

# Age, Body Composition, Body Mass Index and Chronic Venous Diseases in Postmenopausal Women

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**Abstract**—Chronic venous diseases (CVD) are one of the common, though controversial problems in medicine. It is generally accepted that this pathology predominantly occurs in women. The issue of excessive weight as a risk factor for CVD is still considered debatable. To the author's best knowledge, today in Ukraine, there are barely any studies that describe the relationship between CVD and obesity. Our study aims to determine the association between age, body composition, obesity and CVD in postmenopausal women. The study was conducted in D. F. Chebotarev Institute of Gerontology, National Academy of Medical Sciences of Ukraine. We have examined 96 postmenopausal women aged 46-85 years (mean age –  $66.19 \pm 0.96$  years), who were divided into two groups depending on the presence of CVD. The women were examined by vascular surgeons. For the diagnosis of CVD, we used clinical, anatomic and pathophysiological classifications. We also performed clinical, ultrasound and densitometry examinations. We found that the CVD frequency in postmenopausal women increased with age (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. We also observed a significant correlation between the lower extremities' fat mass and age in both examined groups. A significant correlation between body mass index and age was determined only in postmenopausal women without CVD.

**Keywords**—Chronic venous disease, risk factors, age, obesity, postmenopausal women.

## I. INTRODUCTION

CVD of lower extremities are among of the most discussed problems in medicine. In the Western countries, approximately 3% of total health care costs are associated with venous disorders, with chronic venous disorders occurring in 25-30% of women and 10-40% of men [1], [2].

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, age, sex, genetic factors, sedentary lifestyle, sedentary working, dietary aspects (consuming large amounts of farinaceous and meat foods) etc. predominate [3]-[6].

The data on association between obesity and CVD are still considered controversial. Some scientists believe there is a significant correlation between BMI and the clinical severity according to the C-category of clinical, anatomical and pathophysiological (CEAP) classification [7]. Other scientists confirm that body mass index and age are significant predictors of CVD clinical grade according to the C-category of the CEAP classification [8], [8], [9]. On the contrary, a

French epidemiological study did not reveal any relationship between the CEAP classification's C-category and obesity [5]. Today, there have been no such studies in Ukraine.

The aim of this study is to examine the association between age, body composition (lean and fat masses), obesity and CVD in postmenopausal women.

## II. MATERIALS AND METHODS

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

96 postmenopausal women were included. The subjects aged 46-85 years (mean age:  $66.19 \pm 0.96$  years) were divided into groups, depending on the presence of CVD: The first group was made of 21 postmenopausal women without CVD (age:  $62.86 \pm 2.05$  years), the second group – 75 postmenopausal women with CVD (age:  $67.13 \pm 1.05$  years).

All patients were examined by vascular surgeons. The following data were collected: demographic (age and sex) and anthropometric (weight, height) 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. The diagnosis of CVD was established based on the symptoms, clinical and ultrasound (if necessary) examinations of the lower extremities. For 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.

BMI was computed by the ratio of body weight (kilograms) and height<sup>2</sup> (meters), expressed in  $\text{kg/m}^2$  [10]. Diagnosis of obesity was established when BMI was above  $30 \text{ kg/m}^2$ .

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

The results are presented in the following manner: Mean values (M)  $\pm$  Standard Deviation (SD). For data calculation we used correlation, regression and ANOVA analysis. A result was considered significant if  $p$  values were lower than 0.05 ( $p < 0.05$ ). "Statistika 6.0" (StatSoft, Inc. ©) was used for data processing purposes.

## III. RESULTS

We have examined 96 postmenopausal women (age –  $66.19$

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$\pm 0.96$  years, height –  $1.57 \pm 0.007$  m, weight –  $76.77 \pm 1.73$  kg, BMI –  $30.82 \pm 0.63$  kg/m<sup>2</sup>). The histogram of examined women depending on age is presented on Fig. 1.

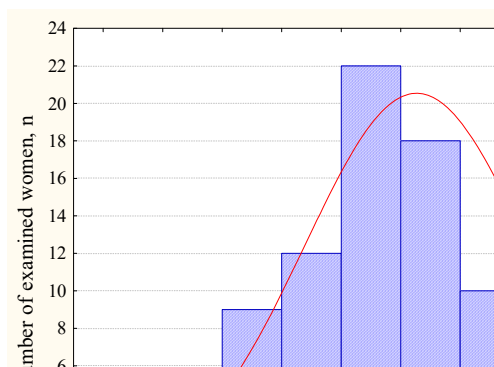


Fig. 1 The histogram of examined women depending on age

No differences were observed between age and BMI across the examined groups depending on the CVD presence (Table I).

TABLE I  
ANTHROPOMETRIC CHARACTERISTICS OF THE EXAMINED PATIENTS

Parameters	Group I	Group II	F	p
Age, years	62.86 $\pm$ 2.05	67.13 $\pm$ 1.06	3.54	0.06
Weight, kg	76.14 $\pm$ 4.39	76.95 $\pm$ 1.86	0.04	0.85
Height, cm	1.55 $\pm$ 0.02	1.58 $\pm$ 0.01	4.42	0.04
BMI, kg/m <sup>2</sup>	31.66 $\pm$ 1.64	30.59 $\pm$ 0.67	0.48	0.51

Note. Group I – women without CVD, Group II – postmenopausal women with CVD.

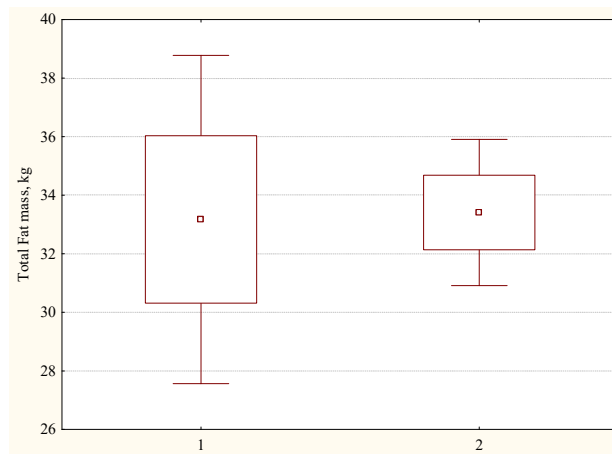
The share of postmenopausal women with CVD increased with age: from 72% in the group of 45-59 years to 84% in the group of 75-89 years (Table II). No differences of lean and fat mass were exhibited depending on the CVD presence (Fig. 2). Correlation and regression analyses of relations between fat mass and age are shown in Fig. 3.

TABLE II  
THE DISTRIBUTION OF EXAMINED WOMEN DEPENDING ON THE PRESENCE OF CVD

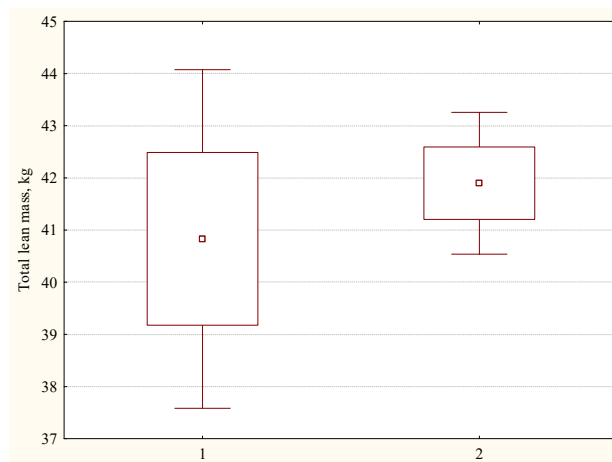
Age group, years	Group I (n, %)	Group II (n, %)	Total
45-59	7 (28 %)	18 (72 %)	25 (100 %)
60-74	10 (22 %)	36 (78 %)	46 (100 %)
75-89	4 (16 %)	21 (84 %)	25 (100 %)
Total	21 (22 %)	75 (78 %)	96 (100 %)

Note. Group I – women without CVD, Group II – postmenopausal women with CVD.

In postmenopausal women without CVD, a significant correlation between BMI and age was observed. In postmenopausal women with CVD, this association was not confirmed (Fig. 4).

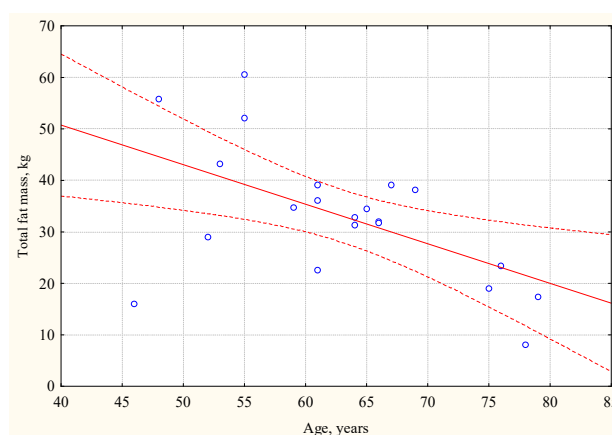


(a) Total fat mass

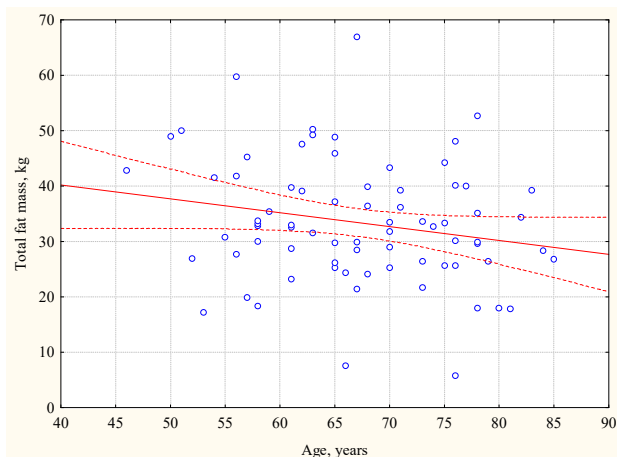


(b) Total lean mass

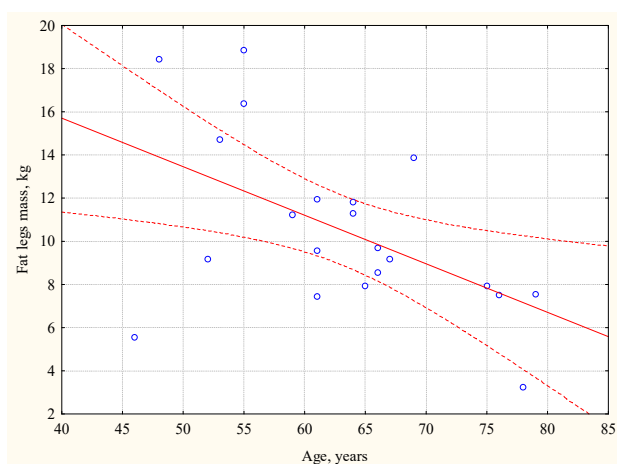
Fig. 2 Body composition in postmenopausal women depending on the presence of CVD; 1 – women without CVD, 2 – postmenopausal women with CVD



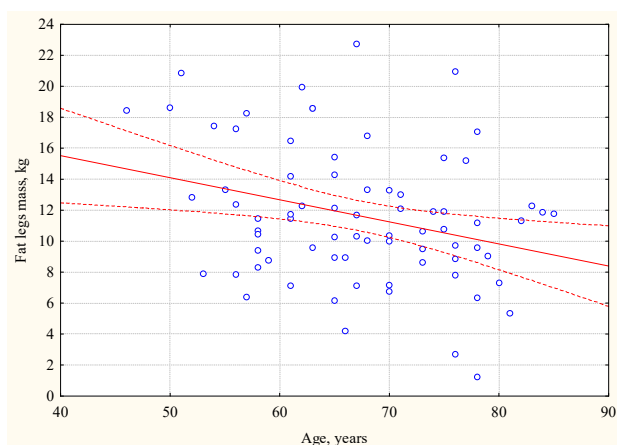
(a) Postmenopausal women without CVD; Fat total mass, kg =  $50.26 - 0.25 * \text{Age, years}$  ( $r = -0.21$ ;  $t = -1.82$ ;  $p = 0.07$ )



(b) Postmenopausal women with CVD; Fat total mass, kg =  $21.23 - 0.14 * \text{Age, years}$  ( $r = -0.55$ ;  $t = -2.87$ ;  $p = 0.01$ )

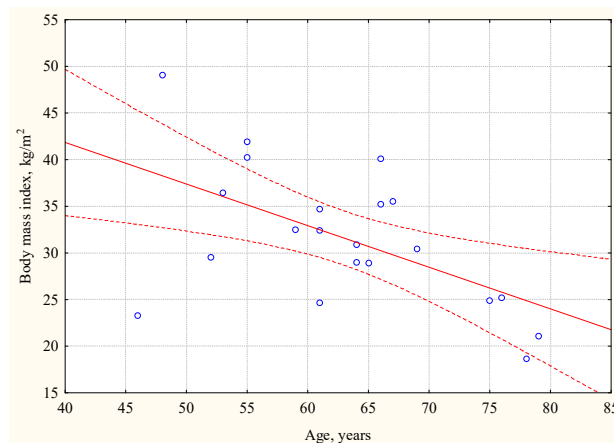


(c) Postmenopausal women without CVD; Fat legs mass, kg =  $24.71 - 0.23 * \text{Age, years}$  ( $r = -0.52$ ;  $t = -2.66$ ;  $p = 0.02$ )

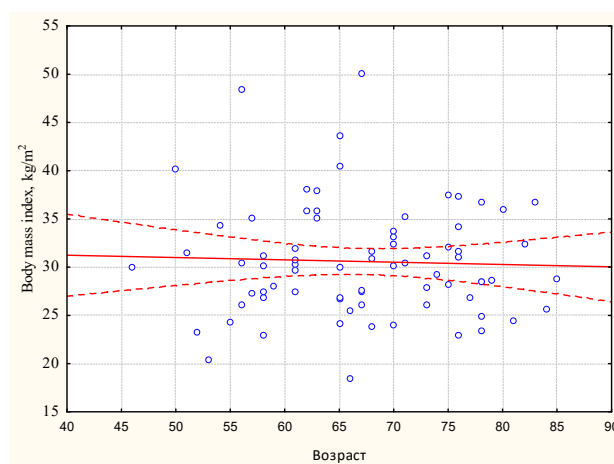


(d) Postmenopausal women with CVD; Fat legs mass, kg =  $21.23 - 0.14 * \text{Age, years}$  ( $r = -0.29$ ;  $t = -2.66$ ;  $p = 0.009$ )

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



(a) Postmenopausal women without CVD; Body mass index,  $\text{kg/m}^2 = 59.68 - 0.45 * \text{Age, years}$  ( $r = -0.55$ ;  $t = -2.93$ ;  $p = 0.009$ )



(b) Postmenopausal women with CVD; Body mass index,  $\text{kg/m}^2 = 32.29 - 0.24 * \text{Age, years}$  ( $r = -0.37$ ;  $t = -0.32$ ;  $p = 0.75$ )

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

#### IV. CONCLUSION

The CVD frequency in the Ukrainian postmenopausal women increases with age.

We found a significant correlation between the total fat mass and age in the postmenopausal women with CVD. At the same time, we observed a significant correlation between fat legs mass and age in both examined groups.

A significant correlation was determined between body mass index and age in postmenopausal women without CVD. The patients with CVD do not present this association.

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