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AGE, BODY MASS INDEX, BODY COMPOSITION IN POSTMENOPAUSAL WOMEN WITH CHRONIC VENOUS DISEASE

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Chronic venous disease (CVD) is one of the common, though controversial problems in modern medicine. The aim of our study is to determine the association between age, body composition, obesity and CVD in postmenopausal women. We have examined 96 postmenopausal women aged 46-85 years (mean age – 66.19±0.96 years), that in accordance to the presence of CVD all women were divided in two groups. The diagnosis of CVD was established on C-category of clinical, anatomical and pathophysiological (CEAP) classification and vascular surgeon consultation. We have detected increases of CVD frequency with age in postmenopausal women (from 72 % in those aged 45-59 years to 84 % in those aged 75-89 years). A significant correlation between the total fat mass and age was determined in postmenopausal women with CVD. Significantly, higher values of body weight, BMI, total body fat, and lower extremity body fat were found in the oldest group with CVD compared to patients without CVD.

Keywords: chronic venous disease, risk factors, age, obesity, postmenopausal women.

The work is a fragment of the research project "10 years risk and incidence of osteoporotic fractures in the population of Ukraine: age and regional features", state registration No. 0118U002899.

Chronic venous diseases (CVD) of the lower extremities are among of the most discussed problems of medicine. In the Western countries, approximately 3% of total health care costs are associated with venous disorders; chronic venous disorders occurring in 25-30% of women and 10-40% of men [2, 6, 11, 12]. In the recent decade, the active study of various aspects of this pathology is ongoing, but many questions remain unresolved. Among the well-known risk factors of CVD, there are age, sex, genetic factors, sedentary lifestyle, sedentary working, dietary aspects (consuming large amounts of farinaceous and meat foods) etc. [9, 10, 14, 15]. The data on association between obesity and CVD are still considered controversial. Some scientists believe there is a significant correlation between the BMI and clinical severity, according to the C-category of clinical, anatomical and pathophysiological (CEAP) classification [7]. Other scientists confirm that the body mass index and age are significant predictors of CVD's clinical grade, according to the C- category of the CEAP classification [10, 13]. On the contrary, a French epidemiological study did not reveal any relationship between the CEAP classification's C-category and obesity [1]. Today, there have been no such studies in Ukraine.

The purpose of the study was to examine the association of age, body composition (lean and fat masses), obesity and chronic venous diseases in postmenopausal women.

Materials and methods. The study was performed at D. F. Chebotarev Institute of Gerontology, NAMS Ukraine. The study was approved by the Institute's Ethical Committee (17.05.2017, Protocol № 5). All the examined signed a voluntary informed consent form to participate, being the subjects to the respective diagnostic examination procedures.

Our research involved 96 postmenopausal women. The subjects aged 46-85 years (mean age – 66.19 ±0 .96 years) were divided into groups, depending on the presence of CVD: the first group was made of 21 postmenopausal women without the CVD (age – 62.86 ± 2.05 years), the second group – 75 postmenopausal women with the CVD (age – 67.13 ± 1.05 years). According to the gerontological classification of age, women were divided into the following groups: middle-aged – 25 persons (26%) from 46 to 59 years (mean age – 54.4 ± 0.77 years), elderly – 46 persons (48%) of 61 - 74 years (mean age – 66.14 ± 0.56 years) and old - 25 (26%) persons of 75 - 85 years (mean age 78.16 ± 0.58 years).

The diagnosis of CVD was established based on the symptoms, clinical and ultrasound (if necessary) examinations of the lower extremities. All patients were examined by vascular surgeons. The following data were collected: demographic (age and sex) and anthropometric (weight, height, BMI) characteristics; personal anamnesis of venous thrombosis, pulmonary embolism and other health problems; current and previous therapy of cardiovascular diseases; history of venous thrombosis, as well as the results of clinical examination of the lower extremities. For the CVD assessment, we used the CEAP classification [7]. The C0s category, according to the CEAP classification (no deficiency or obstruction), was determined after excluding other possible causes of existing symptoms.

The BMI was computed by the ratio of body weight (kilograms) and height^2 (meters), expressed in kg/m^2 (WHO, 1998). Diagnosis of obesity was established when BMI was above 30 kg/m^2. The women were divided into three groups: I group – with a normal body weight (BMI 18.5 -24.9 kg/m^2), II group – with an excessive weight (BMI 25.0 – 29.9 kg/m^2), III group – with obesity (BMI is over 30.0 kg/m^2). The

lean and fat masses were measured by the Dual-energy X-ray absorptiometry (DXA) with Hologic (Discovery WI, USA, 2015).

For the data processing purposes, "Statistika 6.0" (StatSoft, Inc. ©) was applied. We used variable and categorical metrics. A result was considered significant if *p* values were lower than 0.05 ($p<0.05$). The results are presented in the following manner: Mean values (M) ± Standard Deviation (SD). For the data calculation we used: correlation, regression and ANOVA analysis. Intergroup differences were evaluated using the Scheffe test. The relationship between BMI and age, fat and lean mass was determined using linear regression.

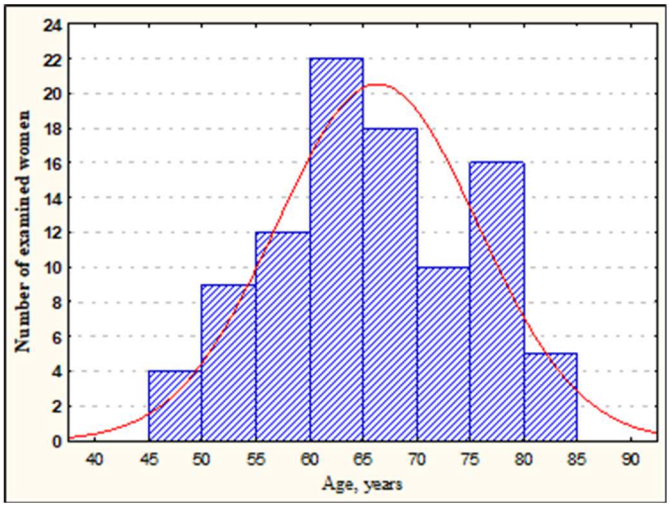

Fig. 1. Histogram of the observed women's distribution by age. Note: red line shows normal distribution

Results of the study and their discussion. We have examined 96 postmenopausal women (age – 66.19 ± 0.96 years, height – 1.57 ± 0.007 m, weight – 76.77 ± 1.73 kg, BMI – 30.82 ± 0.63 kg/m^2). The histogram of examined women depending on their ages is presented in fig. 1.

There were no differences observed among age, body mass and BMI across the examined groups depending on the presence of CVD (table 1).

Table 1

Anthropometric characteristics of the examined patients

Parameters	Group I	Group II	F	P
Age, years	62.86±2.05	67.13±1.06	3.54	0.06
Weight, kg	76.14±4.39	76.95±1.86	0.04	0.85
Height, cm	1.55±0.02	1.58±0.01	4.42	0.04
BMI, kg/m^2	31.66±1.64	30.59±0.67	0.48	0.51

Note: CVD - chronic venous disease, Group I – women without the CVD, Group II – postmenopausal women with the CVD.

The ratio of postmenopausal women with the CVD increased with age: from 72% in the group of 45-59 year-olds to 84% in the group of 75-89 year-olds (table 2).

Table 2

The distribution of examined women depending on the presence of CVD

Age group, yrs	Group I (n, %)	Group II (n, %)	Total
45-59	7 (28 %)	18 (72 %)	25 (100 %)
60-74	10 (22 %)	36 (78 %)	46 (100 %)
75-89	4 (16 %)	21 (84 %)	25 (100 %)
Total	21 (22 %)	75 (78 %)	96 (100 %)

Among the observed patients, 18% (17 of 96 persons) had a normal body weight, 28% (27 out of 96) were overweight and 54% (52 out of 96) had obesity. The CVD was diagnosed in 71% of patients with a normal body weight (12 out of 17), in 85% of patients with excessive weight (23 out of 27) and in 77% with obesity (40 out of 52) (table 3).

Table 3

Distribution of patients' BMI and age depending on the CVD presence

BMI	45-59 years		60-74 years		75-89 years	
	Without CVD	With CVD	Without CVD	With CVD	Without CVD	With CVD
18.5-24.9	1	4	1	4	3	4
25.0-29.9	1	5	2	11	1	7
>30	5	9	7	21	0	10
Total	7	18	10	36	4	21

Note. CVD - chronic venous disease

There were revealed no differences of lean and fat mass depending on the presence of CVD (fig. 2). In the elderly group of patients with and without the CVD, there were found significant differences in the parameters of body weight ($p = 0.009$), BMI ($p = 0.005$), total fat mass ($p = 0.024$), total lean mass ($p = 0.003$) and lean legs' mass ($p = 0.002$) (table 4).

Table 4

Anthropometric characteristics, lean and fat mass of the examined patients depending on the presence of CVD and age

	45-59 years			60-74 years			75-89 years		
	Without the CVD	With the CVD	p	Without the CVD	With the CVD	p	Without the CVD	With the CVD	p
age	52.6±4.43	55.1±3.5	0.143	64.4±2.76	66.6±3.5	0.106	77.0±1.83	78.3±3.04	0.394
height	1.55±0.07	1.62±0.06	0.02	1.55±0.1	1.58±0.06	0.22	1.54±0.07	1.56±0.07	0.567
weight	88.3±25.68	78.4±16.44	0.261	76.9±9.1	78.0±17.1	0.843	53.0±8.6	73.9±14.04	0.009
BMI	36.1±8.56	29.9±6.67	0.065	32.2±4.36	31.1±6.05	0.598	22.5±3.14	30.3±4.8	0.005
TFM	41.6±16.0	35.3±11.58	0.285	33.7±4.98	33.9±10.79	0.966	16.9±6.42	30.9±11.08	0.024
TLM	43.2±9.75	41.1±5.26	0.486	42.1±5.78	42.2±6.98	0.945	33.6 ±2.29	42.0±4.89	0.003
LFM	13.5±1.89	12.8±5.0	0.753	10.1±2.05	11.8±4.09	0.216	6.6±2.22	10.4±4.6	0.123
LLM	13.5±3.13	13.0±2.1	0.686	13.0±1.95	15.8±16.29	0.605	10.4±0.59	13.0±1.66	0.002
n	7	18		10	36		4	21	

Note. CVD - chronic venous disease, TFM - total fat mass, TLM - total lean mass, LFM – legs' fat mass, LLM – legs' lean mass.

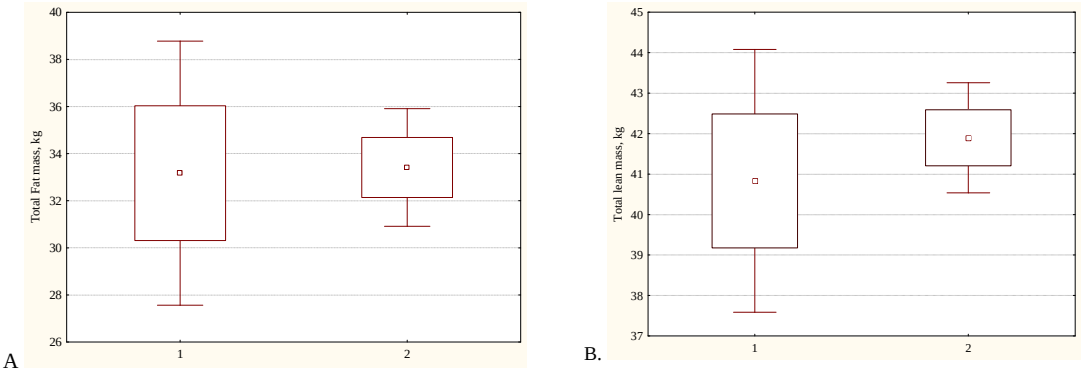

Fig. 2. Body composition of the postmenopausal women depending on the presence of CVD

Note. CVD - chronic venous disease, A. – Total fat mass, B. – Total lean mass; 1 – women without the CVD, 2 – postmenopausal women with the CVD.

Correlation and regression analyses of relations between fat mass and age are shown in fig. 3.

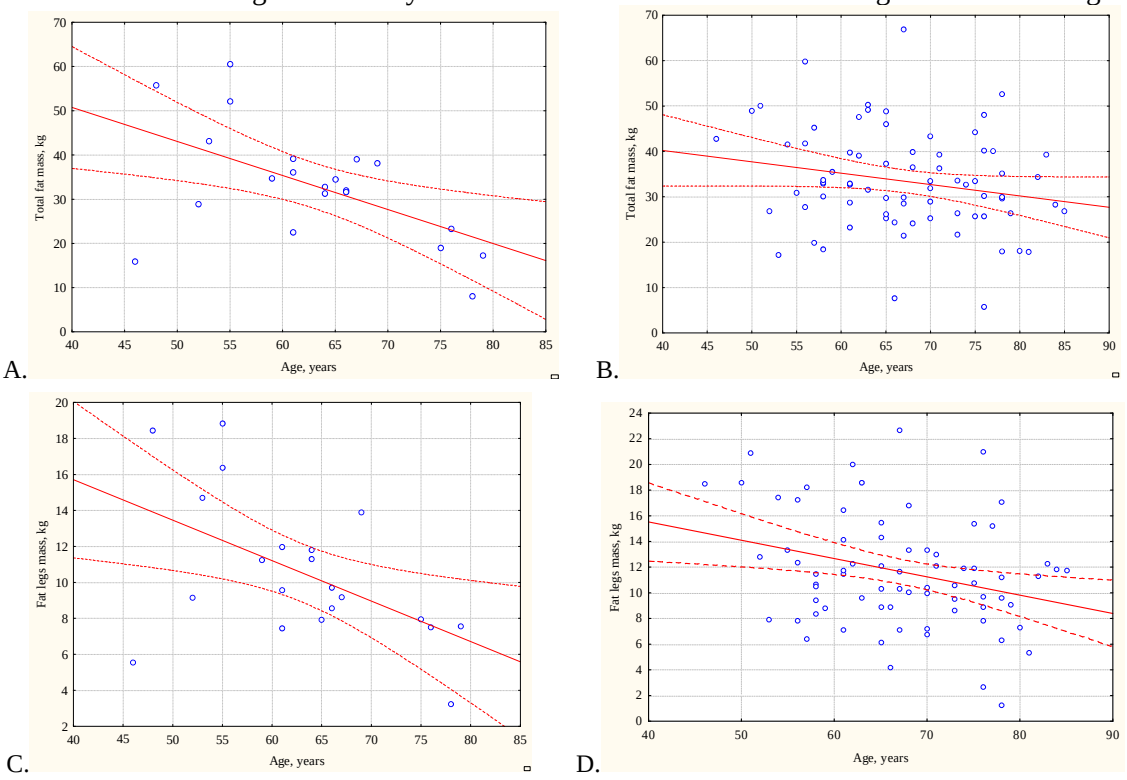

Fig. 3. Correlation between fat mass and age in postmenopausal women depending on the presence of CVD

Note. CVD - chronic venous disease. A. – Postmenopausal women without the CVD; total fat mass, kg = 81.51 – 0.77 * Age, years (r=-0.55; t=-2.87; p=0.09). B. – Postmenopausal women with the CVD; total fat mass, kg = 50.26 – 0.25 * Age, years (r=-0.21; t=-1.82; p=0.07). C. – Postmenopausal women without the CVD; Fat legs' mass, kg = 24.71 – 0.23 * Age, years (r=-0.52; t= -2.66; p=0.02). D. – Postmenopausal women with the CVD; Fat legs' mass, kg = 21.23 – 0.14 * Age, years (r=-0.29; t= -2.66; p=0.009).

In postmenopausal women without CVD, there was a significant correlation between BMI and age, unlike in postmenopausal women with CVD, where this association was not confirmed (fig. 4).

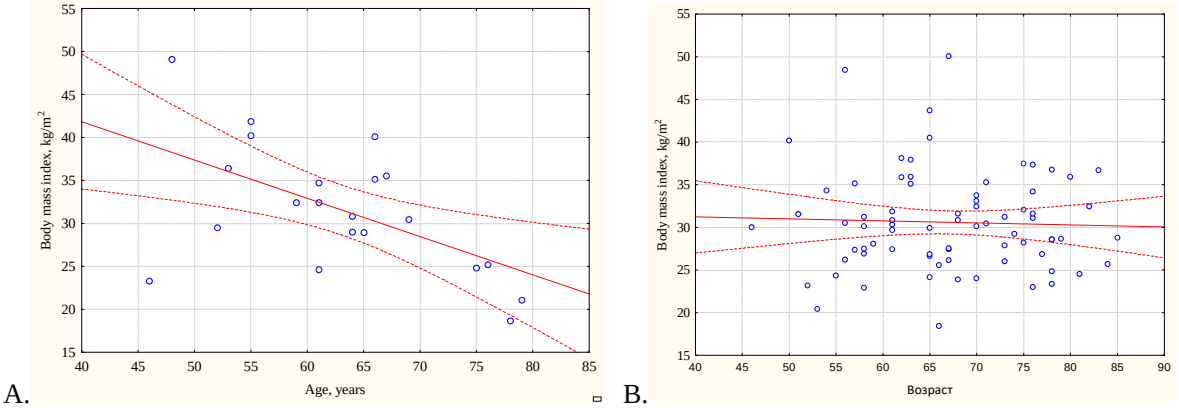

Fig. 4. Correlation between body mass index and age in postmenopausal women depending on the presence of chronic venous diseases.

Note. CVD - chronic venous disease. A. – Postmenopausal women without the CVD; Body mass index, kg/m^2 = 59.68 – 0.45 * Age, years (r=-0.55; t= -2.93; p=0.009). B. – Postmenopausal women with the CVD; Body mass index, kg/m^2 = 32.29 – 0.24 * Age, years (r=-0.37; t= -0.32; p=0.75).

The CVD is an umbrella concept including morphological and functional disorders of the venous system, such as varicose, post-thrombotic disease of the lower extremities and angiodysplasia (phlebodysplasia). It is usually manifested by a discomfort in lower extremities, cosmetic defects and, in certain cases, it may be life-threatening [5].

The Framingham Study showed that the CVD incidence increased with age, regardless of gender. About 10% of women and 1% of men were diagnosed with the CVD in the age group of up to 30 years, while in the persons over 70 years, the prevalence reached 77% and 57%, respectively [12].

According to a large number of studies presented in the literature, advancing age of the patients has been associated with a higher chance of CVD developing [4, 12]. The results of our study support this fact: the incidence of CVR in postmenopausal women increased with age (from 72% in women aged 45-59 years to 84% in women of 75-89 years).

In the literature, the issue of excessive weight being a risk factor for CVD is deemed controversial. There is a significant correlation between an excessive weight or obesity and the severity of CVD‘s category C (clinical manifestations), according to the CEAP classification, unlike in the patients with a normal body weight. However, this association was independent of age and gender. Danielsson et al. detected a significant association between the clinical severity, according to C of CEAP classification, and BMI [3]. In the Study of San Diego Population, an increased waist circumference was associated with the CVD in males and females, and the increased body weight was a risk factor for a moderate CVD, though just in females. Obesity is a risk factor for venous thrombosis [8]. In addition, deep obstruction is significantly more common in patients with an excessive weight and obesity than in patients with a normal body weight [15].

In a number of papers, pregnancy is considered in the context of an excess body weight, being a risk factor for the CVD [9, `10, 15]. In this case, the probability of CVD developing gets higher with an increased number of pregnancies [4, 12]. In 2015, the Iranian scientists studied the incidence of CVD among the hairstylists. 197 women of 18-68 years were examined, 47.7% of them were diagnosed with the CVD. In this study, no significant association was found between the CVD and body weight of the participants. However, the CVD significantly correlated with patients’ ages (OR=1.08; 95% CI: 1.03, 1.13); family history of the CVD (OR=1.99; 95% CI: 1.03, 3.82), blood pressure (OR=4.41; 95% CI: 1.63, 11.90); and duration of standing (OR=2.34; 95% CI: 1.05, 5.22) [4]. Similar results were obtained by the Japanese scientists who examined 1,198 nurses aged 19-50 years. They found no correlation between the CVD’s development and BMI. However, they revealed the following risk factors for the CVD: women's age (OR = 1.317; 95% CI: 1.196, 1.450), time spent standing (OR=1.712, 95% CI: -2.423, 1.209) and family history of the CVD (OR=2.706, 95% CI: 1.444, 5.073). By contrast, the main protective factors were: wearing elastic stockings (OR= 0.052, 95% CI: 0.025, 0.107), resting with legs raised (OR=0.201, 95% CI: 0.095, 0.425), and physical exercise (OR=0.141, 95%CI: 0.072, 0.274). Moreover, age of the nurses (r=0.47, P < 0.01) and their length of work (r=0.51, P<0.01) were linearly associated with the CVD [13].

Our research is limited by the fact that all the examined patients had such comorbidities, as osteoporosis, osteoarthritis, and back pain. However, in the literature, there is evidence of a possible relationship between the knee joints osteoarthritis and CVD. In addition, in the group of 75-89 year-olds, there were only 4 patients with no signs of lower extremity CVD. It may be interpreted as a confirmation of the reference data stating that the number of CVD cases increases with age.

Conclusions

We have detected an increase of the CVD frequency with age in the examined Ukrainian postmenopausal women. Significantly higher body weight, BMI, total body fat, and lower extremity body fat were found in the oldest group with the CVD compared to the patients without the CVD. A significant correlation was further revealed between the total fat mass and age in the postmenopausal women with the CVD.

A significant correlation between BMI and age was only observed in the postmenopausal women without the CVD.

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Реферати

ВІК, ТІЛОБУДОВА ІНДЕКС МАСИ ТІЛА В ЖІНОК У ПОСТМЕНОПАУЗАЛЬНОМУ ПЕРІОДІ ІЗ ХРОНІЧНИМ ЗАХВОРЮВАННЯМ ВЕН НИЖНІХ КІНЦІВОК

Поворознюк В.В., Костромін Г.О., Заверуха Н.В.

Хронічне захворювання вен (ХЗВ) є однією з найбільш поширених, хоча й суперечливих проблем сучасної медицини. Метою дослідження є визначення зв'язку між віком, тілобудовою, ожирінням та ХЗВ у жінок у постменопаузальному періоді. Обстежено 96 жінок віком 46-85 років (середній вік 66,19±0,96 років), яких розподілено на дві групи відповідно до наявності ХЗВ. Діагноз ХЗВ був встановлений на основі клініко-етіолого-анатомо-патофізіологічної класифікації (CEAP) та консультації судинного хірурга. Виявлено, що частота ХЗВ у жінок у постменопаузальному періоді зростала зі збільшенням віку обстежених (від 72% жінок віком 45-59 років до 84% жінок 75-89 років). У жінок з наявним ХЗВ визначено вірогідну кореляцію між загальною жировою масою та віком. У жінок із ХЗВ у старечому віці виявлено вірогідно більші значення показників маси тіла, ІМТ, загальної жирової маси та жирової маси нижніх кінцівок у порівнянні з пацієнтами без ХЗВ.

Ключові слова: хронічне захворювання вен, фактори ризику, вік, ожиріння, жінки у постменопаузальному періоді.

Стаття надійшла 12.062019 р.

ВОЗРАСТ, ТЕЛОСТРОЕНИЕ, ИНДЕКС МАССЫ ТЕЛА У ЖЕНЩИН В ПОСТМЕНОПАУЗАЛЬНОМ ПЕРИОДЕ С ХРОНИЧЕСКИМ ВЕНОЗНЫМ ЗАБОЛЕВАНИЕМ НИЖНИХ КОНЕЧНОСТЕЙ

Поворознюк В.В., Костромин Г.А., Заверуха Н.В.

Хроническое заболевание вен (ХЗВ) является одной из распространенных, хотя и неоднозначных проблем в медицине. Цель нашего исследования - определить связь между возрастом, телостроением, ожирением и ХЗВ у женщин в постменопаузальном периоде. Обследовано 96 женщин в возрасте 46-85 лет (средний возраст - 66,19 ± 0,96 года), которые были разделены на две группы в зависимости от наличия хронического венозного заболевания. Диагноз ХЗВ был установлен на основе клинико-этиоло-анатомо-патофизиологической классификации (CEAP) и консультации сосудистого хирурга. Обнаружено увеличение частоты ХЗВ с возрастом у женщин в постменопаузальном периоде (с 72% в возрасте 45-59 лет до 84% в 75-89 лет). Значительная корреляция между общей жировой массой и возрастом была определена у женщин в постменопаузальном периоде с ХЗВ. У женщин с ХЗВ в старческом возрасте выявлено достоверно более высокие значения показателей массы тела, ИМТ, общей жировой массы и жировой массы нижних конечностей по сравнению с пациентами без ХЗВ.

Ключевые слова - хроническое заболевание вен, факторы риска, возраст, ожирение, женщины в постменопаузальном периоде.

Рецензент Ляховський В.І.