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BODY CIRCUMFERENCE DIMENSIONS IN UKRAINIAN MEN WITH ALOPECIA AREATA

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Annotation. *Alopecia areata is a chronic autoimmune disease accompanied by focal hair loss and is often associated with a number of somatic and endocrine disorders. In modern studies, more and more attention is paid to the anthropometric characteristics of patients as potential markers of risk for the development of dermatological pathology. Of particular scientific value is the analysis of body circumferences, which can reflect the general metabolic and hormonal status of men suffering from alopecia. The identification of such features allows us to expand our understanding of the pathogenetic mechanisms of the disease and contribute to the improvement of a personalized approach to its diagnosis and treatment. The aim of the study is to establish the features of body circumference dimensions in young Ukrainian men with alopecia areata. A clinical, instrumental and anthropological (determination of body circumference dimensions) examination was performed on 81 young Ukrainian men with alopecia areata. The severity of alopecia areata was determined according to the recommendations of Shutsky I. V. The body circumference dimensions of 82 practically healthy Ukrainian men of similar age, who were taken from the data bank of the National Pirogov Memorial Medical University, Vinnytsya, served as a control. The results were statistically processed in the licensed package «Statistica 6.0» using non-parametric evaluation methods. In Ukrainian men with alopecia areata in general, of the I, II and III degrees (most pronounced) of severity compared to practically healthy men, in most cases, significantly higher values of the upper limb circumferences (by 3.04-9.58 %, with the exception of patients with I degree of severity), lower limb (by 3.07-10.88 %, with the exception of the hip circumference in patients in general, I and III degrees of severity), and trunk (by 2.59-16.39 %) were established. Between groups of patients with alopecia areata with different degrees of severity of the disease in men, trends towards lower values (by 2.39-5.69 %) of the shoulder circumferences in a tense state, forearm in the upper part, hand compared to patients with III degree of severity and forearm in the lower part and hand compared to patients with II degree of severity, as well as trends towards larger values (by 2.65-5.10 %) of hip and chest circumferences during inspiration, expiration, and at rest compared to patients with stage I severity, and hip circumferences compared to patients with stage II severity.*

Keywords: *skin diseases, practically healthy and alopecia areata-affected Ukrainian men, anthropometry, body circumferences.*

Introduction

Alopecia areata (AA) is one of the most common forms of pseudo-scarring hair loss, characterized by autoimmune damage to hair follicles with the development of bald patches of varying size and location. According to a global systematic review, the prevalence of AA in the population is about 2 % over the lifetime, with minor regional variations [13]. In Japan, the disease is recorded in 0.27 % of the population, with 46.1 % of patients having comorbidities, including atopic dermatitis, thyroid dysfunction or other autoimmune conditions [7]. In the UK, the overall incidence of AA was 0.26 % in the general population, with rates slightly higher in men (53.6 %) than in women [12].

The etiology of AA is multifactorial and includes genetic predisposition, autoimmune disorders, psycho-emotional factors and external triggers. The pathogenesis is based on a violation of immune tolerance to hair follicle antigens, with infiltration of CD8+ T cells and increased levels of cytokines, such as interferon-gamma, which contribute to the suppression of hair growth [22]. The disease is not limited to the scalp – the lesion can affect the eyebrows, beard, eyelashes and other parts of the body. According to the classification, the forms of alopecia areata (localized), ophiasis (in the form of a ribbon along the hairline), totalis (hair loss on the scalp) and universalis (complete baldness of the whole body) are distinguished [16].

Alopecia areata has a significant negative impact on the quality of life of patients, especially among young men. Meta-analytic data indicate that 27-39 % of people with AA are diagnosed with clinically significant symptoms of anxiety and depression [15], which in turn aggravates the course of the disease through psychoneuroimmune mechanisms. A review of the social and psychological burden of AA highlighted the reduced ability to work, difficulties in interpersonal interaction and the development of social isolation in over 40 % of patients [19]. Data from clinical registries also show that men with AA are more likely to seek medical help in the later stages, when severe forms of the disease develop [4].

The overall pattern of incidence of different types of alopecia in clinical practice indicates the dominance of androgenetic alopecia, but alopecia areata ranks second, occurring in 19.3 % of cases according to a multicenter study in 22 trichology clinics [23]. At the same time, studies in Northern Anatolia confirm that among young men, the alopecia areata is recorded in 1.5 % of individuals, mainly under the age of 30 [6]. This correlates with data from Saudi Arabia, where the average age of patients was 25.6±9.8 years, and 57 %

of them were men [4].

In recent years, more and more researchers have paid attention to the relationship between somatotype, body circumference and the development of alopecia areata, which may be due to hormonal background, insulin resistance, fat metabolism and metabolic syndrome. Studies have outlined the relationship between low body mass index or, conversely, excess weight and the severity of AA [8]. At the same time, the issue of morphological features of the body structure, in particular, circumference parameters, in men with alopecia areata remains insufficiently studied, which may have both diagnostic and prognostic significance.

In view of the above, the analysis of body circumference in men with alopecia areata, especially in the context of national characteristics, is of important scientific and practical importance. Studying such parameters in representatives of the Ukrainian population can provide new understanding of the pathogenetic mechanisms of the disease and contribute to the formation of individualized approaches to patient management.

The aim of the study is to establish the characteristics of body circumferences in young Ukrainian men with alopecia areata.

Materials and methods

Clinical-instrumental and anthropological (in accordance with the recommendations of Shaparenko P. P. [21]) examination of 81 patients with alopecia areata, young Ukrainian men (25-44 years old according to the WHO age periodization, 2015) was conducted on the basis of the Military Medical Clinical Center of the Central Region and the Department of Skin and Venereal Diseases with a postgraduate course of the National Pirogov Memorial Medical University, Vinnytsya. The study was conducted at the National Pirogov Memorial Medical University, Vinnytsya «The latest aspects of diagnosis, course, development and implementation in practice modern methods of chronic dermatoses and STDs complex treatment», state registration No. 0119U000712. Committee on Bioethics of National Pirogov Memorial Medical University, Vinnytsya (protocol № 4 From 18.03.2023) found that the studies do not contradict the basic bioethical standards of the Declaration of Helsinki, the Council of Europe Convention on Human Rights and Biomedicine (1977), the relevant WHO regulations and laws of Ukraine.

The diagnosis of alopecia areata was made using the ARAMO ASW 300 dermatoscope-trichoscope (Korea), which allows assessing the density and thickness of the hair, the condition of the cuticle, scalp keratin and capillary vessels of the scalp. The severity of alopecia areata was determined according to the recommendations of Shutsky I. V. [18]: Grade I – single lesions with a diameter of 3-5 cm; Grade II – lesions with a diameter of 5-10 cm; Grade III – subtotal alopecia; Grade IV – total alopecia. In our study, the following distribution of sick men was established: I degree – 35, II degree – 33, III degree – 12, IV degree – 1.

The determination of body circumference dimensions (shoulder in tension and at rest, forearm and lower leg in the upper and lower parts, thigh and hips, neck, waist, hand, foot, chest during inhalation, exhalation and at rest) was carried out using a centimeter tape, which was changed after every 100 measurements (measurement accuracy was up to 0.5 cm).

The control group consisted of the body circumference dimensions of 82 practically healthy Ukrainian men of a similar age group, who were taken from the data bank of the National Pirogov Memorial Medical University, Vinnytsya Research Center.

Statistical processing of the study results was carried out in the licensed package «Statistica 6.0» using non-parametric evaluation methods. The nature of the distributions for each of the obtained variation series, the average for each trait under study and the standard square deviation were assessed. The reliability of the difference in values between independent quantitative values was determined using the Mann-Whitney U-test.

Results. Discussion

It was found that the girth dimensions of the shoulder in a tense and relaxed state, the forearm in the upper and lower parts and the hand in patients with alopecia areata of Ukrainian men in general (respectively 35.44±3.70 cm, 32.10±3.54 cm, 28.69±2.43 cm, 18.19±1.56 cm, 22.06±1.48 cm), II (respectively 35.82±3.32 cm, 32.53±3.38 cm, 29.09±2.38 cm, 18.52±1.65 cm, 22.20±1.41 cm) and III (respectively 36.75±2.22 cm, 33.08±1.83 cm, 29.33±1.42 cm, 18.42±1.20 cm, 22.83±1.63 cm) of the severity are significantly greater ($p<0.05$-0.001) than in practically healthy Ukrainian men (respectively 33.23±2.84 cm, 30.17±2.94 cm, 27.33±2.01 cm, 17.44±1.24 cm, 21.39±1.22 cm) (Fig. 1). In addition, the shoulder girth in a tense state in sick men of the I degree of severity (34.66±4.34 cm) has a tendency ($p=0.079$) to greater values compared to practically healthy men (see Fig. 1A). When comparing the girth sizes of the upper limb between patients with alopecia areata of different severity, it was found that in male patients with grade I severity, there were significantly less ($p<0.05$) and a tendency ($p=0.055$-0.079) values of the girths of the shoulder in a tense state, the upper forearm (28.07±2.69 cm) and the hand (21.67±1.44 cm) compared to male patients with grade III severity, as well as the lower forearm (17.77±1.55 cm) and the hand compared to male patients with grade II severity (see Fig. 1).

It was found that the circumference sizes of the thigh, upper and lower leg and foot in patients with alopecia areata of Ukrainian men in general (respectively 58.11±6.19 cm, 39.06±3.34 cm, 24.90±2.29 cm, 25.88±1.45 cm), I (respectively 57.63±7.57 cm, 38.66±3.86 cm, 24.66±2.63 cm, 25.83±1.32 cm), II (respectively 58.06±5.33 cm, 39.33±2.92 cm, 24.80±1.79 cm, 25.98±1.43 cm) and III (respectively 59.75±3.91 cm, 39.33±2.99 cm, 25.67±2.46 cm, 25.75±1.96 cm) of the severity are significantly greater ($p<0.05$-0.001) than in practically healthy Ukrainian men (re-

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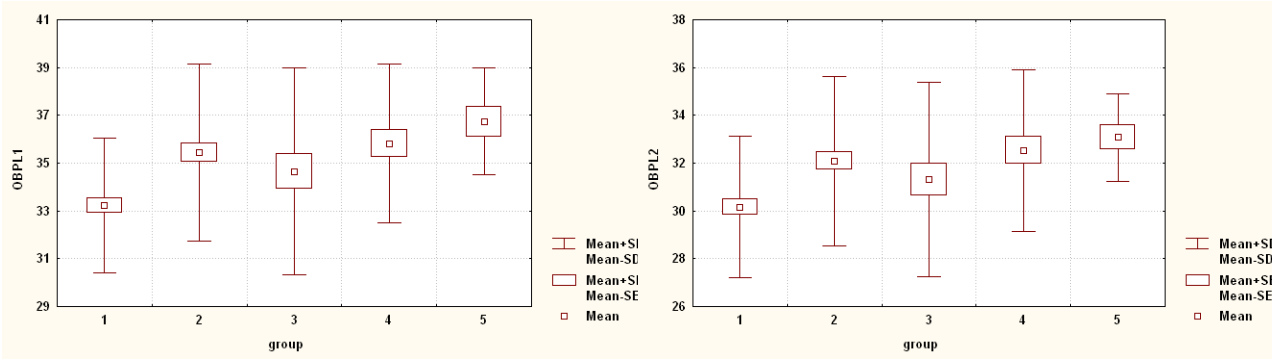

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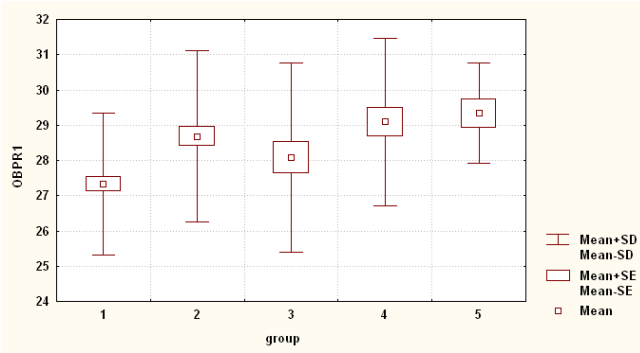

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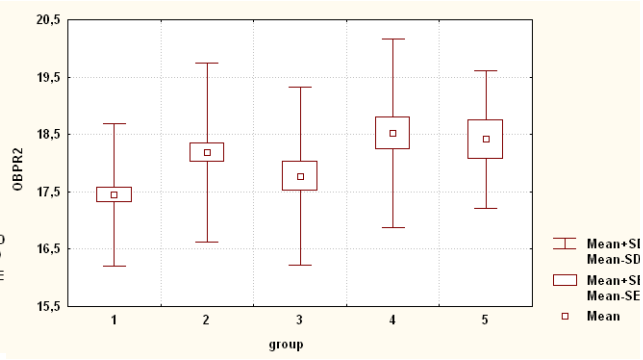

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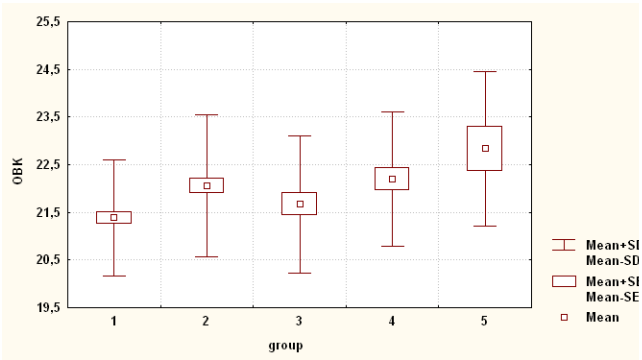

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Fig. 1. Features of the circumference dimensions of the upper limb in patients with alopecia areata of varying severity in Ukrainian men (cm). **A** – shoulder girth in a tense state (OBPL1); **B** – shoulder girth in a relaxed state (OBPL2); **C** – upper arm circumference (OBPR1); **D** – lower forearm circumference (OBPR2); **E** – hand circumference (OBK). In this and the following figures, 1 – practically healthy men; 2 – men with alopecia areata in general; 3 – men with alopecia areata of the 1st degree of severity; 4 – men with alopecia areata of the 2nd degree of severity; 5 – men with alopecia areata of the 3rd degree of severity; group – corresponding groups of examined men; Mean – average value; Mean±SE – mean value ± error of the mean; Mean±SD – average value ± standard deviation.

spectively 53.25±4.49 cm, 36.43±2.91 cm, 23.41±1.87 cm, 24.96±1.46 cm) (Fig. 2). In addition, the hip circumference in sick men of the II degree of severity (98.00±7.03 cm) has a pronounced tendency (p=0.057) to greater values compared to practically healthy men (95.04±6.39 cm) (see Fig. 2B). When comparing the girth dimensions of the lower limb between patients with alopecia areata of different severity, only a slight tendency (p=0.097) was found to have larger values of the thigh girth in male patients with grade III severity compared to male patients with grade I severity (see Fig. 2A).

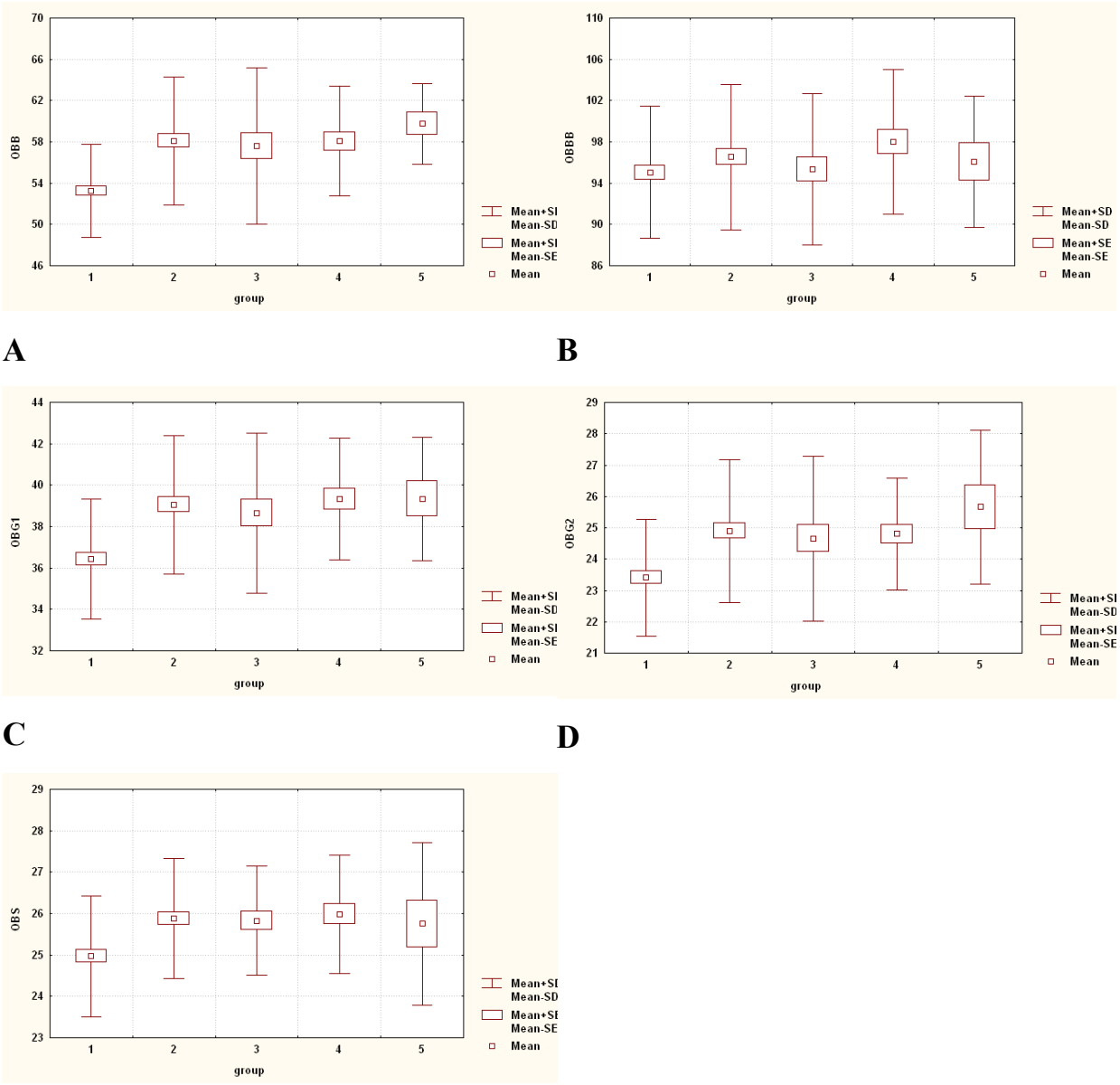

Fig. 2. Features of the circumference dimensions of the lower limb in patients with alopecia areata of varying severity in Ukrainian men (cm). **A** – hip circumference (OBB); **B** – hips circumference (OBBB); **C** – girth of the leg in the upper part (OBG1); **D** – girth of the leg in the lower part (OBG2); **E** – foot circumference (OBS).

It was found that the circumferences of the neck, waist, and chest during inspiration, expiration, and at rest in Ukrainian men with alopecia areata were as follows: in general (39.40±3.05 cm, 93.62±12.35 cm, 107.4±9.9 cm, 101.2±9.7 cm, 103.6±10.0 cm, respectively), in the first (38.67±2.60 cm, 91.80±14.33 cm, 105.4±10.5 cm, 99.37±10.26 cm, 101.3±10.4 cm, respectively), in the second (39.67±3.67 cm, 95.06±11.51 cm, 108.7±10.3 cm, 102.3±10.2 cm, respectively) 105.1±10.3 cm) and III (respectively 40.75±1.91 cm, 94.92±8.43 cm, 109.9±6.0 cm, 104.0±5.6 cm, 106.5±6.7 cm) degrees of severity are significantly greater ($p<0.05$-0.001) than in practically healthy Ukrainian men (respectively 37.67±1.92 cm, 79.48±7.32 cm, 100.0±6.0 cm, 93.18±6.39 cm, 95.20±6.57 cm) (Fig. 3). When comparing the girth sizes of the body between patients with alopecia areata of different severity, it was found that in male patients with the III degree of severity there were significantly more ($p<0.05$) and a tendency ($p=0.057$-0.088) values of the hip and chest girths during inhalation, exhalation and at rest compared to male patients with the I degree of severity, as well as the hips compared to male patients with the II degree of severity (see Fig. 3).

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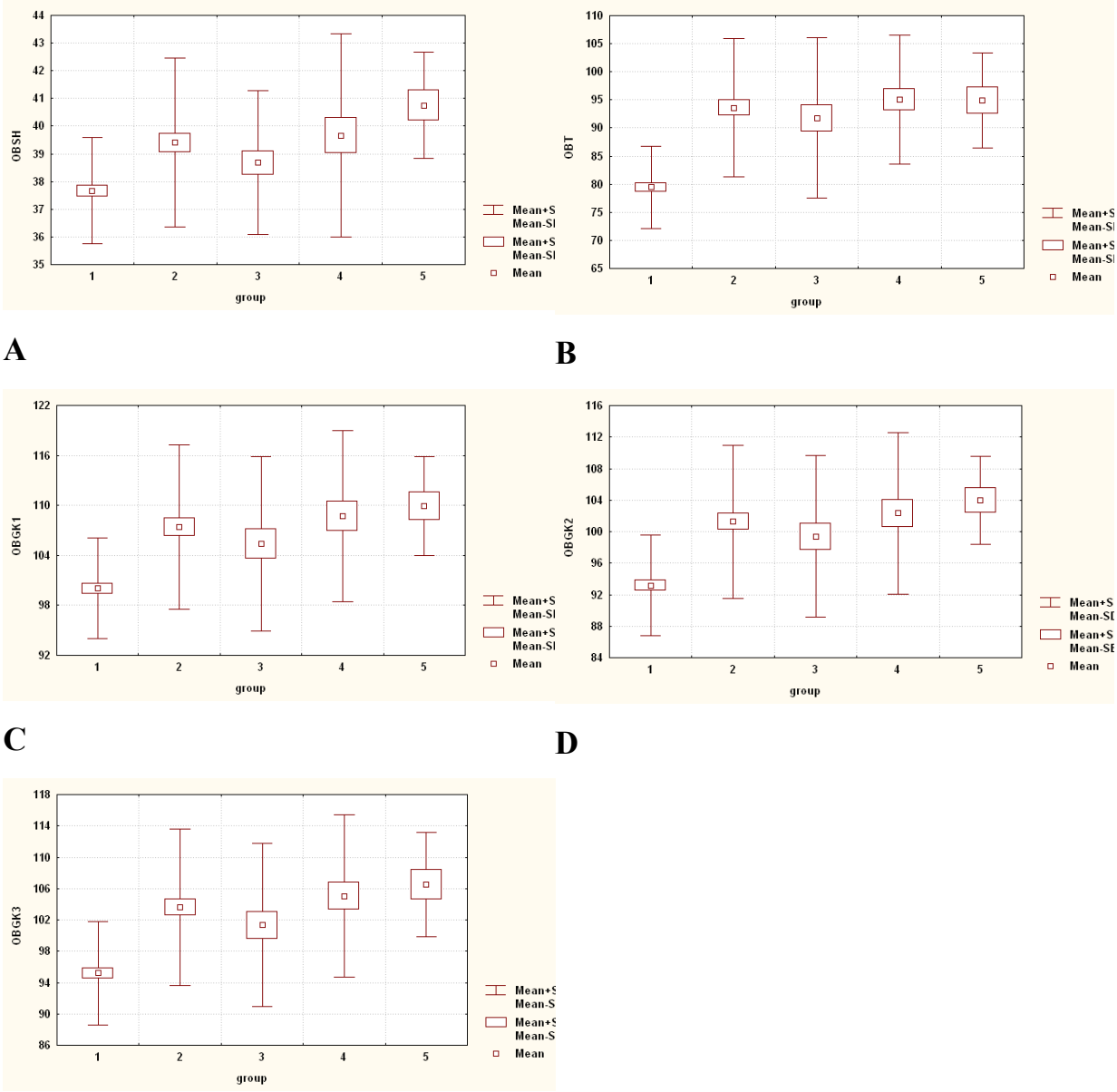

Fig. 3. Features of the body circumference dimensions in patients with alopecia areata of varying severity in Ukrainian men (cm). **A** – neck circumference (OBSH); **B** – waist circumference (OBT); **C** – chest circumference during inspiration (OBGK1); **D** – chest circumference on exhalation (OBGK2); **E** – chest circumference at rest (OBGK3).

Thus, all girth dimensions of the upper limbs (shoulder in tense and relaxed state, forearm in upper and lower part and hand) in patients with alopecia areata Ukrainian men in general, II and III degree of severity are significantly larger ($p<0.05$-0.001) compared to practically healthy Ukrainian men (respectively by 6.24 % – 6.40 % – 4.98 % – 4.12 % – 3.04 % for patients in general, by 7.23 % – 7.25 % – 6.05 % – 5.83 % – 3.65 % for patients of II degree of severity and by 9.58 % – 8.80 % – 6.82 % – 5.32 % – 6.31 % for patients of III degree of severity). When comparing the girth sizes of the upper limbs between Ukrainian men with alopecia areata of different severity, patients with grade I severity had significantly lower ($p<0.05$) and a tendency ($p=0.055$-0.079) values of the shoulder girth in a tense state (by 5.69 %), the upper forearm (by 4.30 %) and the hand (by 5.08 %) compared to patients with grade III severity, as well as the lower forearm (by 4.05 %) and the hand (by 2.39 %) compared to patients with grade II severity.

Most of the circumference sizes of the lower extremities, namely the thighs, upper and lower legs and feet, in Ukrainian men with alopecia areata in general, I, II and III degrees of severity are significantly larger ($p<0.05$-0.001)

compared to practically healthy Ukrainian men (respectively by 8.36 % – 6.73 % – 5.98 % – 3.55 % for patients in general, by 7.60 % – 5.77 % – 5.07 % – 3.37 % for patients with I degree of severity, by 8.28 % – 7.37 % – 5.60 % – 3.93 % for patients with II degree of severity and by 10.88 % – 7.37 % – 8.80 % – 3.07 % for patients with III degree of severity). There are practically no significant differences or trends in the circumference sizes of the lower extremities between patients with alopecia areata of varying severity.

All circumferences of the body (neck, waist, chest during inhalation, exhalation and at rest) in patients with alopecia areata of Ukrainian men in general, I, II and III degrees of severity are significantly larger ($p<0.05$-0.001) compared to practically healthy Ukrainian men (respectively by 4.39 % – 15.10 % – 6.89 % – 7.92 % – 8.11 % for patients in general, by 2.59 % – 13.42 % – 5.12 % – 6.24 % – 6.02 % for patients of I degree of severity, by 5.04 % – 16.39 % – 8.00 % – 8.91 % – 9.42 % for patients of II degree of severity and by 7.56 % – 16.27 % – 9.01 % – 10.40 % – 10.61 % for patients of the III degree of severity). When comparing the values of the girth dimensions of the body between Ukrainian men with alopecia areata of different degrees of severity, in patients of the III degree of severity, significantly more ($p<0.05$) and a tendency ($p=0.057$-0.088) were found to have larger values of the girth of the thigh (by 5.10 %), chest during inhalation (by 4.09 %), during exhalation (by 4.45 %) and at rest (by 4.88 %) compared to patients of the I degree of severity, as well as the thigh (by 2.65 %) compared to patients of the II degree of severity.

The results of the study of the features of body circumference in men with AA demonstrate the presence of statistically significant anthropometric differences between patients and individuals without this pathology. These results are confirmed in previous works, which indicate an association between the development of dermatological diseases and indicators of somatotype, body mass index (BMI) and metabolic status.

In particular, it was found that certain somatotypological characteristics significantly increase the likelihood of psoriasis, and also affect the severity of its course. The authors identified discriminant models taking into account body circumference parameters, which allow predicting the risks of developing pathology among men with different somatotypes, emphasizing the importance of morphometric features in dermatological practice [1].

A similar role of morphological features was also confirmed in patients with alopecia areata. Patients with AA have a statistically higher prevalence of metabolic syndrome compared to the control group (34.2 % vs. 14.2 %; $p<0.05$). In addition, the presence of metabolic syndrome is associated with higher waist circumference and BMI, which is consistent with the results of our study on increased body circumference in patients with AA [2].

The data on the association of metabolic syndrome and dermatological pathologies are also confirmed in the meta-analysis of Ali Z. et al., which indicated that the risk of metabolic syndrome in patients with atopic dermatitis is increased by 2.1 times compared to individuals without dermatosis. It is known that such metabolic changes indirectly affect inflammatory mechanisms involved in the pathogenesis of alopecia [3].

An additional factor that may be associated with the development of dermatoses, particularly in adolescents, is BMI. For example, adolescents with acne had a higher mean BMI than a healthy group, suggesting a potential role for obesity as a background pathology [5]. Similarly, Gayen R. et al. have shown a link between obesity, hyperandrogenism and acne severity in women, emphasizing that hormonal shifts related to fat metabolism contribute to the formation of dermatological manifestations [10].

In addition to acne, the relationship between anthropometric indicators and the functional state of the skin has also been found in atopic dermatitis. Children with high BMI had a more severe course of the disease, which is explained by increased inflammatory processes due to metabolic imbalance [14].

No less important are the data of Fortes C. et al., who have shown that the combination of obesity and smoking increases the likelihood of developing androgenetic alopecia, especially in men. In their study, 68 % of patients with androgenetic alopecia were overweight or obese, confirming the influence of morphological phenotype on the formation of hair pathology [9].

C. Lie et al. presented a systematic analysis of data on the association between AA and metabolic syndrome, where it was noted that insulin resistance, abdominal obesity and lipid metabolism disorders contribute to the development of alopecia due to chronic subclinical inflammatory activation. This is consistent with existing data on increased waist circumference in our sample of men with AA [17].

The significant role of body weight in the development of acne was also confirmed by Neupane S. et al., who indicated that the frequency of acne in individuals with BMI>25 was almost twice as high as in patients with normal body weight (OR=1.98; 95 % CI: 1.12-3.45; $p=0.02$) [20]. A. Zhang and J. I. Silverberg in their meta-analysis showed that the presence of excess body weight increases the risk of developing atopic dermatitis by 41 % (OR=1.41; 95 % CI: 1.30-1.53), which indicates common mechanisms of pathogenesis of chronic skin diseases associated with obesity [24].

Thus, the accumulated scientific data indicate the presence of a close relationship between anthropometric parameters, in particular body circumference, and the risk of occurrence and course of dermatological pathologies. Our results on the increase in circumference indicators in patients with alopecia areata in Ukrainian men confirm the importance of a comprehensive assessment of somatotypological and metabolic characteristics in the management of such patients.

Conclusion and prospects for further developments

1. In patients with alopecia areata Ukrainian men in

general and of various degrees of severity compared to practically healthy men, significantly higher values of almost all body circumferences were established (except for the circumferences of the upper limbs in patients with the I degree of severity and the circumference of the hips in patients in general, I and III degrees of severity).

2. Among the groups of Ukrainian men with alopecia areata with various degrees of severity of the disease, only tendencies towards lower values of the circumferences of the shoulder in a tense state, the forearm in the upper part, the hand compared to patients with the III degree of severity and the forearm in the lower part and the hand compared to patients with the II degree of severity were established, as well as tendencies towards higher values of the circumferences of the thigh, chest on inhalation, on exhalation, in a calm state compared to patients with the I degree of severity and the thigh compared to patients with the II degree of severity.

In the future, it is planned to study the features of other anthropometric and somatotypological indicators in Ukrainian men with alopecia areata.

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ОСОБЛИВОСТІ ОБХВАТНИХ РОЗМІРІВ ТІЛА У ХВОРИХ НА ГНІЗДОВУ АЛОПЕЦІЮ УКРАЇНСЬКИХ ЧОЛОВІКІВ

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Анотація. *Гніздова алопеція є хронічним автоімунним захворюванням, що супроводжується вогнищевим випадінням волосся і часто асоціюється з низкою соматичних та ендокринних порушень. У сучасних дослідженнях все більше уваги приділяється антропометричним характеристикам пацієнтів як потенційним маркерам ризику розвитку дерматологічної патології. Особливу наукову цінність становить аналіз обхватних розмірів тіла, які можуть відображати загальний метаболічний та гормональний статус чоловіків, що страждають на алопецію. Виявлення таких особливостей дозволяє розширити уявлення про патогенетичні механізми хвороби та сприяти вдосконаленню персоналізованого підходу до її діагностики і лікування. Мета дослідження – встановлення особливостей обхватних розмірів тіла у хворих на гніздову алопецію українських чоловіків молодого віку. У 81 хворого на гніздову алопецію українських чоловіків молодого віку проведено клініко-інструментальне та антропологічне (визначення обхватних розмірів тіла) обстеження. Тяжкість перебігу гніздової алопеції проводили за рекомендаціями Шуцького І. В. Контролем слугували обхватні розміри тіла 82 практично здорових українських чоловіків аналогічного віку, які були взяті з банку даних науково-дослідного центру Вінницького національного медичного університету ім. М. І. Пирогова. Статистична обробка отриманих результатів проведена у ліцензійному пакеті «Statistica 6.0» з використанням непараметричних методів оцінки. У хворих на гніздову алопецію українських чоловіків загалом, I-го, II-го та III-го ступеня (найбільш виражено) тяжкості порівняно з практично здоровими чоловіками, у більшості випадків, встановлені достовірно більші значення обхватів верхньої кінцівки (на 3,04-9,58 %, за винятком хворих I-го ступеня тяжкості, нижньої кінцівки (на 3,07-10,88 %, за винятком обхвату стегон у хворих загалом, I-го й III-го ступеня тяжкості), та тулуба (на 2,59-16,39 %). Між групами хворих на гніздову алопецію з різним ступенем тяжкості захворювання чоловіків встановлені тенденції до менших значень (на 2,39-5,69 %) обхватів плеча у напруженому стані, передпліччя у верхній частині, кисті порівняно з хворими III-го ступеня тяжкості та передпліччя у нижній частині і кисті порівняно з хворими II-го ступеня тяжкості, а також тенденції до більших значень (на 2,65-5,10 %) обхватів стегна, грудної клітки на вдиху, на видиху, у спокійному стані порівняно з хворими I-го ступеня тяжкості та стегна порівняно з хворими II-го ступеня тяжкості.*

Ключові слова: *шкірні захворювання, практично здорові та хворі на гніздову алопецію українськи чоловіки, антропометрія, обхватні розміри тіла.*