Anthropometric analysis and body sculpt improvement in application to female students from cheerleading picked teams

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PhD, Associate Professor **O.V. Timofeeva**[1]
PhD, Associate Professor **E.A. Lubyshev**[1, 2]
PhD, Associate Professor **N.A. Ibragimova**[2]
PhD, Associate Professor **D.V. Vyprikov**[2]
[1]Peoples' Friendship University of Russia, Moscow
[2]Plekhanov Russian University of Economics, Moscow

Corresponding author: olgtimofeeva@mail.ru

Abstract

Objective of the study was to develop and experimentally substantiate a customized strength training block to improve body sculpt.

Methods and structure of the study. An anthropometric analysis reliably reveals a correlation between the height to body-weight ratio, circumferential dimensions, skin-fat thickness, and body proportionality, and is, therefore, an integral indicator of the female body shape.

Given that female students from picked teams perform at sports events in the presence of a large number of spectators, a customized strength training block aimed to improve body sculpt was included in the training sessions and used three times a week for 40 minutes. More strength exercises were used on the torso muscles (abs, oblique muscles), legs (lateral, inner, back and front of the thigh) and glutes. These exercises were performed at a rapid pace, for 1 minute per area, at HR of 140-150 bpm. The study was carried out at two Moscow higher educational establishments – Peoples' Friendship University of Russia and Plekhanov Russian University of Economics - in the conditions of training activities 3 times a week and lasted 1 academic year.

Subject to the study were the female students (n=40) of the 1st-2nd years of study from different faculties who had been previously engaged in dance sport or gymnastics.

Results and conclusion. The anthropometric analysis of the body shape made it possible to develop a customized strength training block aimed to improve the body sculpt of the female students from the cheerleading picked teams. It was proved to contribute to statistically significant changes in the anthropometric indices, improvement of female students' physical fitness and body correction, and thus, beneficial for their physical appeal.

Keywords: anthropometric analysis, body sculpt improvement, female students, cheerleading.

Background. Cheerleading is a mass, much-in-demand, and popular sport among student youth [2].

At non-sports universities, cheerleading picked teams are made up of female students who have been previously engaged in gymnastics or dance sport. Performing in the sports arena, it is not only physical and functional fitness levels that matter, but also the athletes' appearance and well set-up figure with good muscle definition that undoubtedly boost their self-confidence. The authors of numerous studies in various sports argue that aesthetic perception of own body largely depends on a person's self-esteem and business success [1]. Therefore, it is not only physical and technical fitness levels that are important for female students of the picked teams but also a beautiful aesthetic appearance, in which the athletes feel confident and comfortable, which enable them to successfully perform at sports events, revealing all their strengths [1].

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Results and discussion. At the initial stage of the experiment, the anthropometric rates of the female students from the picked teams of the Peoples' Friendship University of Russia and Plekhanov Russian University of Economics corresponded to the very high to below average levels (Table 2). The measurement of the skin-fat thickness showed that the fat mass percentage exceeded the normal level in 48% (n=19) of the female students of the picked teams, while 52% (n=21) had a normal level, and only a slight correction of their external shape was required.

It should be noted that the muscle mass percentage in 86% (n=34) of the female students from the picked teams was within the normal range, while in the remaining 14% (n=6) it exceeded the normal level. This fact is indicative of the good level of the subjects' muscular development, which is a result of their sports activities. The repeat examination revealed significant improvements in the anthropometric indices

of the female students' - from a very high to an average level. We also found a reduction in the fat mass percentage by 14.8% (p<0.01), which proved the effectiveness of the customized strength training block aimed to improve body sculpt (Fig. 1).
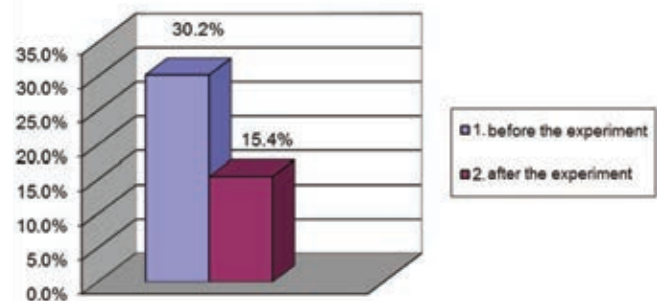

Fig. 1. *Fat mass percentage*

The subjects' body mass rates after the experiment significantly decreased by 8.3% (p<0.05) (Table 1). The comparison of the values of the body-weight index by Kettle's formula before and after the experiment showed that there was a statistically significant increase of 5%. The reduction of the waist, hip and thigh circumferences contributed to the weight loss (Table 1).

The dynamics of changes in the waist circumference indicated a significant decrease of 6.4% (p<0.01). A similar pattern was observed in the hip circumference – a decrease of 4%, which corresponded to a statistically significant change (p<0.05). The dynamics of changes in the thigh circumference throughout the experiment also showed a statistically significant change of 5% (p<0.01).

After a year of trainings, the anthropometric indices in the female students of the cheerleading picked teams improved from the very high to the average lev-

Table 1. *Changes in anthropometric indices in female students from cheerleading picked teams (Performance Cheer) throughout the study*

Indicator	$X \pm m$ (n = 40)	$X \pm m$ (n = 40)	P_0
	1	2	
Body mass, kg	61.1 ± 1.2	56.2 ± 1.1	<0.05
Body length, cm	168 ± 2.7	168 ± 2.7	>0.05
Height to body-weight ratio, kg/cm	371.7 ± 6.2	353.1 ± 5.4	<0.05
Circumferences, cm			
Upper arm circumference, cm	24.2 ± 0.8	23.5 ± 0.2	>0.05
Chest circumference, cm	88.6 ± 1.6	86.5 ±1.2	>0.05
Waist circumference, cm	65.2 ± 1.3	61.1 ± 0.7	<0.01
Hip circumference, cm	93.3 ± 1.2	89.6 ± 0.8	<0.05
Thigh circumference, cm	54.1 ± 0.7	51.4 ± 0.2	<0.01
Lower leg circumference, cm	35.3 ± 0.4	34.7 ± 0.4	>0.05

Notes: 1 – indices before the experiment; 2 – indices after the experiment; n – sample size; $X \pm m$ – arithmetic mean and error of arithmetic mean; P_0 – significance of differences between the end values.

Table 2. *Changes in body shapes throughout the study*

Ranking, %	Body shape class	Body shape perfection level	EG (n=40)	
			before	after
	1	very high	5	7
Below 72.5	2	above average	13	17
60-72	3	average	14	16
40-59	4	below average	8	0
Below 39	5	poor	0	0

el, and there were no female students with the below average and poor levels (Table 2).

Conclusion. The anthropometric analysis of the body shape made it possible to develop a customized strength training block aimed to improve the body sculpt of the female students from the cheerleading picked teams. It was proved to contribute to statistically significant changes in the anthropometric indices, improvement of female students' physical fitness and body correction, and thus, beneficial for their physical appeal.

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