

**Title: Sports Games: Studying the Significance of Sexual Dimorphism in Somatotypes in Young Female Athletes**

**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 study of the features of manifestations of sexual somatotypes in female athletes of adolescence engaged in game sports. The study involved 48 athletes. It was found that in female athletes of adolescence engaged in these sports, there is an inversion in the manifestations of their sexual dimorphism, with a predominance of mesomorphic and andromorphic sexual somatotypes. The results obtained as a result of the study give grounds to assert that the occurring somatic processes are forced adaptive changes occurring in the organisms of young athletes, under the influence of intense, and sometimes inadequate, physical and psycho-emotional loads.

**Keywords:** female athletes; adolescence; sexual dimorphism index; sexual somatotypes; adaptation; team sports

## **Aim of the article**

The aim of the article is to present an analysis of the results of the conducted study, according to the obtained values of the sexual dimorphism index in adolescent female athletes representing four team sports.

## **Hypothesis of the article**

During the preparation for this study, its author came up with a working hypothesis, the essence of which was that in a number of young female athletes, in all types of team sports, under the influence of intense physical and psycho-emotional stress, inversions of their sexual somatotypes are adaptively formed, from physiological,

gynecomorphic, to inversions, transitional mesomorphic sexual somatotype, and pathological for women of all age groups - andromorphic sexual somatotype.

## **Methods and means of research**

In conducting this study, its author used such research methods as literary-critical analysis of all available sources of information on the issue under study. Also, in conducting the study itself, such methods as anthropometry, pelvimetry, the method of indices, and the method of mathematical statistics were used. This study was conducted longitudinally, over 2 years, at a number of training centers for training female athletes in the above-mentioned team sports in Nova Kakhovka, Kherson region, and in Zaporizhia and Mykolaiv. A total of 48 female athletes took part in the study: volleyball (n=11), beach volleyball (n=10), handball (n=15), basketball (n=12). The length of practice in these team sports ranged from 5 to 8 years. The female athletes' level of athletic qualification ranged from the 1st sports category to candidate for master of sports (CMS) and master of sports (MS). All participants in the study gave their voluntary, both verbal and written, consent to participate in it.

## **Introduction**

Today, it has become commonplace for women of all ages to engage in physical culture and sports en masse. It has already become commonplace for women to actively participate in sports that were previously considered to be primarily male [1, 3; 6, 9, 10; 11]. For many decades, various team sports have been popular among young women of all ages, including team sports such as volleyball, beach volleyball, handball, and basketball. When selecting athletes for these sports, many coaches focus on selecting athletes with the characteristics of “masculine candidates,” with certain anthropometric and morphofunctional indicators, as well as with strength, endurance, reaction speed, coordination, and a number of other physical and mental indicators, often related to male somatic and psychological characteristics [1-3; 6-11]. During training and competitions, with their intense physical and psycho-emotional stress, with an early start to practicing these sports (before the onset of menarche and the establishment of the ovarian-menstrual cycle), a fairly large number of athletes in puberty and adolescence develop sexual somatotypes opposite to the feminine ones - mesomorphic and andromorphic, often combined with negative changes in the dynamics of the ovarian-menstrual cycle (OMC) and changes in the timing and stages of puberty in female athletes [1, 2, 5, 8].

The issues of physical and psycho-emotional adaptation to the dynamics of training and competitive loads in athletes of different age groups are always relevant and in demand. A number of professional studies by both domestic and foreign authors are devoted to the study of this issue. But, often, these studies concern some one sport. We did not find any works concerning the review and analysis of morphological and psychological changes and manifestations of adaptation processes in a number of identical sports when analyzing available sources of information. In this regard, in this paper, we would like to focus on the consideration of the processes of adaptation changes in sexual somatotypes, according to the values of the sexual dimorphism

index, in adolescent athletes involved in such team sports as volleyball and beach volleyball, handball, basketball.

At the beginning of the study, the sexual dimorphism index (hereinafter SDI) values were determined in each group of female athletes who took part in our study. The average age of the female athletes in the entire group (n=48) was  $21.34 \pm 1.86$  years. To determine the body type of the girls, the somatotype diagnostic scheme was used, which is based on the definition of the index by J.M. Tanner (1968, 1979) [1, 2, 5, 7-11]. This index, using the values of the pelvis and shoulder width, allows us to classify women as gynecomorphs, mesomorphs and andromorphs [1, 2, 5, 7-11], and allows to identify gender characteristics of the metabolic and hormonal status and establish correspondence with gender [1, 2, 5, 11].

### **Results of the study and discussion**

When distributing female volleyball players into somatotypes, we obtained the following indicators: the average value of the SDI in the group was  $80.34 \pm 1.80$  ( $p < 0.05$ ). This corresponds to the values of the mesomorphic somatotype (73.1–82.1) [1, 2, 5, 7-11]. In the group, only 1 (9.09%) female volleyball player meets the criteria of the gynecomorphic somatotype. Three (27.27%) athletes correspond to the parameters of the andromorphic sexual somatotype [1, 2, 5, 7-11]. The remaining 7 (63.64%) girls were classified as mesomorphic sexual somatotype. Also, 10 athletes involved in beach volleyball took part in the study - all the girls were classified as adolescents. The average age of the athletes was  $18.36 \pm 0.46$  years.

The results of the study reliably determined ( $p < 0.05$ ) that in the group of girls involved in beach volleyball the value of the SDI in the entire study group is  $80.79 \pm 1.32$  ( $p < 0.05$ ). This corresponds to the values of the mesomorphic somatotype (73.1–82.1) [1, 2, 5, 7-11]. However, it was determined that in the study group there were 3 (30.00%) gynecomorphic athletes, 6 (60.00%) mesomorphs, and 1 (10.00%) andromorphs.

In the studied group of female students involved in basketball (n=12), the average age was  $21.73 \pm 0.37$  years. The results of the study of the SDI values showed that its average value in the group was  $81.56 \pm 1.23$  ( $p < 0.05$ ). This also corresponds to the values of the mesomorphic somatotype (73.1–82.1) [1, 2, 5, 7-11]. However, it is noteworthy that the overwhelming majority of athletes in the study group have andromorphic and mesomorphic sexual somatotypes – 5 (41.67%), respectively, and only 2 (16.66%) athletes correspond to the values of the gynecomorphic sexual somatotype.

And finally, in the group of female students involved in handball (n=15), the IPD value in the entire group was  $82.04 \pm 0.03$  ( $p < 0.05$ ). This corresponds to the values of the mesomorphic somatotype (73.1–82.1) [1-11]. It was determined that in the study group there were 1 gynecomorphic athletes (6.67%), 6 mesomorphs (40.00%), and andromorphs (53.33%). In total, among the female athletes (n=48), 17 (35.42%) were representatives of the andromorphic sexual somatotype, every second athlete, or 24

(50.00%), was mesomorphic, and 7 (14.58%) were gynecomorphs. When examining the distribution of sexual somatotypes in all 4 types of martial arts that female athletes of adolescence practice, we obtained the following results, which are presented in the table.

<b>№</b>	<b>Name of the indicator</b>	<b>Andromorphic type</b>	<b>Mesomorphic type</b>	<b>Gynecomorphic type</b>
1.	Volleyball players (n=11)	3 sportswomen 27,27%	7 sportswomen 63,63%	1 sportswomen 9,09%
2.	Beach volleyball (n=10)	1 sportswomen 10,00%	6 sportswomen 60,00%	3 sportswomen 30,00%
2.	Basketball players (n=12)	5 sportswomen 41,67%	5 sportswomen 41,67%	2 sportswomen 16,66%
4.	Handball (hand ball) players (n=15)	8 sportswomen 53,33%	6 sportswomen 40,00%	1 sportswomen 6,67%

**Table.** Indicators of the SDI in all studied groups of female athletes

When analyzing the obtained values of the SDI in somatotypes in all four groups of the studied athletes, we found that representatives with non-female sexual somatotypes - andromorphic and mesomorphic - were found to be the dominant number - 28 (85.42%) of all female athletes, which is a prognostically unfavorable indicator in the somatic restructuring of the girls' body according to the masculine (male) type, with the corresponding hormonal adaptation processes [1, 2, 5, 7-11]. The obtained data are alarming, since according to the opinion of the researchers [1, 2, 5, 7-11], the presence of a mesomorphic somatotype indicates mild sex dysplasia, and the andromorphic type in women is regarded as an inversion of sexual dimorphism [1, 2, 5, 7-11].

## **Conclusions**

1. When studying the value of the sexual dimorphism index, it was reliably established that a significant number of representatives of the andromorphic and mesomorphic sexual somatotypes were identified - 28 (85.42%) of all athletes, which is a prognostically unfavorable indicator in the somatic restructuring of the girls' body.

2. In all four groups of athletes, fairly high values of the mesomorphic sexual somatotype were noted, as a marker of somatic adaptive processes occurring in young athletes.

3. These somatic processes can be assessed as adaptive changes occurring in the body of young female athletes under the influence of intense physical and psycho-emotional stress.

4. The analysis of the values of sexual somatotypes obtained as a result of the study, in all the studied groups, confirmed the hypothesis put forward by the author of this study.

The prospects for further research are to determine a number of anthropometric, morphofunctional and reproductive indicators in this group of female athletes.

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