

The influence of gender on selected risk factors for chronic non-communicable diseases in patients hospitalized in surgical wards: A cross-sectional study

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Abstract

Background. Chronic non-communicable diseases (CNCDs) are the leading cause of mortality in the world. Identification of risk factors and the implementation of preventive measures can effectively reduce the chance of disease and death due to CNCDs.

Objectives. The aim of this study was to analyze selected risk factors of CNCDs in women and men hospitalized in surgical wards.

Material and methods. The study group included 420 patients aged 18–84 years who were hospitalized in surgical wards. All participants were interviewed prior to anthropometric measurements, blood pressure, and fasting blood tests. A statistical analysis of the material was performed with the use of Student's t-test, χ^2 test, Fisher's exact test, Mann-Whitney U test, and analysis of variance (ANOVA).

Results. The analysis of the study material showed abdominal obesity in 63% of patients, more likely in women ($p < 0.001$); increased total cholesterol values in 30% of patients, more frequently in women ($p = 0.025$); blood pressure values $\geq 140/90$ mm Hg in 28% of patients, more frequently in men ($p < 0.001$); alcohol abuse (≥ 5 points in the Michigan Alcoholism Screening Test, MAST) in 12.6% of patients, more frequently in men ($p < 0.001$).

Conclusions. Both women and men are at risk of developing CNCDs; however, women should pay more attention to psychological counseling and the prevention of obesity and hypercholesterolemia, while men should be educated on how to prevent hypertension and alcohol abuse.

Key words: obesity, risk factors, cardiovascular diseases, smoking, diabetes mellitus type 2

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Introduction

As a result of globalization, demographic changes and unfavorable changes in lifestyle, i.e., excessive consumption of highly processed foods and sugary drinks and low levels of physical activity that result in an increased number of overweight and obese population, chronic non-communicable diseases (CNCDs) constitute a serious problem for the entire health care sector all over the world. It is estimated that 38 million people died in 2012 due to CNCDs – mainly cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases. In developed countries, they account for 70% of all deaths.¹ In Europe, the percentage of deaths caused by CNCDs is even higher (80%).²

In Poland, the vast majority of the population dies due to chronic non-communicable diseases. In 2012, 46.1 per 10,000 persons died due to cardiovascular diseases, 25.6 per 10,000 persons due to cancer, 5.2 per 10,000 persons due to respiratory diseases, and 1.9 per 10,000 persons due to diabetes.³

Therefore, in 2012, the state members of the World Health Assembly decided to implement the program “25×25” which calls for reducing the number of premature deaths due to CNCDs by 25%.⁴ To accomplish that, the therapeutic team members (doctors, nurses, nutritionists) should take action in the field of primary prevention, i.e., diagnose the incidence and then implement educational activities aimed at reducing or eliminating these factors. This will contribute to a lower number of new cases – and thus deaths – due to chronic non-communicable diseases.

The major modifiable (lifestyle-related) risk factors for CNCDs include: improper diet, smoking, alcohol abuse, low physical activity, elevated levels of blood pressure (BP), total cholesterol (TC), and glucose (GL).

The aim of the study was to analyze the prevalence of selected risk factors (e.g., low level of activity, alcohol abuse, improper diet, obesity, depression, smoking, elevated levels of blood pressure, total cholesterol and glucose) of CNCDs in women and men hospitalized in surgical wards, and identify the target group of patients who should be included in educational program covering the primary prevention of CNCDs during hospitalization.

Material and methods

This study was a descriptive, cross-sectional survey conducted among 420 patients in the age group 18–84 years, hospitalized in Department of Urology, Department of General Surgery, Department of Orthopedics and Traumatology of the Locomotor System, and Department of Neurosurgery at the University Clinical Hospital in Wrocław, Poland. Persons eligible for the study were patients who, on the examination day, did not have surgery, and their diagnosed condition did not significantly affect

their lifestyle in the period of 3 months prior to hospitalization. The exclusion criteria disqualifying prospective participants covered conditions such as cancers, active infectious diseases, and the cases when persons were subjected to surgery within the 3 months prior to the survey. All participants were informed of the purpose and course of the study, and also possibility of withdrawal at any stage. They also signed a written consent to participate in the study.

The research project was approved by the Bioethics Committee (No. KB 566/2013).

The data collected for the study was obtained by the diagnostic survey method implementing tools such as the author's questionnaire and standardized questionnaires, i.e., International Physical Activity Questionnaire (IPAQ), Beck Depression Inventory (BDI), Menu Scoring Method by Starzyńska, Fagerstrom Test for Nicotine Dependence, Michigan Alcoholism Screening Test (MAST), Inventory to Measure Coping Strategies with Stress (Mini-COPE), Chronic Obstructive Pulmonary Disease Questionnaire (COPD Questionnaire), and Systematic Coronary Risk Evaluation (SCORE).^{5–12}

Our questionnaire was a survey of own authorship, which included questions about sociodemographic data, i.e., age, sex, marital status, place of residence, education, income per person in the family, socioeconomic status.

Blood pressure (BP) was measured with the use of OM-ROM M6 Comfort blood pressure monitor (Omron Healthcare, Kyoto, Japan) in accordance with current guidelines recommended by the Polish Society of Hypertension.¹³ The analysis included the mean value of 2 blood pressure recordings.

The BP values over 140/90 mm Hg on the examination day were regarded as elevated, whereas the group of patients with hypertension (HTN) included persons with documented diagnosis of hypertension or being treated for HTN.

The glucose (GL) and total cholesterol (TC) levels were measured from first morning blood samples taken after a minimum 8-h fast, using CardioChec Brand Analyzers (PTS Panels Co., PTS Diagnostics, USA). The abnormal value of TC was established at the level of >190 mg/dL according to the European Guidelines on cardiovascular disease prevention in clinical practice (v. 2012).¹⁴ Patients with lipid disorders were defined as those with documented disease or taking medications to lower the TC levels in the blood. The established value for abnormal level of glucose was >100 mg/dL following the Guidelines on diabetes management in clinical practice (v. 2014).¹⁵ Patients defined as suffering from diabetes (DM) were those with a documented disease or those taking medication to lower their blood glucose levels.

The body mass index (BMI) was calculated as kg/m² from the weight and height, measured with the use of medical scales ZMP RADWAG T 6496 (ZMP RADWAG Co., Radom, Poland), in accordance with current guidelines

announced by the World Health Organization (WHO).¹⁶ Participants were weighed only in their pyjamas (without shoes). Obesity was defined as a BMI of 30 kg/m² or greater.

Waist circumference (WC) in cm was measured with an insertion tape. Measurements were taken from the mid-point between the iliac crest and the lower ribs measured at the sides. Abdominal obesity was established at waist circumference ≥ 94 cm in men and ≥ 80 cm in women.¹⁷

The Menu Scoring method by Starzyńska was applied to evaluate a diet. A score lower than 12 is indicative of an improper diet.

The International Physical Activity Questionnaire short form was used to evaluate participants' physical activity during the 7 days prior to hospitalization by the frequency (day/week), duration (min/day or h/day), and intensity (sedentary, light, moderate, or vigorous) of physical activity. According to the IPAQ scoring protocol, the data collected was converted to Metabolic Equivalent Task minutes per week (MET-min/wk): total minutes over last 7 days spent on light, moderate, and vigorous activity were multiplied by 3.3, 4.0, and 8.0, respectively, to create MET scores for each activity level. Physical activity levels were also classified into 3 categories: low, moderate and high, according to the scoring system provided by IPAQ. The physical activity of people aged 18–69 years was evaluated according to the guidelines.

The Fagerstrom Test for Nicotine Dependence is a standard instrument in the form of a questionnaire to assess the nicotine addiction. The degree of nicotine addiction is evaluated in 3 categories as low (0–4 points), moderate (5 points), and high (6–10 points).

The Michigan Alcoholism Screening Test is a fast screening tool consisting of 25 questions designed to identify alcoholism in subjects. Obtaining ≥ 5 points shows the compliance with the examination criteria for alcoholism, 4 points – the examined person is probably an alcoholic, ≤ 3 points – the examined person is probably not an alcoholic.

The Beck Depression Inventory is used for self-report inventory to assess the level of depression. The result of 0–11 points indicates a lack of depression, 12–26 points – mild depression, 27–49 points – moderately severe depression, 50–63 points – very severe depression.

The Chronic Obstructive Pulmonary Disease Questionnaire is a tool which identifies patients who may suffer from COPD, and who have not been diagnosed with other respiratory diseases. It is designed to be used in people over 40 years of age who smoked or smoke cigarettes, or were/still are exposed to other risk factors for COPD, such as air pollution with dust or chemicals at home or work. The questionnaire consists of 8 questions, and each answer is assigned a number of points. By adding up the points scored in questions 1–8, the obtained result allows evaluating the risk of COPD. The score of: ≤ 16 points – suggests the diagnosis of other respiratory diseases, e.g., asthma; ≥ 17 points – suggests diagnosis of COPD.

The SCORE was computed using all the variables required for its calculation (i.e., sex, age, cigarette addiction, TC level, and systolic BP). Based on the obtained results, the patients were assigned to one of the risk groups: significantly increased ($\geq 10\%$), increased (5–9%), moderate (1–4%), and low (0%). People with diabetes and previously diagnosed cardiovascular disease belong to the group of increased risk.

The Polish version of the inventory Mini COPE was implemented in the study to define strategies for coping with stress (adopted by Zygryd Juczyński and Nina Ogińska-Bulik). Inventory Mini-COPE consists of 28 statements, which are divided into 14 strategies of coping with stress: active coping, planning, positive reevaluation, acceptance, sense of humor, turn to religion, seeking emotional support, seeking instrumental support, dealing with something different, denial, venting, use of psychoactive substances, cessation, and self-blame.

All the data received from surveys was entered in Microsoft Office Excel 2010 and the statistical analysis of the parameters studied in the paper was performed with the use of STATISTICA software v. 10.0 along with the Student's t-test, χ^2 test, Fisher's exact test, the Mann-Whitney U test, and ANOVA. The level of significance was established at $p < 0.05$.

Results

The study involved 420 patients hospitalized in a general surgery ward (35.3%), urology (17.9%), orthopedics traumatology (20.1%), and neurosurgery (26%) wards. Among the patients, women accounted for 48.8% and men for 51.2% of the studied population. The youngest participant in the study was 18 years old, and the oldest was 84 years old. Table 1 shows some characteristics among the patients.

The analysis of the material showed that significantly more men than women on the examination day were characterized with higher values of BP ($>140/90$ mm Hg) ($p < 0.001$). However, prior to admission, women were more often diagnosed with HTN (43.4% vs 40.9%). In the group of people who on the examination day had BP $\geq 140/90$ mm Hg, 63% were suffering from HTN. In contrast, 37% of the studied population were people with BP $\geq 140/90$ mm Hg, thus requiring further examination for the diagnosis of hypertension.

On the examination day, impaired fasting glucose (IFG) (≥ 100 mg%) was diagnosed in 18.0% of women and 20.9% of men, while increased levels of TC (>190 mg/dL) occurred in 30% of patients, significantly more often among women than men ($p = 0.025$). Prior to admission to the hospital, 11.6% of patients were diagnosed with DM and 20% were treated for lipid disorders (Table 2).

Among the patients, 20% smoke actively, and 21% were exposed to passive smoking. The vast majority of smokers (84.5%) declared that they smoke a pack of cigarettes a day or less. Women significantly prevail among patients

Table 1. Characteristics of the studied group

Variables	Total n = 420	Gender		p-value
		women n = 205	men n = 215	
Age (M ±SD)	52.4 ±16.2	52.4 ±16.1	52.3 ±16.3	0.929 ^a
Place of residence:				
rural area	108 (25.7%)	46 (22.4%)	62 (28.8%)	0.123 ^b
town with ≤10,000 inhabitants	23 (5.5%)	13 (6.3%)	10 (4.6%)	
city with 10,000–100,000 inhabitants	89 (21.2%)	52 (25.4%)	37 (17.2%)	
city with >100,000 inhabitants	200 (47.6%)	94 (45.9%)	106 (49.3%)	
Marital status:				
single	106 (25.3%)	47 (22.9%)	59 (27.6%)	0.003 ^{#b}
married	271 (64.7%)	127 (62.0%)	144 (67.3%)	
widow/widower	42 (10%)	31 (15.1%)	11 (5.1%)	
Education:				
basic	35 (8.4%)	25 (12.3%)	10 (4.6%)	0.002 ^{#b}
basic vocational	76 (18.1%)	34 (16.7%)	42 (19.5%)	
secondary vocational	111 (26.5%)	39 (19.1%)	72 (33.5%)	
high school	74 (17.7%)	43 (21.1%)	31 (14.4%)	
post-secondary	12 (2.9%)	8 (3.9%)	4 (1.9%)	
bachelor's degree	9 (2.2%)	6 (2.9%)	3 (1.4%)	
master's degree	102 (24.3%)	49 (24%)	53 (24.7%)	
Professional activity:				
student (up to 26 years)	22 (5.2%)	12 (5.9%)	10 (4.7%)	0.049 ^{#b}
labourer	44 (10.5%)	15 (7.3%)	29 (13.5%)	
white-collar worker	122 (29.1%)	60 (29.3%)	62 (28.8%)	
disability retiree	48 (11.4%)	17 (8.3%)	31 (14.4%)	
pensioner	141 (33.6%)	80 (39%)	61 (28.4%)	
unemployed	43 (10.2%)	21 (10.2%)	22 (10.2%)	
Socioeconomic status*:				
high	n = 325 82 (25.5%)	n = 162 43 (26.5%)	n = 163 39 (23.9%)	0.817 ^b
medium	184 (56.6%)	89 (54.9%)	95 (58.3%)	
low	59 (18.2%)	30 (18.5%)	29 (17.8%)	

M – mean; SD – standard deviation; ^a – Student's t-distribution test; ^b – χ^2 test; [#] significant differences ($p < 0.05$); * respondents subjectively assessed their economic status.

Table 2. Prevalence of individual CVD risk factors in patients

Variable	Gender		p-value
	women n = 205	men n = 215	
BP > 140/90 mm Hg*	20%	36.6%	<0.001
Hypertension	43.4%	40.9%	NS
GL > 100 mg/dL*	18%	20.9%	NS
Diabetes	11.7%	11.6%	NS
TC > 190 mg/dL*	35.1%	25.1%	0.033
Hypercholesterolemia	22.4%	19.1%	NS
Excessive weight	58.5%	65.1%	NS
Overweight	35.1%	40.9%	NS
Obesity	23.4%	24.2%	NS
Abdominal obesity	74.6%	62.9%	<0.001
Current smoking	18.5%	21.4%	NS
Abuse alcohol	2.2%	19.2	<0.001
Improper diet	93.7%	95.3	NS
Low level of activity	22.9%	24.2%	NS
Symptoms of depression	13.2%	5.2%	0.016

* on the examination day; NS – not statistically significant; BP – blood pressure; GL – glucose; TC – total cholesterol.

who are occasional smokers ($p < 0.001$), whereas men prevail among patients smoking 2 packs a day or more ($p < 0.001$). The mean number of points obtained by smokers in the Fagerstrom test evaluating the degree of dependence on nicotine was 4.09 ± 2.41 . A significantly higher number of points was obtained by men than women ($p = 0.002$). In 1/3 of all smokers (including 2/3 of smokers over 40 years) appears the risk of developing COPD. This group represents 7.3% of the study population. Gender does not affect the risk of developing COPD. It was also revealed that 7% of patients think that they are exposed to inhalation of air contaminated by exhaust fumes and gases (e.g., CO₂, SO₂) in the workplace – men more often than women ($p < 0.01$).

The analysis of the study material concerning the risk of death from cardiovascular diseases (CVD) showed that:

- 1/4 of patients belongs to the low-risk group, more women than men ($p < 0.001$);
- over 1/3 of patients belong to a group of moderate risk, more men than women ($p < 0.001$);
- every 10th patient belongs to a high-risk group;
- over 1/3 of patients belong to a group of significantly increased risk, more men than women ($p < 0.001$).

It was also shown that the average risk of death according to the SCORE scale was 6.3% for men; however, it was much lower for women (2.6%).

The analysis of the study material showed no statistically significant difference in the number of people with abnormal body weight in terms of gender. However, women (74.6%) significantly more often than men (62.9%) are characterized by abdominal obesity (Table 2).

Evaluation of the diet showed that 64.4% of patients eat only 3 meals a day. Men consume fewer meals per day than women ($p < 0.01$) and their menu also less often includes milk, cheese, fruit and vegetables ($p < 0.05$). In the studied group of patients, almost half of them declared consuming fish once a week, and 30% do not eat fish at all (or they do very rarely). In contrast, 1/3 of patients consume sweets every day or a few times a week, and about 30% claim that they consume more than 5–6 g (a teaspoon) of table salt daily (more men than women; $p = 0.007$). The average total number of points obtained by patients was 8.92 ± 4.53 . This means that the diet of patients is improper. Only slightly more than 5% of patients reached a score ranging from 12 to 27 points (their menu is just sufficient or satisfactory). Women more often obtained a greater mean number of points in the menu survey (9.4) than men (8.5) ($p = 0.035$).

In the study group, 43.1% of patients do not drink alcohol, and women are more likely to be abstinent than men ($p < 0.001$). In contrast, men are overrepresented both among social drinkers ($p < 0.01$) and people who drink regularly 1 ($p = 0.024$) or 2 ($p = 0.048$) drinks a day. The analysis of the data obtained through the MAST questionnaire showed that:

- 12.6% of patients met the criteria for alcoholism, more men than women ($p < 0.001$);
- 7.1% of alcohol drinkers probably have a problem with alcohol abuse, more men than women ($p = 0.001$);
- women are characterized by better culture of drinking alcohol (obtained lower mean number of points – 0.3 vs 3.2; $p < 0.001$) than men.

The analysis of the study material obtained through IPAQ survey showed that women gained an average of 3815 ± 5069 MET (min/week), and men 3901 ± 4574 MET (min/week) ($p > 0.05$). The analysis also showed that high physical activity is characteristic for every 3rd patient; 44% declared moderate activity, and the remaining 23.5% of patients assess their activity as light. There was no significant difference in activity levels in terms of gender.

At the time of examination, 91% of patients had no symptoms suggestive of depression, whereas symptoms of mild depression were observed in 8.3% of the patients, more frequently in women ($p = 0.005$). The analysis of BDI showed that women significantly more often received more points than men (4.0 vs 2.7; $p = 0.013$).

Patients, most often in situations of severe stress, apply the method of finding emotional support (2.41 ± 0.66 points) and actively coping with stress (2.38 ± 0.59 points). In contrast, hardly ever, in difficult moments do they turn

to psychoactive substances (0.13 ± 0.41 points) or apply the method of denial (0.23 ± 0.47 points). When going through rough patches, women more often than men try to occupy themselves with something else to not think about the problem ($p < 0.001$); their attention is directed towards religion ($p < 0.001$), discharging emotions ($p < 0.001$) or ceasing all activities ($p = 0.030$). In contrast, men are more likely to actively cope with stress ($p = 0.014$) or plan on how to solve the problem ($p = 0.016$).

Among the immediate family members of patients (parents, siblings, grandparents), there have been reported a number of chronic non-communicable diseases, i.e.,:

- hypertension was diagnosed in immediate family members of 50% of patients;
- immediate family members of every 3rd patient suffer from coronary heart disease or had a myocardial infarction;
- immediate family members in 1/5 of patients had a stroke;
- 29.3% of patients' family members suffer from diabetes.

Nearly 2/3 of the patients have a positive family history of cardiovascular diseases, i.e., meaning that the immediate family members were diagnosed with hypertension, ischemic heart disease, heart attack or stroke, while almost 1/3 of patients had a family history of developing diabetes. In families of female patients, immediate members of family were significantly more frequently diagnosed with cardiovascular diseases ($p < 0.001$) and diabetes ($p = 0.033$).

The analysis of the study material revealed the following correlations at the significance level of $p < 0.005$:

- weak positive correlation between age and SBP values ($r = +0.258$), values of DBP ($r = +0.121$), glucose levels ($r = +0.304$), total cholesterol levels ($r = +0.161$), and Beck Depression Inventory ($r = +0.267$);
- weak negative correlation between age and the level of physical activity ($r = 0.168$);
- weak positive correlation between BMI and SBP values ($r = +0.368$), values of DBP ($r = +0.322$), glucose levels ($r = +0.274$), serum TC ($r = +0.143$), and the result of the SCORE scale ($r = 0.301$);
- weak positive correlation between waist circumference and the values of DBP ($r = +0.287$), glucose level ($r = +0.319$), TC level ($r = +0.105$), the Beck Depression Inventory result ($r = +0.106$), and the MAST test result ($r = +0.252$);
- moderate positive correlation between waist circumference and SBP values ($r = +0.403$);
- high positive correlation between waist circumference and the SCORE scale result ($r = +0.500$).

The studies showed that, with age, the value of SBP increases and the growth rate is approx. 0.26 mm Hg/year. It was also shown that the relationship between the age factor and SBP is stronger in women than in men. The value of SBP also increases with increasing values of BMI and waist circumference. This dependence is stronger in women than in men.

Discussion

Due to the global spread and a high share in overall mortality, CNCDS pose a serious problem in both medical and economic terms for the entire health sector. By identifying risk factors for these diseases, we can effectively reduce the number of new cases and premature deaths caused by them, as well as decrease the costs associated with the treatment and loss of full capacity for active independent life. In the present study, the attempt was made to identify selected risk factors for CNCDS among patients hospitalized in surgical wards with a special focus on gender as a variable affecting prevalence of the risk factors.

Hypertension is one of the major risk factors for CVD incidence such as stroke, and, as a consequence, has a significant impact on the prevalence and mortality.^{18–20} Studies carried out in China and USA showed that HTN is a predictor for the occurrence of higher TC values.^{21,22} Own study confirmed that HTN is slightly more frequently diagnosed in women than in men;²³ however, many authors indicated that HTN is more common in men.^{24–28} In Bosnia and Herzegovina and Brazil, approx. 40% of men are treated for HTN, which is the same result as the one obtained in own study.^{27,29} The research carried out in Lithuania showed, however, that over 70% of local men suffer from HTN.²⁵

The increased level of TC is one of the most important risk factors contributing to the development and death from CVD.^{30,31} The study carried out in the USA showed, however, that hypercholesterolemia is a predictor for hypertension and diabetes.²² In our study, increased levels of TC (>190 mg/dL) occurred on examination day more frequently in women (57.1%) than in men (42.9%), which confirmed the findings of other authors.^{21,25} In Bahrain, Malaysia and Norway increased levels of TC were, on the other hand, more frequently observed in men.^{23,28,32}

Studies in many countries have shown that patients with increased glucose levels or diabetes more often suffer from CVD, stroke and obesity.^{18–20,33–35} The study by Sun et al. showed that the presence of higher TC values correlates with diabetes.²¹ In the USA, approx. 25% of women suffer from DM.²² In the present study, the percentage was much lower, and gender did not affect significantly the number of people with diabetes, as was confirmed by the results of other authors.^{24,25} In Malaysia and Lebanon, women were significantly more likely to develop DM;^{23,36} however, other studies showed that men often had a significantly higher values of GL.^{21,37} On examination day, the IFG (≥ 100 mg%) were diagnosed in 18.0% of women and 20.9% of men. A similar proportion of men with IFG was reported by other authors.^{29,32,38}

Smokers are predisposed to developing HTN, stroke and COPD.^{18,19,26,39,40} Smokers with diabetes or the ones having increased blood glucose levels are exposed to a higher risk of complications and premature death.⁴¹ In 2005, the smoking addiction affected 42% of Polish males and 25% of Polish

females.⁴² Although, in recent years, there has been a decrease in the number of active smokers, still about 15–20% of the population in developed countries are active smokers.^{28,29,32,43–47} This was confirmed by the results of own study.

Most likely, the reduction in the percentage of smokers in the European Union was influenced by the introduction of laws prohibiting smoking in public places. In our study, there was no statistically significant difference between women and men in terms of the number of smokers. In contrast, mainly in developing countries, men are more often active smokers.^{23,25,27}

In the present study, 11.2% of the respondents were characterized by an increased risk of death due to CVD within the next 10 years (from 5–9%) and 36.6% had a significantly increased risk (>10%). Similar results were also obtained in Finland, where 27% of women and 63% of men were assigned to a group of high 10-year risk of death from cardiovascular disease (>5%).⁴⁸ In Romania, the percentage was slightly lower and amounted to 25%.⁴⁹ In contrast, the study in France showed that only 1% of respondents was characterized by a 5% or greater 10-year risk of CVD death.⁴⁴ This is probably related to the effective prevention of risk factors for CVD (decrease in the number of smokers and those suffering from HTN). Therefore, over 6 years (2007–2012), a decrease in the 10-year risk of CVD death in both men and women was observed. The test results of MONICA and SEPHAR survey showed that among men the average risk of death, according to the SCORE scale, is around 5%, whereas for women it was much lower (around 2%).^{49,50} In the present study, similar results were obtained. However, the results from the HAPIEE study (conducted in the Czech Republic, Poland and Russia) showed that the mean value representing the risk of death for men was approx. 7.5% (the lowest rate was recorded in Poland – 7.37%, the highest in Russia – 9.07%), while the risk of death from CVD among surveyed women was 3 times lower.⁵⁰

Meta-analyses of several studies demonstrated a significant influence of overweight and obesity on the development of many chronic diseases. People with excess body weight are more likely to develop DM, CVD (including HTN and stroke), dyslipidemias, chronic respiratory disease, i.e., COPD, as well as mood disorders, i.e., depression.^{20–22,26,29,38,51–54} In the present study, up to 58.5% of women and 66% of men had excessive body weight (BMI >25). Among government officials in Bahrain and professional drivers in Brazil, this percentage was even higher, which may be associated with sedentary type of work.^{29,32} The inhabitants of developing countries were also characterized by a higher percentage of excessive body weight both in women and in men.^{24,25} In contrast, residents of low-income countries were characterized by a lower percentage of overweight and obese population than our study showed.^{26,55} In the present study, 23.4% of women and 24.2% of men had varying degrees of obesity (BMI >30). However, in many countries, the proportion of obese women was much higher than in our study.^{22,23,25}

It was also shown that WC >80 cm for women and >94 cm for men is a strong predictor for the development of HTN, DM and dyslipidemia, and strongly correlated with increased mortality due to CVD and chronic respiratory diseases in particular.^{33,56–60} In the present study, 74.6% of women and 62.9% of men were characterized by abdominal obesity. Similar results were also obtained by other authors.³² In Brazil, the percentage of men with abdominal obesity was a bit smaller, but it is due to different criteria for obesity (WC >102 cm).²⁹ However, in Nigeria, only 9% of men are characterized by abdominal obesity.⁵⁵ This is most likely related to the different measurement criteria (WC >102 cm) and the large energy expenditure during agricultural work. In contrast, a large percentage of Nigerian women (over 50%), despite the different criteria (WC >88 cm) were characterized by abdominal obesity, which is associated with sedentary work (mainly trade).⁵⁵

Poor eating habits play an important role in the development of CVD and DM.^{14,18,61,62} The WOBASZ study showed that Poles consume too little cereal, milk and fish.⁶³ This is confirmed by results of our study. Only 31.9% of women and 17.7% of men consumed 4–5 meals a day, while only 11% of patients consumed 5 servings of vegetables or fruit each day. In the USA, a similar percentage of the population eat fruit and vegetables in the recommended amounts, while in Bahrain or Nepal an even smaller percentage of those surveyed eat 5 servings of vegetables or fruit, which is definitely associated with lower socio-economic status of Nepalese.^{26,32,46} Studies demonstrated that every additional gram of salt in the diet increased the chance of developing HTN by 14%.²⁶ In the present study, every 3rd patient overuses salt when preparing food, while in the USA only 0.6% of Americans consume less than recommended 5–6 g of salt per day.⁴⁶

The authors of numerous studies have shown that alcohol increases the risk of HTN, stroke, triglyceridemia, and DM.^{26,64–66} The EZOP Poland study showed that approx. 10.9% of respondents (18.6% of men and 3.3% of women) abuse alcohol;⁶⁷ these results were confirmed in present study. In Germany, approx. 7% of the population consumed “dangerous” amounts of alcohol – men more frequently than women.⁴³ However, in Nepal, people with low socio-economic status (approx. 25% of respondents) consumed 5 or more doses of alcohol each day.²⁶

Low level of physical activity (PA) is strongly correlated with the incidence of CVD, hemorrhagic stroke, and diabetes.^{19,34,61,68} Smokers characterized by low levels of PA are more likely to develop COPD.³⁹ In contrast, people leading a sedentary lifestyle often exhibit symptoms of depression.⁶⁹ The NATPOL 2011 showed that the number of physically inactive Poles was 28.2% of the population.⁷⁰ The IPAQ results obtained in the survey conducted among residents of Warszawa showed that 32% of them were characterized by low levels of PA, while our study results showed that 23.5% of respondents were characterized by low levels of PA (by IPAQ).⁷¹ The studies conducted in Mexico and Norway showed that men are more

physically active than women.^{24,28} In Lithuania, the opposite tendency was observed.²⁵ Our findings did not confirm the gender dependence.

Many studies have reported the influence of depression on the risk of developing CVD, stroke and obesity.^{18,72–76} The EZOP Poland study showed that women more often show symptoms of depression.⁶⁷ The present study confirmed this dependence. The study conducted by Cooper et al. among African Americans showed that the greater the abdominal obesity, the more intensive depressive symptoms are.⁷⁶ Our study confirmed a positive correlation between WC and the BDI.

Our study findings showed that actively coping and seeking emotional support are the most commonly used strategies in tackling stress among surgical patients. Moreover, the patients who have been subjected to neurological rehabilitation because of a history of stroke, most often cope with stress with the abovementioned strategies.⁷⁷ Our study showed that a higher intensity of depressive symptoms in the study group resulted in more frequent use of dysfunctional strategies in stressful situations, i.e., self-blame, which was confirmed by Klein et al.⁷⁸ This is probably the consequence of the fact that people who are not able to cope with stress actively experience the feeling of hopelessness resulting in bad mood.

Conclusions

Gender does not differentiate patients in terms of the number of diagnosed risk factors.

Women were significantly more frequently characterized by increased values of TC and diagnosed with depression and abdominal obesity, while men more often were characterized by the values of BP \geq 140/90 mm Hg and alcohol abuse.

Men's diet is less balanced and varied when compared to women's diet.

Abdominal obesity significantly increases the risk of HTN, and this dependence is stronger in women than in men.

In women, the average risk of death from CVD according to the SCORE scale is 2.5 times lower than in men.

Members of a therapeutic team should implement measures to identify modifiable risk factors for CNCs in patients hospitalized in surgical wards, especially among men, and apply proper educational activities for prevention purposes in the abovementioned groups.

Strengths and limitations

This paper is a pioneer study carried out among patients who were treated in hospital for surgical reasons and additionally agreed to participate in the study aiming to determine the prevalence of CNCs in the Polish population. The results confirmed the need for developing preventive

measures against increasing prevalence of CNCDS among Polish population. The interdisciplinary team has a chance to diagnose the first symptoms of CNCDS or their risk factors often only during hospitalization for other reasons (i.e., surgical reason) when the direct contact with a patient allows for thorough examination. Next interdisciplinary team should select a group of patients who will be subjected to additional educational activities. These activities could be carried out by nurses as one of their responsibilities is patient education.

However, there were a few limitations to the study. The first one concerned the questions which focused on physical activity within the last 7 days prior to hospitalization, and patients usually change their routine before surgery. The second limitation refers to a higher BP level resulting probably from the stress connected with surgery. The last limitation is connected with self-report instruments used in this study which provide subjective assessment of the current reality.

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