

# Study and Analysis of the Characteristics of Sexual Somatotypes in Young Female Athletes Engaged in Shooting Sports

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## Abstract

The article presents the obtained results and their analysis, according to the features of the distribution of sexual somatotypes in female athletes of adolescence engaged in shooting from a small-bore pistol and a small-bore rifle. It was established that in the studied groups there are athletes of both gynecomorphic and mesomorphic sexual somatotypes, with a complete absence of representatives of the andromorphic sexual somatotype.

**Keywords:** female athletes, adolescence, shooting sports, sexual dimorphism, sexual somatotypes

## Introduction

Women's sports, especially in recent decades, have become an object of study for scientists in many medical and biological fields and a number of related fields - anatomists, physiologists, pathologists, sports physicians and psychologists, endocrinologists, gynecologists, traumatologists and, of course, specialists from coaching teams in various sports [1-8]. The object of research in female athletes of different age groups is practically all changes occurring in their bodies, in all organs and systems, both compensatory-adaptive and possibly pathological in nature. Morphological and functional changes related to dynamic processes in the formation of sexual somatotypes are also studied, especially during the period of active growth and development of the body of young female athletes - in prepubertal, pubertal and adolescence [1-8].

## Aim of study

In connection with the above, the purpose of our study is to study the characteristics of sexual somatotypes and their analysis in adolescent female athletes involved in shooting sports.

## Hypothesis of the study

At the beginning of the author's study, he put forward a working hypothesis, the essence of which was as follows: in young female athletes who, during the training and competitive period, are subjected to significant physical and psycho-emotional stress for a long time and intensively, as a result of their body's adaptation to them, a somatic restructuring of their bodies is possible, with possible changes/inversions of their original, female, gynecomorphic

sexual somatotype, towards an inverse/transitional, mesomorphic sexual somatotype.

## Research objectives

To achieve the stated objective of the study, its tasks were developed, namely:

1. To recruit reliably similar groups of female athletes in the sports under study, both in terms of sport type, sports experience and qualifications, and age, who have expressed their voluntary desire to participate in it.
2. To select the necessary complex of anatomical and anthropometric studies and groups of special morphofunctional index values for this study, as well as, in addition to anthropometric measurements, to take pelvimetric measurements for all participants in the study using Martin's calipers and a centimeter tape.
3. To find similar scientific articles and research articles that are close and/or similar to the study. To conduct their literary-critical analysis.
4. To subject all digital indicators and values obtained as a result of the study to mathematical statistics and critical analysis.

## Material and methods

In our study, the following methods were used: anthropometry, with the definition of such transverse dimensions of the body of female athletes as shoulder width (SW), or biacromial size, pelvic width (PW), or bicristal size, necessary for determining such a morphofunctional index value as the sexual

dimorphism index (SDI), according to the method proposed by J. Tanner, W. Marshall (2004), and further somatotyping, depending on the obtained individual SDI values [1, 4, 6, 8]. Also, the method of literary analysis of available sources of information on the issue under study, the method of mathematical statistics were used. All young female athletes who took part in the study gave their voluntary, both verbal and written consent.

### Abbreviation

- **SW** - shoulder width;
- **PW** - pelvic width;
- **SDI** - index of sexual dimorphism, according to the method of J. Tanner and W. Marshall, as modified by E.P. Sharaikina.

### Results and discussion

Name of the indicator	Female Smortsmens specializing in air pistol shooting (n=40)	Female Smortsmens specializing in air rifle shooting (n=39)
Shoulder width (cm)	31.14±0.77 cm	32.46±0.53 cm
Pelvic width (cm)	27.83±0.87 cm	27.45±0.78 cm
Sexual dimorphism index (c.u.)	71.26±1.36 conventional units	72.26±1.54 conventional units

**Table 1: Indicators obtained in the studied groups of female athletes**

The analysis of the obtained results of anthropometric indicators of shoulder width and pelvis width, as well as their ratios, showed that, on average, the bicristal size of the pelvis corresponds to the permissible lower value of this pelvis size, corresponding to 28-29 cm [1-8]. The shoulder width size indicators for a number of athletes in both groups exceed the pelvis width indicators, which indirectly indicates mesomorphic changes in the somatic structure of their bodies and the trapezoid shape of their torso, formed according to the masculine type. The average SDI indicators in the group of

The study involved 79 adolescent female athletes involved in shooting sports. Of these, 40 were air pistol shooters and 39 were air rifle shooters. The average age of the athletes in both groups was 19.15±1.07 years, which corresponds to the criteria of adolescent age [1, 7]. Sports experience was from 1.5 to 5.5 years. The level of sports qualification in their sports disciplines was from 3rd-1st category to candidate for master of sports and master of sports. The frequency and intensity of training was from 3 to 5 times a week, 1.5-2 hours per training session. After conducting anthropometric measurements of the SW and PW, we obtained the anthropometric indicators and SDI values presented in Table 1, at  $p \leq 0.05$ :

### Показатели, полученные в исследуемых группах спортсменов

athletes specializing in air pistol shooting (n=40) correspond to the values of the gynecomorphic sexual somatotype - less than 73.1 conventional units [1-6, 8]. In the group of female athletes specializing in air rifle shooting (n=39), the majority of female athletes, although within the framework of gynecomorphy, already have a tendency towards the lower limit values of the mesomorphic sexual somatotype (from 73.1 to 82.1 c.u.) [1-6, 8]. The mathematical calculations carried out to determine the sexual somatotypes of female athletes showed the results presented in Table 2:

Name of the indicator	Gynecomorphic sexual somatotype	Mesomorphic sexual somatotype	Andromorphic sexual somatotype
Female Smortsmen specializing in air pistol shooting (n=40)	33 (82.5%) female sportsmens	7 (17.5%) female sportsmens	—
Female Smortsmen specializing in air rifle shooting (n=39)	29 (74.36%) female sportsmens	10 (25.64%) female sportsmens	—

**Table 2: Values of sex somatotypes identified in the studied groups of female athletes**

The conducted analysis of the obtained individual values of the SDI and anthropometric indices of the SP and WT, their ratios (SW/PW), and the subsequent somatotyping showed that in the group of young female athletes specializing in air pistol shooting, there are no athletes with an inverse andromorphic sexual somatotype. At the same time, despite the fact that girls with a gynecomorphic sexual somatotype dominate in this group of athletes (82.5%), there are still athletes with a transitional, mesomorphic sexual somatotype - 17.5% of all girls in this group. Their colleagues involved in air rifle shooting also do not have athletes with an inverse, andromorphic sexual somatotype in the group. The physiological gynecomorphic sexual somatotype dominates and was determined in the majority of girls – 74.36% of the entire study group. The transitional, mesomorphic sexual somatotype was determined in 10 (25.64%) female athletes.

During additional interviews with sportswomen, it was found that the mesomorphic sexual somatotype is found in sportswomen with a long sports experience and having a higher sports qualification and, obviously, with a more intense physical load in the training process. At the same time, the high percentage of prevalence of the gynecomorphic sexual somatotype in this type of sports specialization is explained by the specifics of training in shooting sports, which has less intense physical loads than sportswomen in games, athletics and other types of modern women's sports.

### Conclusions

1. It was found that in the studied group of female athletes, taking into account the specific requirements and existing physical activity, athletes with a physiological, gynecomorphic sexual somatotype predominate.
2. In both groups of female shooters, there are no girls with a pathological, inverse, andromorphic sexual somatotype.
3. The presence of a mesomorphic sexual somatotype in 17 (21.52%) female shooters in two groups of girls studied may be due to more intense physical activity used in their training process, as well as the stated longer periods of their sports experience.
4. The hypothesis that was put forward by the author at the beginning of this study was fully confirmed.

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