



Anatomical and Morphological Features of the Bone Pelvis In Young Female Athletes Engaged in Freestyle Wrestling

Konstantin Anatolyevich Bugaevsky*

The Petro Mohyla Black Sea State University, Nikolaev, Ukraine

***Corresponding Author:** Konstantin Anatolyevich Bugaevsky, The Petro Mohyla Black Sea State University, Nikolaev, Ukraine.

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Abstract

The article presents the results of the conducted research devoted to the identification of individual features of the shape and size of the bone pelvis, in female athletes of different age groups and skill levels, who are engaged in such kind of martial arts as freestyle wrestling. In addition to anatomical and anthropometric values in the female athletes who took part in the study, a number of necessary in the study, morphofunctional index values were determined. According to the obtained results, their analysis was carried out and practical conclusions were drawn.

Keywords: Female Athletes of Different Age Groups; Freestyle Wrestling; Anatomico-Anthropometric Characteristics; Bone Pelvis; Morphofunctional Index Values

Abbreviations

RI: Rohrer's Index; BMI: Body Mass Index; SW: Shoulder; PW: Pelvic Width d. *Cristarum*; RPWI: Relative Pelvic Width Index; RSWI: Relative Shoulder Width Index; GDI: Gender Dimorphism Index J. Tanner; SDI: Sexual Dimorphism Index; PI: Pelvic Index; SFP: Simple Flat Pelvis; TNP: Transversely Narrowed Pelvis

Introduction

Today, many girls and young women of prepubertal, pubertal, adolescent and first adulthood attend classes in freestyle wrestling, train and participate in competitions in this kind of martial arts. Significant physical and psycho-emotional stresses experienced by female athletes of different age groups, especially in pubertal and prepubertal periods of their ontogenesis, significantly affect all systems of their not yet formed, or in the process of formation of the reproductive system and bone-ligament apparatus, which significantly affects the formation of their sexual somatotype. There are two important predictors of correct formation - the ovarian-menstrual cycle and the relationship between the beginning of

sports and the first menstruation, as well as the anatomico-anthropological and morphofunctional changes occurring in the dynamics of formation of their bone pelvis. This research paper is an attempt to investigate this problem.

Aim

The purpose of this article is to present the results of the conducted research on anatomical-anthropological and morphological features of the bone pelvis, and their analysis, which are necessary for better understanding and practical application, while conducting sports training and competitive training process, in female athletes of different age groups and level of sports qualification, engaged in freestyle wrestling.

Methods and means of research

During this study, which was carried out with the absolutely voluntary consent of the female athletes, such methods of research as anthropometry, measurement of the size of the bone pelvis (pelvimetry) using Martin's circular, the survey were used, statistical

method. The method of indices was also used, with the determination of morphofunctional index values necessary in the study, as well as the method of literary and critical analysis of available sources of information, on the subject under study, both domestic and foreign.

Methodology of the Study

The study was conducted in 2021 on the basis of the training-sports complex "Gart" in Novaya Kakhovka, Kherson region, Ukraine. Sixteen female athletes of pubertal and adolescent age took part in the conducted study. Age categories: schoolchildren - 1 (6.25%), cadets - 8 (50.0%), juniors - 10 (62.5%). The mean age of female athletes (n=16) was 16.74 ± 0.31 years. The experience of 12 of them (75,0%) in freestyle wrestling made up 6-8 years, the remaining 4 - from 3 to 5 years. Number of trainings - up to 5-6 per week, their duration from 2 to 4 hours.

Results of the Study and Discussion

As a result of the study we found that the average body length in the study group was 163.63 ± 1.89 cm and body weight was 58.41 ± 2.51 kg. Weight-to-length ratios were determined using Rohrer's index (RI), Kettle I and Kettle II (BMI). Body mass index (BMI) values in the group were - 21.62 ± 0.85 kg/cm², Kettle I - 356.54 ± 14.18 g/cm, IR - 13.31 ± 0.58 kg/cm³. In addition, we conducted studies that included determination of shoulder (SW) and pelvic width (PW), relative pelvic width index (RPWI) and relative shoulder width index (SWI), gender dimorphism index (GDI) by J. Tanner, and pelvimetry. After completion of the study, the necessary calculations were made, statistical processing was performed, and the results were analyzed.

To determine the type of body type in girls we used the scheme of somatotype diagnostics, based on the determination of the J.M. Tanner (1979) index, or the Sexual Dimorphism Index (SDI), which allows us to determine the correspondence of the proportions of the human body and its gender [2,8]. The J.M. Tanner somatotyping of women is based on the principle of determining the somatic type of a person's sex. This index, using the values of the width of the pelvis and shoulders, allows to refer women to gynecomorpha, mesomorpha and andromorpha [4,8], and also allows to reveal gender features of the exchange-hormonal status and to establish correspondence of the development of the bone system to the sex of a person [2,4]. According to the results of anthropometry, so-

matotyping was carried out in the studied group, using the values of sexual somatypes according to the classification proposed by J. Tanner.

To determine a number of additional morphological indexes, we determined such anthropometric values as shoulder width (SW), and pelvic width (PW) (d. *cristarum*). We obtained the following indices: in the group, the value of SW corresponded to 26.41 ± 0.65 cm ($p < 0.05$), which is less than the acceptable anatomical norm, which is 28-29 cm [7,8]. As for shoulder width dimensions (WD), the following indicators were obtained: in the group (n = 16) WD values were 31.53 ± 1.38 cm ($p < 0.05$). According to the results of the study it was reliably determined ($p < 0.05$) that in the studied group the SW in relation to PW corresponds to the male torso structure, the girls have android type of figure - with wide shoulders and narrow pelvis [6]. The value of the gender somatotype index in the whole (n = 16) study group is 68.19 ± 3.89 , which corresponds to the gynecomorphic type. At the same time it is determined that the female athletes of gynecomorpha in the studied group are 9 (56,25%), mesomorpha - 5 (31,25%), and andromorpha - 2 (12,5%).

The relative shoulder width index (RSWI) in the whole group was $19,22 \pm 0,71$ cm, which corresponds to the mesomorphic type. At the same time, 9 (56.25%) female athletes were defined as dolichomorphic type, 4 (25.00%) - mesomorphic type and 3 (18.75%) - brachymorphic type of physique [5,8].

The relative pelvic width index (RPWI) indicates existing changes in the appearance of the bony pelvis [1]. In our study, we obtained the following results: the average RPWI index is 16.15 ± 0.38 cm, which is metriopiella (average pelvic dimensions) [6]. In 9 female athletes (56.25%) RPWI corresponded to stenopyelia values (narrow pelvis), in 5 (18.75%) it corresponded to metriopyelia values (medium pelvis) and in 2 (12.50%) wide pelvis was determined [5]. The following pelvimetry data were obtained in the entire group: d. *spinarum* - 23.19 ± 0.58 cm, d. *cristarum* - 26.41 ± 0.65 cm, d. *trochanterica* - $31, 16 \pm 0.66$ cm, s. *externa* - 19.00 ± 0.58 cm, s. *vera* - 10.41 ± 0.42 cm ($p < 0.05$). Analysis of the results of pelvimetry, determining two transverse (d. *spinarum*, d. *cristarum*) and 1 direct size (c. *externa*) authentically ($p < 0.05$) indicates that our findings were less than the anatomical norms of external

pelvic dimensions: d. *spinarum* - 25-26 cm; d. *cristarum* - 28-29 cm; c. *externa* - 20-21 cm [7]. The only exception is d. *trochanterica*, which corresponds to normal values (30-32 cm) [7].

The pelvic bone index (PBI) proposed by Kovtyuk N.I. was used to analyze the development and determine the degree of pelvic bone formation, as well as to determine the relationship with the indicators of sexual maturity of female athletes [3]. Among all female athletes the PBI was 42.63 ± 1.81 cm, which corresponds to the average value for this age group [3].

We also used such an informative morphological index as pelvic index (PI) [1]. In the whole group its value was 99.69 ± 2.07 ($p < 0.05$) corresponding to the presence of narrow pelvis [7]. At the same time in 9 (56,25%) the index indicates a narrow pelvis, in 3 (18,75%) it is close to the norm, and in 4 (25,00%) female athletes, it is below the norm with a tendency to form a narrow pelvis. The revealed changes of the pelvis are as follows.

Types of bone pelvic changes in young female athletes

- Anatomically narrow pelvis - 13 (81.25%) female athletes.
- Transverse tapered pelvis - 7 (43.75%) female athletes.
- Wide pelvis - 2 (12.50%) female athletes.
- Normal pelvic dimensions - 1 (6.25%) female athletes.
- 5. Simple flat pelvis (SFP) was recorded in 1 (6.25%), transversely narrowed pelvis (TNP) was recorded in 7 (43.75%) female athletes.

Identified degrees of pelvic constriction

- I degree of pelvic constriction - 5 (31.25%) female athletes.
- II degree of pelvic constriction - 3 (18.75%) female athletes.
- "Erased" pelvic shape (unisex pelvis) - 13 (81.25%) female athletes.

Conclusions

- In 9 (56,25%) young female athletes still preserved gynecomorphic type, in older groups of athletes, taking into account their sports experience the number of female athletes-mesomorphs - 5 (31,25%) and romorphs - 2 (12,5%) is increasing, which is an unfavorable sign of disorders of the endocrine and reproductive systems.

Formation in the majority of 13 (81,25%) young female athletes of the anatomically narrow pelvis in the form of its "erased" forms, in combination in 8 (50,00%) girls of pelvic constriction of I-II degree of constriction, in the presence of reliably confirmed its bone mat

Bibliography

1. Bugaevsky KA. Features of the pelvis, a number of anthropometric values and morphological parameters in volleyball players. "Collection of materials of the international scientific and practical conference". "Medical science and practice at the present historical stage. Kyiv (2016): 20-25.
2. Dyusenova AA. "Somatotypological and endocrinological features of female athletes engaged in wrestling and boxing". Scientific notes of P.F. Lesgaft University 2 (2013): 116-120.
3. Kovtyuk NI. "Dynamics of formation of pelvic size in school-age girls of Chernivtsi region". *Clinical Anatomy and Operative Surgery* 3 (2004): 48-49.
4. Nadeina SY. "Determination of morphofunctional features in sportsmen with different somatotypes according to the classification of J. Tanner" (2021): 196.
5. Strelkovich TN. "Anthropometric characteristics of the pelvis of women depending on the somatotype". In the world of scientific discoveries 2.2 (2012): 60-73.
6. Syrova OV. "Interrelation of anthropometric parameters with pelvic dimensions in girls of 17-19 years". *Morphology* 133.3(2008): 45-47.
7. Yashvorska VA. "About some anthropometric features of the pelvis in modern girls". *Obstetrics and Gynecology* 1 (2012): 56-59.
8. Yagello V, et al. "Morpho-functional aspects of efficiency of competitive activity of athletes specializing in freestyle wrestling". Pedagogy, psychology and medical and biological problems of physical education and sports. Collection of scientific papers edited by S.S. Yermakov Kharkiv: KHDADM (XXPI) 14 (2004): 93-104.