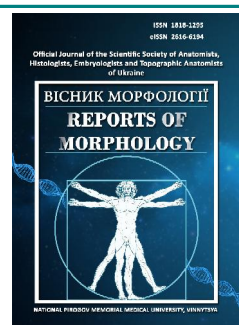




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Pelvic circumference in young men and young women studying in higher education institutions of Bukovina, depending on the sport

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CONFLICT OF INTEREST

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In recent decades, anthropological research methods have been widely used by scientists to correctly predict the achievement of high sports results. The aim of the study is to find out the features of the pelvic circumference of young men (YM) and young women (YW), who study in higher education institutions in Bukovina, depending on the sport. Anthropometric parameters were studied for 115 first and second year students of higher education institutions in Chernivtsi, aged 16 to 21, including 78 (67.82 %) YM and 37 (32.18 %) YW, the main group - 75 (65.22 %), were students of I-II courses of the Faculty of Physical Culture and Human Health of Yuriy Fedkovych Chernivtsi National University, control group - 40 (34.78 %) - college students and students of the Faculty of Dentistry of Bukovina State Medical University. Among the students of the main group - 57 (76.00 %) YM and 18 (24.00 %) YW. Students of the main group, in addition to physical activity, which was included in the program of their specialty, additionally engaged in the following sports: football - 40 (53.34 %), of which YM - 36 (48.00 %), YW 4 (5.34 %), volleyball - 18 (24.00 %), of which YM - 9 (12.00 %), YW 9 (12.00 %), tennis - 10 (13.34 %), of which YM - 8 (10.67 %), YW 2 (2.67 %), basketball - 7 (9.32 %), of which YM - 4 (5.32 %), YW 3 (4.00 %), the control group consisted of 21 (52.50 %) YM and 19 (47.50 %) YW, which are loaded with hours of physical education, according to the curriculum of their specialty and additionally All students were determined to determine body weight and pelvic circumference according to the method of Bunak V. V. in the modification of Shaparenko P. P. Statistical analysis of the data was performed using a licensed program RStudio. Analyzing the average pelvic circumference of YM and YW, it is noteworthy that the average pelvic circumference among both study groups is much larger in YM compared to YW (representatives of the main group - respectively 83.40±3.01 cm and 78.31±3.01 cm; representatives of the control group - respectively 88.47±3.01 cm and 75.31±3.01 cm). In the main group, depending on the sport, volleyball players (YM - 86.11±3.02 cm; YW - 77.55±3.03 cm) and basketball players (YM - 85.50±3.03 cm; YW - 76.66±3.03 cm) have the largest pelvic circumference, followed by football players (YM - 81.52±3.02 cm, YW - 75.00±3.02 cm), and the smallest tennis players - 81.00±3.02 cm YM and 74.50±3.02 cm YW. Based on the regression analysis, it was found that weight is a significant factor for pelvic circumference.

Keywords: athletes, anthropometry, pelvic circumference, sex differences.

Introduction

In modern medicine, almost all branches are directly or indirectly related to anthropology. This characteristic has become especially important in connection with the development of various sports [1, 4, 6, 10, 11, 15, 16].

Highly productive athletes are extraordinary people who experience high physical and psychological stress during their professional life. However, to date, the prognostic value

and dominance of total and partial body size in predicting the prospects for achieving high results in many sports have not been fully established [22].

Today, the theory of training athletes, based on the methodology of integrative approaches and opportunities of related disciplines, allows to provide such a systematization of knowledge, characterized by functional

completeness and absence of contradictions, allows to obtain knowledge accumulated in the theory of sports training, physiology, biochemistry, morphology, psychology, etc. [2].

The direction of management and control of training of athletes, their selection and orientation, modeling and forecasting unite the field of knowledge, which is intensively developed in the last two decades. This is due to the manifestation of the general trend and objectification of the training system of athletes, the introduction of scientific and technological progress, using the opportunities of general disciplines such as cybernetics, morphometry, systems approach, etc., finding reserves to improve the training system of athletes [5, 7-9, 13, 14, 17, 18, 21].

In this regard, the formation of a holistic system of knowledge requires consideration of management and control, selection and orientation, modeling and forecasting, as one of the key areas in the study of the theory of training athletes [19].

The purpose of the study is to find out the features of the pelvic circumference of young men and young women who study in higher education institutions in Bukovina, depending on the sport.

Materials and methods

We conducted a study of anthropometric parameters on 115 first and second year students of higher education institutions in Chernivtsi, aged 16 to 21, of which 78 (67.82 %) young men (YM) and 37 (32.18 %) young women (YW).

The Commission on Bioethics of the Bukovina State Medical University (Minutes № 6 of 18.03.2022) found that the studies were carried out in compliance with the basic provisions of the ICH GCP (1996), the Council of Europe Convention on Human Rights and Biomedicine (04.04.1997), the Helsinki Declaration Association for Ethical Principles of Conducting Scientific Medical Research with Human Participation (1964-2013) and Order of the Ministry of Health of Ukraine № 690 of 23.09.2009.

All subjects were divided into two groups: the main group - 75 (65.22 %), were students of I-II courses of the Faculty of Physical Culture and Human Health of Yuriy Fedkovych Chernivtsi National University, control group - 40 (34.78 %), were college students and students of the dental faculty of Bukovina State Medical University.

Among the students of the main group - 57 (76.00 %) YM and 18 (24.00 %) YW, who in addition to physical activity, which was included in the program of their specialty additionally engaged in the following sports: football - 40 (53.34 %), of which YM - 36 (48.00 %), YW 4 (5.34 %), volleyball - 18 (24.00 %), of which YM - 9 (12.00 %), YW 9 (12.00 %), tennis - 10 (13.34 %), of which YM - 8 (10.67 %), YW 2 (2.67 %), basketball - 7 (9.32 %), of which YM - 4 (5.32 %), YW 3 (4.00 %). The control group consisted of 21 (52.50 %) YM and 19 (47.50 %) YW, who are loaded with hours of physical education, according to the curriculum of

their specialty and additionally did not play sports.

All students were determined body weight and pelvic circumference according to the method of Bunak V. V. in the modification of Shaparenko P. P. [20]. Determination of body weight was performed on floor scales (mechanical): for the most accurate results, weighing should be performed in the morning, on an empty stomach, after visiting the toilet. When weighing, students wore a minimum of clothing (underwear), stood on the scales so that the legs were symmetrical in relation to the center of the scales. The circumference of the pelvis (circumference) was measured with a centimeter tape in a supine position, bringing it under the buttocks, through the wings of the hip bones and the anterior surface of the pubic joint (increase).

The weight of the studied students of the main group is: female - 56.62 ± 3.02 kg, male - 69.70 ± 3.02 kg, where the greatest weight were students who played volleyball - 67.88 ± 3.02 kg, of which 70.65 ± 3.02 kg weight YM and 64.50 ± 3.02 kg YW, football - 67.58 ± 3.02 kg, of which 69.20 ± 3.02 kg is the weight of YM and 63.56 ± 3.02 kg of YW, basketball - 67.57 ± 3.02 kg, of which 69.00 ± 3.02 kg is the weight of YM and 63.10 ± 3.02 kg of YW, tennis players weigh slightly less - 61.50 ± 3.02 kg, of which 64.04 ± 3.02 kg in YM and 58.51 ± 3.02 kg in YW. The weight of students in the control group is: male - 77.04 ± 3.02 kg, female - 56.10 ± 3.02 kg.

In studying the distribution of pelvic circumference in the main group by sport, used the Kruskal-Wallis test (nonparametric ANOVA) to identify a significant difference in the average rates of respondents depending on the sport (as a central trend is considered the median distribution) [12]. To determine for which age groups there is a statistical difference between the medians - used the Conover-Iman test [3]. Statistical analysis of the data was performed using a licensed program RStudio.

Results

When comparing the pelvic circumference between males (83.40 ± 3.01 cm) and females (78.31 ± 3.01 cm) of the main group (Fig. 1), a statistically significant difference was found, as evidenced by the results of Welch's t-test: $t(39.72) = -3.221$, $p < 0.05$.

When comparing the pelvic circumference between males (88.47 ± 3.01 cm) and females (75.31 ± 3.01 cm) of the control group (Fig. 2) also found a statistically significant difference, as evidenced by the results of the Welch t-test: $t(37.97) = -4.127$, $p < 0.001$.

The values of the pelvic circumference, depending on the sport, are: YM volleyball players - 86.11 ± 3.02 cm, and YW - 77.55 ± 3.03 cm; basketball players YM - 85.50 ± 3.03 cm, and YW - 76.66 ± 3.03 cm; football players YM - 81.52 ± 3.02 cm, and YW - 75.00 ± 3.02 cm; tennis players YM - 81.00 ± 3.02 cm, and YW - 74.50 ± 3.02 cm.

The value of the pelvic circumference depending on the sport, regardless of sex, is presented in Figure 3. It seems that there is a significant difference in the average value of

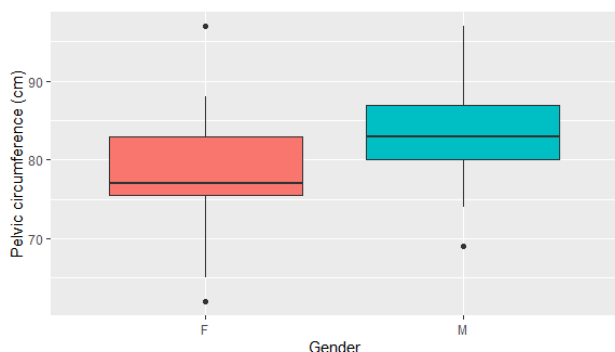


Fig. 1. Distribution of the pelvic circumference of the respondents of the main group by sex. F - female; M - male.

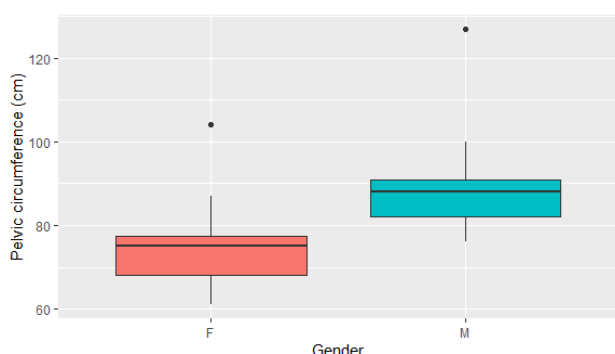


Fig. 2. Distribution of pelvic circumference of respondents in the control group by sex.

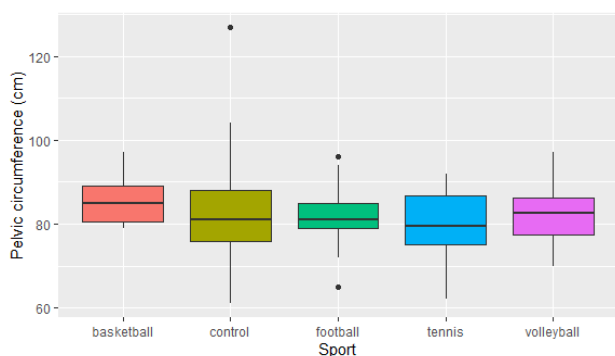


Fig. 3. Distribution of pelvic circumference of respondents by sport.

the pelvic circumference depending on the sport, including the control group. However, the results of the Kruskal-Wallis test are as follows - $\chi^2(6)=7.139$, $p=0.308$. Since $p<0.05$, the difference between the medians of the groups is not statistically significant.

Regression analysis shows that weight is a significant factor for pelvic circumference. The constructed model for predicting the circumference of the pelvis (coefficient of determination is 0.614, $p<0.001$) has the form of the following linear equation: $y = 44,76 + 0,562 \cdot x$, where y - pelvic circumference, x - weight.

Discussion

Much attention is paid to the study of the peculiarities of anthropometric and somatotypological indicators in athletes in modern sports medicine. Thus Olezko V. G. [15] identified trends in changes in mass and age, proportions and circles of body parts and its composition in athletes of different sexes, depending on the groups of weight categories, as a result, obtained indicators of group models (III-x) morphofunctional state weightlifters, who testified that most of the indicators change with increasing weight category and have differences depending on the sex of athletes.

O. P. Khapitska and others [10] provide data on anthropometric and somatotypological indicators on the variability of hemodynamic parameters of the lower extremities of volleyball players.

I. Y. Gorskaya [6] studied the specifics of the morphological status of highly qualified pilots in bobsleigh, using anthropometry, a method of analyzing body composition (apparatus "Tanita"). Proved the feasibility of establishing the morphological status of high-skilled bobsleigh, conducted a comparative analysis (indicators of body length, body weight, girth, thickness of fat folds and the ratio of body components: fat, bone, muscle).

D. M. Kotko and others [11] studied changes in some anthropometric indicators in athletes - athletes in the stages of long-term training, including weight-growth index of Kettle, the relative amount of muscle tissue, the absolute amount of bone component of the body.

S. Cullen and others [4] studying the anthropometric profiles of elite athletes concluded that there are differences in anthropometric profiles between different athletes and different sports, which emphasizes the need to have available regulatory ranges for specific sports to ensure optimal monitoring of individual athletes. especially different between sports, as well as age, training status.

There are almost no works devoted to the study of the comprehensive parameters of the pelvis for sports.

We found that the average pelvic circumference among both study groups was significantly larger in YM compared to YW (representatives of the main group - respectively 83.40 ± 3.01 cm and 78.31 ± 3.01 cm; representatives of the control group - respectively 88.47 ± 3.01 cm and 75.31 ± 3.01 cm). In the main group, depending on the sport, volleyball players (YM - 86.11 ± 3.02 cm; YW - 77.55 ± 3.03 cm) and basketball players (YM - 85.50 ± 3.03 cm; YW - 76.66 ± 3.03 cm) have the largest pelvic circumference, followed by football players (YM - 81.52 ± 3.02 cm, YW - 75.00 ± 3.02 cm), and the smallest tennis players - 81.00 ± 3.02 cm YM and 74.50 ± 3.02 cm YW. Based on the regression analysis, it was found that weight is a significant factor for pelvic circumference.

Therefore, there is a need to further establish anthropometric parameters for specific sports, assessed by standardized methods, in accordance with the recommendations, to ensure optimal monitoring and

interpretation of anthropometric characteristics in athletes.

Further study of anthropometric parameters of students will allow to more correctly solve the problems of selection and sports orientation.

Conclusion

1. Comparison of the mean pelvic circumference of YM and YW shows that the average pelvic circumference among both study groups is much larger in YM compared to YW (representatives of the main group - respectively 83.40±3.01 cm and 78.31±3.01 cm; representatives of the

control group - respectively 88.47±3.01 cm and 75.31±3.01 cm).

2. By comparison, the largest pelvic circumference has volleyball players (YM - 86.11±3.02 cm; YW - 77.55±3.03 cm) and basketball players (YM - 85.50±3.03 cm; YW - 76.66±3.03 cm), then football players (YM - 81.52±3.02 cm; YW - 75.00±3.02 cm), and the smallest tennis players (YM - 81.00±3.02 cm; YW - 74.50±3.02 cm).

3. Based on the regression analysis, it was found that a significant factor for pelvic circumference is weight.

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ОСОБЛИВОСТІ ОКРУЖНОСТІ ТАЗА В ЮНАКІВ І ДІВЧАТ, ЯКІ НАВЧАЮТЬСЯ В ЗАКЛАДАХ ВИЩОЇ ОСВІТИ БУКОВИНИ, ЗАЛЕЖНО ВІД ВИДУ СПОРТУ

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Для коректного прогнозування досягнення високих спортивних результатів в останні десятиріччя науковцями широко використовуються антропологічні методи дослідження. Мета дослідження - з'ясувати особливості окружності таза юнаків і дівчат, які навчаються в закладах вищої освіти Буковини, залежно від виду спорту. Проведено дослідження антропометричних параметрів у 115 студентів першого та другого курсів закладів вищої освіти м. Чернівці, віком від 16 до 21 року, з них 78 (67,82 %) юнаки та 37 (32,18 %) дівчата. Основну групу - 75 (65,22 %), становили студенти I-II курсів факультету фізичної культури та здоров'я людини Чернівецького національного університету імені Юрія Федьковича, контрольну групу - 40 (34,78 %) - студенти коледжу та студенти стоматологічного факультету Буковинського державного медичного університету. Серед студентів основної групи - 57 (76,00 %) юнаків та 18 (24,00 %) дівчат. Студенти основної групи, окрім фізичного навантаження, яке входило в програму їхньої спеціальності додатково займалися такими видами спорту: футбол - 40 (53,34 %), з них юнаків - 36 (48,00 %), дівчат 4 (5,34 %), волейбол - 18 (24,00 %), з них юнаків - 9 (12,00 %), дівчат 9 (12,00 %), теніс - 10 (13,34 %), з них юнаків - 8 (10,67 %), дівчат 2 (2,67 %), баскетбол - 7 (9,32 %), з них юнаків - 4 (5,32 %), дівчат 3 (4,00 %). Контрольну групу становили 21 (52,50 %) юнак і 19 (47,50 %) дівчат, які навантажені годинами фізкультури, відповідно до навчальної програми їхньої спеціальності та додатково спортом не займалися. Усім студентам було проведено визначення маси тіла та окружності таза за методикою Бунака В. В. у модифікації Шапаренка П. П. Статистичний аналіз отриманих даних проводили за допомогою ліцензованої програми RStudio. Аналізуючи середню величину окружності таза юнаків і дівчат звертає увагу те, що в середньому окружність таза серед обох досліджуваних груп значно більша у юнаків порівняно з дівчатами (представники основної групи - відповідно $83,40 \pm 3,01$ см і $78,31 \pm 3,01$ см; представники контрольної групи - відповідно $88,47 \pm 3,01$ см і $75,31 \pm 3,01$ см). В основній групі залежно від виду спорту найбільшу окружність таза мають волейболісти (юнаки - $86,11 \pm 3,02$ см; дівчата - $77,55 \pm 3,03$ см) та баскетболісти (юнаки - $85,50 \pm 3,03$ см; дівчата - $76,66 \pm 3,03$ см), далі футболісти (юнаки - $81,52 \pm 3,02$ см; дівчата - $75,00 \pm 3,02$ см), а найменшу тенісистки - $81,00 \pm 3,02$ см юнаки та $74,50 \pm 3,02$ см дівчата. На основі проведеного регресійного аналізу встановлено, що значимим фактором для окружності таза є вага.

Ключові слова: спортсмени, антропометрія, окружність таза, статеві розбіжності.