

Level and dynamics of functional preparedness indexes of kettlebell sportsmen

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Abstract:

The aim of this study was to explore the effectiveness of an experimental training program for athletes in the kettlebell sport during the stage of specialized based preparation using the indexes of functional preparedness. Forty sportsmen (18–22 years old, of grade 1 and candidates in the sports masters grade) took part in the research. Sportsmen either participated in the experimental group (EG, n=20) or the control group (CG, n=20). The indexes (heart rate at rest, blood pressure, vital capacity, duration of delay of breathing during inhalation and exhalation, heart rate recovery time after standard loading) of the sportsmen in the EG were better than those in the CG ($P < 0.05-0.001$). This research shows that this experimental program had a positive training influence on the functional preparedness of the sportsmen involved. This program can increase the competitive results of sportsmen during the next stages of their long-term preparation in the kettlebell sport.

Keywords: functional preparedness, sportsman, kettlebell sport.

Introduction

The aim of sport training is to achieve the maximally possible training level of preparedness of sportsman, conditioned by the specific of kind of sport and requirements to achieve the highest results in the competitive program [2, 4, 8]. Next to permanent perfection of technique of competitive exercises and development of physical qualities, among the basic tasks of sport training there is a providing of necessary level of functional possibilities of the systems of organism, which carry the basic loading in chosen kind of sport [3, 4, 5].

Kettlebell sport is the modern and popular kind of sport that is rapidly developing around the world [1, 7, 9, 10]. The number of international competitions grows annually, the rules of these competitions are improving too. It requires the constant intensification of training process in kettlebell sport. And searching the effective ways to improve different sides of sportsmen' preparation at the stages of long-term preparation. At the same time, the analysis of the modern training programs of sportsmen of Ukraine testifies to their insufficient efficiency [4, 6, 8].

The research of the leading scientists' works in the branch of sport [2, 4, 5] makes it possible to claim that it is necessary to create a powerful aerobic base and increase the functional potential of sportsmen as it promotes the huge implementation of great amounts of special work and helps to form abilities to transfer the large training loads and increase the level of sportsmanship at the stage of specialized basic preparation except the improving of the exercise technique. That is why the development of the modern program of sportsmen' training at the stage of specialized basic training with a consideration of important indexes of functional preparedness will promote the increasing of results in kettlebell sport.

Materials and methods

Forty sportsmen (18–22 years old, with 1 grade and candidates in masters of sport) took part in the research. The sportsmen participated in the experimental group (EG, n=20) and the control group (CG, n=20). Sportsmen were evenly distributed according to the weight categories with certainly equal indexes of functional preparedness ($P > 0.05$). Duration of pedagogical experiment – 2 years. The level and dynamics of indexes of functional preparedness of cadets of EG and CG were checked three times (at the beginning of the experiment, after the first year of the research and at the end of it).

The research of functional preparedness of sportsmen has been conducted after the indexes of heart rate at rest, blood pressure (systolic and diastolic), vital capacity (VC), duration of holding of breathing during the inhalation, duration of holding of breathing during the exhalation, heart rate recovery time after standart loading (20 squats for 30 seconds).

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 indexes in each of groups has been also estimated. The correlation analysis between the indexes of functional preparedness and competition results of sportsmen with a different qualification in the kettlebell sport were taken too (n=34).

The aim of the article is to explore the influence of trainings by the experimental program on the indexes of functional preparedness of sportsmen in the kettlebell sport at the stage of the specialized base preparation.

Tasks of article:

1. To define interconnection between the indexes of functional preparedness of sportsmen and their results of competitions.

2. To develop the experimental program and check up it's influence on functional preparedness of sportsmen.

Research methods: theoretical analysis and generalization of scientific and methodical literature, pedagogical supervision, testing, pedagogical experiment, methods of mathematical statistics.

Results

For research of interconnection between the indexes of functional preparedness of sportsmen and their results of competitions in the kettlebell sport we conducted the correlation analysis of functional parameters of sportsmen with a different qualification (group A and B) with their competitive results (with 32 kg–kettlebells). Group A included sportsmen with 1 grade and candidates in masters of sport (CMS) (n=22), group B – masters of sport (MS) (n=12) (tabl. 1).

Table 1. Interconnection between indexes of functional preparedness of sportsmen with a different qualification (n=34) and their results of competitions in the kettlebell sport

The indexes of functional preparedness	Coefficients of correlation	
	Group A (n=22)	Group B (n=12)
Heart rate at rest	-0.39	-0.57
Systolic blood pressure	-0.09	-0.21
Diastolic blood pressure	-0.15	-0.18
Vital capacity	0.27	0.53
Duration of holding of breathing during the inhalation	0.18	0.33
Duration of holding of breathing during the exhalation	0.20	0.29
Heart rate recovery time after standart loading	-0.34	-0.55

The research of interconnection between the sport results of sportsmen with a different qualification and indexes of their functional preparedness has shown that coefficients of correlation of sportsmen of group B are higher, than in group A after all explored functional indexes (tabl. 1).

The reliably close communication ($P < 0.05$) with the results of competitions in kettlebell sport among the high-ranked sportsmen was defined in the next consequences: heart rate at rest ($r = -0.57$), vital capacity ($r = 0.53$) and heart rate recovery time after standart loading ($r = -0.55$ y.o.). It means that it is necessary to improve functional possibilities of cardiovascular system and respiratory system to increase the results in kettlebell sport. There is a weak interconnection with the rest of indexes in the group B and with all the indexes in the group A ($P > 0.05$) (tabl. 1).

Depending on the works of leading scientists [2, 4, 5] and results of own previous researches [6–10], we have developed the experimental program of training sportsmen in kettlebell sport at the stage of the specialized base preparation that is based on the important indexes of functional preparation. According to the results of previous researches, it is adjusted that important indexes of functional preparation of sportsmen in kettlebell sport are the indexes which characterize the cardiovascular and respiratory systems. The task of the experimental program is to increase the level of effectively important indexes of functional preparedness of sportsmen, to increase the amount of loading at the each stage of program, to achieve the highest implementation of the deep specialization during the preparation to the competitions.

The basic features of the experimental program are: contents of the experimental program is directed on the permanent accented perfection of effectively important indexes of functional preparedness of sportsmen; narrowing sport specialization; increasing the amount of special loading; permanent development of strength of muscles of legs and back; 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 loading with individual possibilities, weight category and preparedness of sportsman); implementation by sportsmen in a special-preparatory stage and competitive period one time for a week competitive exercise with duration more than 5 minutes, and one time on a stage – with duration more than

10 minutes in one approach; the use of kettlebells with different weight (from 16 to 40 kg with a step 2–4 kg) promotes to the rational dosage of load; rational organization of educational-training process (wide use of didactic principles and methods of training and renewal of capacity of sportsman) provides the decrease of level of sporting traumatism and promotes to rapid growth of sport results.

To verify the efficiency of employments by the experimental program to perfection of functional preparedness of sportsmen, we have analyzed the level and the dynamics of indexes of heart rate at rest, blood pressure (systolic and diastolic), vital capacity, duration of holding of breathing during the inhalation, duration of holding of breathing during the exhalation, heart rate recovery time after standart loading among the sportsmen of experimental and control groups (tabl. 2).

Table 2. The level and dynamics of indexes of functional preparedness of sportsmen of EG and CG during the pedagogical experiment ($X \pm m$, $n=40$)

Basic phases of long cycle	Stages	EG (n=20)	CG (n=20)	Stydent's criterion (t)
Heart rate (beats p/min)	1	70.3±1.37	69.4±1.09	0.54
	2	67.2±1.08	68.2±1.08	0.64
	3	64.1±0.83	67.2±1.01	2.41
	t (1–3)	3.90	1.44	
Systolic blood pressure (mmHg)	1	120.4±1.82	120.9±1.51	0.20
	2	119.1±1.51	119.5±1.38	0.21
	3	117.6±1.25	118.4±1.06	0.45
	t (1–3)	1.26	1.36	
Diastolic blood pressure (mmHg)	1	73.9±1.28	72.6±0.79	0.85
	2	72.5±1.06	72.1±0.89	0.34
	3	71.1±0.87	71.7±0.82	0.53
	t (1–3)	1.83	0.81	
Vital capacity (ml)	1	4392.3±119.89	4207.1±121.41	1.09
	2	4538.4±112.28	4385.7±125.71	0.91
	3	4761.5±100.61	4542.9±117.68	1.41
	t (1–3)	2.36	1.99	
Duration of holding of breathing during the inhalation (sec)	1	78.3±2.45	79.4±2.31	0.33
	2	89.5±2.41	85.9±2.52	1.01
	3	101.9±3.12	92.8±2.69	2.20
	t (1–3)	5.95	3.79	
Duration of holding of breathing during the exhalation (sec)	1	43.8±2.03	41.4±1.61	0.96
	2	48.2±1.85	44.9±1.46	1.37
	3	54.5±1.40	49.3±1.22	2.79
	t (1–3)	4.31	3.93	
Heart rate recovery time after dosed physical loading (sec)	1	97.4±2.23	99.7±2.85	0.64
	2	91.2±2.38	94.9±2.54	1.08
	3	84.5±1.86	90.8±2.37	2.12
	t (1–3)	4.45	2.39	

Analysis of heart rate at rest among the sportsmen of EG and CG showed that the indexes are almost similar at the first stage of experiment ($P>0.05$). At the second stage the results of experimental group are better than among the control group for 1 beats p/min, however there is no reliable difference ($P>0.05$) (tabl. 2). At the third stage heart rate of sportsmen of experimental group (64.1 beats p/min) is reliably better than among the control group (67.2 beats p/min) for 3.1 beats p/min ($P<0.05$) that testifies the effect of employment by the experimental program to improve the functional indexes of cardiovascular system among the sportsmen of experimental group (fig. 1).

Analysis of indexes of blood pressure showed that the average meanings of both systolic and diastolic pressures have no real difference at all the stages of pedagogical experiment ($P>0.05$) (tabl. 2). The systolic blood pressure of the EG dropped during the period of research for 2.8 mmHg ($P>0.05$), while the relevant in CG dropped for 2.5 mmHg ($P>0.05$). The diastolic blood pressure among the EG dropped for 2.8 mmHg while the CG's dropped for 0.9 mmHg ($P>0.05$). The research of indexes of vital capacity showed that the indexes of both groups were equal at the beginning of the experiment ($P>0.05$). The average meaning of vital capacity of EG was better than CG at the second stage for 152.7 ml but the difference was unreliable ($P>0.05$). The difference between the indexes of CG and EG increased to 218.6 at the third stage, but stayed unreliable ($P>0.05$) (tabl. 2). The changes of indexes of vital capacity during the research are characterized with positive dynamics in both groups – at the end of the experiment the indexes of vital capacity in EG (4761.5 ml) increased for 369.2 ml relative to the initial data (4392.3 ml) ($P<0.05$). The average meaning of vital capacity in CG was 4207.1 ml while at the end it was 4542.9 ml. So, the difference is 335,8 ml and appears to be unreliable ($P>0.05$).

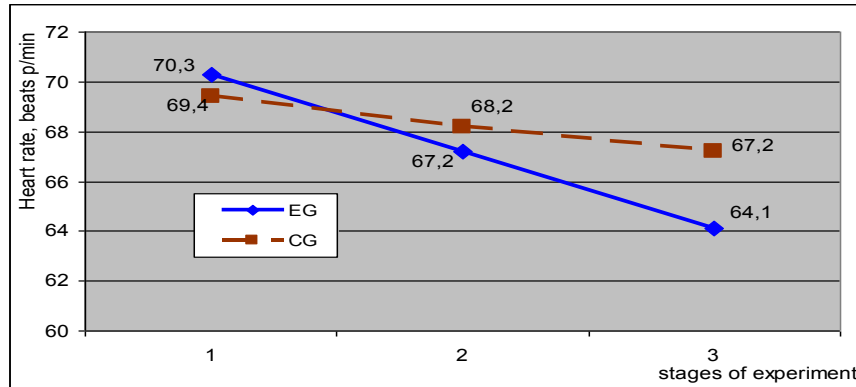


Fig. 1. The dynamics of indexes of heart rate at rest among the sportsmen of EG and CG in the process of the experiment (n=40, beats p/min)

The researches of duration of holding of breathing during the inhalation showed that the indexes at the first and second stages of experiment were similar ($P > 0.05$) (tabl. 2). The average meaning of duration of holding of breathing during the inhalation in EG (1 m 42 sec) prevails the meaning in CG (1 m 33 sec) for 9,1 sec ($P < 0.05$) at the third stage (fig. 2). The analysis of dynamics of indexes of duration of holding of breathing during the exhalation in EG and CG during the pedagogical experiment showed that there is an improvement of indexes in both groups. However, the results of EG are more notable. In such reason, the difference between the initial and final data in EG is 23.6 sec ($P < 0.001$), in CG – 13.4 sec ($P < 0.01$). It confirms that there is an effectiveness of experimental program of the sportsmen in the kettlebell sport.

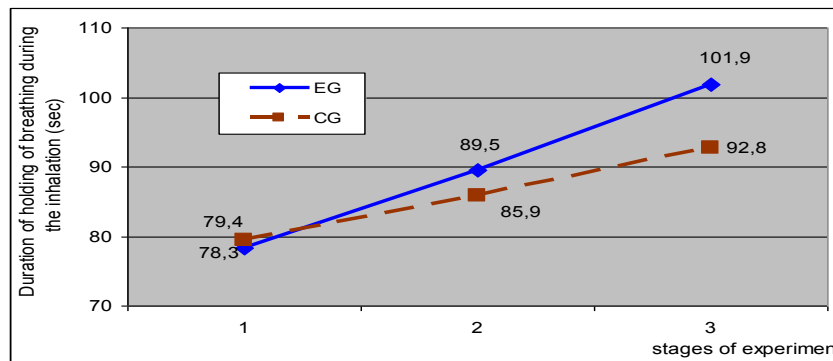


Fig. 2. The dynamics of indexes of duration of holding of breathing during the inhalation of EG and CG in the process of the experiment (n=40, sec)

We have found the similar tendency of changes of indexes of duration of holding of breathing during the exhalation. There was no difference between the average meanings of indexes of CG and EG at the first stage ($P > 0.05$), and there was the same small difference at the second stage ($P > 0.05$). The difference between indexes of duration of holding of breathing during the exhalation in the EG (54.5 sec) and CG (49.3 sec) is 5.2 sec and appears to be reliable at the third stage ($P < 0.05$). It was also found that indexes of duration of holding of breathing during the exhalation among the sportsmen of both groups have grown during the experiment. So, the difference between the initial and final data in EG and CG is reliable ($P < 0.01$) but in EG it is 10,7 sec, in CG – 7,9 sec (tabl. 2). It confirms the positive influence of the exercises provided by the experimental program to the functional preparedness of respiratory system of sportsmen of EG.

Analysis of heart rate recovery time after dosed physical loading showed that there was no reliable difference between the indexes of sportsmen of EG and CG at the first and second stages ($P > 0.05$). At the third stage the indexes of heart rate recovery time among the sportsmen of EG (1 m 25 sec) were better than among those who represented CG (1 m 31 sec) for 6,3 sec ($P < 0.05$) (tabl. 2). As a result, the analysis of indexes of functional preparedness of sportsmen of EG and CG confirmed that the training based on the experimental program has better influence than traditional one on improving functional possibilities of cardiovascular and recovery system.

Discussion

Analysis of the level and dynamics of indexes of functional preparedness showed that after most explored parameters the indexes of EG were certainly better than the indexes of CG at the end of the pedagogical experiment. It proves the effectiveness of experimental program that helps to improve the important indexes of

functional preparedness of sportsmen of EG. The research of dynamics of heart rate during the pedagogical experiment confirms that both groups have improved their indexes of cardiovascular activity for 2,2 beats per minute in CG and for 6,2 beats per minute in EG. The difference between those indexes in CG is unreliable ($P>0.05$), in EG is reliable ($P<0.01$). Analysis of indexes of blood pressure also showed that, there is no reliable difference among the indexes at the beginning and at the end of experiment ($P>0.05$), the changes of average meanings in EG have more pronounced tendency to lower. The changes of vital capacity in EG during the experiment are reliable ($P<0.01$) and in CG – unreliable. Analysis of changes of indexes used to show the duration of holding of breathing during the inhalation and exhalation in EG and CG showed that the improvement of indexes has its place. However, the results of EG are more visible.

This research allows us to define the advantages of experimental program over the traditional one at the stage of specialized basic preparation as a conclusion. This high level of indexes of functional preparedness at the stage of specialized basic preparation will promote the improvement of the sportsmen' results in kettlebell sport at all the stages of preparation.

Conclusions

1. The audit of effectiveness of the experimental program confirmed its more positive influence in comparison with the operating program on the improvement of indexes of functional preparedness of sportsmen in kettlebell sport.

2. It is exposed that at the end of experiment the sportsmen of EG have certainly better ($P<0.05-0.001$) than in CG indexes of heart rate – on 3.1 beats p/min, duration of holding of breathing during the inhalation – on 9.1 sec, duration of holding of breathing during the exhalation – on 5.2 sec, heart rate recovery time – on 6.3 sec.

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