

Analysis of the results of the introduction of the experimental methodology for the integrated development of motor qualities and the assimilation of elements of the technique of young weightlifters 10–12 years

Eugen Bugaev¹
Viktor Dzhyim¹
Olga Boltenkova²

¹Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine
²Kharkiv Institute of Finance of Kyiv Trade and Economic University, Kharkiv, Ukraine

Purpose: revealing the influence of the experimental technique on the development of motor qualities and the assimilation of elements of the technique of young weightlifters 10–12 years.

Material & Methods: in this study young men of 10–12 years engaged in weight lifting sections in the Youth Sports School of KhTP, as well as in the sports school No. 2 of Kharkov took part. The subjects were divided into two groups, control and experimental, for 24 athletes 10–12 years in each. At the time of the experiment, there was no significant difference between the groups in the tests that were used to determine the level of physical and technical preparedness.

Results: experimental technique of complex development of impellent qualities and mastering of elements of technics of weightlifting of young sportsmen is presented. The combination of the assimilation of elements of technics and physical exercises is more effective the accentuated decision of each of the elements.

Conclusions: it was found that the combination of training in weightlifting techniques with the development of motor skills in the experimental group made it possible to more effectively solve both problems – the assimilation of the element of technics and the development of motor qualities.

Keywords: preparation of weightlifters, motor qualities, elements of technics, sports results.

Introduction

Weightlifting is an Olympic and popular sport among modern youth [1; 3; 8; 18; 19]. This circumstance attracts specialists' attention to the development and scientific and methodological substantiation of the theory and methods of training athletes of different ages and qualifications.

Increasing the requirements for performing skills has forced many specialists to pay special attention to the qualitative basic and specialized training of athletes in weightlifting. Its goal is to technically perfect mastery of various elements, connections and combinations.

Various studies conducted in various complex coordination sports, devoted to the following issues: the development of a general concept of long-term training of athletes, model characteristics of the sport, management issues, the study of biomechanical fundamentals of exercise techniques, the development of didactic provisions reflecting the most important for the practice of sports patterns in training complex motor actions, methods of teaching exercises [3], theory and methodology of selection and prediction [20; 21], education of physical qualities [22; 23].

According to the research, the initial training stage is especially important, as during this period there is a rapid development of power abilities, the development of sports skills, the intensive course of adaptation processes to the specific con-

ditions of weightlifting. The problem of training young athletes at the stage of initial training in weightlifting is given some attention, there is a constant improvement of the methods of training young athletes. In particular, scientific research devoted to various aspects of this problem has been carried out in recent years [2; 3; 18–19], two methodological aids have been issued (L. S. Dvorkin, 2005; V. G. Oleshko, 2011). A large number of scientific articles have been published, programs for the Youth Sports School are being issued. All this testifies to the relevance of the research direction.

Analyzing the available scientific and methodical literature devoted to the training of athletes in weightlifting, it should be noted that many issues are presented quite widely.

In particular, different views on the age at which weight lifting begins (L. S. Dvorkin, 2005; V. G. Oleshko, 2011), the scope and content of the training work (Yu. V. Verkhoshanskii 2013; BI Sheiko, 2008), the use of various training aids (L. S. Dvorkin, 2005, N. A. Laputin, 1973, Yu. K. Gaverdovskii, 2007; A. V. Chernyak, 1970; V. Yu. Dzhyim 2013).

Relationship of research with scientific programs, plans, themes. Scientific research was carried out on the theme of the Consolidated Plan for Research in the Field of Physical Culture and Sports for 2011–2015. 3.7 "Methodological and organizational-methodical bases for determining the individual norm of the physical state of a person" (state registration number 0111U000192.

Purpose of the study: to reveal the influence of the experimental method on the development of motor qualities and the assimilation of the elements of the technique of young weightlifters 10–12 years old.

Material and Methods of the research

In this study, young men of 10–12 years old, engaged in weight lifting sections in the Youth Sports School of KhTP, as well as in the sports school No. 2 of Kharkov took part. The subjects were divided into two groups, control and experimental, with 24 athletes in each. At the time of the experiment, there was no significant difference between the groups in the tests that were used to determine the level of physical and technical preparedness.

Research methods: theoretical method and generalizations of literature, pedagogical observation, pedagogical experiment, method of mathematical statistics.

Results of the research and their discussion

In the training process, which lasted for 2 years, the experimental group developed the methodology of the complex development of physical qualities and the assimilation of elements of technology, which positively influenced their performance.

So, within two years, the results of testing physical qualities improved, and their increase in most indicators was observed immediately after the first year of training (Table 1)

The results in the 30 m run for the first year of training improved by 0,6 s ($t=2,65$; $p<0,05$), for the second one by 0,5 s ($t=2,14$; $p<0,05$).

Speed agility is also a credible change. The time to overcome the distance in the shuttle race 3x10 m decreased after a year of training by 0,7 s ($t=2,14$; $p<0,05$), after the second – by 0,6 s ($t=2,12$; $p<0,05$), which in general for two years was 1,3 s ($t=4,72$; $p<0,001$).

The testing of speed-strength qualities with the use of jumping exercises also revealed uniform changes between the indicators of the first and second years of training (Table 1).

Standing high jump, this is a difficult exercise for technical characteristics, after the first year of training it improved by 4,7 cm ($t=2,21$; $p<0,05$), at the end of the study the average figure increased by 4,5 cm ($t=2,18$; $p<0,05$).

Easier in technical performance, standing long jump for the first year improved by 15,5 cm ($t=2,55$; $p<0,05$), after the second year of training the result was 189,8 cm ($t=2,64$; $p<0,05$).

At the same time, tests on the use of force-oriented exercises have a slightly different orientation. The results of push-ups, significantly improved in the first and second year of training ($t=2,36$; 2,09; $p<0,05$).

Indicators of the strength of the hands in the pull-up exercise on the crossbar have a significant improvement only during the period of the experiment ($t=2,24$; $p<0,05$), while for each year there were no significant changes ($p>0,05$).

Specific motor exercises, which are used in training weightlifters and used during training of young weightlifters of the experimental group, have a positive dynamics (Table 1).

The number of sit-ups for 30 s for the first year increased by 2 times ($t=2,33$; $p<0,05$), and 2 times in the future ($t=2,17$;

Table 1
Dynamics of changes in the indicators of the general physical preparedness of weightlifters 10–12 years of the experimental group

Indicators	Group			Estimating the statistical difference	
	10 years, n=24	11 years, n=24	12 years, n=24	t	p
Running on 30 m, s	6,2±0,15	5,6±0,17	5,1±0,16	$t_{1,2}=2,65$ $t_{1,3}=5,02$ $t_{2,3}=2,14$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Shuttle run 3x10 m, s	8,6±0,20	7,9±0,21	7,3±0,19	$t_{1,2}=2,14$ $t_{1,3}=4,72$ $t_{2,3}=2,12$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Standing high jump, cm	35,4±1,4	40,1±1,6	44,6±1,3	$t_{1,2}=2,21$ $t_{1,3}=4,82$ $t_{2,3}=2,18$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Standing long jump, cm	157,9±4,3	173,4±4,3	189,8±4,5	$t_{1,2}=2,55$ $t_{1,3}=5,13$ $t_{2,3}=2,64$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Push-ups, number of time	32,5±1,9	39,0±2,0	44,5±1,7	$t_{1,2}=2,36$ $t_{1,3}=4,71$ $t_{2,3}=2,09$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Pull-up, number of time	8,6±1,2	10,6±0,9	12,1±1,0	$t_{1,2}=1,33$ $t_{1,3}=2,24$ $t_{2,3}=1,12$	$p_{1,2}>0,05$ $p_{1,3}<0,05$ $p_{2,3}>0,05$
Sit-ups number of time for 30 s	22,2±0,5	24,2±0,7	26,2±2,3	$t_{1,2}=2,33$ $t_{1,3}=5,12$ $t_{2,3}=2,17$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$

$p < 0,05$).

The results of testing the motor qualities of young weightlifters of 10–12 years of the control group also have a positive dynamics, but significant changes occurred only at the end of the experiment ($p < 0,05$), while after the first and second years of training they were not significant ($p > 0,05$).

Conducted training process in the experimental group also positively influenced the formation of elements of the technique of weightlifting (Table 2).

The performance of the competitive snatch classic exercise improved over two years. For the first year the result increased by 9,5 kg ($t = 2,35$, $p < 0,05$), for the second year the result improved by 9,2 kg ($t = 2,24$; $p < 0,05$).

In the second competitive exercise – snatch classic, the gain for the first year of training was 9,5 kg ($t = 2,28$; $p < 0,05$), for the second year of training was 8,5 kg ($t = 2,11$; $p < 0,05$).

In the sum of the double-event in accordance with the snatch and jerk, the classical improvement was significant ($p < 0,05$) from year to year.

When performing squats with a barbell on the shoulders of young weightlifters 10–12 years, the average result at the beginning of the study was $43,6 \pm 3,0$ kg, and in the second year (11 years) it increased to $52,6 \pm 2,6$ kg, and for the third year of the study (12 years) reached $61,1 \pm 2,8$ kg. The difference in results in the period from 10 to 11 years was 9,0 kg ($t = 2,27$; $p < 0,05$), in the following year from 11 to 12 years – 8,5 kg ($t = 2,22$; $p < 0,05$), for the entire study period the result increased by 17,5 kg ($t = 4,26$; $p < 0,001$).

The output of the barbell upright rowing for young weightlifters was $31,9 \pm 3,3$ kg. After the first year of training (at 11

years), the results increased and averaged $42,5 \pm 3,1$ kg, after the third year (12 years) the average group results reached $51,6 \pm 2,9$ kg.

Probability of the difference in results was from 10 to 11 years – $t = 2,34$; $p < 0,05$, the next year (from 11 to 12 years) received less significant changes – $t = 2,14$; $p < 0,05$.

In the study barbell bent over rowing parameters in young weightlifters, the average group result was $44,4 \pm 3,2$ kg at the beginning of the study, in the second year (11 years) the index was $54,5 \pm 2,8$ kg, in the third year of the study (12 years) – $64,0 \pm 3,0$ kg. The difference in results from 10 to 11 years was 10,1 kg ($t = 2,37$; $p < 0,05$), in the following year from 11 to 12 years – 9,5 kg ($t = 2,14$, $p < 0,05$), and in two years the increase in the result was 19,6 kg ($t = 4,48$; $p < 0,001$).

Conclusions

1. The training process, which used the technique of complex development of motor qualities and the assimilation of elements of the technique of weightlifting in the experimental group allowed to increase the test results. This may indicate that the messages of assimilation of elements of engineering and physical exercises that ensure their implementation, effective.

2. The combination of training in the elements of weightlifting techniques with the development of motor qualities in the experimental group made it possible to effectively solve both problems – the assimilation of the element of technology and the development of motor qualities.

Further research: based on the comparison of the results of the experimental group with similar results of the control group, to prove that the developed method is more effective than the traditional training program.

Table 2

Dynamics of changes in the indices of special physical training and elements of the technique of weightlifters 10–12 years of the experimental group

Indicators	10 years, n=24	Group		Estimating the statistical difference	
		11 years, n=24 $\bar{X} \pm m$	12 years, n=24	t	p
Snatch classic, kg	19,2±2,7	28,7±3,0	37,9±2,8	$t_{1,2}=2,35$ $t_{1,3}=4,81$ $t_{2,3}=2,24$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Clean and jerk classic, kg	27,7±2,9	37,2±3,0	45,7±2,7	$t_{1,2}=2,28$ $t_{1,3}=4,54$ $t_{2,3}=2,11$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Snatch, clean, and jerk combination, kg	46,9±5,6	65,9±6,0	83,6±5,5	$t_{1,2}=2,31$ $t_{1,3}=4,68$ $t_{2,3}=2,17$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Front squat, kg	43,6±3,0	52,6±2,6	61,1±2,8	$t_{1,2}=2,27$ $t_{1,3}=4,26$ $t_{2,3}=2,22$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Barbell upright rowing, kg	31,9±3,3	42,5±3,1	51,6±2,9	$t_{1,2}=2,34$ $t_{1,3}=4,48$ $t_{2,3}=2,14$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$
Barbell bentover rowing, kg	44,4 ±3,2	54,5±2,8	64,0±3,0	$t_{1,2}=2,37$ $t_{1,3}=4,47$ $t_{2,3}=2,31$	$p_{1,2}<0,05$ $p_{1,3}<0,001$ $p_{2,3}<0,05$

Conflict of interests. The authors declare that no conflict of interest.
Financing sources. This article didn't get the financial support from the state, public or commercial organization.

References

1. Verkhoshanskiy, Yu.V. (2013), *Osnovy spetsialnoy silovoy podgotovki v sporte* [Fundamentals of Special Strength Training in Sports], Sovetskiy sport, Moscow. (in Russ.)
2. Gavardovskiy, Yu.K. (2007), *Obuchenie sportivnym uprazhneniyam. Biomekhanika. Metodologiya. Didaktika* [Training of sports exercises. Biomechanics. Methodology. Didactics], Fizkultura i Sport, Moscow. (in Russ.)
3. Dvorkin, L.S. (2005), *Tyazhelaya atletika* [Weightlifting], Sovetskiy sport, Moscow. (in Russ.)
4. Dzhim, V.Yu. (2013), "Comparative analysis of the technique of jerky exercises in weightlifting and kettlebell lifting", *Pedagogika, psikhologiya ta mediko-biologichni problemi fizichnogo vikhovannya i sportu*, No. 11, pp. 10-16. (in Russ.)
5. Doronin, A.M. (1992), *Skorostno-silovaya podgotovka sportsmenov s ispolzovaniem mashiny upravlyayushchego vozdeystviya: avtoref. diss. na soiskanie uchenoy stepeni kand. ped. nauk* [Speed-strength training of athletes using a control machine: PhD thesis abstract], GT-sOLIFK, Moscow, 28 p. (in Russ.)
6. Yevdokimov, B.S. (1971), "Assessment of the level of special training for the physical fitness of a weightlifter", *Tyazhelaya atletika*, Fizkultura i sport, Moscow, pp. 118-123. (in Russ.)
7. Ippolitov, N.S. (1975), *Issledovanie prognosticheskoy znachimosti skorostno-silovyykh kachestv u podrostkov pri otbore dlya zanyatiy tyazhelayu atletikoy: avtoref. diss. na soiskanie uch. stepeni kand. ped. nauk* [Investigation of the prognostic significance of speed-strength qualities in selection for weightlifting: PhD thesis abstract], Leningrad, 24 p. (in Russ.)
8. Korobkov, A.V. (1964), *Issledovanie vzaimosvyazi razvitiya fizicheskikh kachestv i obucheniya tekhnike tyazheloatleticheskikh uprazhneniy: avtoreferat. dis. kand. ped. nauk* [Investigation of the interrelation between the development of physical qualities and training in the technique of weightlifting exercises: PhD thesis abstract], Moscow, 25 p. (in Russ.)
9. Laputin, N.A. (2004), *Spetsialnye uprazhneniya tyazheloatleta* [Special weightlifter exercises], Fizkultura i sport, Moscow. (in Russ.)
10. Medvedev, A.S., Frolov, A.I. & Furaev, A.N. (1980), "High-speed strength qualities of weightlifters of high qualification and their relationship with technical skill", *Tyazhelaya atletika*, FiS, Moscow, pp. 33-34. (in Russ.)
11. Mikhaylyuk, M.P. (1977), "Speed-power training of qualified weightlifters", *Tyazhelaya atletika*, Fizkultura i sport, Moscow, pp. 46-48. (in Russ.)
12. Oleshko, V.H. (2011), *Pidhotovka sportsmeniv u sylovykh vyдах sportu* [Training of athletes in power sports], DIA, Kyiv. (in Ukr.)
13. Platonov, V.N. (2015a), *Sistema podgotovki sportsmenov v olimpiyskom sporte. Obshchaya teoriya i ee prakticheskie prilozheniya. V 2 kn.* [The system of training athletes in the Olympic sport. General theory and its practical applications. In 2 books], Book 1, Olimp. lit, Kiev. (in Russ.)
14. Platonov, V.N. (2015b), *Sistema podgotovki sportsmenov v olimpiyskom sporte. Obshchaya teoriya i ee prakticheskie prilozheniya. V 2 kn.* [The system of training athletes in the Olympic sport. General theory and its practical applications. In 2 books], Book 2, Olimp. lit, Kiev. (in Russ.)
15. Piven, O.B. & Jim, V.Yu. (2014), "Improvement of the training process of athletes of power sports on the basis of their biorhythms", *Slobozans'kij naukovo-sportivnij visnik*, No. 5 (43), pp. 65-69. (in Ukr.)
16. Piven, O.B. & Dorofeev, T.I. (2017), "Dependence of sports result from data of physical development, morphofunctional and special force readiness of weightlifters at the stage of preliminary basic training", *Slobozans'kij naukovo-sportivnij visnik*, No. 4 (60), pp. 75-85. (in Ukr.)
17. Farfel, B.C. (1963), "Moving qualities of weightlifters", *Tribuna masterov tyazhelayu atletiki*, Fizkultura i sport, Moscow. (in Russ.)
18. Filin, V.P. (1970), *Problema sovershenstvovaniya dvigatelnykh (fizicheskikh) kachestv detey shkolnogo vozrasta v protsesse sportivnoy trenirovki: avtoref. diss. na soiskanie uch. stepeni d-ra. ped. nauk* [The problem of improving the motor (physical) qualities of school-age children in the process of sports training: Doctor of Science thesis abstract], Moscow, 55 p. (in Russ.)
19. Chernyak, A.V. (1970), "Speed-strength training of sportsmen-dischargers", *Tyazheloatlet: sbornik statey v pomoshch treneru*, FiS, Moscow, pp. 28-36. (in Russ.)
20. Cornelius, A.E., Brewer, B.W. & Van Raalte, J.L. (2007), "Applications of multilevel modeling in sport injury rehabilitation research", *International Journal of Sport and Exercise Psychology*, Vol. 5(4), pp. 387-405, doi: 10.1080/1612197X.2007.9671843.
21. Visek, A.J., Watson, J.C., Hurst, J.R., Maxwell, J.P. & Harris, B.S. (2010), "Athletic identity and aggressiveness: A cross-cultural analysis of the athletic identity maintenance model", *International Journal of Sport and Exercise Psychology*, Vol. 8(2), pp. 99-116, doi: 10.1080/1612197X.2010.9671936.
22. Huijing, P.A. (1992), "Elastic Potential of Muscle", *Strength and Power in Sport*, Blackwell Scientific Publications, pp. 151-168.
23. Komi, P.V. (1992), "Stretch-Shortening Cycle", *Strength and Power in Sport*, Blackwell Scientific Publications, pp. 169-179

Received: 10.05.2018.

Published: 30.06.2018.

Information about the Authors

Eugen Bugaev: *Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*

ORCID.ORG/0000-0002-4498-828X

E-mail: Evpug@mail.ru

Viktor Dzhym: *PhD (Physical Education and Sport); Kharkiv State Academy of Physical Culture: st. Klochkivska, 99, Kharkov, 61058, Ukraine.*

ORCID.ORG/0000-0002-4869-4844

E-mail: djimvictor@gmail.com

Olga Boltenkova: *senior lecturer; Kharkov Institute of Finance of Kyiv Trade and Economic University: I. Pletnevsky, 5, Kharkiv, 61003, Ukraine.*

ORCID.ORG/0000-0001-8806-8365

E-mail: o.boltenkova@ukr.net