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Anthropometric and Morphological Peculiarities of Female Students with a Different Body Length with Account of their Evolution Constitution

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Abstract

The article presents the results of a study devoted to the study of the values of a number of anthropometric and morpho-functional indices in students with low and high growth, with physical training at the university and their relationship with the values of the trochanter index as an indicator of the constitutional type of age-related human evolution. It was established that negatively altered types of trochanter index values in the study group were detected in the overwhelming majority of low-growth students – in 37 (94.87%) female students. In the gynecomorphic sex somatotype, a greater number of age-related disorders was identified – 23 (58,97%) than in the case of students with mesomorphic and andromorphic sexual somatotypes, 9 (23,08%), 1 (2,56%) female student Physiological gynecomorphic somatotype, normoevolytic constitutional type of sexual evolution has been revealed.

Keywords: Female Students; Trochanter Index; Morphological Index Values; Anthropometric Indicators; Low Growth; High Growth; Sexual Dimorphism; Somatotypes; Physical Culture

Abbreviations: WP: Width of the Pelvis; WS: Width of The Shoulders; Tri: Trochanteric Index; Tri: Trochanteric Index; BMI: Body Mass Index; SDI: Index Of Sexual Dimorphism; AI: Andromorphy Index; OMC: Ovarian-Menstrual Cycle; ANP: Anatomically Narrow Pelvis.

Introduction

The study of issues related to the medical and biological aspects of student youth is always relevant and a priority, especially if they relate to the consideration of anthropometric indicators and morphofunctional values of female students as future mothers [1-4]. The anthropometric and morphofunctional changes occurring in the body of modern young people require close attention and deeper study. In the available sources of information on the issue under study, we did not find works by either domestic or foreign researchers concerning the relationship between the values of the trochanteric index as the basis for somatotyping variants of evolutionary constitutional changes with the index of sexual dimorphism and the main anthropometric indicators and morphological index values in relation to girls tall and short stature, adolescence, engaged in physical education at the university. The available data is scattered, not systematized and, in our opinion, requires further study and generalization.

Aim of Study

The purpose of this article is to present the results of the study conducted by the author and its analysis, which were devoted to the identified features of a number of anatomical and anthropological indicators and a number of morphofunctional index values among female medical university students involved in physical education and sports. The purpose of the study is to determine the anatomical, anthropological and morphological features of the body and the size of the pelvis of female students, in accordance with the classification of Tanner J.

Materials and Methods

The study was conducted in 2021-2022. Sample size - with the voluntary participation of female students of short stature (n=39) and female students classified (according to the values of the body length scale) as having high stature (n=42), during their physical education classes at the university.

When conducting this study, its author used the following research methods: literary-critical analysis of all available sources of information on the issue under study; anthropometry; pelvimetry; method for calculating indicators of a number of morphofunctional index values; method of mathematical statistics.

Due to the fact that most of the female students can be attributed to such age periods as adolescence and the first reproductive age, it seems quite relevant to study the individual development processes of their body, through the refraction of the individual morphofunctional values obtained from them and their connection with such an important indicator as trochanteric index (TrI) [5-8]. This extraordinary index and its practical application have entered into practice in a number of medical fields (anatomy, anthropology, morphology, sports and forensic medicine, sexology, etc.), thanks to the research of the Soviet scientist Shtefko VG [5-7]. It should be noted that in the studies of V.G. Shtefko, he was more interested in determining the constitutional type of age-related evolution of the body, including in young people [5-7]. According to the method proposed by Shtefko VG, the ***trochanteric index*** is the ratio of height (cm) to leg length (cm) - from the upper edge of the greater trochanter of the femur to the surface on which the foot stands) [5-7]. The result of his research was a classification of values according to which the author proposed to characterize the types of age-related evolution of people [5-7]. Shtefko VG distinguishes – parameter indicators [5-7].

- **Pathological type** - less than 1.85 conventional units;
- **Disevolutionary type** - from 1.86 to 1.91 conventional units;
- **Hypoevolutionary type** - from 1.92 to 1.94 conventional units;
- **Normoevolutionary type** - from 1.95 to 2.0 conventional units;
- **Hyperevolutionary type** - from 2.01 to 2.03 conventional units;
- **Disevolutionary type** - from 2.04 to 2.08 conventional units;
- **Pathological type** - more than 2.09 conventional units.

In our work, we used this classification of values. Also, to obtain a number of objective data regarding the formation and presence of existing anthropomorphological values, we (in addition to determining body mass and length) used the index method, which includes determining the body mass index (BMI), index of sexual dimorphism (SDI) with determination of sexual somatotypes, andromorphy index (IA).

Results and Discussion

The average age of female students in the short stature group was 19.09±0.23 years ($p<0.05$), and in the tall girls group it was 19.91±0.33 years, which corresponds to adolescence [2,4,5,8,9]. For each examinee, the overall dimensions (length and weight of the body), the diameters of the shoulders and pelvis were determined. The body length values in the group of short girls were as follows: low height (150–159 cm) was determined in 24 (61.54%), below average height (160–162 cm) – in 15 (38.46%) students. The average body length (height) of female students in the study group was 158.1±0.52 cm ($p<0.05$), which corresponds to short stature [2,5]. In the group of female students of high stature, the following values of their body length were obtained: high height - from 170 to 179 cm was determined in 29 (69.05%) students, very high height - from 180 to 190 cm - in 10 (23.81%)), gigantic height – more than 190 cm – in 3 (7.14%) female students [9]. The average body length in this group was 177.43±1.02 cm ($p<0.05$), which corresponds to the criteria for high growth [9]. When determining body weight, it was found that its average value in the group of short students was 54.32±1.45 kg ($p<0.05$), and in the group of tall students – 69.63±1.75 kg ($p<0$ .05).

At the same time, body weight less than 47 kg (which is a predictor of cyclicity disorders of the ovarian-menstrual cycle (OMC) [2,10], was determined in the group of short stature students in 7 (17.95%), over 60 – in 9 (23, 08%). In the group of tall girls, only 1 (2.38%) had a body weight of less than 47 kg, and 31 (73.81%) had a body weight of more than 60 kg. The values of body mass index (Quetelet II) in the group were as follows: on average for the group – 21.69±0.60 kg/cm^2. At the same time, lack of body weight (16-18.5 kg/m^2) was recorded in 5 (12.82%) female students, from 18.5

to 24.99 (normal values) [4,10] – in 31 (79, 49%), BMI values were from 25 to 30 kg/cm^2 (overweight, pre-obesity) [4,10] – in 1 (2.56%), a BMI value of more than 30 kg/cm^2 (I degree obesity) was detected [4,10] – in 2 (5.13%) students. Data regarding BMI values in the group of tall female students are as follows: normal BMI values were determined in 31 (73.81%) students, underweight in 2 (4.76%), significant underweight in 1 (2. 38%) female students, excess body weight (pre-obesity) – in 8 (19.05%) female students.

The average BMI value in the group of tall female students was 21.99±0.48 kg/cm^2 ($p<0.05$), which corresponds to its normal values. 11 (26.19%) female students have deviations both in the direction of decrease (deficiency and lack of body weight) and in the direction of increase (pre-obesity). Also, in both study groups (n=81), we determined the values of the andromorphy index (AI), which indicates certain sexual characteristics of the metabolic-hormonal status and allows us to distinguish android, orthogynoid (balanced) and hypergynoid types of constitution: less than 67.5 - hypergynoid, from 67.5 to 73.5 – orthogynoid, and over 73.5 – android [2,5,8].

When carrying out anthropometric measurements, their analysis and statistical processing, we obtained the following results: the average value of this index in the group of short students was 60.29±2.44 ($p<0.05$), which corresponds to the hypergynoid type of constitution. In the group of tall female students, the average value of AI was 73.67±2.54 ($p<0.05$), which corresponds to the indicators of the android type of constitution [2,5,8]. A detailed study of the obtained values of AI showed that in the group of short students (n = 39), the vast majority of them - 26 (66.67%) met the criteria for hypergynoid index value, 7 students were classified as orthogynoid (balanced) type of constitution, and 6 (15.38%) of the studied female students have an android type of constitution. In the group of tall female students, all 42 (100%) female students had AI values corresponding to the android type.

When determining the values of the index of sexual dimorphism according to J. Tanner, the following indicators were obtained: the average value of shoulder width or biacromial size (cm) in the entire group was 30.09±0.85 cm ($p<0.05$), and the average value of pelvic width - biacromial size (dis. cristarum) (cm) was 24.95±0.39 cm ($p<0.05$), which is less than the average physiological norm for girls in this age group, which corresponds to 28- 29 cm and is an indirect criterion for an anatomically narrow pelvis [2,10-12]. This ratio of the size of the WS in relation to the WP, in which the shoulders are wider than the pelvis, does not correspond (in a large number of studied female students) to the criteria of the feminine constitution [2,10-12]. However, taking into account the measurements of WS and WP, the average value of the sexual dimorphism index (SDI) in the group was 65.32±2.61 ($p<0.05$). This corresponds to the values of the gynecomorphic somatotype [2,10-12]. Data on the identified sexual somatotypes in short female students are as follows: andromorphic sexual somatotype was identified in 5 (12.82%) female students, mesomorphic sexual somatotype - in 7 (17.95%), gynecomorphic sexual somatotype - in 27 (69.23%) short female students. When determining the values of the index of sexual dimorphism according to J. Tanner, in the group of tall female students (n=42), the following indicators were obtained: the average value of shoulder width or biacromial size (cm) was 35.19±0.85 in the entire group cm ($p<0.05$), and the average value of pelvic width - biacromial size (dis. cristarum) (cm) was 27.76±0.99 cm ($p<0.05$), which is less than the physiological average the norm for girls in this age group, which corresponds to 28-29 cm and is an indirect criterion for an anatomically narrow pelvis [2,10-12]. This ratio of the size of the WS in relation to the WP, in which the shoulders are wider than the pelvis, does not correspond (in a large number of studied female students) to the criteria of the feminine constitution [2,10-12].

Taking into account the measurements of shoulder width and pelvic width obtained in this group of female students, the average value of the sexual dimorphism index (SDI) in the group was 77.81±2.53 ($p<0.05$), which corresponds to the values of the mesomorphic sexual somatotype [2,10-12]. Data on the identified variants of sexual somatotypes in the group of tall female students are as follows: andromorphic sexual somatotype was determined in 12 (28.57%) students, mesomorphic sexual somatotype - in 13 (30.95%) students, gynecomorphic sexual somatotype - in 17 (40 .48%) tall female students. Noteworthy is the fact that in the group of tall students, in contrast to their short colleagues, the number of girls with a gynecomorphic sexual somatotype is reduced and the number of girls with mesomorphic and andromorphic sexual somatotypes is almost 2 times increased - in 25 (59.52%) tall female students. The obtained values of the TrI indicator in the group of female students of short stature are as follows: the hypoevolutive type was determined in 5 (12.82%) students, the hyperevolutionary type was absent, the disevolutionary type was determined in 9 (23.08%) students, the pathological type - in 23 (58.97%) female students, normo-evolutionary - in 2 (5.13%) female students.

The obtained TrI values in the group of female students of short stature were 1.84±0.02 ($p<0.05$), which corresponds to the pathological type of age-related evolution in this group of female students of short stature [5-8]. It was reliably established ($p<0.05$) that negatively altered types of TrI values (hypoevolutionary, disevolutionary and pathological types) in the study group dominate and were identified in

the vast majority of short stature female students who took part in our study - in 37 (94, 87%) female students. And only 2 (5.13%) had a normal type of age-related evolution, characteristic of girls of this age [5-8].

As for the values of TrI in female students with tall stature, its indicator, on average for the group, was 1.87±0.02 ($p<0.05$), which corresponds to the constitutional disevolutionary type of age-related evolution of the organism [5-8]. At the same time, the values of the pathological type of age-related evolution were established in 19 (45.24%), hypoevolutionary type - in 3 (7.14%), disevolutionary type - in 12 (28.57%), hyperevolutionary type - in 1 (2, 35%), normoevolutionary type – in 6 (14.29%) of the studied female students of tall stature. Thus, violations of the constitutional type of age-related evolution were identified in 36 (85.71%) tall female students.

Conclusion

In both groups of female students, multiple, interrelated violations of anthropometric and morphofunctional values, with disturbances in somatotypes and a number of index values were identified. The number of girls with mesomorphic and andromorphic sexual somatotypes – among tall students is 25 (59.52%), and 12 (30.71%) are short students. According to the values of the andromorphy index, all 42 (100%) tall female students correspond to the android type, and among short students, 26 (66.67%) correspond to the criteria of the hypergynoid index value, 7 female students - to the orthogynoid (balanced) type of constitution, and 6 (15.38%) - to the android type of constitution. Violations of the constitutional type of age-related evolution were identified in 36 (85.71%) female students of tall stature and in 37 (94.87%) students of short stature.

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