

Features of development of maximum and explosive strength in weightlifting groups of sports improvement and higher sports skill

UDC 796.88



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Abstract

Objective of the study was to experimentally test the method of strength training of weightlifters in the groups of sports improvement and higher sportsmanship using the static-dynamic method and plyometric exercises.

Methods and structure of the study. Five weightlifters with the sports title "Master of Sports of Russia" and 11 weightlifters with the sports title "Candidate for Master of Sports" participated in the experiment. The consecutive pedagogical experiment lasted four months, of which two months were the ascertaining part and two months were allotted for the forming part with the use of experimental factors. Athletes trained five times in a weekly microcycle. The peculiarity of the experimental methodology was the inclusion in the main part of the training session of weightlifters of exercises performed using the static-dynamic method using 60-90% of the load from a single maximum. In addition, weightlifters used exercises performed by the plyometric method. Various types of jumps and arm extensions were used. At each training session, one or two exercises were performed in three series, consisting of 5-10 repetitions.

Results and conclusions. In all tests of the experimental stage of the study, a significant increase in the results was found. The greatest increase in results, exceeding 5%, was established in terms of the manifestation of maximum and explosive strength: "High jump according to Abalakov" (8%, $p < 0.05$); "Bar deadlift" (5.4%, $p < 0.01$); "Long jump from a place" (5.2%, $p < 0.01$), as well as in the competitive exercises "Classic push" (5.2%, $p < 0.01$); "Classic "Classic jerk" (4.3%, $p < 0.05$). According to the results of the correlation analysis of strength indicators in competitive exercises (snatch and clean and jerk), in comparison with the control ones, a strong positive relationship was revealed: in the deadlift of the barbell, in squats with a barbell on the chest and long jump from a place. A moderate positive relationship was observed in the control test "High jump from a place according to the method of V.M. Abalakov.

Keywords: weightlifting, strength abilities, maximum strength, explosive strength, weightlifters, static-dynamic method, plyometric method, weights.

Introduction. The modern system of training in weightlifting requires a high level of development of the actual strength and speed-strength abilities, which, together with the perfect technique for performing competitive and special-preparatory exercises, are considered the basis for progression in this sport [5, 6]. According to experts, in conditions of sufficient theoretical development of the methodology of special speed-strength training, a significant reserve for increasing its productivity lies in the search for optimal combinations and modifications of existing means, methods and forms of training [1, 3, 4]. Objec-

tive of the study was to experimentally test the method of strength training of weightlifters in the groups of sports improvement and higher sportsmanship using the static-dynamic method and plyometric exercises.

Methods and structure of the study. The experiment was carried out at the secondary school No. 3 in Belgorod, five weightlifters with the sports title "Master of Sports of Russia" and 11 weightlifters with the sports title "Candidate for Master of Sports" participated in the study. The consecutive pedagogical experiment lasted four months, of which two months were the ascertaining part and two months were allot-



ted for the forming part with the use of experimental factors. Athletes trained five times in a weekly micro-cycle. The peculiarity of the experimental methodology was the inclusion in the main part of the training session of weightlifters of exercises performed using the static-dynamic method using 60-90% of the load from a single maximum (Table 1).

In addition, during the experimental stage of the mesocycle, at the end of the main part of the training session, weightlifters used exercises performed by the plyometric method, including: jumping with a barbell from a squat position, extending the arms in a lying position with the arms off the surface, jumping to a hill with weights on feet, long jump, back jump, deep jump, jump over obstacles. At each training session, one or two exercises were performed in three series, consisting of 5-10 repetitions.

The obtained results were processed using the methods of mathematical statistics to determine the significance of differences according to Student's t-test and Pearson's correlation coefficient in quantitative measurements [2].

Results of the study and their discussion. The data are presented in table 2.

Based on the results of a comparative analysis of growth rates in control trials, it was revealed that a significant increase in results was found in all tests

of the experimental stage of the study. The greatest increase in results, exceeding 5%, was established by the indicators "High jump according to Abalakov" (8%, $p < 0.05$); "Bar deadlift" (5.4%, $p < 0.01$); "Long jump from a place" (5.2%, $p < 0.01$), as well as in the competitive exercises "Classic push" (5.2%, $p < 0.01$); "Classic Snatch" (4.3%, $p < 0.05$).

According to the results of the correlation analysis of strength indicators in competitive exercises (snatch and clean and jerk), in comparison with the control ones, a strong positive relationship was revealed: in the deadlift of the barbell ($r = 0.93$ - with a jerk, 0.91 - with a push), with a barbell on the chest ($r = 0.96$ - with a snatch and with a push), long jump from a place ($r = 0.74$ - with a jerk, 0.71 - with a push), both at the initial stage of testing and at final. A moderate positive relationship was observed in the control test "High jump from a place according to the method of V.M. Abalakov" ($r = 0.52$ - with a jerk, 0.46 - with a push).

Conclusions. An experimental training technique for strength training of qualified weightlifters was developed, which was based on exercises performed using the static-dynamic method using 60-90% of the maximum load, and plyometric exercises using one's own body weight and weights. According to the results of a comparative analysis of indicators, it was revealed that in all control exercises at the experimen-

Table 1. Application of the static-dynamic method in the training of weightlifters of the SS and HSS groups

Exercise	Day	Dosage	Load, PM
Snatch to a half squat with a stop below the knees, 3 s	1	4 x 3	60-80%
Snatch to a squat with a stop below the knees, 2 s	1	4 x 1	90%
Shvung bench press from the chest with a stop in the squat, 2 s	2	2x3, 2x2	60%, 70%,
		2x2	80-85%
Two-stop snatch pull (2 s) - below the knees and above the knees	3	2x4 2x3	80%, 85%,
		4x2	90%
Back squat with squat stop, 3 sec	3	2x4 4x2	80%, 90%
	4	2x3 3x2	70%, 80%,
Lifting the barbell on the chest with a stop in the squat, 3 s		3-4x1	90%
Squats with a barbell on the chest with a stop in the squat, 2 s	4	2x5 2x4	60%, 70%
		2x3	80%,
		3x2	90%
Push of the barbell from the racks with a stop in the «scissors», 3 s	5	2x3	70%
		2x2	80%
		3-4x1	90%



Table 2. Results of a comparative analysis of the increase in the indicators of maximum and explosive strength before and after the end of the experimental stage

Control exercise	Pre-testing M±m	Final testing M±m	Difference, abs.	Difference, %	t	p
Deadlift bar, kg	166,9±9,5	176,5±9,9	9,6	5,4	3,8	< 0,01
Snatch classic, kg	109,6±6,7	114,5±7,5	4,9	4,3	2,9	< 0,05
Classic push, kg	137±8,1	144,1±8,8	7,1	5,0	3,4	< 0,01
Long jump from a place, cm	244,1±7,3	257,5±8,4	13,4	5,2	3,5	< 0,01
High jump from a place according to Abalakov, cm	50,8±2,6	55,3±2,9	4,5	8,0	2,7	< 0,05

tal stage of the study, a significant increase in results was established. According to the results of the correlation analysis of strength indicators in competitive exercises (jerk and push), in comparison with the control ones, a strong positive relationship was revealed: in the deadlift of the barbell, in squats with a barbell on the chest and long jump from a place. A moderate positive relationship was observed in the control test "High jump from a place according to the method of V.M. Abalakov.

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