Acta Scientific ANATOMY

Volume 2 Issue 11 November 2023

Research Article

Studying A Number of Anatomic-Anthropometric Indicators and Reproductive Values in Female Students of a Medical University with Different Body Mass Index Values

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Received: November 17, 2023

Published: November 28, 2023

Abstract

This author's research article presents the results and analysis of a study concerning the identification of individual changes in a number of anatomical, anthropometric, and morphofunctional, as well as in a number of reproductive indicators, among female medical university students assigned to a special medical group for physical education. at the university, having both high and low body mass index.

Keywords: Female Students; Morphological Index Values; Anatomic-Anthropometric Indicators; Increased Body Mass Index; Low Body Mass Index; Bony Pelvis; Ovarian-Menstrual Cycle and Its Disorders; Sexual Dimorphism; Somatotypes; Physical Culture

Abbreviation

SMG: Special Medical Group; WP: The Width of the Pelvis; WS: Width of the Shoulders; BMI: Body Mass Index; B**O**I: Body Obesity Index According to R Bergman; SDI: Index of Sexual Dimorphism; OMC: Ovarian-Menstrual Cycle; MB: Menstrual Bleeding; ANP: Anatomically Narrow Pelvis; T**C**P: Transversely Contracted Pelvis; SFP: Simple Flat Pelvis; FRP: Flat-Rachitic Pelvis; ANP: Anatomically Narrow Pelvis; RPWI: Relative Pelvic Width Index; PBI: Pelvic Bone Index, Proposed by N.I. Kovtyuk; RI: The Rohrer Weight-Height Index; **B**PI: Brachiopelvic Index

Introduction

Physical development is one of the main characteristics of the formation of a girl's reproductive system. Its important evaluation indicator is body weight, which indirectly characterizes the amount of adipose tissue in the body [8; With. 98]. This indicator is one of the main physiological factors that determines the time of appearance and degree of development of secondary sexual characteristics, the age of menarche and the nature of the formation of menstrual function and fertility in general [4,7]. Thus, among female students there is a tendency to increase gynecological and endocrine morbidity, in the structure of which one of the leading places is occupied by increased body weight and obesity [2,7]. Analysis of specialized literature shows that greater attention of researchers when studying the influence of body weight on the formation and functioning of the reproductive system in women is attracted by obesity [2,4]. Among modern female students, underweight is significantly common [1,3]. Low body weight in women of reproductive age, incl. in adolescence and early adulthood, is regarded as a biological marker of somatic and reproductive ill-being, and body weight deficiency is associated with the development of disorders of sexual development and menstrual cycle disorders [1,4]. Today, the study of the health of female students, as a special social group with a high risk of functional disorders of the body, is of particular importance [1,3].

Physical education in the higher education system is an important factor in strengthening and maintaining the health of modern youth. After a medical examination at the beginning of the academic year, students are selected for the special medical group (hereinafter referred to as SMG), who, based on the results of a medical examination, are diagnosed with certain disorders in physical development and/or health [5].

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 J. Tanner. The individual indicators of the reproductive system of these female students were also studied, in the form of identifying various disorders of their ovarian-menstrual cycle.

Material and Methods

In the study, we focused on identifying changes in indicators in female students with high and low body weight, in determining the characteristics of a number of anthropometric indicators (height, weight and associated values of special indices - BMI (body mass index), BOI (body obesity index according to R Bergman. The norm of the BOI is considered to be an index value for women in the range of 21 - 32. An indicator of < 21 indicates underweight, > 32 indicates increased body weight [10]. In preparing this article, the author actively used the method of literary critical analysis of available domestic and foreign literature on the issue under study, the index method, anthropometric measurements, pelvimetry of the external dimensions of the pelvis, using Martin's compass, and the method of mathematical statistics. Also, all female students of the special medical group who took part in the study conducted by the author gave written, voluntary consent. To determine the values of the ovarian-menstrual cycle and its dynamics, the author's questionnaire was used to determine the individual characteristics of the OMC (Bugaevsky K.A., 2008©).

Results and Discussion

To conduct the study, during a medical examination of first- and second-year students at Zaporozhye State University, we identified a group of female students with high and low body weight and assigned to a special medical group. In the first year the SMG is 93 people, in the second year - 112 people, in total - 205 people. The number of SMG students with increased body weight in the first year is 17 (18.28%) people, with low body weight - 50 (53.76%). In the second year, 21 (18.75%) of all second-year SMG female students were overweight, and 41 (36.61%) were underweight. A total of 38 first- and second-year students with increased body weight, aged 18-23 years (average age 19.7 ± 2.16 years) took part in the study. Body mass index (BMI) was determined using the classical formula [8; p. 98] The examined girls did not have significant differences in age, but differed in body length and weight ($p < 0.05$). In the group of female students with low BMI, height indicators in the group (n = 91) were 163.45 ± 0.61 cm ($p < 0.05$), body weight 51.76 ± 0.61 kg ($p < 0.05$).In the entire group, the BMI was 15.84 ± 0.16 kg/m^2 ($p < 0.05$). Upon detailed examination of the results of determining BMI indicators, the following values were determined: underweight (< 18 kg/m^2) was recorded in 85 (93.41%) female students, significant (pronounced) underweight (< 16 kg/m^2) - in 41 (45.1%) female students.

In the group of female students with a BMI > 25 kg/m^2, 38 (18.54%) students of the special medical group of the first and second years have a body weight of more than 85-90 kg. In the entire group (n = 38), the indicator was 28.78 ± 1.59 kg/m^2 ($p < 0.05$). In the first year, the average body weight was 97.36 ± 6.78 kg, BMI - 28.56 ± 1.81 kg/m^2, which corresponds to excess body weight. In the second year, the average body weight was 100.58 ± 3.73 kg, BMI was 28.96 ± 1.40 kg/m^2, which also corresponds to excess body weight. At the same time, in 3 (17.65%) first-year students and 4 (19.05%) second-year students (18.42% of all students with increased body weight), BMI indicators were in the range of 30.0-34.9 kg/m^2, which corresponds to the first degree of obesity [8].

When determining the values of the body obesity index using the method of R. Bergman [10], we obtained the following results: in all female students of two years with a high BMI, the body obesity index was 28.92 ± 3.9 kg/m^2 ($p < 0.05$), which indicates obesity [10; With. 1085]. For first-year female students, the BOI value corresponds to 30.95 ± 4.73, and for second-year female students - 27.28 ± 1.98. The BOI indicator in the group with low BMI was 7.0 ± 0.29. All 100% of female students in this group had an indicator below normal, which indicates the presence of body weight deficiency due to a significant decrease in the amount of adipose tissue [10].

The Rohrer weight-height index (IR) in the entire study group (n = 38) was 19.2 ± 1.08 kg/cm3 ($p < 0.05$). For first-year female students, IR was 18.97 ± 1.37 kg/cm3, for second-year female students - 19.38 ± 0.75 kg/cm3, which indicates increased rates of physical development [8; With. 99].

When assessing the time of onset of menarche, for all examined female students of a special medical group with increased body weight (n = 38), it was found that it was 13.7 ± 0.16 years, which corresponds to the average statistical indicators [3,4]. For first-year students, the age of menarche was 13.6 ± 0.7 years, and for second-year students - 13.8 ± 0.6 years. However, upon closer examination of the results obtained, it was found that the onset of the menstrual cycle in 4 students (10.53%) occurred at the age of 11-12 years, in 32 girls (84.21%) - at the age of 13-14 years, with 14 to 15 years old - 2 students (5.26%). 97.4% of first- and second-year students had various types of menstrual irregularities. In 12 (31.58%) of them, secondary amenorrhea was recorded, with the absence of menstrual bleeding for more than 6 months [1,4]. In 26 (68.42%) female students, hypomenstrual syndrome was recorded, with manifestations of hypo-oligo- and proyomenorrhea, in combination with clinical manifestations of algomenorrhea [7]. The average duration of the menstrual cycle among female students is below the physiological norm of 21-35 days, namely 16.6 ± 1.36 days [7]. The number of girls with a menstrual cycle lasting less than 3 days (oligomenorrhea) in the first year was 11 students, or 64.71%, in the second year - 16 students, or 76.2%. When determining the time for establishing stability of the ovarian-menstrual cycle in the entire group, it is 1.4 ± 0.47 years, which corresponds to acceptable physiological characteristics [3,7]. Of the total number of female students, 35 (92.11%) report severe premenstrual syndrome. Only 3 (7.89%) female students noted its complete absence.

It was found that the duration of menstrual bleeding (MB) in the entire group was 2.4 ± 0.4 days, which corresponds to the manifestation of oligomenorrhea [4,7]. Our data confirm the opinion of other researchers who indicate that in adolescence and in the first green (reproductive) age, oligomenorrhea prevails in the structure of menstrual irregularities in 65-70% of overweight patients [4,7]. It was taken into account that body weight less than 47-45 kg is a predictor of menstrual irregularities [1,3]. According to the study, the following indicators were obtained: 23 (25.28%) female students had a body weight below 47 kg, of which 11 girls (12.09%) had a weight from 38 kg to 45 kg. All of them had different types of OMC disorders, 17 (18.68%) of them had secondary amenorrhea, with the absence of menstrual bleeding for more than 6 months. The age of menarche in the group was 12.6 ± 0.7 years. The duration of the menstrual cycle among female students is within the normal range - 26.6 ± 0.28 days [3]. When determining the time of establishing stability of the flow, the menstrual cycle (OMC) in the entire group is 1.2 ± 0.34 years. In 11 female students (12.09%), the OMC has not yet been established and is within 42-104 days, which corresponds to such a OMC disorder as proyomenorrhea [3]. It has been reliably established that the duration of menstrual bleeding in the entire group is 5.4±0.2 days ($p < 0.05$), but upon closer examination it was found that in 43 female students (47.25%) it was less than 3 days, which corresponds to the manifestation of oligomenorrhea [3]. For 38 female students (41.76%) it is 3-7 days, which corresponds to normal indicators [3]. In 8 students (8.79%), the duration of menstrual bleeding was within 8-9 days. In general, all 100% of female students experience various menstrual dysfunctions. 83 (91.21%) girls have a pain component (algomenorrhea). Dysmenorrhea was recorded in 89 (97.8%) female students, 73 girls (80.22%) noted premenstrual syndrome, and 18 female students (19.78%) did not have it.

Among the examined students with low BMI values, according to measurements of the size of the bone pelvis, it was determined that 73 students (80.22%) had a transversely contracted pelvis (TCP), 13 students (14.29%) had a simple flat pelvis (SFP), 5 students (5.5%) had a flat-rachitic pelvis (FRP). All 100% of female students had a decrease in 1-3 external dimensions of the pelvis by 1.5-2 cm, which is interpreted as an anatomically narrow pelvis (ANP) [5; With. 20; 9; With. 64]. Pelvic narrowing of I degree was determined in 49 (53.85%), II degree in 37 (40.66%), III-IV degree in 5 (5.5%). In our study, we obtained the following results for the relative pelvic width index (RPWI): the average RPWI in the entire study group (n = 91) was 13.5 ± 0.11 cm. In 100% of female students, the RPWI corresponded to the values of stenopyelia (narrow pelvis) [9; With. 66].

To assess the formation of the pelvic bones and determine the relationship with indicators of puberty, we used the pelvic bone index (PBI), proposed by N.I. Kovtyuk [6]. Among the examined female students (n = 91), the PBI was 38.64 ± 0.61 cm, which corresponds to the average value of this indicator for this age group [6]. In 4 students (4.4%), this figure was less than 30 cm, which indicates that these students are at risk in terms of age-related rates of formation of bone maturity of the pelvic bones [6]. In the group of female students with increased body weight (n = 38), the value of the brachiopelvic index (BPI) among first and second year students was 64.30 ± 0.12 cm ($p < 0.05$). For first-year female students its value was 59.3 ± 0.8 cm, for second-year female students it was

68.80 ± 0.17 cm. The indicators of shoulder width and pelvic width in the study group have the following values: in the entire group, shoulder width and pelvic width are 42.50 ± 3.2 cm and 33.71 ± 1.71 cm, respectively ($p < 0.05$). In the 1st year these indicators are 42.12 ± 3.21 cm and 33.06 ± 1.75 cm, in the 2nd year - 42.81 ± 3.24 cm and 34.24 ± 1.51 cm. The data obtained allow us talk about the ratios of the width of the pelvis and the width of the shoulders that are not typical for women. The predominance of the width of the shoulders over the width of the pelvis is characteristic of a masculine (andromorphic) rather than a feminine (gynecomorphic) body type [5,8].

The Rohrer weight-height index (RI) in the entire group (n = 38) was 19.2 ± 1.08 kg/cm3 ($p < 0.05$). For first-year female students, RI was 18.97 ± 1.37 kg/cm3, for second-year female students - 19.38 ± 0.75 kg/cm3, which indicates increased rates of physical development [5; 8]. The value of PBI (pelvic bone index) among first and second year students was 43.77 ± 2.84 cm ($p < 0.05$). In the first-year students, the value of this indicator corresponded to 43.64 ± 3.34 cm, and in the second year - 43.88 ± 2.45 cm. All three indicators ($p < 0.05$) indicate a fairly high level of pelvic bone maturity in all first- and second-year female students [6]. The relative pelvic width index (RWI) values in the entire group were 19.69 ± 0.92 cm ($p < 0.05$). For first-year girls this index corresponded to a value of 19.49 ± 0.90 cm, for second-year students it was 19.85 ± 0.92 cm. The values of the index for the entire sample among two-year students corresponded to the values of eurypyelia (large pelvis), with a predominant increase three transverse dimensions of the bony pelvis [5,9].

Based on the results of measurements of the bone pelvis, first- and second-year students of a special medical group with increased body weight were divided into 3 groups: 1) with normal sizes - 2 students (5.26%); 2) wide pelvis - 26 (68.42%) [3,9]) a "mixed" pelvic shape was identified in 10 female students (26.32%) [5,9]. Thus, among the examined female students, those who have "mixed" and "large" pelvis prevail - 36 female students, or 94.74%. The data obtained coincide with the data of N.I. Kovtyuk. and other researchers on this issue [5,6,9]. Recently, when conducting similar studies among women of reproductive age, non-standard, so-called "mixed" forms of a narrow pelvis are often identified [5,9].

Conclusions

- 98.7% of the examined female students have a complex combined pathology with changes in the menstrual cycle, pelvic size and anthropometric parameters.
- A decrease in body weight and BMI indicators below the level of 18.5 kg/m^2 and more than 25 kg/m^2 is expressed among female students in the first years of study at the university.
- 37 (97.4%) of the examined female students of a special medical group with increased body weight and all 100% of female students with low BMI values have various diverse disorders of the ovarian-menstrual cycle such as hypomenstrual syndrome.
- Among the identified disorders of menstrual function in 80.22% of female students, the following predominate: algomenorrhea, proyomenorrhea, secondary amenorrhea, severe premenstrual syndrome.
- The majority of students with low BMI indicators have various types of narrow pelvis with I-III degrees of narrowing; among students with high BMI indicators, "mixed" and wide pelvis are identified - 36 students, or 94.74%.

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