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SEX DIFFERENCES IN ANTHROPOMETRIC CHARACTERISTICS AND THEIR CLINICAL SIGNIFICANCE

Abstract. Sex differences in anthropometric characteristics are an important aspect of medical anthropology and clinical practice, as they can affect the development, diagnosis and treatment of various diseases. The difference in body parameters between men and women is important not only for general physiology, but also for assessing the risks of developing cardiometabolic, orthopedic, oncological and other pathologies. Taking such differences into account in clinical medicine can contribute to a personalized approach to the treatment and prevention of diseases, which makes research on this topic particularly relevant. The purpose of this review article is to analyze and summarize current scientific data on sex differences in human anthropometric characteristics, as well as to assess their clinical significance in various medical areas, including cardiology, endocrinology, orthopedics and sports medicine. For the review, a search for scientific publications was carried out in the Google Scholar, Scopus databases. 45 relevant sources were selected, from which, after analysis according to the criterion of antiquity, 21 publications were selected that contain the most relevant and up-to-date information on the topic of the article. The results obtained indicate significant differences between men and women in body parameters, in particular in the size of bone structures, the distribution of adipose and muscle tissue, limb proportions and growth characteristics at different ages. These differences can have a direct impact on the development of cardiovascular diseases, metabolic disorders and musculoskeletal disorders. In addition, sex differences in anthropometric characteristics can affect the pharmacokinetics of drugs, which needs to be taken into account when prescribing therapy. In general, the analysis of the literature confirms the need to take into account sex anthropometric differences in clinical practice to improve diagnostic approaches, develop effective preventive measures and personalize treatment.

Keywords: sex differences, anthropometry, clinical significance, somatotype, body indices, morphofunctional features.

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СТАТЕВІ РОЗБІЖНОСТІ В АНТРОПОМЕТРИЧНИХ ХАРАКТЕРИСТИКАХ ТА ЇХ КЛІНІЧНЕ ЗНАЧЕННЯ

Анотація. Статеві розбіжності в антропометричних характеристиках є важливим аспектом медичної антропології та клінічної практики, оскільки вони можуть впливати на розвиток, діагностику та лікування різних захворювань. Різниця у параметрах тіла між чоловіками та жінками має значення не лише для загальної фізіології, а й для оцінки ризиків розвитку кардіометаболічних, ортопедичних, онкологічних та інших патологій. Врахування таких відмінностей у клінічній медицині може сприяти персоналізованому підходу до лікування та профілактики захворювань, що робить дослідження цієї тематики особливо актуальним. Метою даної оглядової статті є аналіз та узагальнення сучасних наукових даних щодо статевих розбіжностей в антропометричних характеристиках людини, а також оцінка їхнього клінічного значення у різних медичних напрямках, включаючи кардіологію, ендокринологію, ортопедію та спортивну медицину. Для проведення огляду було здійснено пошук наукових публікацій у базах даних Гугл Академія, Scopus. Відібрано 45 релевантних джерел, з яких після аналізу відповідно до критерію давності обрано 21 публікацію, що містять найбільш релевантні та актуальні відомості щодо тематики статті. Отримані результати свідчать про значні відмінності між чоловіками та жінками у параметрах тіла, зокрема у величині кісткових структур, розподілі жирової та м'язової тканини, пропорціях кінцівок та особливостях зростання у різні вікові періоди. Ці розбіжності можуть мати безпосередній вплив на розвиток серцево-судинних захворювань, метаболічних розладів та опорно-рухових порушень. Крім того, статеві відмінності в антропометричних характеристиках можуть впливати на фармакокінетику лікарських засобів, що потребує врахування при призначенні терапії. Загалом, аналіз літератури підтверджує необхідність врахування статевих антропометричних розбіжностей у клінічній практиці для покращення діагностичних підходів, розробки ефективних профілактичних заходів та персоналізації лікування.

Ключові слова: статеві розбіжності, антропометрія, клінічне значення, соматотип, індекси тіла, морфофункціональні особливості.

Statement of the problem. Anthropometry is a key component of human morphological studies, which allows for the quantitative assessment of body

parameters and their variations. It includes measurements of body size, proportions, and composition and is used in various fields of science and medicine, including sports physiology, nutrition, endocrinology, and gerontology. Defining standards for anthropometric studies is critically important to ensure the accuracy and reproducibility of measurements, which allows them to be used as scientifically sound criteria for assessing physical development, health status, and predicting disease risks [1].

One of the important areas of use of anthropometry is the assessment of the health of older people, since these indicators allow for the detection of changes in body structure associated with age-related pathologies. The simplicity of measurements and their high informativeness make anthropometric methods a valuable tool for screening and monitoring the health of older people, in particular for the detection of sarcopenia, osteoporosis, and metabolic disorders [2].

Anthropometric measures are also widely used to assess obesity and cardiometabolic risks. In addition to classic measures such as body mass index (BMI), waist circumference, and waist-to-hip ratio, recent studies suggest alternative measures that may have greater prognostic value. For example, neck circumference-to-height ratio or indices that take into account visceral fat deposition are used as additional criteria for assessing the risk of cardiovascular disease and metabolic syndrome [3].

Genetic mechanisms that influence morphological characteristics are of considerable interest in modern anthropometry. The combination of whole-genome sequencing data and simulation approaches has revealed numerous genetic variants associated with height, body weight, and other somatotypic features. These discoveries contribute to the understanding of the hereditary factors that determine anthropometric differences and allow the use of the obtained data in personalized medicine [4].

Particular attention is paid to the application of anthropometric calculations to assess the body composition of athletes. The simplicity and accessibility of the methods make them convenient for determining the ratio of fat and muscle mass, which is important for optimizing the training process and monitoring the body's condition. The use of reference values allows you to assess deviations from the norm and adapt physical activity taking into account individual morphological characteristics [5].

In addition, anthropometry plays a significant role in nutrition, where the morphological characteristics of the body are used to determine nutritional status and assess the risk of deficiency states. Measurements of fat mass, limb circumference and skin-fat fold thickness allow you to assess the level of nutritional insufficiency or excessive accumulation of adipose tissue, which is of great importance in clinical practice [6].

One of the key aspects of modern anthropometric studies is the analysis of sex differences in human morphological characteristics. Genetic and hormonal factors determine significant differences between men and women in the distribution of fat

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and muscle mass, the structure of the skeletal system and overall body proportions. Furthermore, these differences may have important clinical significance, influencing the risk of developing certain pathologies, including osteoporosis, cardiovascular and metabolic diseases [7].

The purpose of the article – analysis and generalization of current data on sex differences in human anthropometric characteristics, as well as determination of their clinical significance in various fields of medicine, in particular in diagnostics, disease prognosis, and personalized treatment approaches.

Research objects and methods. Using the scientometric databases Scopus and Google Academy, a search was conducted for publications related to the research topic. The search used the criterion of publication age - no more than 10 years. Thus, out of 45 identified publications, 24 were removed (one of them was a duplicate). 21 publications were included in the review. PRISMA was used for organization and the PRISMA flow diagram for visualization of the process of selecting publications for review of literary sources in accordance with international standards for writing review articles [8].

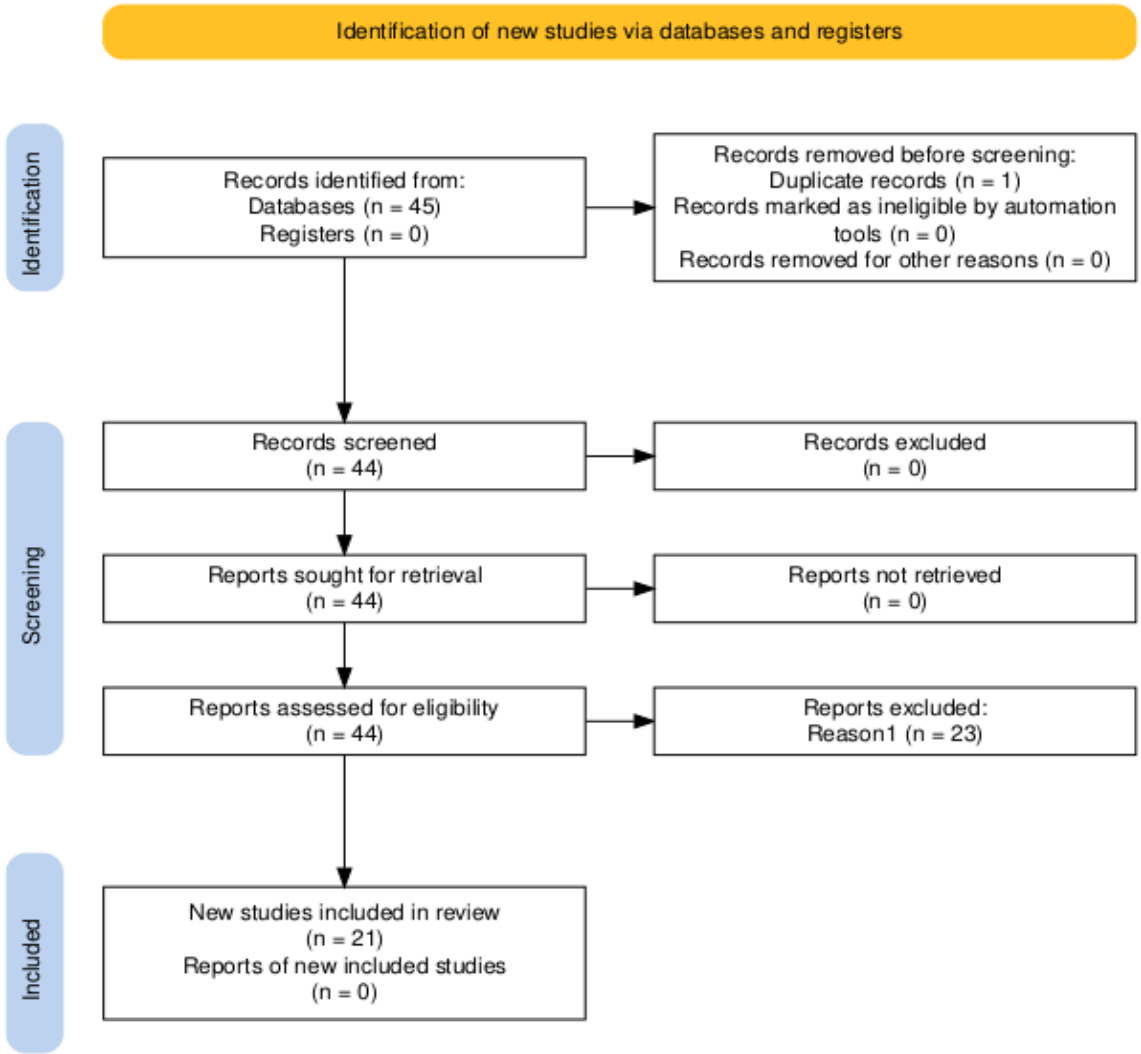

Fig. 1. The PRISMA flow diagram of literary sources search results.

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Presentation of the main material.

Research results and their discussion. The study of sex differences in anthropometric characteristics is an important direction of modern medical anthropology, since such differences affect the diagnosis, prognosis and treatment of various diseases. Genetic and morphological variability of the population of Ukraine, in particular, anthropometric characteristics of individuals of different sexes, largely depend on territorial distribution and ethnic characteristics. Studies of discriminant analysis indicate significant regional variations in anthropometric parameters in men, which indicates the need to take into account geographical and ethnic factors when assessing morphological characteristics [9]. Similar trends are observed in the analysis of dermatoglyphic characteristics, which can also be used to recognize regional anthropometric features in men [10].

At the same time, indicators of somatic development vary depending on the region and age group, which is important when developing standards for biomedical research. It has been established that in somatically healthy men from different regions of Ukraine there are differences in body length and weight, which requires an individualized approach to the assessment of anthropometric parameters in clinical practice [11]. A study of the characteristics of dermatoglyphics among the Ukrainian population confirmed the presence of regional trends in morphological characteristics, which emphasizes the influence of environmental factors on the formation of anthropometric features [12].

Analysis of the relationship between somatotype and psychological characteristics indicates that in women with a mesomorphic somatotype, a certain correlation is observed between morphological parameters and personal characteristics, which indicates the multifactorial nature of sexual differences in anthropometric indicators [13]. In sports, sexual differences are especially pronounced in the ratio of muscle and fat mass, levels of physical fitness and functional capabilities of the body. For example, men have been found to have more muscle mass and less fat tissue than women in taekwondo, which is explained by physiological and hormonal factors [14]. Similarly, football players have differences in the kinematics of head strikes, which is important for injury prevention [15].

Significant anthropometric features are also found in women's sports, for example, female wheelchair basketball players have a specific distribution of fat mass and differences in the ratio of muscle mass of the upper and lower body, which should be taken into account when developing training programs [16]. Differences in the fat layer are also observed in clinical practice. In patients with urticaria, sex differences in the thickness of the skin-fat folds have been found, which may be an important criterion in understanding the pathogenesis and approaches to the therapy of this disease [17].

In addition, the features of anthropometric characteristics may have clinical significance in the assessment of benign skin neoplasms. For example, characteristic anthropometric trends have been identified in men with nevi, which may indicate

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general patterns of development of skin neoplasms [18]. The analysis of sex differences is also important in perinatology. It has been shown that maternal anthropometric parameters have a sex-specific effect on the body composition of newborns, which indicates the need to take these factors into account when assessing intrauterine development [19].

A comparative analysis of the composition of the upper and lower extremities using anthropometric and X-ray methods confirmed the presence of sex differences, which must be taken into account when assessing the musculoskeletal system and its changes during aging [20]. This is of particular importance in geriatrics, since anthropometric parameters change with age, and in men and women these processes occur differently, which should be taken into account when assessing the risk of osteoporosis, sarcopenia and other age-related changes [21].

Thus, the results of the studies confirm the significant role of sex differences in anthropometric indicators, which is of both fundamental importance for understanding the morphological features of a person and applied importance in clinical practice, sports medicine, gerontology and perinatology.

Conclusions. Sex differences in anthropometric characteristics play a key role in the formation of individual physiological characteristics and can have a significant impact on the development and course of various diseases. Taking into account these differences is necessary for more accurate diagnosis, development of personalized approaches to the treatment and prevention of pathologies associated with the cardiovascular, metabolic and musculoskeletal systems. The obtained data emphasize the importance of further research in this area in order to optimize clinical practice and expand the understanding of the impact of sex characteristics on human health.

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