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Research Article

Population-Centric Method of Somatotyping and its Practical use in Female University Students doing Physical Education

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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. Taking into account the application of the population-centered method of somatotyping, it was determined that in this group of female students, the width of the shoulders significantly exceeds the width of the pelvis - the type of figure that is characteristic of the male physique. Based on the results of determining the values of the index of the relative width of the bone pelvis (the morphine index for women), while performing somatotyping according to the technique B.A. Nikityuk-A.I. Kozlov found that the majority of female students - 33 (68,77%) have a narrow pelvis (stenopyelia). It is also determined that girls with a rectangular body shape predominate among female students - 40 (83,33%), 5 (10,42%) female students with a trapezoid shape and 3 (6,25%) - with an average body shape.

It is established that the normoevolytic type of the age-related constitutional evolution of the organism is determined only in 3 (6,25%) female students of the study group. The data obtained as a result of the research carried out have practical application in assessing the results of the level of individual health of female students and in conducting physical education classes at the university.

Keywords: Female Students; Adolescent Age; Population-Centric Method; Sexual Dimorphism; Morphological Index Values; Anthropometric Indicators; Somatotypes; Physical Culture

Abbreviation

WP: The Width of The Pelvis; WS: Width of the Shoulders; ISWR: The Index of Relative Shoulder Width; IRWP: The Index of Relative Width of the Pelvis; PBI: The Pelvis-Brachial Index; TRI: Trochanteric Index; BMI: Body Mass Index; ANP: Anatomically Narrow Pelvis

Introduction

The study of issues related to various changes in the structure and functioning of the human body is always relevant [1]. This also applies to young people, including adolescence [2,3], as the transitional period between the period of puberty and the beginning of the first reproductive age, the time when the formation is basically completed and the formation of basic anthropomorphic and morphofunctional indicators and values occurs, such as boys and girls [4,5]. According to O.V. Kalmina., *et al*., "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 normal and pathological conditions, as well as developing preventive measures." [4].

When analyzing the available scientific and scientific-methodological literature, we found that when conducting various morphological and anthropometric studies, the authors do not always take into account the typical and constitutional features, as well as the living and activity conditions of the subjects being studied. 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 influence the formation of the characteristics of the structure and functioning of the individual. This determines the formation of the human constitution and morphotype [4].

The constitution, as defined by B. A. Nikityuk, is "the integrity of morphological and functional properties, inherited and acquired, relatively stable over time, determining the characteristics of the body's reactivity, the pace of its individual development and the material prerequisites of human abilities [2]. Since typical and constitutional features of structure and function reflect individual variability, they can be considered as the basis for characterizing individual health [2]. A person's somatic type is a complex morphological assessment focused on characterizing physical status and health [2]. According to OV. Kalmin., *et al*., "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 T.N. Galkina and O.V. Kalmin that "the anatomical manifestation of the constitution is the somatotype, the diagnosis of which, based on body measurement data, has brought constitutionalology closer to the exact sciences. In the structure of the physical state of people, in order of importance, the leading one is the somatometric or anthropometric factor [3]. A not fully resolved problem when conducting research among youth and students is, in our opinion, the use of a population-centric method, as opposed to an individual-centric research method.

According to O. V. Kalmin., *et al*. "Population-centric diagnostic methods make it possible to determine the place of the subject within a more local group, provide for a minimum number of measurements during the study and the simplicity of the methodology for determining the somatotype based on anthropometry data, are sufficiently informative for assessing indicators of the pace of individual development and provide information about the speed of metabolic processes characteristic for the subject, which explains their relevance in clinical practice and preventive medicine.

These schemes make it possible to apply an individual typological approach to assessing the main indicators that are important in preventive medicine, to differentiate the "norm" of signs, depending on both the body type and the patient's racial and ethnic background" [4]. The author of this article fully shares the opinion of the respected OV. Kalmin and all his co-authors.

Aim of study

The purpose of this article is to review and analyze the author's research concerning the practical use of an individual typological approach to assessing the main indicators that are important in preventive medicine in order to differentiate the "norm" of signs, depending on both body type and race. ethnicity of the patient and/or the individual being studied.

Material and methods

The study was conducted in 2021-2022, with the participation of I-III year students of Zaporizhzhya State Medical University. A total of 48 teenage 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 classified as adolescents. All female students who took part in this study gave their voluntary, written consent to participate in it.

When conducting the study, we used such methods as somatotyping according to the method of BA. Nikityuk - AI. Kozlov. To do this, we determined the morphia index in girls, determining two values that were compared and interconnected in somatotypes - the index of relative shoulder width (ISWR) and the index of relative width of the pelvis (IRWP), or the morphological index for women [1,2,4]. We also determined such a morphological index value as the pelvis-brachial index (PBI). Anthropometric indicators (body length and weight), linear, latitudinal and girth dimensions (shoulder width, pelvic width), and a number of morphofunctional index values were determined.

Results and Discussion

As a result of anthropometric measurements, we obtained the following indicators: body length in the entire group corresponded to average height and amounted to 165.56 ± 0.30 cm [1-3,5]. The average body weight in the group was 57.45 ± 1.18 kg. Individual indicators of BMI values in the study group (n = 48) are as fol-

lows: body mass deficiency was determined in 4 (8.34%) students, chronic energy deficiency - in 1 (2.08%), overweight (pre-obesity) - in 2 (4.17%), class I obesity - in 1 (2.08%), normal BMI - in 40 (83.33%) female students.

The average BMI value was 20.94 ± 0.42 kg/cm^2, which corresponds to the normal values of this index indicator [1-3,5]. The average value of shoulder width (WS) - biacromial size among female students was 31.48 ± 0.62 cm, pelvic width (WP) - intercrestal size (distancia cristarum) - 26.67 ± 0.30 cm. Noteworthy is the fact that in the group the average width of the shoulders significantly exceeds the width of the pelvis. The girls of the group have broad shoulders and a narrow pelvis - a body type characteristic of a male body type [1,3,5]. The number of students whose shoulder width exceeded the width of the pelvis in the entire study group was 42 (87.5%), and only 6 (12.5%) students with a pelvic width greater than the width of the shoulders.

The index of relative shoulder width IRSW (morphia index) 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 of mesomorphy [1-3,5]. The IRSW values we obtained in the group are as follows: brachymorphic physique was determined in 4 (8.33%) female students, mesomorphic physique - in 12 (25.00%) female students, dolichomorphic physique - in 32 (66.67%) female students.

We defined the IRWP (morphological index for women) as the ratio of the width of the pelvis (intercrestal size) to body length, multiplied by 100 [1,2,4,5]. Its average value in the group was 16.11 ± 0.19 cm, which corresponds to the values of metriopyelia (middle pelvis). The values of IOST we obtained in the group are as follows: stenopyelia was determined in 33 (68.77%) female students, metripyelia - in 12 (25.00%) female students, eurypyelia - in 3 (6.25%) female students.

Noteworthy is the fact that there were only 3 (6.25%) 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 intercrestal size of the bony pelvis of female students (dist. cristarum) was 26.67 ± 0.30 cm, with its physiological norm being 28-29 cm [1,5]. The number of girls with distancia cristarum sizes smaller than the physiological (anatomical and obstetric) norm was 34 (70.84%), which indirectly indicates the presence of an anatomically narrow pelvis (ANP) in these girls. The number of female students with distancia cristarum sizes corresponding to the normal 28-29 cm was 10 (20.83%) and in 4 (8.33%) this size was 1-2 cm larger than the norm.

The pelvic-brachial index (TBI) was determined using the formula: pelvic width (cm) x 100/shoulder width (cm). A TBI value of up to 69.9 characterizes a trapezoidal body, 70.0-74.9 is a medium body, 75.0 or more is a rectangular body [1,5]. The results obtained in the group are as follows: the average value of TBI was 86.15 ± 1.74, which corresponds to the rectangular shape of the body of the studied female students [1,5]. When considering the individual indicators of TBI of female students, it was found that among them girls with a rectangular body shape predominate - 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 characteristics of the constitutional type of age-related evolution of the body in female students in the study group, the values of the trochanteric index (TrI) were determined according to the method of V. G. Shtefko [1,5-7]. The data obtained and their distribution according to the types of age-related evolution are as follows: the dis evolutionary type was determined in 5 (10.42%) students, the hypo evolutionary type - in 3 (6.25%) students, the norm evolutionary type - in 3 (6.25%), hype revolutionary type - in 2 (4.17%), pathological type - in 35 (72.92%) students. The obtained TrI values indicate that in this group of female students, various disorders of the constitutional type of age-related evolution of the body were identified in 45 (93.75%) female students.

Conclusions

- Taking into account the results of applying the population-centric somatotyping method, it was found that in this group of female adolescent students, the width of the shoulders significantly exceeds the width of the pelvis - a body type characteristic of a male physique.
- Based on the results of determining the values of the index of the relative width of the bony pelvis (morphine index for women), when performing somatotyping according to the method of BA. Nikityuk - AI. Kozlova found that the majority of female students - 33 (68.77%) have a narrow pelvis

(stenopielia).

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

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