TOTAL AND LONGITUDINAL BODY DIMENSIONS IN UKRAINIAN MEN WITH ALOPECIA AREATA

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Annotation. *Studying total and longitudinal body dimensions in patients with alopecia areata is important for assessing changes in anthropometric indicators associated with this disease. Studying the sexual characteristics of anthropometric indicators can contribute to improving diagnostic approaches and assessing the risks of developing concomitant pathologies. Analysis of the obtained data will allow integrating anthropological characteristics into a comprehensive strategy for the treatment and prevention of alopecia. The purpose of the study was to establish the characteristics of total and longitudinal body dimensions in young Ukrainian men with alopecia areata. Clinical-instrumental examination (using the ARAMO ASW 300 dermatoscope-trichoscope) and anthropological assessment (in accordance with the recommendations of Shaparenko P. P.) were conducted in 81 young Ukrainian men with alopecia areata. The severity of alopecia areata was assessed according to Shutskiy I. V. The control group included the total and longitudinal body dimensions of 82 practically healthy young Ukrainian men of the same age group, obtained from the database of the Scientific Research Center of the National Pirogov Memorial Medical University, Vinnytsya. Statistical analysis of the results was performed using the licensed software package "Statistica 6.0" with non-parametric evaluation methods. In contrast to practically healthy individuals, young Ukrainian men with alopecia areata, regardless of overall status or severity levels (Grades 1, 2, and 3), demonstrated significantly greater or tendencies toward greater values for body mass (12.57-20.96 %), body surface area (4.26-12.56 %), acromial height (1.84-2.45 %), and digit anthropometric points (3.40-5.42 %). Additionally, significantly lower values were observed for pubic height (5.23-6.85 %) and trochanteric height (13.07-14.28 %). These findings indicate that, compared to practically healthy individuals, men with alopecia areata have shorter lower limbs and longer upper limbs and torso, which manifests as a "subpathological" constitutional type. No significant differences or trends in total and longitudinal body dimensions were identified among groups of patients with varying degrees of alopecia areata severity. Thus, the findings suggest both genetic predisposition (changes in longitudinal body dimensions) and the influence of environmental factors (changes in body mass) in the development of this multifactorial disease.*
Keywords: *skin diseases, alopecia areata, practically healthy and sick Ukrainian men, total and longitudinal body dimensions.*

Introduction

Alopecia areata is a common dermatological condition characterized by hair loss in limited areas of the skin. One of the most common forms of this disease is alopecia areata, which attracts special attention of researchers due to the complexity of pathogenesis and significant impact on the quality of life of patients. Alopecia areata is autoimmune in nature, which is caused by an imbalance in the regulation of the body's immune response, in particular, the attack of T-lymphocytes on hair follicles. The development of this condition is influenced by genetic factors, environmental triggers and stressful situations that stimulate a pathological immune response [4, 23, 26]. In clinical practice, several forms of alopecia areata are distinguished depending on the extent of the lesion: a localized form (alopecia areata), which is limited to single foci, total alopecia (alopecia totalis), which affects the hair on the head, and a universal form (alopecia universalis), in which hair falls out on the entire body [4, 12, 23].

Epidemiological studies indicate that alopecia areata is a fairly common condition, with a prevalence of approximately 0.1-0.2 % in the general population, but a lifetime risk of developing the disease of up to 2 % [7, 12, 23]. In the United States, the prevalence of the disease varies considerably by race and ethnicity, with the highest rates observed among African Americans and the lowest among Asians [13]. Men and women have been found to have different risks of developing alopecia areata, although the statistics remain controversial. For example, some studies suggest a male predominance, while others show an approximately equal prevalence of the disease in both sexes [16, 23]. Alopecia areata significantly affects the quality of life of patients, which is especially noticeable in cases of generalized forms accompanied by severe cosmetic defects. Patients experience decreased self-esteem, impaired social relationships, and limited professional activity [8, 15, 24]. In addition, alopecia is often associated with the development of anxiety disorders, depression, and other psychological problems, which significantly complicate the adaptation of patients to changes in appearance. Systematic reviews demonstrate that the level of anxiety and depression in such patients significantly exceeds the average in the general population, which makes this disease not only a dermatological but also a social problem [21, 24]. Given the above, the need for further study of alopecia areata, taking into account its impact on various aspects of patients' lives, becomes obvious. Special attention should be paid to anthropometric characteristics, which may be important in predicting the

severity of the disease and assessing its impact on the body as a whole [4, 12, 30]. The study of these indicators is also important in the context of racial and gender differences that affect the prevalence and course of alopecia. Anthropometric data can be a valuable marker for an individualized approach to treatment, as well as for the development of new strategies for prevention and management of the disease.

The purpose of the study establishment of the characteristics of total and longitudinal body dimensions in young Ukrainian men with alopecia areata.

Materials and methods

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 National Pirogov Memorial Medical University, Vinnytsya, a clinical, instrumental and anthropological (in accordance with the recommendations of P. P. Shaparenko (2000) [25]) examination of 81 patients with alopecia areata of young Ukrainian men (25-44 years according to the WHO age periodization, 2015) was conducted. 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 18.03.2024) 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 dermatoscope-trichoscope ARAMO ASW 300 (Korea), which is a combined model for digital dermatoscopy of various parts of the body, as well as trichoscopy of the scalp and hair, obtaining high-resolution images and their subsequent computer processing with special software. This device allows you to assess hair density, hair thickness, the condition of the cuticle, keratin of the scalp and capillary vessels of the scalp.

The severity of alopecia areata was determined according to I. V. Shutsky [18], according to which 4 stages are distinguished: stage I single lesions with a diameter of 3-5 cm; stage II lesions with a diameter of 5-10 cm; stage III subtotal alopecia; stage IV total alopecia. The following distribution of patients with alopecia areata in Ukrainian men was established: 35 patients with stage 1 severity; 33 patients with stage 2 severity; 12 patients with stage 3 severity.

Body weight was determined using medical scales, the accuracy of which was up to 0.1 kg. Body length was determined using a metal anthropometer of the Martin system, the accuracy of which was up to 0.5 cm. Based on

body weight and length, the body surface area (S, m^2) was calculated using the Du Bois formula:

$$S = W^{0.425} \times H^{0.725} \times 0.007184,$$

where, W is body weight (kg); H is body length (cm).

Additionally, longitudinal body dimensions (heights of the suprasternal, pubic, acromial, digital, and trochanteric anthropometric points) were determined using a Martin system metal anthropometer.

As a control group, the total and longitudinal body dimensions of 82 practically healthy Ukrainian men of a similar age group were used, which were taken from the data bank of the National Pirogov Memorial Medical University, Vinnytsya Research Center.

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

Results. Discussion

It was found that the body weight of Ukrainian men with alopecia areata, both in general (86.30±16.63 kg) and of different degrees of severity (respectively, 82.94±18.08 kg in men with the 1st degree of severity; 89.12±16.40 kg in men with the 2nd degree of severity; 88.25±12.46 kg in men with the 3rd degree of severity), is significantly lower (p<0.05-0.001) than in practically healthy Ukrainian men (73.68±10.40 kg) (Fig. 1-A). When comparing the value of this indicator between patients with alopecia areata of different degrees of severity, only a tendency (p=0.070) to higher values in patients with the 1st degree of severity compared to patients with the 2nd degree of severity was found (see Fig. 1-A).

Body length between practically healthy and patients with alopecia areata, as well as between patients with different degrees of severity of Ukrainian men, has no significant differences or trends (Fig. 1-B). The body surface area of Ukrainian men with alopecia areata, both in general (2.043±0.207 m^2) and of different degrees of severity (respectively, 1.984±0.197 m^2 in men with 1st degree of severity; 2.068±0.200 m^2 in men with 2nd degree of severity; 2.142±0.231 m^2 in men with 3rd degree of severity), is significantly lower (p<0.001) or has a slight tendency to lower values (p=0.074) than in practically healthy Ukrainian men (1.903±0.148 m^2) (Fig. 1-C). When comparing the value of this indicator between patients with alopecia areata of different severity, it was found to be significantly (p<0.05 in both cases) lower in patients with grade 1 severity compared to patients with grade 2 and grade 3 severity (see Fig. 1-C).

The height of the suprasternal anthropometric point between practically healthy and patients with alopecia areata, as well as between patients with different severity
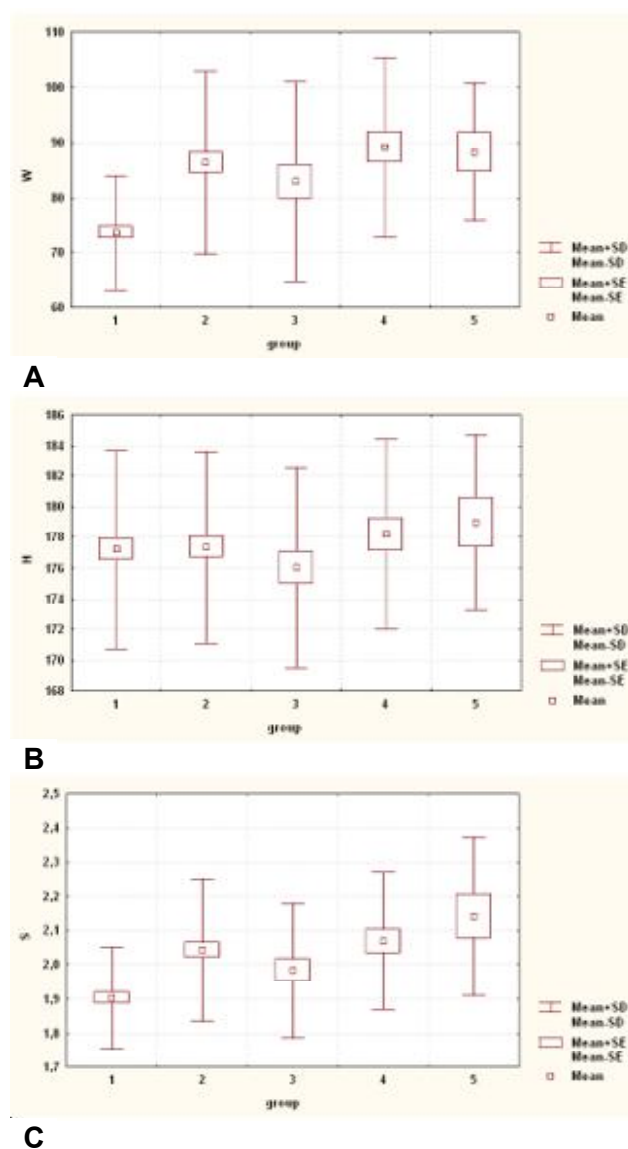
A

B

C

Fig. 1. Features of total body dimensions in patients with alopecia areata of various degrees of severity in Ukrainian men. **A** – body weight (W, kg); **B** – body length (H, cm); **C** – body surface area (S, m²); in this and the following figure, 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.

C

D

E

Fig. 2. Features of longitudinal body dimensions in patients with alopecia areata of varying severity in Ukrainian men. **A** – height of the suprasternal anthropometric point (ATND, cm); **B** – height of the pubic anthropometric point (ATL, cm); **C** – height of the acromial anthropometric point (ATPL, cm); **D** – height of the digital anthropometric point (ATP, cm); **E** – height of the trochanteric anthropometric point (ATV, cm).

of Ukrainian men, has no significant differences or trends (Fig. 2-A).

The height of the pubic anthropometric point in Ukrainian men with alopecia areata, both in general (84.90±4.23 cm) and in different degrees of severity (respectively, 84.37±4.15 cm in men with grade 1 severity; 84.97±4.59 cm in men with grade 2 severity; 85.83±3.35 cm in men with grade 3 severity), is significantly lower (p<0.001 in all cases) than in practically healthy Ukrainian men (90.57±5.04 cm)
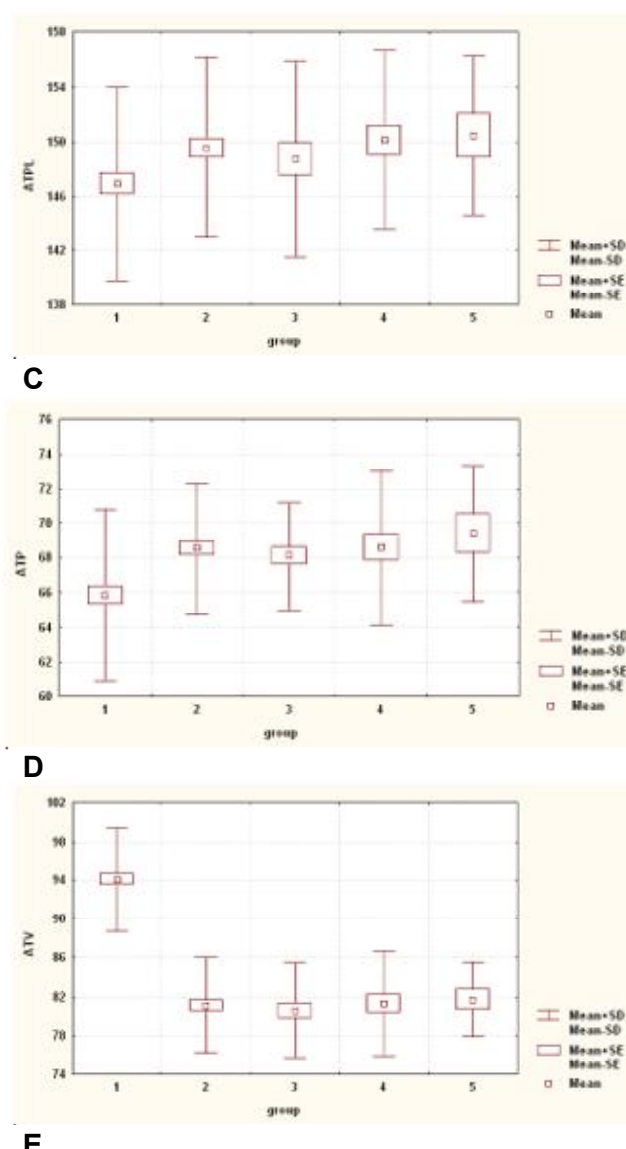
(Fig. 2-B). When comparing the value of this indicator between patients with alopecia areata of different degrees of severity, no significant differences or trends were found (see Fig. 2-B).

The height of the acromial anthropometric point in Ukrainian men with alopecia areata in general (149.6±6.6 cm), as well as in men with grade 2 disease (150.1±6.5 cm) and in men with grade 3 disease (150.5±5.8 cm), is significantly higher (p<0.05-0.01) than

in practically healthy Ukrainian men (146.9±7.1 cm) (Fig. 2-C). When comparing the value of this indicator between patients with alopecia areata of different severity, no significant differences or trends were found (see Fig. 2-C).

The height of the digital anthropometric point in Ukrainian men with alopecia areata, both in general (68.51±3.78 cm) and in different degrees of severity (respectively, 68.09±3.10 cm in men with grade 1 severity; 68.59±4.44 cm in men with grade 2 severity; 69.42±3.92 cm in men with grade 3 severity), is significantly higher (p<0.05-0.001) than in practically healthy Ukrainian men (65.85±4.95 cm) (Fig. 2-D). When comparing the value of this indicator between patients with alopecia areata of different degrees of severity, no significant differences or trends were found (see Fig. 2-D).

The height of the trochanteric anthropometric point in Ukrainian men with alopecia areata, both in general (81.13±4.88 cm) and in different degrees of severity (respectively, 80.61±4.86 cm in men with grade 1 severity; 81.36±5.36 cm in men with grade 2 severity; 81.75±3.82 cm in men with grade 3 severity), is significantly lower (p<0.001 in all cases) than in practically healthy Ukrainian men (94.04±5.40 cm) (Fig. 2-E). When comparing the value of this indicator between patients with alopecia areata of different degrees of severity, no significant differences or trends were found (see Fig. 2-E).

Thus, among the total body dimensions, both the mass and the body surface area of Ukrainian men with alopecia areata, both in general and in the 1st, 2nd and 3rd degree of severity, are significantly larger (p<0.05-0.001) or tend to be larger (p=0.074) compared to practically healthy Ukrainian men (by 17.13 % 12.57 % 20.96 % 19.77 % for body mass and by 7.36 % 4.26 % 8.67 % 12.56 % for body surface area, respectively). When comparing the total body dimensions between Ukrainian men with alopecia areata of different severity, only a tendency towards higher values (p=0.070) of body weight in Ukrainian men with alopecia areata of grade 2 compared to men with grade 1 (by 7.45 %), as well as significantly lower values (p<0.05 in both cases) of body surface area in Ukrainian men with alopecia areata of grade 1 compared to men with grade 2 and 3 (by 4.23 % and 7.96 %, respectively).

Among the longitudinal body dimensions, the height of the pubic and trochanteric anthropometric points in Ukrainian men with alopecia areata, both in general and in the 1st, 2nd and 3rd degree of severity, is significantly lower (p<0.001 in all cases) compared to practically healthy Ukrainian men (respectively by 6.26 % 6.85 % 6.18 % 5.23 % for the pubic anthropometric point and by 13.73 % 14.28 % 13.48 % 13.07 % for the trochanteric anthropometric point); and the height of the acromial and digital anthropometric points on the contrary, in most cases, are significantly greater (p<0.05-0.001) compared to practically healthy Ukrainian men (respectively by 1.84 % 2.19 % 2.45 % for the acromial anthropometric point, with the exception of patients with the 1st degree of severity, and by 4.04 % 3.40 % 4.16 % 5.42 %

for the digital anthropometric point). No significant differences or trends in longitudinal body dimensions were found between patients with alopecia areata of different severity.

The smaller values of pubic and trochanteric anthropometric points, as well as the larger values of acromial and digital anthropometric points, found by us in patients with alopecia areata in Ukrainian men, against the background of the absence of significant or trends in body length differences with practically healthy men, indicate the presence of a "subpathological" constitutional type [20] in this disease. That is, in patients with alopecia areata in Ukrainian men, shorter lower limbs and longer upper limbs and torso are observed.

The relationship between anthropometric parameters and the risk or severity of dermatological diseases is a relevant topic of research. Scientific works analyzing the influence of body weight, body mass index (BMI), body composition and somatotype on the course of skin diseases indicate a significant role of these parameters in the pathogenesis and clinical manifestation of such conditions, in particular alopecia, psoriasis, acne and other pathologies.

According to the study by O. B. A. R. Al-Qaraleh (2020), in men with psoriasis, both mild and severe, significant differences in the thickness of the skin-fat folds were found [2]. The analysis showed a strong correlation between the increase in the thickness of the folds and the severity of the disease (r=0.68; p<0.05). The authors concluded that the somatotype of patients should be taken into account when assessing the risk of developing severe forms of psoriasis. At the same time, A. Budu-Aggrey et al. (2019) confirmed the causal relationship between increased BMI and the risk of psoriasis, finding that each unit increase in BMI was associated with a 9 % increased risk (p<0.001) [3].

Patients with alopecia areata were found to have metabolic syndrome more often than controls (OR=3.2; p<0.001). In addition, fasting glucose and waist circumference were significantly higher in patients with severe forms of the disease, confirming the association between obesity parameters and the course of alopecia. Similar results were obtained in studies analyzing the relationship between body parameters and other skin diseases [1]. I. Gunas et al. (2016) studied the somatotype and body composition in individuals with acne and found that adolescents with a mesomorphic somatotype had a significantly higher incidence of acne than those with an ectomorphic type (p<0.05) [9]. It was also noted that acne severity was more pronounced in patients with increased adipose tissue.

The importance of anthropometric indicators is also emphasized in other studies. It was found that men with pyoderma have a higher BMI (27.5±3.1 kg/ml) compared with healthy controls (24.3±2.8 kg/ml; p<0.001). The authors emphasize that increased BMI is one of the key factors influencing the risk of developing inflammatory skin diseases [17]. In addition, a study by S. Ozbas Gok et al.

(2015) proves that men with androgenetic alopecia more often have signs of metabolic syndrome, including abdominal obesity (OR=2.5; p=0.02) [22]. This indicates a systemic effect of obesity on the development of dermatological diseases through hormonal and metabolic mechanisms.

Particular attention should be paid to studies that analyze the relationship between BMI and the onset of dermatological pathologies. For example, K. R. Van Straalen et al. (2021) found that patients with hidradenitis suppurativa had a higher mean BMI at the time of diagnosis (30.8±4.5 kg/ml) than the control group (25.6±3.7 kg/ml; p<0.001) [28]. The authors emphasize the importance of taking BMI into account in predicting the risk of developing this disease.

Another study by S. Fang et al. (2017) emphasizes the importance of anthropometric indicators in the prognostic assessment of melanoma [5]. Patients with increased BMI showed higher levels of C-reactive protein, which correlated with worse treatment outcomes (p=0.02). A systematic review by P. Fleming et al. (2015) emphasizes that obesity is a risk factor not only for the development of psoriasis, but also for its progression [6]. A comparison of BMI between patients with mild and severe psoriasis showed a significant difference (28.9±4.6 vs. 31.2±5.2 kg/ml; p<0.001).

In patients with acne, a relationship between BMI and disease severity has also been observed. For example, K. Lech and A. Reich (2019) found that obese adolescents were more likely to have severe acne (p<0.05) [11], and a study by I. Snast et al. (2019) in a sample of 600,404 adolescents demonstrated that obesity is an independent risk factor for acne (odds ratio OR=1.41; p<0.001) [27].

Regarding alopecia, the results of studies are mixed, but most support the importance of anthropometric indicators. Y. B. Lee and W. S. Lee (2022) analyzed 257 cases of alopecia and found that patients with higher BMI were at higher risk of developing more severe forms of the disease (OR=2.3; p=0.04) [14]. A study in a Taiwanese population confirmed this association, noting that in men with androgenetic alopecia, higher BMI correlated with the severity of hair loss (r=0.72; p<0.01) [29].

In the context of other dermatological diseases, such as acne and rosacea, researchers also noted the importance of not only BMI but also muscle mass. A decrease in relative muscle mass was associated with more severe forms of rosacea (p=0.03), suggesting the importance of overall body composition in the pathogenesis of the disease [19].

The pathogenetic relationship between anthropometric parameters and dermatological diseases is due not only to the mechanical effect of adipose tissue, but also to changes in the hormonal background, levels of pro-inflammatory cytokines and immunological response. For example, N. Y. Haddad et al. (2022) showed that the features of the somatotype affect the risk of benign nevi formation, in particular, a high content of adipose tissue is associated with a higher probability of their occurrence (p<0.05) [10].

Thus, based on the data presented, it can be stated that anthropometric parameters, such as BMI, skin-fat fold thickness, relative muscle mass and overall body composition, have a significant impact on the risk of occurrence and course of dermatological diseases, including alopecia areata. This emphasizes the need for further study of the role of anthropometric parameters in predicting the severity of diseases, as well as in the development of personalized approaches to treatment.

Conclusion and prospects for further developments

1. In patients with alopecia areata Ukrainian men, both in general and of varying severity, compared with practically healthy Ukrainian men, higher values of mass and body surface area and height of acromial and finger anthropometric points were established, as well as lower values of height of pubic and trochanteric anthropometric points. The obtained changes in longitudinal body dimensions against the background of the absence of discrepancies with practically healthy men in body length indicate the presence of a "subpathological" constitutional type in this disease.

2. Between groups of Ukrainian men with alopecia areata with varying severity of this disease, only single differences in mass and body surface area were established.

In further studies, it is planned to study the features of other anthropometric indicators in patients with alopecia areata Ukrainian men.

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ОСОБЛИВОСТІ ТОТАЛЬНИХ І ПОЗДОВЖНІХ РОЗМІРІВ ТІЛА У ХВОРИХ НА ГНІЗДОВУ АЛОПЕЦІЮ УКРАЇНСЬКИХ ЧОЛОВІКІВ

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Анотація. *Вивчення тотальних і поздовжніх розмірів тіла у хворих на гніздову алопецію є важливим для оцінки змін антропометричних показників, повязаних із цим захворюванням. Вивчення статевих особливостей антропометричних показників може сприяти вдосконаленню діагностичних підходів та оцінці ризиків розвитку супутніх патологій. Аналіз отриманих даних дозволить інтегрувати антропологічні характеристики у комплексну стратегію лікування та профілак-тики алопеції. Мета дослідження встановлення особливостей тотальних і поздовжніх розмірів тіла у хворих на гніздову*

алопецію українських чоловіків молодого віку. Проведено клініко-інструментальне (за допомогою дерматоскопу-трихоскопу ARAMO ASW 300) та антропологічне (у відповідності до рекомендацій П. П. Шапаренка) обстеження 81 хворих на гніздову алопецію українських чоловіків молодого віку. Визначення тяжкості гніздової алопеції проводили за І. В. Шуцьким. В якості контрольної групи використані тотальні та поздовжні розміри тіла 82 практично здорових українських чоловіків аналогічної вікової групи, 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. На відміну від практично здорових, у хворих на гніздову алопецію українських чоловіків як загалом, так і 1-го, 2-го та 3-го ступеня тяжкості спостерігаються достовірно більші або тенденції до більших значень маси тіла (на 12,57-20,96 %), площі поверхні тіла (на 4,26-12,56 %), висоти акроміальної (на 1,84-2,45 %) та пальцевої (на 3,40-5,42 %) антропометричних точок, а також достовірно менші значення висоти лобкової (на 5,23-6,85 %) та вертлюгової (на 13,07-14,28 %) антропометричних точок. Тобто у хворих на гніздову алопецію українських чоловіків порівняно з практично здоровими спостерігаються більш короткі нижні кінцівки та більш довгі верхні кінцівки й тулуб, що є проявом "субпатологічного" конституціонального типу. Практично не встановлено достовірних або тенденцій розбіжностей тотальних і поздовжніх розмірів тіла між групами хворих на гніздову алопецію з різним ступенем тяжкості даного захворювання. Таким чином, отримані результати вказують як на генетичну схильність (зміни поздовжніх розмірів тіла), так і вплив факторів навколишнього середовища (зміна маси тіла) на виникнення даного мультифакторіального захворювання.

Ключові слова: *шкірні захворювання, гніздова алопеція, практично здорові та хворі українськи чоловіки, тотальні та поздовжні розміри тіла.*