Application of the Population-Centric Method of Somatotyping at Female Students of The Medical Education

Bugaevsky KA*

The Petro Mohyla Black Sea State University, Nikolaev, Ukraine

*Corresponding Author: Bugaevsky KA, The Petro Mohyla Black Sea State University, Nikolaev, Ukraine

Abstract

The article presents the results of a study devoted to the practical application of the population-centered method of somatotyping and the study of the values of a number of anthropometric and morphofunctional indices in female medical students in physical education. The analysis of the obtained results of the study is presented, practical conclusions are drawn.

Keywords: female students; adolescent age; population-centric method; morphological index values, anthropometric indicators; sexual dimorphism; somatotypes; physical culture

Introduction

The study of issues related to various changes in the structure and functioning of the human body is always relevant [1, p. 20-25]. This also applies to young people, including adolescents (for girls, this period is from 16 to 21 years) [2; 3], as a transition between the period of puberty and the beginning of the first reproductive age, the time when, basically, the formation is completed and the formation of the main anthropomorphic and morphofunctional indicators and values takes place, both in boys and girls [4; 5]. According to O.V. Kalmina et al., (2010), "The relevance of choosing adolescence for monitoring is due to the fact that this age period is a stage of ontogenetic development between adolescence and adulthood and is the most accessible and promising in terms of developing morphological criteria for diagnosing norms and pathologies, as well as development of preventive measures" [4]. Diagnosis of body type (somatotype) is one of the important stages of work in solving these problems [4]. The environment in which a person lives forces his body to adapt to numerous exogenous factors that directly affect the formation of structural features and functioning of the individual. This causes the formation of the human constitution and morphotype [4]. The constitution as defined by BA. Nikityuk, it is "the integrity of morphological and functional properties, inherited and acquired, relatively stable over time, determining the characteristics of the reactivity of the organism, the pace of its individual development and the material prerequisites for human abilities [2]. Since the typical and constitutional features of the structure and function reflect individual variability, they can be considered as the basis for characterizing individual health [2]. The somatic type of a person is a complex morphological assessment focused on the characteristics of the physical status and health [2]. According to OV. Kalmina et al., 2010, "The

somatotype serves as a morphological characteristic of a person, being a portrait of metabolic processes in his body [4]. It is also difficult to disagree with the opinion of TN. Galkina and OV. Kalmin, that "the somatotype serves as an anatomical manifestation of the constitution, the diagnosis of which, on the basis of body measurement data, brought constitutionalology closer to the exact sciences. In the structure of the physical condition of people, in order of importance, the leading factor is the somatometric or anthropometric factor [3].

Aim of the work

The aim of the study is to determine the anthropometric and somatotypological characteristics when using the population-centric method of somatotyping in this group of female students of adolescence who took part in the study.

Object, material and methods of research, and organization of the study

The study was conducted in 2021-2022, with the involvement of students of I-III courses of Zaporozhye State Medical University (ZSMU). In total, 48 adolescent girls took part in the study during their physical education classes. The average age of female students was 19.29 ± 0.23 years. All of them are related to adolescence.

We, in the course of the study, used such methods as somatotyping according to the method of B.A. Nikityuk - A.I. Kozlov. To do this, we carried out the determination of the morphine index in girls, with the determination of two values that are compared and interconnected in somatotypes with each other - the index of the relative width of the

shoulders (IRWS) and the index of the relative width of the pelvis (IRWP), or the morphine index for women [1, p. 20-25; 2, p. 47-54; 4, p. 38-42; 5]. We also determined such a morphological index value as the hip-brachial index (HBI). Anthropometric indicators (body length and weight), linear, latitudinal and girth dimensions (shoulder width, pelvic width), a number of morphofunctional index values were determined. After the completion of the study, we made the necessary calculations, carried out their statistical processing and analyzed the results. The obtained material was processed on a personal computer using the Statistica 5.0 software package. Results with $p<0.05$ were considered statistically significant. Also, the method of literary-critical analysis of the available special research literature on the issue under study was used; method of mathematical statistics.

Results of the study and discussion

The body length in the entire group corresponded to the average height and amounted to 165.56 ± 0.30 cm [1, p. 20-25; 2, p. 47-54; 3, p. 121-125; 5]. The mean body weight in the group was 57.45 ± 1.18 kg. The average BMI was 20.94 ± 0.42 kg/cm², which corresponds to the normal values of this index indicator [1, p. 20-25; 2, p. 47-54; 3, p. 121-125; 5]. Individual indicators of BMI values in the studied group of female students (n=48) were determined as follows:

- Normal values of BMI - 40 (83.33%) female students;
- Deficit of body weight - ≤18.0-18.5kg/cm² - 2 (4,17%) female students;
- BMI ≥30 kg/cm² - 1 (2,08%) female students;
- BMI ‹ 16,0 kg/cm²) – chronic energy deficiency - 1 (2,08%) female students;
- Underweight: BMI from 16.0 to 18.0 kg/cm² - 2 (4.17%) female students;
- BMI from 20.0 to 29.9 kg/cm² - overweight (preobesity) - 2 (4.17%) female students.

The average value of shoulder width (SW) - biacromial size in female students was 31.48 ± 0.62 cm, pelvis width (PW) - intercrest size (distancia cristarum) - 26.67 ± 0.30 cm. Attention is drawn to the fact that in the group the average size of the SW significantly exceeds the values of the PW. The girls of the group have broad shoulders and a narrow pelvis - a type of figure characteristic of the male body type [1-3; 5]. The number of female students in whom SW exceeded WP in the entire study group was 42 (87.5%), and with PW more than SW - only 6 (12.5%) female students. The value of the relative shoulder width index (RSWI), or the morphological index for women, was determined by us as the ratio of shoulder width to body length, multiplied by 100 [1; 3; 5]. Its average value in the group was 20.27 ± 1.00 cm, which corresponds to the values. The values of the RSWI obtained by us in the group:

- Dolichomorphic physique - 32 (66.6%) female students;
- Brachymorphic physique - 4 (8.33%) female students;
- Mesomorphic physique - 12 (25.00%) female students.

The index of relative pelvic width (IRPW) - (an index of morphology for women) was determined by us as the ratio of the width of the pelvis (intercrest size) to the length of the body, multiplied by 100 [1, p. 20-25; 2, p. 47-54; 4, p. 38-42; 5]. Its average value in the group was 16.11 ± 0.19 cm, which corresponds to the values of metriopyelia (middle pelvis). The values of IRPW obtained by us in the group:

- Stenopyelia - 33 (68.77%) female students;
- Metripieliya - 12 (25.00%) female students;

- Euripyelia - 3 (6.25).

It is noteworthy that there are only 3 (6.25%) female students with metriopyelia (normal pelvis) in the entire study group (n=48), with the overwhelming number of girls with stenopyelia (narrow pelvis). An interesting fact is that the average value of the intercrest size of the bone pelvis of female students (distancia cristarum) was 26.67 ± 0.30 cm, while its physiological norm was 28-29 cm [1, p. 20-25; 5]. The number of girls with distancia cristarum sizes smaller than the physiological (anatomical and obstetric) norm was 34 (70.84%), which indirectly indicates that these girls have an anatomically narrow pelvis (ANP). The number of students with distancia cristarum sizes corresponding to the norm of 28-29 cm was 10 (20.83%) and in 4 (8.33%) this size was 1-2 cm more than the specified norm.

The pelvis-brachial index (TPBI) was determined by the formula: pelvic width (cm) x 100/shoulder width (cm). The value of TPBI up to 69.9 characterizes a trapezoidal case, 70.0-74.9 - an average case, 75.0 and more - a rectangular case (Khrisanfova E.N., Perevozchikov I.V., 1991) [1; 5]. The results obtained in the group are as follows: the average value of TPBI was 86.15 ± 1.74, which corresponds to the rectangular shape of the case in the studied female students [1; 5]. When considering the individual indicators of TPBI female students, it was found that girls with a rectangular body shape prevail among them - 40 (83.33%), followed by 5 (10.42%) students with a trapezoidal body shape and 3 (6.25%) - with an average body shape.

In order to study the features of the constitutional type of age-related evolution of the organism in female students in the study group, the values of the trochanter index (TrI) were determined according to the method of V.G. Shtefko [1; 5- 7]. Obtained data and their distribution by types of age evolution:

- Pathological type - 35 (72.92%) female students;
- Disevolutive type - 5 (19.42%) female students;
- Hypoevolutionary type - 3 (6.25%) female students;
- Normoevolutionary type - 3 (6.35%) female students;
- Hyper-evolutionary type - 2 (4.17%) female students.

The obtained values of the trochanter index (TrI) indicate that in this group of female students, various violations of the constitutional type of age-related evolution of the body were identified in 45 (93.75%) female students.

Abbreviations

- **ZSMU** - Zaporozhye State Medical University;
- **WP** - width of the pelvis;
- **WS** - width of the shoulders;
- **BMI** - body mass index;
- **IRWP** - the index of the relative width of the bone pelvis;
- **IRWS** - the index of the relative width of the shoulders;
- **BPI** - the brachiopelvic index;
- **SPI** - Shoulder-pelvic index;
- **HBI** - the hip-brachial index;
- **IPB** - index of pelvic bones;
- **ANP** - anatomically narrow pelvis;
- **TrI** - the trochanter index.

Conclusions

1. Taking into account the use of the population-centric method of somatotyping, in this group of female students of youthful age, the width of the shoulders significantly

exceeds the width of the pelvis - the type of figure characteristic of the male physique.

2. According to the results of determining the values of the index of the relative width of the bone pelvis (morphine index for women), during somatotyping according to the method of B.A. Nikityuk - A.I. Kozlov found that most of the students - 33 (68.77%) have a narrow pelvis (stenopyelia).

3. Among female students, girls with a rectangular body shape predominate - 40 (83.33%), 5 (10.42%) students with a trapezoidal shape and 3 (6.25%) - with an average body shape.

4. Norm-evolutionary type of age-related constitutional evolution of the organism was determined only in 3 (6.25%) female students of the study group.

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