

**INVESTIGATION OF THE EFFECTIVENESS OF USING
ADDITIONAL EQUIPMENT IN THE PREPARATORY PERIOD OF THE
ANNUAL MACROCYCLE OF HIGHLY QUALIFIED POWERLIFTERS**

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Purpose: to investigate the influence of the use of additional equipment, namely, rubber bands, on the development of power indicators of highly qualified powerlifters.

Material and methods: 20 highly qualified powerlifters were involved in the study.

Results: found that the use of additional equipment in powerlifting contributes to a more effective development of athletes' strength qualities, and therefore, leads to an increase in sports results in squatting, bench press and deadlift. The use of additional equipment makes it possible to perform exercises using rubber bands. Rubber bands are fixed in the power frame from above, after which they are stretched and attached to the bar, due to the stretching of the bands, the athlete has the opportunity to facilitate lifting at the lowest point. The help of the expander at the bottom point is the greatest, and at the top point is absent. These exercises are

recommended for highly qualified athletes, when using them, it is necessary to closely monitor the technique of performing the exercises, since in the last phases of the exercises muscle fatigue is observed and the technique of performing the exercise is often violated. The sportsmen of the experimental group used exercises with a rubber expander in the preparatory period for the development of strength qualities in competitive exercises: squats with a barbell, bench press, deadlift. During the training period, we performed 768 barbell lifts in squats, equal to 169,000 kilograms, 1020 lifts in the bench press, equal to 141 thousand kilograms, 720 lifts in deadlift, equal to 165,000 kilograms. During the study period, the control and experimental groups increased their indicators: in squatting with a barbell (control - 10 kg, experimental - 15 kg; $t=2,82$; $p<0,05$); bench press (respectively - 5 kg, 10 kg; $t=1,81$; $p>0,05$) deadlift (respectively - 5 kg, 15 kg $t=1,63$ $p>0,05$), which gives a more significant increase the result of the experimental group on the control.

Conclusions: it was found that the use of this method contributes to a more effective development of power indicators, and therefore leads to an increase in sports results in all three disciplines of powerlifting.

Keywords: powerlifting, additional equipment, squats, rubber expander.

Introduction

The modern training system requires constant improvement of methods to improve the strength indicators of athletes in strength sports. As the analysis of special literature shows, in the strength training of powerlifters, methodical approaches and techniques, tested in weightlifting, are mainly used [2, 3]. In annual macrocycles at all stages of the training of powerlifters, static, dynamic and mixed modes of work are used, since these modes are classic for the training of athletes of strength sports. [7].

Currently, the technical support makes it possible to successfully apply non-traditional methods of developing strength qualities, one of which is the use of additional equipment in the form of rubber expander. This option for using additional equipment is relevant for study in the training of powerlifters, since all classical

exercises have a fixed load with which the athlete interacts, and with the help of modern training means, namely rubber expander, we can change the force with which the projectile interacts with the athlete, where the effort that the athlete applies will change, but the weight will remain the same due to the use of resistance bands. Thus, the load with which the athlete interacts will change.

Analysis of scientific and methodological literature shows that the research of well-known domestic scientists: V. Oleshko [6], O. B. Piven [7] - concerned the speed-strength training of weightlifters, L. Dvorkin [2] investigated the development of strength abilities in an isokinetic mode using training devices. All practical experience indicates a lack of research on unconventional methods of developing strength abilities, especially with the use of variable loads in powerlifting. This mode is promising for study, which determined the relevance of the selected research topic.

Famous researchers in the field of powerlifting and strength sports, V. Oleshko [6], A.I. Stetsenko [8] found that highly qualified powerlifters have a high intensity, about 80 – 100 % of the maximum, and a fairly high training volume, equal to 80-100 barbell lifts per week in basic exercises, through which an increase in strength indicators by increasing the volume or intensity is not effective. Also, the fulfillment of such requirements does not lead to an increase in strength indicators and is dangerous from the side of traumatism and psychological and physical fatigue of an athlete, therefore, the search for new methods and modes is important and relevant.

The result of the analysis of modern literature is the absence and insufficiency of research on unconventional methods for the development of strength abilities, especially the development method using rubber expander in powerlifting. This mode is promising for study, which determined the relevance of the selected research topic.

Purpose of the study– is to investigate the influence of the use of additional equipment, namely, rubber resistance bands, on the development of power indicators of highly qualified powerlifters.

Material and Methods of research

Research methods: according to the methodological approach in solving the problem and the set tasks, the research program included a set of research methods:

analysis of scientific and methodological literature, determination of special physical preparedness using pedagogical testing of qualified powerlifters, pedagogical research and methods of mathematical statistics.

Organization of the study: this study involved highly qualified powerlifters, athletes from the Youth Sports School "KhTZ" and athletes who train on the basis of the KhNUS. The experiment involved 20 highly qualified powerlifters of different ages. All of them were qualified as MS or MSIG. The participants were divided into two equal groups - control and experimental, 10 people each. All athletes compete in weight categories up to 93 and up to 105 kilograms. The training was carried out 4 times a week at the training base of the Youth Sports School KhTZ and KhNUS. Experiment duration 6 months.

Results of the research

The experiment was organized according to the traditional training program for powerlifters for the control group, the experimental group trained using rubber bands.

Before the experiment, all participants took part in control competitions (their results were accepted by us as the initial level of preparedness). The training period was 6 months.

The control group trained according to the generally accepted method, the volume of the load is indicated in Table 1. In the experimental group, the total amount of work was insignificantly, but reduced due to the greater intensity of exercises using rubber expander to create a variable load, the amount of load is indicated in Table 1.

The difference in the training program of the experimental group was in the use of additional equipment, namely, rubber bands to create a variable load. The implementation of these exercises is realized with the help of rubber bands, which are fixed in the power frame from above, stretched and attached to the barbell due to the stretching of the rubber bands, the athlete has the opportunity to facilitate lifting at the bottom point. That is, the help of the expander at the bottom point will be the greatest, and at the top, it will be almost absent. Therefore, the result of using this equipment is the ability to work with a large weight in the range of 90 – 110 % of the

one-time maximum, in contrast to the classical modes, in which the main work is carried out in the range of 70 – 90 % of the one-time maximum.

Table 1

Volume of the load of the control and experimental groups for the period of the experiment

Exercises	CG		EG					
	NLB, repetition	Tonnage, thousand kilograms	NLB, exercises without rubber bands, repetition	NLB, using rubber bands, repetition	NLB general, repetition	Exercise tonnage without rubber bands, thousand kilograms	Tonnage using rubber expander, thousand kilograms	Tonnage general, repetition
Squats with a barbell on shoulders	780	166	494	274	768	98	71	169
Bench press	1050	140	752	268	1020	85	62	147
Deadlift	740	162	436	284	720	95	70	165

Exercises using resistance bands were used with subsequent regularity: in squats and bench press every week, deadlift - once every two weeks (due to the specific dosage of the training volume and intensity in the deadlift). Exercises with a rubber expander were used for 4 attempts with the number of repetitions per attempt in the range from 4 to 1.

The main effects of using additional equipment, namely rubber bands, in addition to those commonly known from strength training, are high overall intensity. The effect of working with a large weight is also important, it strengthens the athlete's confidence when performing exercises with maximum load.

At the end of the general preparatory stage, the athletes of the experimental group showed higher results, in contrast to the control group, which was trained according to the generally accepted method. Thus, at the beginning of the experiment, the differences are insignificant: in squats with a barbell (control – 237,5 kg, experimental - 235 kg; $t=2,81$; $p<0,05$) in the bench press (respectively - 165 kg,

162.5 kg $t=1,84$; $p<0,05$) standing thrust (respectively - 255 kg, 252.5 kg $t=1,12$; $p<0,05$) (Table 2), (Table 3).

Table 2

Indicators of the results of competitive exercises of the control group at the beginning of the preparatory period and at the end ($n_1= n_2=10$)

Indicators	At the beginning		At the end		t	P
	$\bar{X}_1 \pm m_1$	$V, \%$	$\bar{X}_1 \pm m_1$	$V, \%$		
Squats with a barbell on shoulders	237,5 \pm 2,5	1,1	247,5 \pm 2,5	1,0	2,81	<0,05
Bench press	165,0 \pm 2,5	1,5	170,0 \pm 1,25	0,7	1,84	>0,05
Deadlift	255,0 \pm 3,75	1,5	260,0 \pm 2,5	1,0	1,12	>0,05

The coefficients of variation of all the main indicators of basic exercises separately for the control and experimental groups did not practically exceed the overall output level. For example, for squats with a barbell in the control group, it was $V=1,1\%$, for the experimental group - $V=1,6\%$. Accordingly, for the control and experimental groups, the coefficients of variation were the following values: bench press $V=1,5\%$, $=1,9\%$; deadlift - $V=1,5\%$, $V=1,5$.

Table 3

Indicators of the results of the competitive exercises of the experimental group at the beginning of the preparatory period and at the end ($n_1= n_2=10$)

Indicators	At the beginning		At the end		t	P
	$\bar{X}_1 \pm m_1$	$V, \%$	$\bar{X}_1 \pm m_1$	$V, \%$		
Squats with a barbell on shoulders	235,0 \pm 3,75	1,6	250,0 \pm 3,75	1,5	2,81	<0,05
Bench press	162,5 \pm 3,13	1,9	172,5 \pm 2,5	1,5	2,52	<0,05
Deadlift	252,5 \pm 3,75	1,5	267,5 \pm 4,4	1,6	2,61	<0,05

At the end of the experiment, the average indicators in squatting with a barbell were (control – 247,5 kg, experimental - 250 kg; $t=0,55$; $p<0,05$) bench press (respectively - 170 kg, 172,5 kg $t=0,89$; $p<0,05$) deadlift (respectively - 260 kg, 267,5 kg $t=1,48$; $p<0,05$) (Table 4).

Table 4

Indicators of the results of competitive exercises in the experimental group and the control group at the end of the preparatory period ($n_1= n_2=10$)

Indicators	CG		EG		t	P
	$\bar{X}_1 \pm m_1$	$V, \%$	$\bar{X}_2 \pm m_2$	$V, \%$		
Squats with a barbell on shoulders	247,5 \pm 2,5	1,0	250 \pm 3,75	1,5	0,55	>0,05
Bench press	170,0 \pm 1,25	0,7	172,5 \pm 2,5	1,5	0,89	>0,05
Deadlift	260,0 \pm 2,5	1,0	267,5 \pm 4,4	1,6	1,48	>0,05

At the end of the experiment, the difference between the indicators was also probable: in squats with a barbell (control - 10 kg, experimental - 15 kg; $t=2,82$; $p<0,05$); bench press (respectively - 5 kg, 10 kg; $t=1,81$; $p>0,05$) deadlift (respectively - 5 kg, 15 kg $t=1,63$; $p>0,05$) (Table 5).

Table 5

Increase in competitive exercises of the control group and the experimental group at the end of the preparatory period ($n_1= n_2=10$)

Indicators	CG		EG		<i>t</i>	<i>P</i>
	$\bar{X}_1 \pm m_1$	<i>V</i> , %	$\bar{X}_2 \pm m_2$	<i>V</i> , %		
Squats with a barbell on shoulders	10,0±1,25	12,5	15,0±1,25	8,3	2,82	<0,05
Bench press	5,0±1,25	25,0	10,0±2,5	25,0	1,81	>0,05
Deadlift	5,0±3,75	75,0	15,0±5,0	33,3	1,63	>0,05

Conclusions / Discussion

The analysis of scientific literature has confirmed that in recent years, scientists have conducted research on the content and methodology of the training process of qualified powerlifters by different methods (Oleshko V.G., Stetsenko A.I.) [6, 8]. However, the impact of the use of rubber bands in the training of qualified powerlifters in the preparatory period has been little studied, which prompted an analysis in this direction.

The results of a pedagogical experiment with the use of rubber bands in the development of power qualities of qualified powerlifters show that the use of this method contributes to a more effective development of power qualities, and, therefore, leads to an increase in sports results in all three disciplines of powerlifting. The use of exercises with rubber bands is recommended for only highly qualified athletes, because when using it, it is necessary to closely monitor the technique of performing the exercises in which this method is used, because in the last phases of the exercises, muscle fatigue is observed and the technique of performing the exercise is often violated.

During the study, the control and experimental groups increased the indicators: in squatting with a barbell (control - 10 kg, experimental - 15 kg; $t=2,82$; $p<0,05$); bench press (respectively - 5 kg, 10 kg; $t=1,81$; $p>0,05$) deadlift (respectively - 5 kg,

15 kg $t=1,63$; $p>0,05$), which gives a more significant increase in the result of the experimental group on the control.

The study has confirmed the feasibility of using additional equipment, namely, rubber expander, and its further study.

Prospects for further research. Further research will be aimed at developing and substantiating the training process of qualified powerlifters at the stage of the preparatory period of the annual macrocycle.

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