STUDY OF JUNIOR WEIGHT LIFTERS' SPECIAL FITNESS WITH DIFFERENT METHODS OF SPEED-POWER TRAINING IN PREPARATORY PERIOD OF GENERAL PREPARATORY STAGE

Piven O. B., Dzhym V. Y.
Kharkov State Academy of Physical Culture

Abstract. *Purpose:* studying of junior weight lifters' special fitness in preparatory period of general preparatory stage. *Material:* 30 junior weight lifters of 12 – 14 years' old age were involved in experiment (2nd and 3rd sport grades). *Results:* optimal indicators of training by shock method have been determined for sportsmen of experimental group. Scope of loads was: squats with barbell on shoulders - lifting 779 times (90 tons); 310 jumps in depth and jumps out. Power indicators in total of combined exercises have increased by 16.5 kg. In control group other methodic was used. In control group scope of loads was: lifting of barbell - 910 times (111 tons). Power indicators in total of combined exercises have increased by 7.2 kg. *Conclusions:* the following regiment of training is recommended: first 3 weeks - jumps. Dozing and load scopes shall be as follows: first two trainings - two attempts (10 times each) with height of 0.5 m; third training – 3 attempts (10 times each) with height of 0.5 m; forth training – 4 attempts (10 times each) with height of 0.7 m. Jumps in depth shall be used 3 times weekly.
Key words: training, junior, weight lifter, preparatory period, advanced method, speed-power training.

Introduction

Modern system of trainings requires constant perfection of sportsmen-weight lifters' technical fitness, oriented on realization of effective technical actions of junior weight lifters in conditions of preparation for competition functioning. Increase of competitiveness at competitions requires searching of new ways to increasing of competition functioning's efficiency from coaches and sportsmen [1].

Exercises in weight lifting are rather complex by technique. Lifting of edge weight is connected with maximal tension of torso and limbs' muscles, quick change of their operation mode, keeping of balance in reference phase of junior sportsmen's movement. Technique of fulfillment of weight lifting exercises is also influenced by organism's constitution and typological features [5; 6].

Speed-power training is a leading one in weight lifting. Level of speed-power qualities to large extent determines achievement of high results in classic exercises. Weight lifter shall have great strength and be able to manifest it in short period of time.

For training of strength in weight lifting dynamic exercises with heavy weights are used. As it was shown in researches of known scientists [2; 3] with 120 kg snatch sportsman shall realize pull of 130-140 kg. In this case heavy loads ensure increment of muscular strength. But it does not train quickness of muscles' contraction.

It is usually considered that heavy weights increase strength's potential of muscles, which is required for development of quickness. But, as researches of known domestic authors show (N.A. Laputin; A.S. Medvedev; V.G. Oleshko) in explosive phases of snatch and push (lifting and push from breast) working muscles do not manage to manifest their maximal power potential. It witnesses that weight lifter needs speed-power training for achievement of higher sport results [5; 8; 17-18]

It should be noted that in scientific-methodic literature speed-power training of junior weight lifters is elucidated insufficiently. It conditioned urgency of our topic.

Many researchers found that development of speed-power qualities is the most effective in adolescent age up to 14 years [10; 11]. On the base of experimental data V.S. Filin made the following conclusions: mans and methods of speed-power qualities' training are the most effective at stage of initial preparation [3]. Training of weight lifter's speed-power qualities starts from mastering of weight lifting exercises' technique. For this purpose it is necessary to achieve accurate and economic movements. At the beginning exercises shall be fulfilled slowly, then – with maximal pace. In the process of mastering of barbell lifting, its weight shall increase, providing quickness and accuracy of movements remain at proper level [7].

In the base of shock method of training of muscles' explosive power there is sharp (shock) mechanical stretching of tensed muscles. For stimulation of muscles' activity kinetic energy of sportsman's body falling (or sport apparatus) is used [2]. Positive influence of preliminary stretching of tensed muscles was shown in a number of experimental works of known domestic scientists [11; 19; 20].

Purpose, tasks of the work, material and methods

The purpose of the research: studying of junior weight lifters' special fitness with the help of different methods of speed-power training in preparatory period of general preparatory stage.

Organization of the research: in the research pupils of children-junior sport school (CJSS) "KhTZ" participated. 30 junior weight lifters of 12 – 14 years' old age were involved in experiment. All they had 2nd and 3rd sport grades. By sport qualification the participants were divided into two groups: control and experimental. All participants of experiment trained 3 times a week. Experiment was conducted on the base of CJSS KhTZ.

http://dx.doi.org/10.15561/18189172.2015.0908

Results of the research

For control group experiment was organized by traditional schema. Experimental group was trained with application of shock method, oriented on speed-power development. Before experiment all tested participated in control competitions (their results were taken as initial level of their sportsmanship) (see table 1). Results of competitions are regarded as main criterion of experimental training's effectiveness. Before experiment all sportsmen mastered technique of pushing off after jump in depth.

Control group trained by traditional methodic: scope of loads was: 910 of control lifting of barbell (CLB) and 111 tons. Jump loads included jumps on "gout", long jumps, vertical high jumps and triple jumps. In total there were 300 jumps.

In experimental group total scope of work was shortened at the account of squats with barbell on shoulders and included 779 lifting of barbell (90 tons) and 310 jumps in depth. Distinctive feature of experimental training program was application of shock method of speed-power training. Jumps were used only first 3 weeks. Dozing and scope of loads were the following: first 2 trainings – 2 attempts (10 times which) with height 0.5 m; third training – 3 attempts (10 repetitions) with height 0.5 m; forth training – 4 series of 10 repetitions each with height 0.7 m. Jumps in depth were used 3 times a week.

Peculiarities of shock method of speed-power training are as follows: in the base of shock method of explosive power training there is sharp (shock) mechanic stretching of tensed muscles, previous to their active working contraction. As factor of muscles' stimulation we used kinetic energy of sportsman body's falling (or sport apparatus) [2; 9; 11].

Pushing off after jump in depth means jump downward from certain height, then springing by both legs, sportsman pushes off and makes vertical high jump out. In the moment of springing landing and damper squat, kinetic energy of sportsman is partially absorbed by muscles extensors and transformed in potential of their tension. This potential facilitates re-switching of muscles to work in phase of active push off. It is a kind of power addition, which increases intensity and quickness of muscles' contraction in this phase of work. Shock mode of work has specific training effect. It is oriented on physiological mechanisms, which are responsible for quickness and power of muscles' switching in work. For achievement of training effect power dozing is ensured by value of body kinetic energy, height of its falling and depth of damper braking.

Results of experiment were expressed in the following way: at the end of the stage experimental group sportsmen showed higher results then in control group (see table 2). With it 10 of them set personal records in sum of combined exercises and in some special training exercises.

Table 1

Mean indicators of competition and special preparatory exercises of junior weight lifters of control and experimental groups at the beginning of preparatory period of special preparatory stage ($n_1 = n_2 = 15$)

Indicators	CG		EG		*T*	*P*
	$\overline{X}_1 \pm m_1$	V,%	$\overline{X}_2 \pm m_2$	V,%		
Classic snatch, kg	47.5±1.7	13.7	48.5±1.8	14.0	0.4	>0.05
Classic push, kg	67.1±1.6	9.4	67.5±1.3	77	0.2	>0.05
Sum of combined exercises, kg	1140.6±3.3	11.0	116.0±2.9	9.8	0.3	>0.05
Squats with barbell, kg	90.1±1.8	7.5	88.7±1.2	5.4	0.7	>0.05
Bench press, kg ,	56.1±1.8	12.6	60.1±1.5	9.8	1.7	>0.05
Deadlift, kg	96.5±2.1	8.6	99.9±1.9	7.6	1.2	>0.05

At the beginning of preparatory period of general preparatory period distinctions in groups were not confident: in classic snatch (control group – 47.5kg, experimental – 48.5 kg; P>0.05); classic push (accordingly – 67.1 kg, 67.5 kg; P>0.05); sum of combined exercises (accordingly - 114.6 kg, 116.0 kg; P>0.05); squats with barbell on shoulders (accordingly – 90.1 kg, 88.7 kg; P>0.05); bench press (accordingly – 56.1 kg, 60.1 kg; P>0.05); deadlift (accordingly – 96.5 kg, 99.9 kg; P<0.05).

Variation coefficients of all main indicators of special exercises for control and experimental groups taken separately practically did not exceed initial level. For example, for classic snatch it was V=13.7% in control group and V =14.0% in experimental group. Accordingly, in control and experimental groups variation coefficients were as follows: classic push V =9.4 %, V =7.7 %; sum of combined exercises – V =11.0 %, V =9.8 %; squats with barbell – V =90.1 %, V =88.7 %; bench press– V =12.6 %, V =9.8 %; deadlift – V =8.6 %, V =7.6 %.

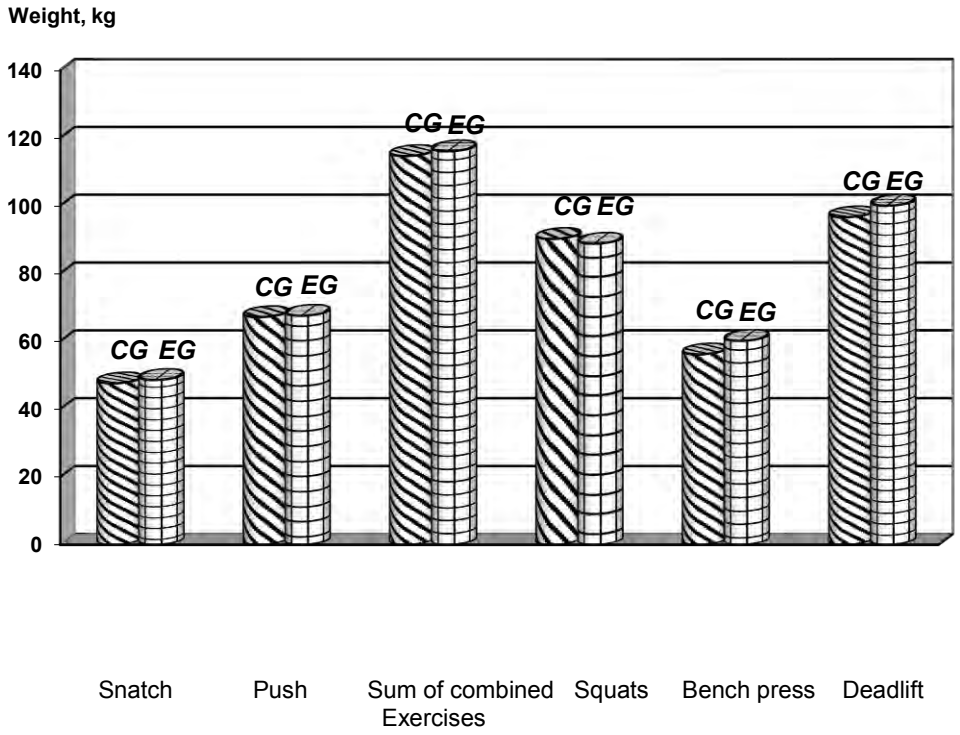

Fig.1. Comparative analysis of special exercises' fulfillment in control (CG) and experimental (EG) groups at the beginning of preparatory period

At the end of preparatory period of general preparatory stage there was confident difference between the following indicators: classic snatch (control group – 50.5 kg, experimental – 56.5 kg; (t=2.5; P<0.05); classic push (accordingly – 71.3 kg, 76.0 ; (t=2.5; P<0.05); sum of combined exercises (accordingly – 121.1 kg, 132.5 kg; (t=2.5; P<0.05); squats with barbell (accordingly– 99.8 kg, 105.3 kg; (t=2.5; P<0.05); bench press (accordingly – 61.0 kg, 67.1 kg; (t=2.5; P<0.05); deadlift (accordingly – 106.3 kg, 118.2 kg; (t=4.6; P<0.05).

Table 2

Mean indicators of results' increment of competition and special preparatory exercises, fulfilled by junior weight lifter of control and experimental groups at the end of preparatory period of special preparatory stage ($n_1 = n_2 = 15$)

Indicators	**CG**	**EG**	***T***	***P***
	$\overline{X}_1 \pm m_1$	$\overline{X}_2 \pm m_2$	2.5	<0.05
Classic snatch, kg	50.5±1.7	56.5±1.6	2.2	<0.05
Classic push, kg	71.3±1.7	76.0±1.3	2.5	<0.05
Sum of combined exercises, kg	12.,8±3.3	132.5±2.7	2.5	<0.05
Squats with barbell, kg	99.8±1.6	105.3±1.5	2.5	<0.05
Bench press, kg ,	61.0±1.8	67.1±1.4	2.5	<0.05
Deadlift, kg	106.3±1.9	118.2±1.8	4.6	<0.05

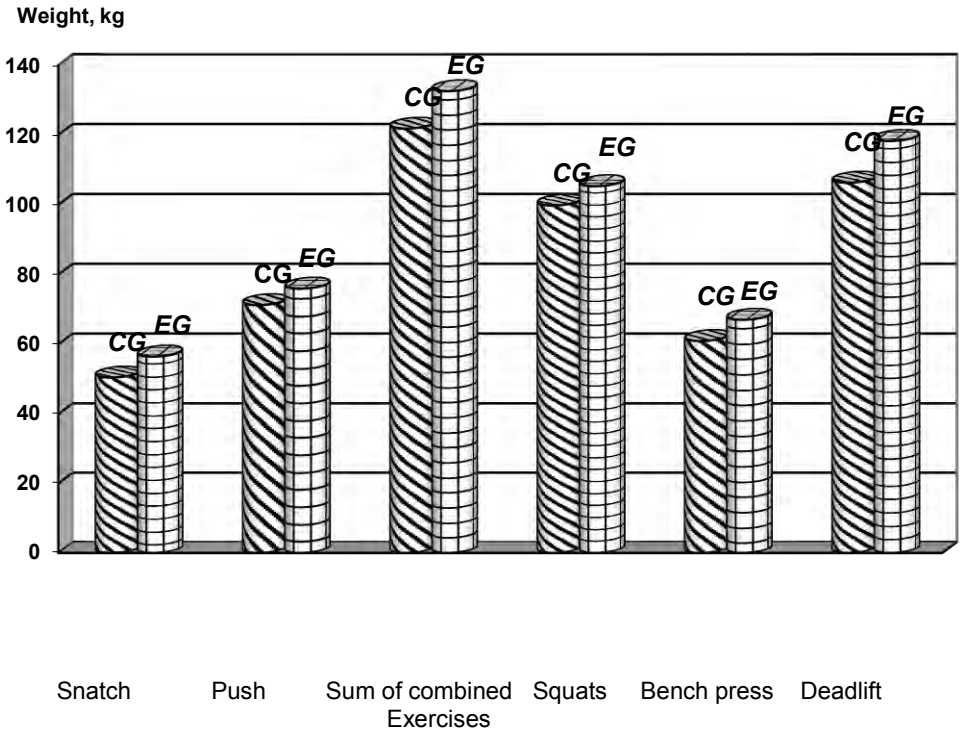

Fig. 2. Comparative analysis of special exercises' fulfillment in control (CG) and experimental (EG) groups at the end of preparatory period

Discussion

Analysis of scientific literature confirmed that researches in sphere of weight lifting were, mainly, of especial character. Recent years scientists have carried out researches of content and methodic of junior weight lifters' training process with the help of different methods, oriented on speed power development [2, 3]; recent scientific works were also devoted to planning of junior weight lifters' training process for year macro-cycle, considering speed-power qualities [4; 8; 10; 11; 12]. However, till present time influence of speed-power trainings on junior weight lifters in preparatory period of general preparatory stage has not been studied yet.

The conducted research confirmed results of other authors [2; 3] about demand in consideration of speed-power trainings' influence on junior weight lifters in preparatory period of general preparatory stage. Besides, we expanded the data of domestic [4; 8; 10; 11; 12] and foreign authors [21; 22; 23; 24] concerning ways for increasing of the most important indicators of speed-power qualities and their influence on junior weight lifters' organism.

Conclusions:

We determined that application of shock method facilitates more effective progress of speed-power qualities and results in improvement of sport results in weight lifting.

Isokinetic exercises are effective supplement to existing traditional means of speed-power trainings. They facilitate more effective increment of efforts in final phase of weight bar lifting that is not always accessible in natural conditions of weight bar lifting. Training of speed-power qualities is the most effective in adolescent age. Just because of this fact it is necessary to train speed-power qualities with the help of special means and methods exactly after mastering of competition exercises' technique. It is rather effective at the stage of initial training. It is witnessed by the results of the research. At the end of preparatory period there was confident difference between indicators of classic snatch (in control group – 50.5 kg, in experimental – 56.5 kg; ($t=2.5$; $P<0.05$); classic push (accordingly – 71.3 kg, 76.0 kg; ($t=2.5$; $P<0.05$); sum of combined exercises (accordingly – 121.1 kg, 132.5 kg; ($t=2.5$; $P<0.05$); squats with barbell (accordingly – 99.8 kg, 105.3 kg; ($t=2.5$; $P<0.05$); bench press (accordingly – 61.0 kg, 67.1 kg; ($t=2.5$; $P<0.05$); deadlift (accordingly – 106.3 kg, 118.2 kg; ($t=4.6$; $P<0.05$).

Further researches will be devoted to working out and substantiation of junior weight lifters' training process at special preparatory stage of preparatory training period.

Acknowledgement

The research has been fulfilled in compliance with combined plan of scientific-research works in sphere of physical culture and sports for 2011-2015 by topic 3.7 "Methodological and organization-methodic principles of determination of individual norm of human physical condition" (state registration number 0111U000192).

Conflict of interests

The authors declare that there is no conflict of interests.

References:

1. Platonov VN. *Sistema podgotovki sportsmenov v olimpijskom sporte* [System of sportsmen's training in Olympic sports], Kiev: Olympic Literature; 2004. (in Russian)
2. Verkhoshanskij IuV. *Osnovy special'noj silovoj podgotovki v sporte* [Principles of special power training in sports], Moscow: Physical Culture and Sport; 1970. (in Russian)
3. Dvorkin LS. *Iunyj tiazheloatlet* [Junior weight lifter], Moscow: Physical Culture and Sport; 1982. (in Russian)
4. Ippolitov NS. *Issledovanie prognosticheskoj znachimosti skorostno-silovykh kachestv u podrostkov pri otbore dlia zaniatij tiazheloj atletikoj. Cand. Diss*. [Study of prognostic significance of adolescents' speed-power qualities with their selection for weight lifting training. Cand. Diss Leningrad; 1975. (in Russian)
5. Laputin AH. *Special'nye uprazhneniia tiazheloatleta* [Special exercises of weight lifter], Moscow: Physical Culture and Sport; 1973. (in Russian)
6. Gaverdovskij IuK. *Obuchenie sportivnym uprazhneniiam* [Training to sport exercises], Moscow: Physical Culture and Sport; 2007. (in Russian)
7. Evdokimov BS. *Ocenka urovnia special'noj podgotovki fizicheskoj podgotovlennosti tiazheloatleta* [Assessment of weight lifter's special physical fitness], Moscow: Physical Culture and Sport; 1971. (in Russian)
8. Medvedev AS, Frolov AI, Furaev AN. *Skorostno-silovye kachestva tiazheloatletov vysokoj kvalifikacii i ikh vzaimosviaz' s tekhnicheskim masterstvom* [Speed-power qualities of elite weight lifters and their interconnection with sportsmanship], Moscow: Physical Culture and Sport; 1980. (in Russian)
9. Filin VP. *Problema sovershenstvovaniia dvigatel'nykh (fizicheskikh) kachestv detej shkol'nogo vozrasta v processe sportivnoj trenirovki. Dokt. Diss*. [Problem of motor (physical) qualities improvement in school age children in process of sport training. Dokt. Diss.], Moscow; 1970. (in Russian)
10. Farfel' BC. Dvigatel'nye kachestva shtangistov [Motor qualities of weight lifters], In: *Tribuna masterov tiazheloj atletiki* [Tribune of weight lifting masters], Moscow: Physical Culture and Sport; 1963. (in Russian)
11. Cherniak AV. *Skorostno-silovaia podgotovka sportsmenov-razriadnikov* [Speed-power training of sportsmen with sport grades], Moscow: Physical Culture and Sport; 1970. – S.28–36. (in Russian)
12. Djim VY. Comparative analysis of exercise equipment jerk in weightlifting and weight sport. *Pedagogics, psychology, medical-biological problems of physical training and sports,* 2013;11:10-16. http://dx.doi.org/10.6084/m9.figshare.815868.
13. Doronin AM. *Skorostno-silovaia podgotovka sportsmenov s ispol'zovaniem mashiny upravliaiushchego vozdejstviia. Cand. Diss*. [Speed-power training of sportsmen with the help of control machine. Cand. Diss.], Moscow; 1992. (in Russian)
14. Arkhangorods'kij ZS, Pilipko VF. *Metodi shvidkisno-silovoi pidgotovki vazhkoatleta* [Methods of weight lifter's speed-power training], Kharkiv, KSAPC; 1998. (in Ukrainian)
15. Mikhajliuk MP. *Skorostno-silovaia podgotovka kvalificirovannykh tiazheloatletov* [Speed-power training of elite weight lifters], Moscow: Physical Culture and Sport; 1977. (in Russian)
16. Filin VP. *Skorostno-silovaia podgotovka iunykh sportsmenov* [Speed-power training of junior sportsmen], Moscow: Physical Culture and Sport; 1968. (in Russian)
17. Oleshko VG. *Pidgotovka sportsmeniv u silovikh vidakh sportu* [Sportsmen's training in power kinds of sports], Kiev: DIA; 2011. (in Ukrainian)
18. Oleshko VG, Pucov OI. *Vazhka atletika* [Weight lifting], Kiev: Weightlifting Federation Ukraine; 2004. (in Ukrainian)
19. Mikhajliuk MP. *Skorostno-silovaia podgotovka kvalificirovannykh tiazheloatletov* [Speed-power training of elite weight lifters], Moscow: Physical Culture and Sport; 1977. 46-48. (in Russian)
20. Cornelius AE, Brewer BW, Van Raalte JL. Applications of multilevel modeling in sport injury rehabilitation research. *International Journal of Sport and Exercise Psychology*. 2007;5(4):387–405. http://dx.doi.org/10.1080/1612197X.2007.9671843.
21. Visek AJ, Watson JC, Hurst JR, Maxwell JP, Harris BS. Athletic identity and aggressiveness: A cross-cultural analysis of the athletic identity maintenance model. *International Journal of Sport and Exercise Psychology*. 2010;8(2);99–116. http://dx.doi.org/10.1080/1612 197X.2010.9671936.
22. Huijing PA. Elastic Potential of Muscle. In: *Strength and Power in Sport*. Blackwell Scientific Publications; 1992. p. 151 – 168.
23. Komi PV. Stretch-Shortening Cycle. In: *Strength and Power in Sport*. Blackwell Scientific Publications; 1992. p. 169 – 179.

Information about the authors:

Piven O.B.; http://orcid.org/0000-0002-2490-5205; story-muravey@mail.ru; Kharkov State Academy of Physical Culture; Klochkovskaya str. 99, Kharkov, 61058, Ukraine.

Dzhym V.Y.; http://orcid.org/0000-0002-4869-4844; djimvictor@mail.ru; Kharkov State Academy of Physical Culture; Klochkovskaya str. 99, Kharkov, 61058, Ukraine.

Cite this article as: Piven O. B., Dzhym V. Y. Study of junior weight lifters' special fitness with different methods of speed-power training in preparatory period of general preparatory stage. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2015;9:51-56. http://dx.doi.org/10.15561/18189172.2015.0908

The electronic version of this article is the complete one and can be found online at: http://www.sportpedagogy.org.ua/html/arhive-e.html

Received: 18.06.2015
Accepted: 19.07.2015; Published: 20.07.2015