

Comparative Assessment of Physical Development and Component Composition of the Body Weight of Sportswoman Participated in Gymnastics

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Annotation. The article considers a comparative assessment of the physical development and component composition of the body mass of female athletes involved in the types of gymnastics. Studies have shown specifically selected features that change under the influence of training loads, contribute to the formation of a harmonious figure and slender posture, and can be used in selective selection for practicing various types of gymnastics.

Key words: physical development, gymnastics, aerobics, anthropometry, body components, total dimensions, partial body dimensions.

Relevance. In recent years, special attention has been paid to the development of women's sports in the Republic of Uzbekistan. Thus, various types of gymnastics remain popular among girls, and it should be noted that the number of girls involved in aerobics has especially increased recently. The fact is that gymnastics and aerobics belong to feminine sports, which are characterized by not so aggressive loads compared to masculine sports, which causes a restructuring of the body of girls according to the "male type", but also entails cardinal changes in the endocrine, muscular and bone systems.

Of particular importance in the preparation of athletes is the study of the effect of specific training loads on the female body (Kondratieva A.V., 2003, Tkachuk M.G., Dyusenova A.A., 2009). However, even within the same specialization, a change in training regimens leads to different changes in the physique of female athletes [1,2,4]. Since physique indicators can significantly affect the optimization of sportsmanship, it is of interest to study the features of physical development and the component composition of the body of female athletes involved in rhythmic gymnastics and aerobics.

Purpose of the study. Comparative assessment of physical development and component composition of the body weight of female athletes involved in gymnastics.

Research objectives. Measurements of total and partial body sizes in gymnasts were carried out according to 16 anthropometric indicators: 3 of them were total sizes, and partial sizes were determined by longitude, latitudinal and girth indicators of body segments. The thickness of the skin-fat folds was measured in the conventional way in four parts of the body: under the scapula, in the upper iliac region, on the back of the leg and shoulder. The diameters (girths) of the shoulders, forearms, thighs and lower legs were also measured according to the traditional method. The component composition of body weight was determined in percentage terms and in points according to the Heath-Carter method [3,5].

The type of constitution, determined by the method of Heath-Carter 1989, is one of the universal methods of somatotypology, and is used in almost all foreign laboratories in the world [8,9]. The results of somatotyping obtained by us can be comparable with the data obtained in other laboratories. Initially, standard measurements were carried out according to 7 dimensional characteristics: determining the length of the body, the diameter of the distal part of the shoulder, thigh, measuring the circumference of the shoulder in a stressed

state, and the circumference of the lower leg. Using a caliper, skin-fat folds were measured in four areas of the body. The somatotype was diagnosed based on the assessment of three components:

- I. F - fat component - endomorphy;
- II. M - muscle component - mesomorphy;
- III. P/L - height-weight index.

According to special formulas, scoring calculations were carried out [4,6,7].

Research results and discussion. The results of measurements of partial body sizes in female gymnasts showed that, compared with their peers who do not go in for sports, they are taller, have longer upper and lower limbs. The highest growth was recorded among athletes involved in rhythmic gymnastics (171.0 ± 1.51 cm). They turned out to be 6 cm taller than the athletes involved in aerobics. Gymnasts also have the largest indicators of the length of the upper (74.9 ± 0.72 cm) and lower limbs (93.5 ± 1.12 cm). The girth dimensions of the body were not pronounced, especially in comparison with the same dimensions in the control group. Obviously, this is due to the formation of the morphological model characteristics of sports in which, under the influence of specific training and sports selection, female athletes with certain somatotypical indicators achieve the highest performance. This is especially true for representatives who specialize in the types of gymnastics, for whom the gracefulness of their physique is a necessary condition for successful performance in competitions.

Among the representatives of the types of gymnastics, we found the lowest values of the circumferences of the shoulder, forearm and hip in female gymnasts. All athletes, compared with the control group, found broader shoulders. Thus, the shoulder width of the gymnasts was, on average, 37.6 ± 0.79 cm; in sports aerobics - 37.9 ± 1.53 cm. At the same time, the differences in the transverse dimensions of the lower parts of the upper and lower limbs in female athletes and in women not involved in sports are insignificant (Table 1).

So, for example, in gymnasts, the transverse dimensions of the lower sections of the forearm and lower leg are 4.7 ± 0.12 cm. and 6.1 ± 0.12 cm, respectively, while similar indicators for their peers who are not involved in sports are 5.0 ± 0.07 cm and 6.5 ± 0.15 cm [1,4,7].

Measurements of the transverse dimensions of the pelvis showed that in athletes involved in rhythmic gymnastics, all indicators are significantly lower than in girls who are not involved in sports. (Table 1).

Representatives of the "sports aerobics" specialization did not reveal significant differences in the transverse dimensions of the pelvis, compared with the control group. As a result of studies of body mass components in all female athletes involved in feminine sports, significantly high rates of the muscle component were found with low rates of the fat component.

Table 1
Morphometric characteristics of partial body sizes
athletes who specialize in gymnastics

№	Anthropometric indicators (cm)	Sports		
1.	Body length - cm	$171 \pm 1,51^*$	$165 \pm 4,02^*$	$163 \pm 1,93$
2.	Case length -cm	$78,4 \pm 0,61^*$	$73,8 \pm 2,62$	$72,8 \pm 0,09$
3.	Upper limb length - cm	$74,9 \pm 0,72^*$	$73,5 \pm 1,92$	$73,0 \pm 0,68$
4.	Lower limb length -cm	$93,5 \pm 1,12^*$	$91,2 \pm 3,80$	$88,7 \pm 1,73$
5.	Shoulder length - cm	$30,2 \pm 0,62$	$29,4 \pm 0,65$	$30,0 \pm 1,3$
6.	Forearm length-cm	$23,5 \pm 0,52^*$	$24,8 \pm 1,51$	$25,0 \pm 0,4$
7.	Brush length -cm	$19,5 \pm 3031^*$	$18,9 \pm 0,92$	$18,0 \pm 0,8$
8.	Thigh length - cm	$43,3 \pm 0,52$	$41,5 \pm 0,64$	$44,3 \pm 1,06$
9.	Calf length - cm	$40,5 \pm 0,72^*$	$40,3 \pm 2,52^*$	$35,8 \pm 0,13$
10.	Shoulder circumference-cm	$23,5 \pm 0,23^*$	$26,2 \pm 0,64$	$24,9 \pm 0,42$

11.	Forearm circumference -cm	20,8±0,22	22,7±0,33	21,0±0,5
12.	Thigh circumference-cm	54,0±0,45*	55,5±0,86	54,0±0,8
13.	Calf circumference-cm	33,5±0,64*	35,2±0,33*	33,0±0,3
14.	Shoulder Width -cm	37,6±0,79*	37,9±1,52*	35,2±0,44
15.	Transverse dimensions of the forearm -cm	4,7±0,12	4,8±0,10	5,0±0,07
16.	Transverse dimensions of the lower leg -cm	6,1±0,12	6,3±0,10	6,5±0,15

*-differences are significant, compared with the control group, at $p < 0.05$ compared with the indicators in the control group (Table 1).

In athletes involved in sports aerobics, the average thickness of skin-fat folds is 11.6 ± 0.06 mm, and in gymnasts - 11.3 ± 0.08 mm. In women not involved in sports, the relative mass of the fat component is greater and ranges from $27.3 \pm 1.33\%$, and the average thickness of skin-fat folds is 15.5 ± 0.14 mm (Table 2).

It was also found that in athletes involved in types of gymnastics, the results of somatotyping carried out according to the Heath-Carter scheme showed that the predominant somatotype in them is the mesomorphic body type [2,4,6,9]. The highest indicator of mesomorphism (4.8 ± 0.5 points) was found in representatives of the specialization "sports aerobics". Gymnasts, on the other hand, are characterized by the highest indicator of ectomorphism, which is 4.2 ± 0.38 points. At the same time, this indicator is expressed to a lesser extent among representatives of the "rhythmic gymnastics" specialization (2.5 ± 0.33 points).

Table 2

Components of the body mass of female athletes involved in rhythmic gymnastics and aerobics

№	Component compound	rhythmic gymnastics (n=30)	aerobics (n=30)	Контроль (n=30)
1.	Fat component (%)	19,9±0,18*	20,5±0,16*	27,3±1,33
2.	Muscle component (%)	42,0±0,18*	43,7±0,18*	38,2±1,17
3.	Bone component (%)	16,5±0,22	16,7±0,34	16,0±0,5
4.	Average thickness of kzhs(mm)	11,3±0,08*	11,6±0,06*	15,5±0,14

Conclusions: The results obtained on the physique of girls involved in various types of gymnastics are quite informative, since the signs are specifically identified that change under the influence of training loads and contribute to the formation of a harmonious figure and slender posture, which, of course, can be used with successful selective selection for classes gymnastics.

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