

Improvement of physical preparedness of sportsmen in kettlebell sport on the stage of the specialized base preparation

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Abstract:

The efficiency of the author program of training of sportsmen in kettlebell sport (long cycle) on the stage of the specialized base preparation by the indexes of general and special physical preparedness is under study in the article. 27 sportsmen (18-24 years old, with 1 digit and KMS) have taken part in the research. They have been included in experimental group (EG, n=13) and control group (CG, n=14). It is clear, that the results of sportsmen in EG almost in all exercises have been better than in CG ($P < 0,05-0,001$), that testifies to the efficiency of the author program.

Keywords: general and special physical preparedness, author program, sportsman, kettlebell sport, long cycle.

Introduction

Today kettlebell sport rapidly develops in the world. There are more different competitions in kettlebell sport: from championships of cities and regions to championships of Europe and world championships [2, 3, 10]. Different people are involved in competitive activity: men, women, juniors, youths, students, veterans. Except classic biathlon the separate type of kettlebell sport develops actively – long cycle (shove two kettlebells from chest with lowering in position of hanging after every getting up) [1, 8, 9].

In contrast to competitions in biathlon (1970), first championship of Ukraine in long cycle was held in 2000 [1]. The popularity of this type of kettlebell sport grows, however, at that time, as a scientific ground of training process in biathlon finds the reflection in works of many scientific [4, 6, 7], the researches, directed on perfection of preparation of sportsmen in long cycle, is conducted not enough.

The development of kettlebell sport in the world, that is confirmed by annual growth of sporting results of participants of competitions from leading countries [3, 9], stipulates hard demands to preparation Ukrainian sportsmen. At the same time, the analysis of the modern training programs in long cycle gives a right to assert about their insufficient efficiency. Growing kettlebell sport popularity and sharpening of competition on an international sporting scene also results to permanent perfection of rules of competitions, calendar of sporting measures, classification norms [1, 8], that requires consideration of the proper changes in the sportsmen training process.

Researching leading scientists' works in industry of sport [5, 6] allows to assert that on the stage of the specialized base preparation, except for perfecting technique of exercises, it is necessary to create a powerful aerobic base, to perfect maximally general and special physical qualities, to increase sportsmen functional potential, that will promote to carry out of large volumes of special work, to form capacities for endurance of the large training load and to increase the level of sporting trade. The results of literature analysis [6, 7, 9] show, that it is very important for sportsmen in long cycle to have good power preparedness in all weight categories, high level of development of endurance and flexibility. Therefore, taking into account the effectively important indexes of physical preparedness, the development of modern author program of training sportsmen on the stage of the specialized base preparation will ensure increase of results in long cycle and make the image of Ukrainian sportsmen on an international sporting scene better.

Materials and methods

27 sportsmen from Lviv aged 18-24, with 1 digit and KMS have taken part in the research. They have been included in experimental group (EG, n=13) and control group (CG, n=14). The sportsmen have been evenly distributed by the weight categories with the for certain even indexes of general and special

physical preparedness ($P>0,05$). Duration of pedagogical experiment – 2 years (4 stages of the author program). The level and dynamics of EG and CG sportsmen physical preparedness indexes were checked up during control training in setup time of every stage of the author program. The indexes of general physical preparedness were checked up during a general preparatory stage, the special physical preparedness – during a special-preparatory stage. The research of indexes of general physical preparedness has been conducted according to the results of: 100 m - running (speed qualities), pulling up on a cross-beam (power endurance), 3 km - running (general endurance), squatting with a barbell (power of muscles of feet), class traction (power of muscles of back), press of barbell lying (power of muscles of chest), inclination of trunk in sitting position (flexibility of the back), crossing of hands behind the back (flexibility of shoulders).

The research of indexes of special physical preparedness has been conducted according to the results of: lifting 2 32 kg - kettlebells on chest for 10 min, bar with 2 32 kg - kettlebells in initial position, shove of barbell (60 %) by a long cycle for 2 min, jumping out with 40 kg - kettlebell for 2 min, bar with 2 24 kg - kettlebells in fixed position.

During the researches the authenticity of difference between the indexes of sportsmen of experimental and control groups by means of Stydent's criterion has been determined. The dynamics of results in each of groups has been also estimated. The aim of article is to explore efficiency of the author program by the indexes of general and special physical preparedness of sportsmen on the stage of the specialized base preparation. Research methods: theoretical analysis and generalization of scientific and methodical literature, pedagogical supervision, testing, pedagogical experiment, methods of mathematical statistics.

Results

Taking into account the results of our previous researches and results of works of leading scientists' works, we have developed the author program of training sportsmen in long cycle on the stage of the specialized base preparation on the basis of effectively important indexes of physical preparedness of sportsmen.

According to the results of previous researches, we have concluded that effectively important indexes of general physical preparedness in long cycle are power of muscles of feet and back, endurance (general and power), flexibility; the effectively important indexes of special physical preparedness in long cycle are results in basic special-preparatory exercises.

The basic differences of the author program from the existent programs are: permanent perfection of effectively important indexes of general and special physical preparedness of sportsmen; narrowing of sporting specialization; increasing volumes of the general and special load (quantity of trainings and hours for a week, lifting of kettlebells, special-preparatory exercises); application of the differentiated approach to perfection of sportsmen physical qualities depending on their weight categories; correlation and interdependence of technical and physical preparedness of sportsmen (the rise of physical preparedness requires transition on the new level of technical preparedness and on the contrary – more perfect technique requires perfection of physical preparedness); individual approach (accordance of the training load with possibilities, weight category and preparedness of sportsman); the use of kettlebells of different weight (16, 20, 24, 26, 28, 30, 32, 34, 36, 40 kg) promote to the rational dosage of load; rational organization of educational-training process.

To verify the efficiency of introduction of the author program of training sportsmen in long cycle on the stage of the specialized base preparation, we have done the analysis of indexes of EG ($n=13$) and CG ($n=14$) sportsmen general and special physical preparedness. The results of the research of indexes of general physical preparedness of sportsmen of EG and CG are resulted in table 1, special physical preparedness – in table 2.

The analysis of the results of 100 m - running has shown that the level of development of speed qualities of sportsmen of both groups were high enough, the indexes of sportsmen of EG and CG between itself for certain do not differ ($P>0,05$) at all stages of research (tabl. 1). Research of dynamics of the results of 100 m - running testifies that the level of speed qualities in the explored groups of sportsmen for certain has not changed during two years of pedagogical experiment ($P>0,05$).

Research of the results in pulling up on a cross-beam testifies that at the beginning of experiment of reliable difference between the level of power qualities of sportsmen of both groups are not exposed ($P>0,05$) (tabl. 1). At the end of the experiment the results of sportsmen of EG have been certainly higher in pulling up than in CG for 1,8 times ($P<0,01$). The analysis of changes of results in pulling up in groups for the period of experiment has shown that in both groups the indexes have become better, but in EG the results have certainly grown for 3,7 times ($P<0,001$), in CG – a difference between the indexes at the beginning and at the end of the research makes only 1,7 times and is unreliable ($P>0,05$) (tabl. 1).

The analysis of the results of 3 km - running has shown that at the beginning of the experiment the indexes of development of endurance of sportsman of EG and CG between itself did not differ ($P>0,05$) (tabl. 1). At the end of the experiment the results of sportsmen of EG of 3 km - running (11 min 47 sec) certainly became better for 34 sec in comparison with the initial data (12 min 21 sec) ($P<0,05$). In CG the indexes also became better for 9,36 sec, but a difference between the results of the first (12 min 29 sec) and last stages (12 min 20 sec) is unreliable ($P>0,05$) (fig. 1). Comparing the level of development of endurance of sportsmen of EG and CG, it is necessary to mark that only at the end of the experiment the difference between the results of sportsmen of EG and CG is reliable and makes 32 sec ($P<0,05$) (fig. 1).

Table 1. The dynamics of indexes of general physical preparedness of sportsmen of EG and CG in the process of the pedagogical experiment ($X \pm m$)

| № | The explored indexes | Stages | EG (n=13) | CG (n=14) | Stydent's criterion (t) |
|----|--|-----------|--------------|--------------|-------------------------|
| 1. | 100 m - running, sec | Beginning | 13,73±0,16 | 13,69±0,13 | 0,22 |
| | | End | 13,69±0,15 | 13,68±0,09 | 0,08 |
| | | t | 0,18 | 0,04 | |
| 2. | Pulling up, times | Beginning | 19,2±0,68 | 19,4±0,75 | 0,20 |
| | | End | 22,9±0,43 | 21,1±0,51 | 2,78 |
| | | t | 4,59 | 1,82 | |
| 3. | 3 km - running, sec | Beginning | 741,15±12,33 | 748,86±11,35 | 0,46 |
| | | End | 706,62±11,87 | 739,50±8,78 | 2,23 |
| | | t | 2,22 | 0,65 | |
| 4. | Inclination of trunk in sitting position, sm | Beginning | 10,8±0,70 | 11,4±0,82 | 0,56 |
| | | End | 14,0±0,40 | 12,2±0,78 | 2,09 |
| | | t | 3,94 | 0,66 | |
| 5. | Crossing of hands behind the back, sm | Beginning | 5,7±0,54 | 5,5±0,66 | 0,25 |
| | | End | 8,2±0,51 | 6,5±0,64 | 2,16 |
| | | t | 3,38 | 1,04 | |
| 6. | Squatting with barbell for 1 time, kg | Beginning | 103,08±4,01 | 106,43±3,93 | 0,53 |
| | | End | 123,08±4,16 | 111,07±4,17 | 2,04 |
| | | t | 3,11 | 0,81 | |
| 7. | The press of barbell lying for 1 time, kg | Beginning | 86,54±2,79 | 87,86±2,66 | 0,34 |
| | | End | 94,23±2,54 | 93,36±2,74 | 0,23 |
| | | t | 2,04 | 1,44 | |
| 8. | Class traction of barbell for 1 time, kg | Beginning | 114,23±3,07 | 111,79±2,93 | 0,58 |
| | | End | 130,46±2,62 | 119,71±2,54 | 2,95 |
| | | t | 4,02 | 2,18 | |

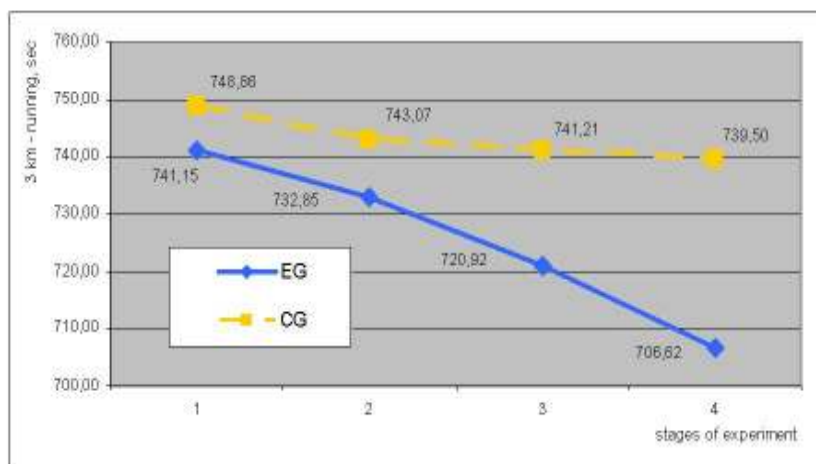


Fig. 1. The dynamics of results on 3 km - running of sportsmen of EG and CG in the process of the experiment (n=27, sec)

Research of indexes of flexibility of sportsmen of EG and CG in the process of the experiment testifies that in inclination of trunk ahead in sitting position at the beginning of the research the results of sportsmen of CG are better than EG for 0,6 sm, but a reliable difference between them is not exposed ($P > 0,05$). At the end of the experiment the indexes of flexibility of back of sportsmen of EG (14 sm) are certainly better than in CG (12,2 sm) for 1,8 sm ($P < 0,05$) (tabl. 1). The analysis of dynamics of indexes of flexibility of back of sportsmen of EG and CG within groups for the period of the experiment has shown that in both groups the results in inclination of trunk ahead in sitting position has grown, however in the EG the results have certainly become better for 3,2 sm ($P < 0,01$), and in CG – for 0,8 sm ($P > 0,05$) (tabl. 1). The analysis of indexes of flexibility of shoulders in crossing of hands behind the back has shown that at the beginning of the research the reliable difference it is not fixed between the results of EG and CG ($P > 0,05$). Only at the end of the experiment it is exposed that results in EG (8,2 sm) in this exercise are certainly better than in CG (6,5 sm) for 1,7 sm ($P < 0,05$) (tabl. 1). Exploring the dynamics of indexes of flexibility of shoulders during the experiment, it is set, that in EG the changes are reliable – the results at the end of the research are certainly higher than at the beginning for 2,5

sm ($P < 0,01$); the results in CG have also become better for 1 sm, but a difference between initial and final data is unreliable ($P > 0,05$) (tabl. 1).

Research of the results in power exercises with a barbell testifies that in all exercises at the beginning of the experiment the indexes of sportsmen of EG and CG certainly do not differ ($P > 0,05$). At the end of the research the indexes of power of muscles of feet of sportsmen of EG in squatting with barbell (123,08 kg) were certainly better than in CG (111,07 kg) for 12,01 kg ($P < 0,05$) (tabl. 1).

The changes of indexes in squatting within groups have shown that in both groups there is a tendency to improve results in the process of pedagogical experiment. In CG the results have grown for 4,64 kg, but a reliable difference between initial and final data is not exposed ($P > 0,05$), and in EG the difference makes 20 kg and is reliable ($P < 0,01$). Comparison of the results of sportsmen of EG and CG in the press of barbell from chest lying testifies that at all stages of pedagogical experiment the indexes of power of muscles of chest of sportsmen of both groups certainly do not differ ($P > 0,05$).

A similar tendency is marked and during the analysis of dynamics of indexes in press of barbell during the experiment – a difference between the indexes of the first and last stages in CG makes 5,5 kg and in EG – 7,79 kg and is unreliable ($P > 0,05$) (tabl. 1). The analysis of the results in class traction of barbell has shown that at the end of the experiment the indexes of power of muscles of back of sportsmen of EG turned out to be better than of sportsmen of CG, for 10,75 kg ($P < 0,01$) (tabl. 1). Research of dynamics of results in class traction in the process of pedagogical experiment testifies that in both groups the results have certainly grown: in EG – for 16,23 kg ($P < 0,01$), in CG – for 7,92 kg ($P < 0,05$) (fig. 2)

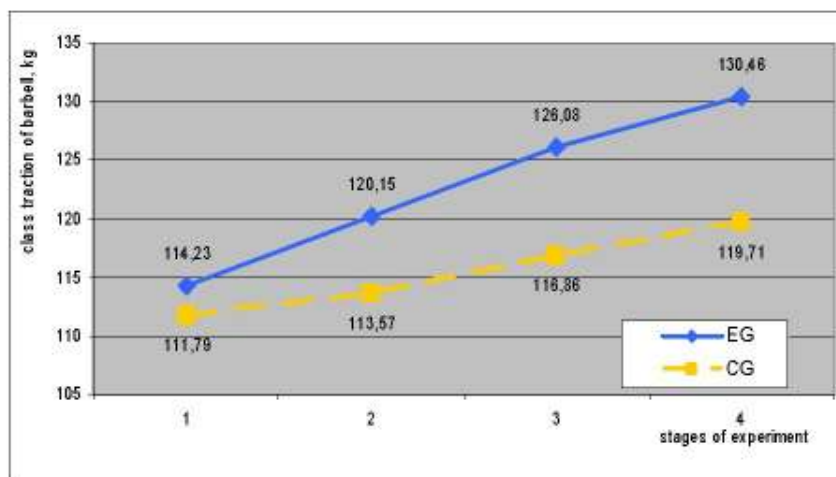


Fig. 2. The dynamics of results in class traction of barbell of sportsmen of EG and CG in the process of the experiment (n=27, kg)

Analysis of indexes of the special physical preparedness by result of lifting 2 32 kg - kettlebells on chest for 10 min has shown that at the beginning of the experiment the indexes of sportsmen of EG and CG certainly did not differ ($P > 0,05$) (tabl. 2). At the end of the research there is a difference between the indexes of group of sportsmen, which has been trained by the author program (64,9 times), and group, which has practiced according to the existent program (54,9 times), has grown to 10 times and is reliable ($P < 0,05$) (fig. 3). Exploring the dynamics of results in lifting 2 32 kg - kettlebells on chest for 10 min during the experiment, we have realized that during two years the results in this exercise in EG and CG have certainly become better.

The difference between initial and final data in CG makes 10,3 times ($P < 0,01$), in EG – 22,8 times ($P < 0,001$) (tabl. 2). Research of results in bar with 2 32 kg - kettlebells in initial position has shown that at the beginning of the experiment the duration of implementation of this exercise by sportsmen of both groups certainly did not differ ($P > 0,05$). At the end of the experiment the result of sportsmen of EG (9 min 03 sec) has certainly prevailed the result of CG (7 min 20 sec) for 1 min 43 sec ($P < 0,01$) (tabl. 2). The analysis of dynamics of results in bar with 2 32 kg - kettlebells in initial position for the period of the experiment has shown that the indexes of sportsmen of both groups had a tendency of improvement.

The difference between initial and final data in CG makes 1 min 11 sec and is unreliable ($P > 0,05$), in EG – 2 min 47 sec and is reliable ($P < 0,01$) (tabl. 2). In the shove of barbell (60 %) by a long cycle for 2 min at the beginning of the research the reliable difference between the indexes of EG and CG was not fixed ($P > 0,05$). At the end of the experiment it is exposed that the results in EG are certainly better than in CG for 1,7 times ($P < 0,05$) (tabl. 2). During the pedagogical experiment the indexes of both groups have certainly grown: in CG – 2,4 times ($P < 0,01$), and in EG – 4,5 times ($P < 0,001$) (tabl. 2).

Table 2. The dynamics of indexes of special physical preparedness of sportsmen of EG and CG in the process of the pedagogical experiment ($X \pm m$)

| No | The explored indexes | Stages | EG (n=13) | CG (n=14) | Stydent's criterion (t) |
|----|--|-----------|-------------|-------------|-------------------------|
| 1. | Lifting 2 32 kg - kettlebells on chest for 10 min, times | Beginning | 42,1±2,95 | 44,6±2,63 | 0,63 |
| | | End | 64,9±2,29 | 54,9±2,21 | 3,14 |
| | | t | 6,13 | 3,01 | |
| 2. | Bar with 2 32 kg - kettlebells in initial position, sec | Beginning | 375,7±23,60 | 368,9±29,08 | 0,18 |
| | | End | 542,6±14,87 | 440,2±24,08 | 3,62 |
| | | t | 4,02 | 2,05 | |
| 3. | Shove of barbell (60 %) by a long cycle for 2 min, times | Beginning | 24,7±0,66 | 25,1±0,81 | 0,36 |
| | | End | 29,2±0,57 | 27,5±0,55 | 2,10 |
| | | t | 5,12 | 2,49 | |
| 4. | Jumping out with 40 kg - kettlebell for 2 min, times | Beginning | 62,1±2,82 | 63,8±3,44 | 0,43 |
| | | End | 78,3±1,70 | 69,1±2,74 | 2,86 |
| | | t | 5,80 | 1,18 | |
| 5. | Bar with 2 24 kg - kettlebells in fixed position, sec | Beginning | 20,2±2,54 | 20,6±1,83 | 0,13 |
| | | End | 43,7±2,29 | 31,9±1,51 | 4,32 |
| | | t | 6,89 | 4,75 | |

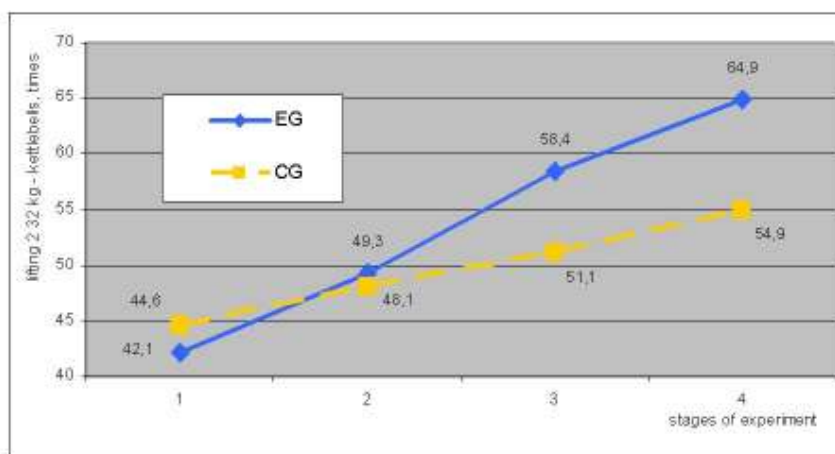


Fig. 3. The dynamics of results in lifting 2 32 kg - kettlebells on chest for 10 min of sportsmen of EG and CG in the process of the experiment (n=27, times)

Research of results in jumping out with 40 kg - kettlebell for 2 min testifies that at the beginning of the experiment the indexes in both groups were certainly identical ($P > 0,05$). At the end of the research the results of sportsmen of EG (78,3 times) were certainly better than in CG (69,1 times) for 9,2 times ($P < 0,01$) (tabl. 2). The analysis of dynamics of results during the period of the experiment has shown that in both groups the changes have a positive character, but in CG the difference between initial and final data makes 5,3 times ($P > 0,05$) and in EG – 16,2 times ($P < 0,001$) (tabl. 2). Analysis of duration of bar with 2 24 kg - kettlebells in fixed position on direct hands has shown that only at the end of the experiment the results in EG is better than in CG for 11,8 sec ($P < 0,001$). Research of changes of indexes during the experiment testifies that at the end of the research the results of sportsmen of both groups were certainly better, comparatively with the initial data: in CG the difference makes 11,3 sec ($P < 0,001$) and in EG – 23,5 sec ($P < 0,001$) (tabl. 2).

Discussion

Analysis of level and dynamics of indexes of general physical preparedness has shown that sportsmen of EG in most power exercises (pulling up on a cross-beam, squatting, class traction), in endurance exercises (3 km - running) and flexibility (inclination of trunk ahead and crossing of hands behind the back) at the end of the pedagogical experiment showed certainly better results than sportsmen of CG ($P < 0,05-0,001$). It testifies efficiency of the author program in relation to perfection of effectively important physical qualities of sportsmen of EG. Only in 100 m - running and in the press of barbell lying the results of sportsmen of EG and CG at the end of the research does not have reliable difference ($P > 0,05$). So, results in 100 m - running and in the press of barbell lying have confirmed our previous conclusions that speed qualities and power of muscles of chest are not effectively important physical qualities for achieving high results in long cycle.

In the whole the conducted research of indexes of general physical preparedness allows to make a conclusion about advantage of the experimental author program above the existing one in relation to

development and perfection of effectively important physical qualities (endurance, power qualities, flexibility) of sportsmen which specialize in long cycle on the stage of the specialized base preparation.

Analysis of level and dynamics of results of sportsmen in special-preparatory exercises has shown that at the end of the pedagogical experiment the indexes of sportsmen of EG in all explored exercises are certainly better than in CG ($P < 0,05-0,001$). It is exposed also that indexes at the end of the research in EG are certainly better ($P < 0,05-0,001$) than at the beginning in all exercises. The difference between initial and final data in most exercises in CG is unreliable ($P > 0,05$). It testifies the efficiency of the author program in relation to perfection of effectively important special qualities of sportsmen in long cycle on the stage of the specialized base preparation.

High level of development of general and special physical qualities of sportsmen on the stage of the specialized base preparation will promote the improvement of their sporting results in long cycle both on this stage and on next stages of many years preparation in kettlebell sport.

Conclusions

The verification of efficiency of the author program has shown its more expressed positive influence, comparatively with the operating program, on the improvement of indexes of general and special physical preparedness of sportsmen in long cycle on the stage of the specialized base preparation.

It is set that sportsmen of EG at the end of experiment have certainly better ($P < 0,05-0,001$) results in pulling up on a cross-beam for 1,8 times, in 3 km - running – for 32 sec, in inclination of trunk ahead from sitting position – for 1,8 sm, in crossing of hands behind the back – for 1,7 sm, in squatting with a barbell – for 12,01 kg, in class traction – for 10,75 kg and in all explored special-preparatory exercises than sportsmen of CG.

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