with signs of insulin resistance and erectile dysfunction in men
	tumor	gynaecological: endometrial, cervical, ovarian, breast cancer in postmenopausal women, gastrointestinal: colorectal cancer, cancer of the pancreas, gallbladder and bile ducts, liver, urological: prostate cancer in men, kidney cancer in both sexes

Source: [5].

Table 2

Composition of the research group

gender	frequency	relative frequency (%)
male	96	39,9
female	148	60,7
Σ	244	100

Table 3

Research sample according the age

Age category	frequency	relative frequency (%)
20–29 years	21	8,6
30–39 years	59	24,1
40–49 years	67	27,3
50–59 years	58	23,7
60–65 years	39	15,9
Non specified	1	0,4
Σ	244	100

Table 4

Research sample according to the education

education	frequency	relative frequency (%)
apprenticeship	43	17,6
high school with a diploma	111	45,5
colledge, university	90	36,9
Σ	244	100

(BMI 25.0–29.9 kg/m2), 43 men in the first-degree obesity range (BMI 30.0–34.9 kg/m2), 28 men in the second-degree obesity range (BMI 35–39.9 kg/m2), and 16 men in the third-degree obesity range (BMI > 40 kg/m2).

The BMI of women ranged from 25.3 to 50.9. The mean BMI was 32.65 (SD = 5.92). The median was Mdn = 32.65. The research sample included n=48 women in the overweight range, n=51 in the first degree obesity range, n=28 women in the second degree obesity range, and n=21 women in the third degree obesity range.

The waist circumference of men was on average AM = 119.42 cm (SD = 14.08 cm), and the median waist circumference was Mdn = 117.5 cm. The minimum was found to be 95 cm, and the maximum was 164 cm.

The waist circumference of women was on average (AM) of 112.21 cm (SD = 12.3 cm), and the median waist circumference was Mdn = 110 cm. The minimum was found to be 90 cm, and the maximum was 149 cm.

The waist-to-hip ratio (WHR) in men ranged from 0.42 to 1.75. The mean WHR value was AM = 1.06 (SD = 0.13). The median was equal to Mdn = 1.05.

The WHR in women ranged from 0.81 to 1.15. The mean WHR value was AM = 1.01 (SD = 0.06). The median was equal to Mdn = 1.01.

Visceral fat in men was on average (AM) = 165.29 cm2 with a standard deviation SD = 43.56 cm2, and the median of visceral fat was Mdn = 153.55 cm2. The minimum was found to be 89.1 cm2 and the maximum was 299.4 cm2.

Visceral fat in women was, on average, AM = 160.28 cm2 with standard deviation SD = 36.5 cm2 and the median visceral fat was Mdn = 154.25 cm2. The minimum was found to be 88.4 cm2 and the maximum was 278.8 cm2.

We used an original questionnaire to collect data. It contained closed, semi-closed, and open items. We evaluated the respondents' answers on a 5-point Likert scale. We assessed the biochemical parameters of the blood in the Alpha Medical biochemical laboratory. The body impedance measurements were performed using the InBody 230 device, with an emphasis on intersex differences. We evaluated the data using both descriptive and inferential statistics. In descriptive statistics, we employed absolute (f) and relative frequencies (%). For interval (continuous) variables, we used the arithmetic mean (AM), standard deviation (SD), median (Mdn), as well as the minimum (min) and maximum (max) values. In inferential statistics, we applied tests for comparing groups and detecting relationships between variables. Before selecting the appropriate test, we assessed the normality of data distribution with the Kolmogorov-Smirnov test. Since normality was not confirmed in all cases, we chose non-parametric tests. To compare multiple groups within a single variable, we employed the Kruskal-Wallis test. For nominal variables, we used the Chi-square test of independence and the Chi-square goodness-of-fit test. When the assumptions for these tests were not met (expected frequencies < 5), we used Fisher's exact test. To evaluate the degree of association, we used the Spearman rank correlation test. The significance level was set at α = 0.05. To determine the practical significance of relationships, we utilised Cohen's d. Values near dCohen = 0.2 are considered small, around 0.5 medium, approximately 0.8 large, and above 0.8 very large. For Spearman's correlation, the correlation coefficient itself indicates the effect size.

Research Results

Statistical analysis of data confirmed or refuted our research hypotheses.

Hypothesis 1: We assume that the nature of health complications related to overweight and obesity is related to gender.

There is a statistically significant difference between men and women in the presence of skin diseases ($\chi^2(1) = 5.823$, $p = 0.016$). In women (n = 27, 18.2%), skin diseases occurred more frequently than in men (n = 7,

Table 5

Incidence of diseases in the sample

Illness	men		women		χ^2	df	p	d
	yes	no	yes	no				
skin diseases	7	89	27	121	5,823	1	0,016	0,313
	7,3 %	92,7 %	18,2 %	81,8 %				
cardiovascular diseases	27	69	31	117	1,656	1	0,198	0,165
	28,1 %	71,9 %	20,9 %	79,1 %				
gynecological problems	17	79	20	128	0,796	1	0,372	0,114
	17,7 %	82,3 %	13,5 %	86,5 %				
spine and joint diseases	50	46	53	95	6,321	1	0,012	0,326
	52,1 %	47,9 %	35,8 %	64,2 %				
respiratory diseases	11	85	37	111	6,757	1	0,009	0,338
	11,5 %	88,5 %	25 %	75 %				
cancer diseases	0	96	1	147	0,651[a]	1	0,607	0,103
	0 %	100 %	0,7 %	99,3 %				
mental disorders	8	88	18	130	0,897	1	0,34	0,120
	8,3 %	91,7 %	12,2 %	87,8 %				

χ^2 – Chi-square, df – degrees of freedom, p – statistical significance, a – Fisher's test.

7.3%). The practical significance of the result remains low (dCohen = 0.313). Additionally, a statistically significant difference exists between men and women regarding spine and joint diseases (χ2(1) = 6.321, p = 0.012). These conditions are more common in men (52.1%) than in women (35.8%). The significance of this finding is also low (dcohen = 0.326). A significant difference was identified in the prevalence of respiratory diseases (χ2 (1) = 6.757, p = 0.009). These diseases are more prevalent in women (n = 37, 25%) than in men (n = 11, 11.5%) (see Table 5). The practical significance remains low (dCohen = 0.338). No significant differences were observed between men and women in the presence of cardiovascular and oncological diseases or mental disorders ($p > 0.05$).

Hypothesis 2: We assume that after completing the weight control program, the values of selected laboratory parameters will change.

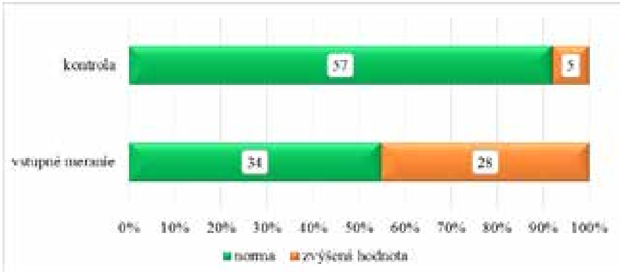
The respondents participated in a programme for conservative weight control for three months. In all anthropometric indicators monitored by us (BMI, waist circumference, WHR, amount of visceral fat), there were statistically significant differences in the change of the mentioned indicators in both men and women after completing the preventive programme ($p < 0.05$). In men, we achieved a loss of total weight (AM = 12.11 kg); in women, AM = 8.81 kg. We also noted a decrease in BMI in men (AM = 3.45) and women (AM = 3.27), a reduction in waist circumference (men: AM = 8.59 cm; women: AM = 6.66 cm), a decline in the WHR index (men: AM = 0.06; women: AM = 0.05), and a decrease in visceral fat amount (men: AM = 33.86 cm²; women: AM = 25.85 cm²).

We conclude that in the laboratory values, there is not always a greater shift towards the normal values; they often simply remain at an elevated level after completing the programme. Based on this, we reject hypothesis H2. We observed differences in blood glucose levels ($p < 0.05$) and total cholesterol ($p < 0.05$), where we noted a transition from elevated values to the normal range during the follow-up measurement. For liver tests and mineralogram, the results were statistically insignificant ($p > 0.05$), but the practical significance was high (dCohen = 0.79). In three respondents, the elevated values shifted to the normal range. However, due to the small number of respondents in this group, the result is not statistically significant. Nonetheless, the practical significance indicates that with an increased number of respondents, the findings would likely achieve statistical significance.

Regarding triglycerides, uric acid, and C-reactive protein levels in blood serum, we observed a statistically insignificant result ($p > 0.05$). In the group with elevated levels, approximately half of the respondents experienced a reduction to normal, while the other half did not.

Glycemia

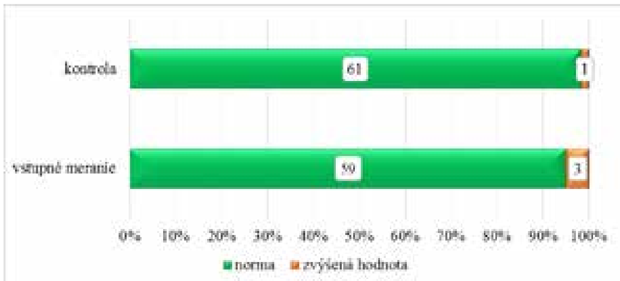
We observed elevated blood glucose levels in (n=28) respondents during the initial measurement. In the follow-up measurement, elevated levels were present in (n=5) (Graph 1). When comparing the number of elevated values in the initial measurement with those in the follow-up (using a Chi-square goodness-of-fit test), we found a statistically significant difference (χ2(1) = 11.571, p = 0.001). More respondents with elevated blood glucose levels showed decreases in their values at the follow-up. The practical significance of the result is very high (dCohen = 1.679).



Graph 1. Glycemia at baseline and follow-up

Liver tests

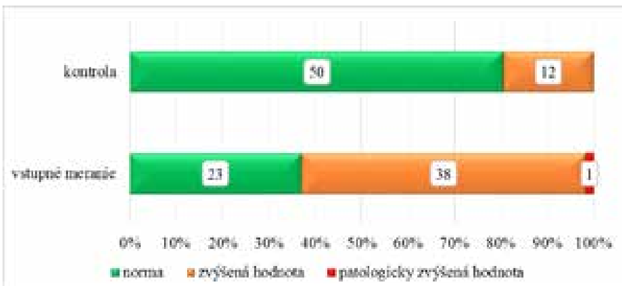
At baseline, liver test values were elevated in (n=3) respondents. At follow-up, elevated values were observed in only one respondent (Graph 2). When comparing the number of elevated values at baseline with the improvement at follow-up (Fisher's exact test), we found no statistically significant difference between them (χ2(1) = 0.334, p = 0.5). The significance of the result is high (dCohen = 0.79).



Graph 2. Liver tests at baseline and follow-up

Total cholesterol

In (n=38), we observed an increased total cholesterol level at the initial measurement, and in (n=1), a high value. During the follow-up measurement, an increased level was detected in 12 respondents, while in 27 respondents, the concentrations of total cholesterol were adjusted to normal levels (Graph 3). When comparing the number of participants with elevated values

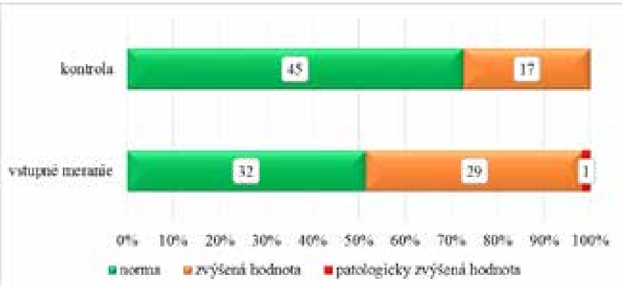


Graf 3. Total cholesterol at baseline and follow-up

from the initial measurement with the improvements observed in the follow-up measurement (Chi-square test of goodness of fit), we found a statistically significant difference between them ($\chi 2(1) = 5.769$, $p = 0.016$). More respondents with initially raised total cholesterol levels showed a decrease during the follow-up measurement. The practical significance of this finding is high (d Cohen = 0.833).

Triglycerides

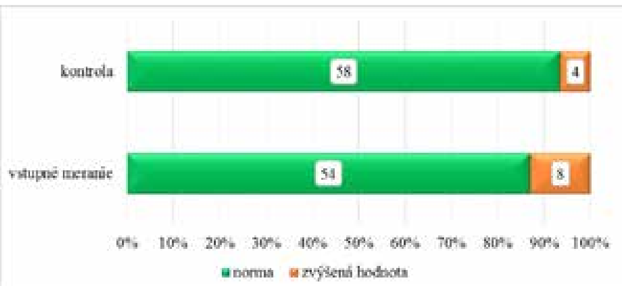
We observed increased values in (n=29) participants, with one respondent showing particularly high values. During the control measurement, the values remained elevated in (n=17); in (n=13) respondents, the triglyceride levels were adjusted from the elevated values to normal (Graph 4). When comparing the number of increased values in the initial measurement with the improvements observed in the control measurement (Chi-square test of goodness of fit), we found no statistically significant difference between them ($\chi 2(1) = 0.533$, $p = 0.465$). The practical significance of this result is low (dCohen = 0.269).



Graf 4. Triglycerides at entry measurement and control

Uric acid

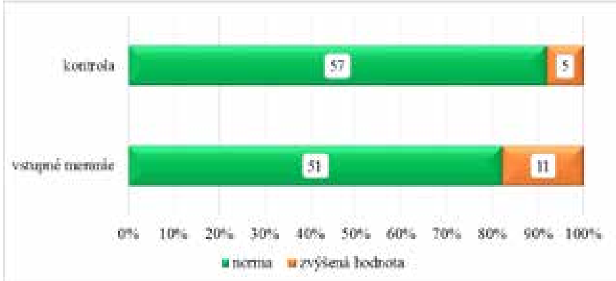
In the first measurement, we observed increased values in (n=8), and in the control measurement, increased values remained in (n=4). In (n=4) respondents, laboratory values of uric acid were adjusted from elevated to the normal range (Graph 5). When comparing the number of increased values in the initial measurement with the improvement observed in the control measurement (Chi-square test of goodness of fit), we found no statistically significant difference between them ($\chi 2(1) = 0$, $p = 1$).



Graph 5. Uric acid at baseline and follow-up

C reactive protein

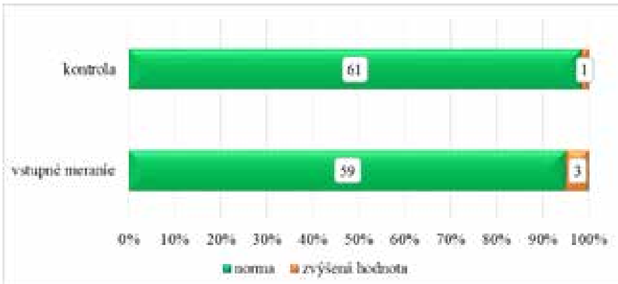
We observed elevated values in the initial measurement in (n=11) respondents. In the control measurement, the values remained elevated in (n=5). In (n=6), the values shifted from elevated to normal (graph 6). We compared the number of elevated values in the first measurement with the improvement seen in the control measurement (Chi-square goodness of fit test) and found no statistically significant difference between them ($\chi 2(1) = 0.091$, $p = 0.763$). The practical significance of the result is low (dCohen = 0.183).



Graf 6. C reactive protein at baseline and control

Mineralogram

Increased mineral values at baseline were observed in (n=3) respondents. At follow-up, these values remained elevated in one respondent (n = 1) (Graph 7). When comparing the number of increased values at baseline with the number of improved values at follow-up using Fisher's exact test, we found no statistically significant difference between them ($\chi 2(1) = 0.334$, $p = 0.5$). The significance of the result is high (dCohen = 0.79).



Graph. 7 Mineralogram during input measurement and control

Discussion of the Research Results

The incidence of obesity is increasing globally and causes structural and functional changes. It shortens average life expectancy. In patients with grade 3 obesity (BMI ≥ 40 kg/m2), the life expectancy is reduced by about 8–10 years. In those with a BMI of 30–35 kg/m2, life expectancy is around 3 years shorter, and with each additional 5 kg/m2 increase in BMI, the risk of vascular mortality from conditions like ischaemic heart disease, stroke, and other vascular diseases rises by 40%. Despite this, obesity is not regarded as a disease [11].

The prevalence of health risks such as hypertension, hyperlipidaemia, and diabetes mellitus in obese individuals increases with larger waist circumference. The associated health risk includes non-alcoholic fatty liver disease, which is more common in men [12]. Other health risks, like obstructive sleep apnoea, also occur more frequently in men than in women (in a ratio of 4:1). Men are more predisposed to this risk than women. The androgenic type of fat deposition is characterised by its accumulation, most particularly in the neck and pharynx [13].

Our research revealed that the health risks associated with obesity differ between men and women. There is also a statistically significant difference between the sexes in the presence of spinal and joint diseases ($\chi2(1) = 6.321$, $p = 0.012$). We observed spinal and joint disease in 50 men (52.1%) and 53 women (35.8%). According to Svacin [14], arthrosis of the shoulder joints and vertebrogenic problems are typical conditions of the obese. Back pain is one of the most common types of pain, and the link between obesity and back pain in the lumbar region is being intensively researched. Obesity is associated with accelerated disc degeneration and joint wear, which heighten the physical demands on muscles and ligaments and lead to painful symptoms [15]. In a population study, Samartisz et al. [16] monitored the incidence of juvenile disc degeneration in individuals aged 13 to 20 years. They found that disc degeneration was significantly linked to obesity ($p=0.023$), with the severity of disc damage increasing with higher BMI. The Finnish study by Shiri et al. [17] also confirmed that obesity and low physical activity are independent predisposing factors for back pain.

Zhang et al. [18] published a meta-analysis that included 10 cohort studies with a total of 29,748 subjects. They concluded that overweight and obesity are risk factors for back pain in both men and women. A strong relationship between back pain in men and higher BMI, higher waist/hip ratio, and higher body fat index was also demonstrated by Chou et al. [19].

Due to the numerous folds on the body caused by obesity and increased sweating, inflammations, fungi, and eczema can develop on the skin. Women often have cellulite and stretch marks. In our sample, we have also found skin problems. There was a statistically significant difference in the presence of skin conditions between men and women ($\chi2(1) = 5.823$, $p = 0.016$). Skin diseases were more common in women ($n = 27$) than in men ($n = 7$).

We also observed a higher incidence of respiratory diseases in women ($n = 37$; 25%) compared to men ($n = 11$; 11.5%). According to several authors [20, 21, 22], it has only recently become a less well-known fact that diabetes increases the risk of developing infectious diseases, a point confirmed during the COVID-19 pandemic. Gynaecological problems were reported by ($n=20$) women included in our study, while $n=17$ men also admitted to issues in this area. The most common is the presence of gynecomastia.

Several epidemiological studies in the past decade have provided additional evidence that obesity is a risk factor for developing malignant tumours. Remarkably, our respondents found that at a specific point in time, not a single man ($n = 0$) and only one woman ($n = 1$) had an oncological disease.

Renehan et al. [23] analysed 221 databases of prospective studies examining the relationship between over 20 types of cancer and increased BMI. They discovered that a rise in BMI by 5 kg/m^2 in men is associated with oesophageal cancer ($p < 0.0001$), thyroid cancer ($p = 0.02$), colon cancer ($p < 0.0001$), and kidney cancer ($p < 0.0001$). The same BMI increase in women was significantly associated with endometrial cancer ($p < 0.0001$), gallbladder ($p = 0.04$), oesophagus ($p < 0.0001$), and kidney ($p < 0.0001$) cancers. The link with colorectal cancer was more pronounced in men ($p < 0.0001$).

Obesity is also linked to psychological issues; in our sample, they were confirmed by 8 men (8.3%) and 18 women (12.2%). The most common mental health conditions include depression, anxiety, eating disorders, and substance abuse. Weight loss often results in improved psychosocial well-being and functioning [7]. Additionally, 27 men (28.1%) and 31 women (20.9%) reported having cardiovascular disease. Allemann et al. [24] found that a family history of essential hypertension in lean individuals predicts future weight gain, suggesting that hypertension can cause obesity. The risk of developing arterial hypertension rises with increasing BMI in both women and men [25]. Weight loss is regarded as the most effective non-drug treatment for hypertension in obese patients. Even a 5-10% reduction in weight is linked to a significant decrease in blood pressure and other obesity-related health issues. A key practical point is that lowering blood pressure is particularly associated with a reduction in visceral fat.

Analysis of laboratory parameters in our sample ($n = 62$) revealed differences in blood glucose levels ($p < 0.05$) and total cholesterol ($p < 0.05$). The link between obesity and the development of diabetes is well established. Up to 90% of diabetics are affected by obesity, which is often referred to as diabetes [26]. Regarding liver tests and mineralogram results, we observed a statistically insignificant outcome ($p > 0.05$), but the practical significance was high (dCohen =0.79). In the group with elevated values, there were 3 participants in both cases, and in two of these, the elevated level reverted to the normal range, which accounts for more than 50%. Due to the small sample size in this group, the result lacks statistical significance. For triglycerides, uric acid, and C-reactive protein levels, the results were statistically insignificant ($p > 0.05$), with approximately half of the participants in the elevated group showing a reduction to normal levels, while the other half did not. Similar results were obtained by Belovičová and Matula [27], who evaluated 184 clients during a spa detoxification stay, observing highly statistically significant reductions in total cholesterol, triglycerides, and glycaemia.

Demonstrably positive changes in biochemical parameters likely require longer interventions. Excessive energy intake impairs lipoprotein metabolism, resulting in elevated levels of total cholesterol, LDL cholesterol, and triglycerides. Among metabolic disorders, there is also a disturbance of purine metabolism, which manifests as elevated uric acid levels in the serum, or hyperuricemia

[7; 3]. The concurrent presence of hyperuricemia, arterial hypertension, and hyperglycemia was first noted as early as 1923 by the Swedish physician Kylin. It was demonstrated that there is a direct correlation between the amount of visceral fat and serum uric acid concentration ($p < 0.01$). Grassi et al. [28] studied the impact of weight loss and insulin resistance on blood uric acid levels. They found that a weight loss of 7.7 ± 5.4 kg prevented the occurrence of acute gout attacks ($p = 0.002$). Serum uric acid levels only normalised after a 58% weight reduction.

Fábryová [6] believes that the treatment of obesity-associated dyslipidemia focuses on weight reduction, dietary measures, and increased physical activity, which significantly improve insulin resistance and dyslipidemia. Trnková [29] emphasises that obesity is a disease where prevention is many times more effective than treatment.

Vansač and Noga (2021) state in their research that supportive communication with a patient is extremely important, as it helps manage stress and loneliness and has a preventive effect [30].

Prospects for further research

Future research should focus on larger and more diverse study populations and longer follow-up periods to better assess long-term changes in biochemical parameters associated with weight reduction. Further studies should also explore psychosocial factors and lifestyle determinants influencing obesity-related complications. Incorporating intervention-based and longitudinal designs may contribute to a deeper understanding of causal relationships.

Conclusions

Obesity as a disease can also cause several chronic non-communicable diseases. It is also regarded as a pandemic of the third millennium. It affects not only the adult population but also children. Both professionals and the general public often underestimate the risk of developing health complications. The health risks of obesity can remain unrecognised for many years.

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Obesity leads to structural and functional changes that culminate in numerous organ-specific pathological complications, significantly affecting morbidity as well as the quality and length of life of obese individuals. The aim of the study was to determine the prevalence of complications associated with obesity. Payer, Jackuliak, and Nagyová [8] point to an association between obesity and the development of several malignant tumors, particularly breast, colorectal, and prostate cancer. Kováčová and Dókuš [9] suggest that pregnant women with obesity are also exposed to a higher risk of maternal and perinatal complications, with the risk increasing as BMI rises. Skin folds formed as a result of obesity and sweating induce skin inflammation, fungal infections, and eczema.

Materials and methods. Data were collected using a questionnaire and bioimpedance measurement with the InBody 230 device, with an emphasis on gender differences. Biochemical parameters were determined using standard laboratory methods in cooperation with the Alpha Medical laboratory. The obtained data were analyzed using descriptive and inferential statistics. The data were evaluated using both descriptive and inferential statistics. In descriptive statistics, absolute (f) and relative frequencies (%) were used. For interval (continuous) variables, the arithmetic mean (AM), standard deviation (SD), median (Mdn), as well as minimum (min) and maximum (max) values were applied. Inferential statistics included tests for group comparisons and for identifying relationships between variables. Prior to selecting an appropriate test, data normality was assessed using the Kolmogorov–Smirnov test. As normality was not confirmed in all cases, non-parametric tests were employed. The Kruskal–Wallis test was used to compare multiple groups within a single variable. For nominal variables, the chi-square test of independence and the chi-square goodness-of-fit test were applied. When the assumptions for these tests were not met (expected frequencies < 5), Fisher's exact test was used. The degree of association was evaluated using Spearman's rank correlation. The level of significance was set at $\alpha = 0.05$. Cohen's d was used to determine the practical significance of relationships. Values close to dCohen = 0.2 are considered small, around 0.5 medium, approximately 0.8 large, and above 0.8 very large. In the case of Spearman's correlation, the correlation coefficient itself indicates the effect size.

Results. A statistically significant difference between men and women was found in the presence of skin diseases ($\chi^2(1)=5.823$, $p=0.016$). Among women (n=27), the prevalence of skin diseases was higher than among men (n=7). A statistically significant difference between men and women was also observed in the presence of spinal and joint diseases ($\chi^2(1)=6.321$, $p=0.012$). Differences were also identified in the prevalence of respiratory diseases ($\chi^2(1)=6.757$, $p=0.009$), which were more frequent in women (n=37) than in men (n=11). In selected laboratory parameters, a decrease in body weight in cases of elevated values does not always result in a significant shift toward normal ranges.

Conclusions. The prevalence of obesity is increasing worldwide and leads to structural and functional changes. It reduces average life expectancy. In patients with class III obesity (BMI ≥ 40 kg/m²), life expectancy is reduced by approximately 8–10 years. In patients with a BMI of 30–35 kg/m², life expectancy is shorter by about 3 years, and with each additional increase in BMI of 5 kg/m², the risk of vascular mortality due to conditions such as ischemic heart disease, stroke, and other vascular diseases increases by 40%. Despite this, obesity is not considered a disease.Obesity should be regarded as a chronic disease as well as a risk factor for the development of other serious chronic conditions. Information on the number of overweight/obese individuals and their comorbidities constitutes a fundamental basis for disease prevention and the prevention of disability. Such information is of great importance for the planning and development of public health policy, as well as for general public health activities and preventive measures.

Key words: obesity, complications of obesity, laboratory parameters.

Ожиріння призводить до структурних і функціональних змін, які завершуються численними органоспецифічними патологічними ускладненнями, що істотно впливають на захворюваність, а також на якість і тривалість життя осіб з ожирінням.

Мета. Метою дослідження було з'ясувати поширеність ускладнень, пов'язаних з ожирінням. Payer, Jackuliak, Nagyová [8] вказують на зв'язок між ожирінням і виникненням кількох злоякісних новоутворень, зокрема раку молочної залози, товстої кишки та простати. Kováčová, Dókuš [9] вважають, що вагітні жінки з ожирінням також зазнають підвищеного ризику материнських і перинатальних ускладнень, причому ризик зростає зі збільшенням ІМТ. Шкірні складки, що утворюються при ожирінні та підвищеному потовиділенні, спричиняють запалення шкіри, грибкові ураження та екзему.

Матеріали та методи. Методи: для збору даних ми використовували анкетування та біоімпедансне вимірювання за допомогою приладу InBody 230 з акцентом на відмінності між статями. Визначення біохімічних параметрів проводили стандартними лабораторними методами у співпраці з лабораторією Alpha Medical. Отримані дані були проаналізовані за допомогою описової та інференційної статистики. В описовій статистиці використовували абсолютні (f) та відносні частоти (%). Для інтервальних (безперервних) змінних застосовували середнє арифметичне (AM), стандартне відхилення (SD), медіану (Mdn), а також мінімальні (min) і максимальні (max) значення. В інференційній статистиці застосовували тести для порівняння груп і виявлення зв'язків між змінними. Перед вибором відповідного тесту нормальність розподілу даних перевіряли за допомогою тесту Колмогорова–Смірнова. Оскільки нормальність була підтверджена не в усіх випадках, було використано непараметричні тести. Для порівняння кількох груп в межах однієї змінної застосовували тест Крускала–Уолліса. Для номінальних змінних використовували χ^2-тест незалежності та χ^2-тест відповідності. Якщо передумови для цих тестів не були виконані (очікувані частоти < 5), застосовували точний тест Фішера. Для оцінки ступеня асоціації використовували рангову кореляцію Спірмена. Рівень значущості встановлено на $\alpha = 0,05$. Для визначення практичної значущості зв'язків використовували коефіцієнт d Коена. Значення, близькі до dCohen = 0,2, вважаються малими, близько 0,5 – середніми, приблизно 0,8 – великими, а понад 0,8 – дуже великими. У випадку кореляції Спірмена сам коефіцієнт кореляції відображає величину ефекту.

Результати. Між чоловіками та жінками виявлено статистично значущу різницю щодо наявності шкірних захворювань ($\chi^2(1)=5,823$, p=0,016). У жінок (n=27) поширеність шкірних захворювань була вищою, ніж у чоловіків (n=7). Також встановлено статистично значущу різницю між чоловіками та жінками щодо захворювань хребта і суглобів ($\chi^2(1)=6,321$, p=0,012). Виявлено різницю й у поширеності респіраторних захворювань ($\chi^2(1)=6,757$, p=0,009). У жінок (n=37) ці захворювання зустрічаються частіше, ніж у чоловіків (n=11). У вибраних лабораторних показниках при зниженні маси тіла за наявності підвищених значень не завжди спостерігається істотне наближення до норми.

Висновки. Поширеність ожиріння у світі зростає та спричиняє структурні й функціональні зміни в організмі. Воно скорочує середню тривалість життя. У пацієнтів з ожирінням III ступеня (ІМТ ≥ 40 кг/м²) тривалість життя зменшується приблизно на 8–10 років. У пацієнтів з ІМТ 30–35 кг/м² тривалість життя є коротшою приблизно на 3 роки, а з кожним подальшим підвищенням ІМТ на 5 кг/м² ризик судинної смертності внаслідок таких станів, як ішемічна хвороба серця, інсульт та інші судинні захворювання, зростає на 40 %. Незважаючи на це, ожиріння не вважається захворюванням. Ожиріння слід розглядати як хронічне захворювання, а також як фактор ризику розвитку інших серйозних хронічних хвороб. Інформація про кількість осіб з надмірною масою тіла/ожирінням, а також про їхні коморбідності є основою профілактики захворювань та інвалідності. Вона має важливе значення для планування та розвитку політики громадського здоров'я, а також для загальних заходів у сфері громадського здоров'я і профілактики.

Ключові слова: ожиріння, ускладнення ожиріння, лабораторні параметри.

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