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Review Article

Adaptive Physical Culture: Analysis of a Number of Obtained Morphofunctional Index Values and Anthropometric Indicators in Girls with Increased Body Weight

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Abstract

In this research article, its author presents the results and analysis of the obtained results of anthropometric measurements and the obtained indicators of a number of morpho-functional index values, in university students with increased body weight, included in a special medical group engaged in adaptive physical education at the university. The identified results are presented and their interpretation is given, practical conclusions are made.

Aim of the article

The purpose of this study and the subsequent writing of its results and the analysis of the obtained anthropometric indicators and a number of morphofunctional index values obtained in a special medical group among university students engaged in adaptive physical education.

Research hypothesis

During the preparatory work for this study, its author put forward the following hypothesis, the essence of which was that in a group of young female students of adolescence with increased values of body weight and body mass index indicators, indicating the disturbances of fat and carbohydrate metabolism occurring in their bodies, other changes occur in parallel, both anthropometric indicators and other morphofunctional index values. All this indirectly testifies to the endocrine disorders occurring, as well as to the changes occurring in their reproductive system.

Keywords: adaptive physical education; female students; special medical group; overweight; anthropometric measurements; anthropometric measurements; morpho-functional index values

Introduction

Protecting the health of student youth is the most important task of modern society, since it is students of higher educational institutions who are the intellectual and socio-economic potential of the country [1, 2]. According to the analysis of modern domestic and foreign studies and publications, in recent decades the health of the population of many countries has worsened, especially pronounced changes in student youth. Therefore, physical development is one of the main characteristics of the formation of the reproductive system of a girl. Its important assessment indicator is body weight, which indirectly characterizes the amount of adipose tissue in the body [7]. This indicator is one of the main physiological factors determining the time of appearance and the degree of development of secondary sexual characteristics, the age of menarche and the nature of the formation of ovarian-menstrual function and fertility in general [4, 7]. An analysis of available specialized literature shows that obesity attracts the greatest attention of researchers when studying the influence of body weight on the development and functioning of the reproductive system in women [2, 4]. To date, the assessment of individual-typological characteristics of the female body remains the least studied (Poroshina N.I., 2000). Therefore, 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 and requires an individual selection of adaptive physical culture and adaptive physical rehabilitation.

Abbreviations

- **BMI –** body mass index**;**
- **RI** - Rohrer index;
- **PBI** - pelvic bone index according to the method of N.I. Kovtyuk (2002);
- **RPWI** - relative pelvic width index;
- **ShPI** - shoulder-pelvic index;
- **BOI** - body obesity index according to Bergman.

Method and materials of the study

In order to conduct the study, during the medical examination of first- and second-year students of Zaporizhzhya State Medical University (ZSMU), we identified a group of female students with increased body weight, referred to a special medical group (hereinafter referred to as SMG) and engaged in individual adaptive physical education programs. The study involved 38 (n=38) first- and second-year female students with increased body weight, aged 18-23 years (mean age 19.7±2.16 years). 23 (60.53%) of them were diagnosed with hypothalamic-pituitary obesity of the first and second degrees, and 15 (39.47%) female students had type I diabetes mellitus with neuroendocrine obesity of the first and second degrees. The ratio of individual anthropometric indicators was assessed by us using a number of special indices. Weight-height ratios were assessed using BMI and the Rohrer index (RI) [2,4]. The following anthropometric measurements were also taken: standing body length, body weight, shoulder width, external dimensions of the pelvic bone [2,5], determination of morphological values and indices – pelvic bone index (PBI) according to the method of N.I. Kovtyuk (2002) [3], relative pelvic width index (RPWI), shoulder-pelvic index (ShPI) [4], body obesity index (BOI) according to Bergman [7]. After completing the study, we made the necessary calculations, carried out their statistical processing and analyzed the results obtained.

Results of the study and discussion

The following indicators were obtained when analyzing the obtained results: the examined girls did not have reliable differences in age, but differed in body length and weight ($p<0.05$). The following indicators were obtained when analyzing the obtained results: 38 (18.54%) female students of the special medical group of the 1st and 2nd years have a body weight of more than 85-90 kg. When determining the BMI values, it was found that in the entire examined group (n=38), the indicator was 28.78±1.59 kg/m² ($p<0.05$). In the 1st year, the average body weight was 97.36±6.78 kg ($p<0.05$), BMI – 28.56±1.81 kg/m² ($p<0.05$), which corresponds to excess body weight. In the 2nd year, the average body weight was 100.58±3.73 kg ($p<0.05$), BMI – 28.96±1.40 kg/m² ($p<0.05$), which also corresponds to excess body weight. Moreover, in 3 (17.65%) first-year female students and in 4 (19.05%) second-year female students (18.42% of all overweight female students), BMI values were within the range of 30.0-34.9 kg/m² ($p<0.05$), which corresponds to grade I obesity [4.7].

When determining the values of the body obesity index (BOI) according to the method of R. Bergman [7], we obtained the following results: for all 2nd year female students, the BOI was 28.92±3.9 ($p<0.05$), which indicates an increase in body weight corresponding to obesity. For 1st year female students, the value of this index corresponds to 30.95±4.73 ($p<0.05$), for 2nd year female students – 27.28±1.98 ($p<0.05$), (1st degree obesity) [7]. The values of a number of indicators and the values of special indices were as follows:

• **Body mass index (BMI)** – 1st year 28.56±1.81 kg/cm²; 2nd year – 28.96±1.40 kg/cm².

• **Rohrer index (RI)** – 1st year 19.20±1.08 kg/cm³; 2nd year – 19.38±0.75.

• **Shoulder width (ShW)** – 1st year 3.21 cm. 42.50±3.20; 2nd year – 42.12±3.21 cm.

• **Pelvis width (PW)** – 1st year 33.71±1.71 cm; 2nd year – 33.06±1.75 cm.

• **Relative pelvic width index (RPWI)** – 1st year 19.49±0.90 cm; II course – 19.85±1.92 cm.

• **Shoulder-pelvic index (ShPI)** - I course 59.30±0.80 cm; II course – 68.81±0.17 cm.

The value of the shoulder-pelvic index (SPI) in first- and second-year female students was 64.3±0.12 cm ($p<0.05$). The shoulder width (SW) and pelvic width (PW) indicators in the study group have the following values: in the entire group, the SW and PW were 42.5±3.2 cm and 33.71±1.71 cm, respectively ($p<0.05$). The data obtained allow us to talk about the shoulder width to pelvic width ratios that are not typical for women. The predominance of shoulder width over pelvic width is typical for the masculine (andromorphic) rather than the feminine (gynecomorphic) body type [4, 6]. The Rohrer weight-height index (IH) values in the entire group (n=38) were 19.2±1.08 kg/cm3 ($p<0.01$), which indicates increased indicators of physical development [4, 6].

The values of the index of relative pelvic width (IRPW) in the whole group were 19.69±0.92 cm ($p<0.05$). In first-year female students, this index corresponded to a value of 19.49±0.90 cm, in second-year female students it was 19.85±0.92 cm. The values of the index in the whole sample and in female students of two years correspond to the values of eurypielia (large pelvis), with a predominant increase in three transverse dimensions of the pelvis [2, 5].

The PBI (pelvic bone index) value in 1st-2nd year female students was 43.77±2.84 cm ($p<0.01$). In the 1st year, the value of this indicator was 43.64±3.34 cm, and in the 2nd year - 43.88±2.45 cm. All the obtained indicators ($p<0.05$) indicate a high level of pelvic bone maturity [3] in all 1st-2nd year female students. Based on the results of pelvic measurements, the following types were determined in female students: широкий таз – 26 студенток (68,42%); смешанная форма таза – 10 (26,32%) студенток; нормальные размеры таза – 2 (5,26%) студентки.

Based on the results of measurements of the pelvic bones, female students of the 1st-2nd years of the special medical group, studying at the university, in physical education classes, in its adaptive, special medical group (SMG), were divided into 3 groups: 1) **with normal sizes** - 2 students (5.26%);

2) **wide pelvis** - 26 (68.42%) [5];

3) **"mixed" or "erased" pelvic** shape was determined in 10 students (26.32%) [2, 5]. Thus, among the examined female students, those with a “mixed” and wide pelvis prevail – 36 female students, or 94.74%. The obtained data coincide with the data of Kovtyuk N.I. and other researchers of this issue [3]. When conducting such studies, non-standard, so-called “mixed” forms of a narrow pelvis are quite often determined [2, 5].

Conclusions

1. 98.7% of overweight female students involved in adaptive physical education have complex combined pathology with changes in BMI, pelvic size and a number of anthropometric indicators, morphological values and special indices.

2. Adaptive physical education, individually selected for students of a special medical group, with strict consideration of the existing pathology, is an important and effective link in adaptive rehabilitation and requires wider application.

3. Проведённый автором, анализ ряда полученных антропометрических показателей и морфо-функциональных индексных значений, полностью подтвердил, выдвинутую им гипотезу исследования.

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