

Increase in level of special physical fitness of the athletes specialising in different combat sports (judo, sambo, combat sambo) through of crossFit training

Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Manuscript Preparation
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Abstract

Background and Study Aim:

The experts consider the level of athletes' special endurance development to the intensive training and competitive influences as the definite factor of success in the competitive activity of athletes in the current context. The aim of this study is knowledge about the possibility of a significant increase in this motor ability of the athletes practising different types of combat sports (judo, sambo, combat sambo).

Material and Methods:

The ninety athletes practising judo, sambo and combat sambo participated in researches. The age of athletes was 19-23 years. Sports qualification of athletes was: 67 candidates master of sports and 23 masters of sports of Russian Federation in combat sports (single combats). Duration of researches was 1 year. For an increase in the level of athletes' special endurance were used exercises of crossFit training. Trainings included series of exercises aimed at the development of high-speed and strength abilities of athletes and special endurance. The following tests were applied to evaluate the level of athletes' special endurance: Sterkowicz Special Judo Fitness Test (SJFT), the test with 60 throwings of 2 sparring partners and simultaneous evaluation of execution method of combat methods, the standard run test and ECG recording method of Zavyalov.

Results:

The reliable differences ($p < 0,01$) were revealed in evaluations of exhaustion level after the performance of specific loads of athletes in experimental and control groups. It was revealed that the level of athletes' exhaustion was significantly lower. The reliable higher values ($p < 0,01$) of the SJFT index were also revealed at athletes of experimental groups (sambo and combat sambo). The received values confirm about a higher level of special endurance at athletes of experimental groups, in comparison with control groups.

Conclusions:

Search of new, scientifically based techniques and programs of intensive functional training of athletes is necessary. Researches of authors of article demonstrate that use of crossFit-training in athletes training activity from different types of fight allows to achieve a significant increase in the level of special fitness to specialised physical impacts.

Keywords:

electrocardiogram (ECG) • exhaustion zone • special endurance • training loads

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Combat sport – *noun* a sport in which one person fights another, e.g. wrestling, boxing and the martial arts [54].

Combat sports – the group of sports disciplines, in which the gist of the competition is the direct clash of two competing athletes. They are affiliated to the national and international sports organisations in order to carry out the official competition, classification, etc. [55]; "every combat sport is martial arts but not vice versa" [55, p. 18].

Martial arts – *plural noun* any of various systems of combat and self-defence, e.g. judo or karate, developed especially in Japan and Korea and now usually practised as a sport [54].

Competition (as sport rivalry) – refers to a contest between individuals, groups, teams or nations, which has been arranged in advance according to the principle of equal chance [55].

Ability – *noun* **1.** a natural tendency to do something successfully or well **2.** a high degree of intelligence or competence **3.** a particular gift for doing something well [54].

Abilities (motor abilities) – stable, enduring traits that, for the most part, are genetically determined and that underlie a person's skill in a variety of tasks. People differ with respect to their patterns of strong and weak abilities, resulting in differences in their levels of skill [57].

Microcycle – *noun* a training cycle that typically lasts for one week [54].

Technique – *noun* a way of performing an action [54].

Technique – specific procedures to move one's body to perform the task that needs to be accomplished [56].

Sports technique – a method of performing a motor task specified in the rules of a given sports discipline that depends on particular athletes' somatic, motor and psychic properties [58].

INTRODUCTION

The experts note that recently a lot of combat sports federations actively change the rules of single combats competitions and increase their dynamics and visual appeal. It is determined by the desire to get more fans of this type of martial arts (after all, every combat sports is martial arts). It is also determined by strict requirements of sponsors and advertisers to see as much as possible people at respective competitions. The last changes in rules of competitions make athletes to perform in competitive activity a large number of various technical actions and to apply offensive style [1, 2]. New rules of competitions demand higher standards of athletes' special physical fitness level. These rules predetermine the necessity of new approaches searches to the organisation of training activity. Such approach promotes the fullest realisation of athletes' motor abilities [3, 4]. The article is devoted to the last recommendations of experts to the level of athletes' fitness specialising in the most popular sport version "toe-to-toe": judo, sambo and combat sambo.

In the last two decades, martial arts with using of punch as elementary means of actions (boxing, jujitsu, sambo) and military combat methods became very popular among young people in many countries of the world [5]. For example, in Australia, Belgium, Canada, Finland, France, and the Netherlands, martial arts are included in the list of 10 most popular sports among youth [6]. The high intensity and brutalisation of competitions according to formula MMA (which perverse sport mission and educational and health potential of combat sports) requires of neo gladiators the high development level of general and special endurance [7, 8]. The main attention of experts of combat sports is paid to a search of effective opportunities of the maximum increase of athletes' functional fitness level to competitive activity [9, 10].

The judo is a sport in which the level of high-speed, strength and functional fitness of athletes substantially determines the level of their sports achievements. The value of high-speed and strength productivity level of judo athletes is a key factor in the successful realisation of

technical and tactical actions in the conditions of combat competition. However, still, there is no consensus about effective methods of high-speed and strength endurance development of judo athletes [11]. Most of the coaches advise solving this problem at the selection stage in judo schools: selection of young people who demonstrate the high level of physical qualities and motor abilities development [12]. It is revealed that the level of physical superiority of young people at the time of selection in judo schools cannot be the objective criterion of achievement of high sports results by them in the future [13]. For an increase in the level of special endurance of judo athletes, coaches often increase the volume of loads at the stage of precompetitive training of athletes. It is revealed that considerable physical activities in combination with long psycho-emotional tension cause change of immunological indicators of judo athletes. It leads to an essential decrease in immunity to the various diseases [14]. The experts note the impossibility of infinite increase in training loads in sports combat [15, 16]. Thus, it is necessary the search of new, effective techniques of training the judo athletes. Such techniques have to guarantee an essential increase in the level of special endurance at the decrease in the negative effects (exhaustion, a decrease in immunity, etc.).

The experts confirm that in modern sambo achievement of high sports results is connected with the number of performance by sambo athletes of various technical actions. If the sambo athlete performs more technical actions in comparison with the rival, his chances of a victory in the competition will be higher [17]. Coaches and athletes should consider activity indicators for planning the competitive activity (to define the number of attempts of techniques performance in every minute of a competition). It is known that athlete should have the sufficient level of functional fitness for the high-quality performance of a large number of the attack actions during all competition. First of all, it is the high level of special endurance development. Increase in special endurance level requires improvement of the scientific and methodical base of sambo athletes training. The experts pay attention to the improvement of the existing evaluation system

of athletes' organism functional reserves level and optimisation of its training loads [18, 19]. The authors of theory and technique of athletes' training suggest using competitive and special preparatory exercises for development of special endurance in training process [20, 21]. It is necessary to consider that these exercises have to be similar in structure and form of performance to the competitive activity of athletes. The experts suggest using specialised tests for precise evaluation of athletes' special endurance development level. These tests represent a performance by an athlete of throws with various amplitude during the certain time: special combat dummies; sparing partners [22].

The process of professional athletes training in the conditions of intense training and competitive influences has to be based on the basis of operational and exact information about the level of athletes' physical condition [23, 24]. The experts consider that the method of ECG (electrocardiogram) is one of the most effective and informative methods of evaluation of muscular load influence level on a human body [25]. This method was officially included in the list of the recommended methods of professional athletes screening issued for professional coaches of the USA [26]. The experts recommend using ECG in athletes' training process [27]. Control over a condition of athletes' cardiovascular system by means of ECG method allows to prevent the development of pathological states and to evaluate the level of myocardium adaptation to the physical activities [28] objectively.

The analysis of scientific data demonstrated that various authors consider the main direction of sports version "toe-to-toe" researches the study of the possibility of an essential increase in the level of athletes' special physical fitness to competitive activity. For example, 67 significant scientific researches devoted to the judo were published for the last 16 years in Russian Federation. More than a half of them (42 theses), concerned problems of increase in the general and special efficiency of judo athletes [29]. The experts consider the value of judo athletes' special endurance level as special physical fitness. The ability to resist the coming exhaustion is a key indicator of professional athletes' training efficiency [30, 31]. The researches of authors are directed to study of opportunities of a significant increase in the level of athletes' special endurance specialising in popular types

of combat sports: judo, sambo, combat sambo. Some experts suggest using the interval training for an increase in the level of athletes' special endurance [2] and techniques of an intensive cardio and strength building training [32, 33].

Authors presupposed that use of means and methods of intensive cardio and strength building training (crossFit) in the training process of elite athletes would promote a significant increase in the level of athletes' special endurance to intensive specific loads. This training is based on the performance of various complexes of physical exercises: run, weightlifting, gymnastics and ballistic exercises [34, 35]. All exercises have to be performed as fast as possible, as certain series, with a limited time interval of recovery between series of exercises. Scientists report about quite significant improvements of athletes' functional fitness level using a crossFit-training in the training sessions [36, 37]. It should be noted that crossFit today is one of the most popular types of intensive functional training for physically active population [38, 39].

Authors determined the identification of a possibility to increase in level athletes' special endurance in different types of combat sports by means of a crossFit-training as a main objective of researches.

MATERIAL AND METHODS

Participants

Six groups of athletes (n = 90) divided into equal groups were composed for researches. Groups no 1 and no 2 consisted of judo athletes. Groups no 3 and no 4 consisted of sambo athletes. Groups no 5 and no 6 consisted of combat sambo athletes. Level of athletes' sports skill was the following: 22 candidate master of sports and 8 masters of sports in judo, 21 candidate master of sports and 9 masters of sports in sambo, 24 candidate master of sports and 6 masters of sports of Russia in combat sambo. The age of athletes was 19-23 years.

Organization of the researches

Researches are devoted to the search of ways to increase in level the special endurance of athletes practising different types of single combats: judo, sambo, combat sambo. The research was conducted in Academy of Dmitry Mindiashev (Krasnoyarsk, Russia). This academy is the large

Tactics – decisions and actions of players in the contest to gain an advantage over the opposing players [56].

Tactics – *plural noun* the art of finding and implementing means to achieve immediate or short-term aims [54].

Sambo – is a Russian martial art and combat sport. The word "SAMBO" is an acronym for SAMOzashchita Bez Oruzhiya, which literally translates as "self-defence without weapons". Sambo is relatively modern since its development began in the early 1920s by the Soviet Red Army to improve their hand-to-hand combat abilities. It was intended to be a merger of the most effective techniques of other martial arts. The pioneers of Sambo were Viktor Spiridonov and Vasili Oshchepkov. Oshchepkov died in prison as a result of the Great Purge after being accused of being a Japanese spy. Oshchepkov spent several years living in Japan and training in judo under its founder Jigoro Kano [Wikipedia].

training centre of athletes taking prizes at competitions of the highest level during a long time: Europe Cups, World Cups, Olympic Games. Duration of researches was 1 year. The program of training at all athletes consisted of daily training sessions, lasting from 2 to 2.5 hours. Training sessions of athletes included: training and improvement of performance technology of technical actions performed in standing position and mat wrestling; general and special physical training; technical and tactical preparation (training competition). General and special physical training of athletes includes: cross run 2 times a week (45-60 minutes); trainings in the gym (2 times a week, 60-90 minutes) aimed at the development of maximum muscle strength and strength endurance (exercises with weights); circuit training. Circuit training represents the consecutive impact on all primary muscular groups due to the selection of the physical exercises which are performed in series as continuous or interval training. The advantage of circuit training is the possibility to use it practically at all stages of athletes' training year cycle.

Circuit trainings of athletes of control groups №1, № 3, № 5 represented performance by athletes of various physical exercises (power and gymnastic direction). Set of exercises consisted of pulls up; pushups; skip jumping; high jumping; snatch and shot put (16-32 kg); rope climbing. Trainings consisted of the sets of exercises performed in a certain sequence (so-called stations) during a certain period with identical intervals of recovery. The usual practice of circuit trainings provides 3 minutes of exercises performance (during this time athlete passes 3 stations) and 1 minute of recovery. Duration of circuit trainings was 45-60 minutes, at 2-times trainings in a week.

It was offered to the athletes from groups №2, №4, №6 (experimental groups) to replace circuit trainings with crossFit-training. These training included series of the exercises aimed at the development of high-speed and power abilities of athletes and at the same time as of special endurance development. The experts refer to these exercises the following: snatch and shot put (16, 24 and 32 kg); hang squat (50-80% of body weight); front squat (70-80% of body weight). Also, athletes performed one-legged squat (alternate), jump to the platform (height of the platform is 50-120 cm), a jumping squat with weight (15 kg). Athletes performed moving of heavy load – sacks with sand (30-40 kg)

on speed, accelerations (60-100 m). All exercises were performed by series of 5 minutes – a time of competition in sambo and combat sambo. It should be noted that in judo duration of competition is 4 minutes. It is known that in the main time of a fight often it is not possible to define the winner and golden score is appointed. Therefore authors found it possible to use this time interval for judo athletes of the experimental group. The general duration of crossFit-trainings was 2 trainings, each of them was 60 minutes, 2 times a week. Recovery intervals between series gradually decreased. The first 3 months the recovery interval between series of exercises was 2.5 minutes, from 3 to 6 months was 2 minutes. From 6 to 9 months the interval of recovery was minimised to 1.5 minutes. From 9 months before the end of researches recovery interval between series of exercises was 1 minute. The main differences of crossFit-training from circuit training in the experiment were the following: a large choice of specialised exercises in crossFit-training (jump to the platform, moving of heavy load, etc.) and consecutive decreasing of recovery intervals between exercises.

Specific tests were applied to evaluation the level of athletes' special endurance development. The Stanisław Sterkowicz special judo fitness test (SJFT), with the subsequent evaluation of the level of athletes' special endurance of was used according to the recommendations of Franchini and Sterkowicz [40]. In addition to this test, authors applied the test with 60 throwings of 2 sparring partners and simultaneous evaluation of execution method of combat methods. Results of this test will help to reveal the level of muscular load influence on the organism of the studied athletes and indicators of special motor abilities development of athletes.

The standard evaluation test of professional athletes' functional condition level of run on the spot within 3 minutes, with a frequency of running steps not less than 180 per minute was used in researches. The ECG was registered at all athletes: before the performance the test, after the performance and at the end of every minute of recovery after load (the general interval of recovery should not exceed 5 minutes). Besides, it was decided to apply the method of professor A. Zavyalov for evaluation the level of athletes' functional condition [19]. This method includes registration of ECG indicators of athletes directly during the trainings. Also, the method includes

evaluation of the received indicators on the emergence of ST ischemic segments and flat T – as objective indicators of acute fatigue of heart muscle during the training. The method of professor A. Zavyalov was used for evaluation of athletes' special endurance level at the performance of the test with throwings of two sparring partners within 5 minutes (time of competition in sambo). The evaluation consists in giving certain points to various indicators of athletes' ECG during the performance of the special physical activity. The load is evaluated from 18 to 21 points before the emergence of the plateau on the ECG – flat T. The emergence of the plateau is evaluated at 22 points. Then it is necessary to consider a percentage ratio of the quantity of ST ischemic segments and existence of the plateau. The last indicators of a zone of moderate fatigue are the existence of ST ischemic segments (up to 50% of complexes of ECG) and the emergence of the plateau on flat T (more than 50% of cases: 25 points). The existence of ST ischemic segments in 50-80% of complexes of ECG (26 points) serves as a criterion of acute fatigue. The existence of ST ischemic segments was evaluated at more than 80% of complexes of ECG at 28 points.

Statistical Analysis

The statistical analysis of research results was carried out with the application of the SPSS20 program. The reliability of differences in results of average values in two connected samples was definite with the help of Student t-test.

RESULTS

It is necessary to emphasise that results of tests at the beginning of the researches did not allow to reveal reliable differences in the level of special endurance development at any group of athletes. At the same time on the end of the experiment obtained data confirmed the increase in the studied indicators at athletes of control and experimental groups. Time of athletes' organisms recovery after the performance of special loads also decreased.

At the beginning of the researches in Sterkowicz fitness test (SJFT) was revealed that evaluation of athletes' fitness level was within of the average level. Judo athletes of group №1 demonstrated the average index 13.39 ± 0.23 , judo athletes from group №2 13.39 ± 0.18 . Sambo athletes from group №3 demonstrated the average index

13.40 ± 0.33 , sambo athletes from group №4 13.41 ± 0.15 . Combat sambo athletes demonstrated on average: group №5 13.40 ± 0.36 , group №6 13.39 ± 0.21 . At the end of researches average values of the index of SJFT significantly changed ($p < 0.01$) towards an increase in the level of athletes' fitness for specific loads. However, the general level of indicators remained within of average indicators. The group of judo athletes №1 demonstrated the average index 13.06 ± 0.13 , judo athletes of group №2 13.04 ± 0.22 . Sambo athletes from group №3 demonstrated the average index 13.23 ± 0.06 , sambo athletes of group №4 13.11 ± 0.18 . Combat sambo athletes from group №5 demonstrated the index 13.25 ± 0.24 , and from group №6 13.12 ± 0.14 . The experts note that these indicators of the index of SJFT are considered as average. At the end of the experiment were found reliable differences ($p < 0.01$) in average values of Sterkowicz SJFT index in athletes of experimental and control groups of sports and combat sambo. Higher evaluations of this index were demonstrated by the athletes using a crossFit-trainings.

In the test with 60 throwings of 2 sparring partners at the beginning of the experiment, it was not succeeded to find significant differences in temporary indicators of cardiovascular system recovery. On average, the total time of heart rate recovery at athletes of control and experimental groups was 2.43 ± 0.34 minutes. At the end of researches, it was revealed reliable decrease ($p < 0.01$) in time of athletes recovery of all groups participated in the experiment. The analysis of the received results did not allow authors to reveal reliable differences between temporary indicators of recovery of athletes' heart rate at various groups. Also, experts did not manage to reveal essential differences in execution method by athletes of combat methods during this test. All athletes performed throwings without appreciable technical errors.

Results of implementation of the standard running test at the beginning of the researches did not allow to reveal reliable differences in recovery level after loads at athletes of all studied groups. On average, time of recovery of athletes' organisms was less than 4 minutes (3.53 ± 0.12). At the end of the experiment indicators of time of athletes' organism recovery of control and experimental groups after the performance of standard physical activity authentically ($p < 0.01$) changed towards the reduction of time of recovery. At

judo athletes of the group, no 1 time of recovery was 3.46 ± 0.17 , judo athletes of no 2 group 3.45 ± 0.45 . Sambo athletes from the group, no 3 on average, demonstrated time of recovery 3.44 ± 0.21 , sambo athletes from the group no 4 3.46 ± 0.28 . In combat sambo athletes from the group, no 5 demonstrated average recovery interval after loads 3.46 ± 0.13 and from the group no 6 3.44 ± 0.34 . Statistically reliable differences in results of recovery time between athletes from different groups were not revealed.

The reaction of an organism to load at throwings of two sparring partners within 5 minutes at the beginning of the experiment demonstrated that this load was rather essential to athletes. At judo athletes from the group, no 1 the acute fatigue – the existence of ST ischemic segments in more than 80% of complexes of ECG was revealed. Authors found critical fatigue in athletes of other studied groups – the existence of ST ischemic segments in more than 80% of complexes of ECG in combination with the plateau. At the emergence of the plateau at the decrease in segments of ST on ischemic type in more than 80% of the ECGs, complexes are recommended to stop the further physical activity. At the end of the experiment indicators of critical fatigue were revealed only at representatives of combat sambo (group no 5). Reaction to load at judo athletes (group no 1) decreased a little and was 27 points. At sambo athletes (group no 3) the level of fatigue decreased to acute and was 28 points. At athletes of all experimental groups (judo, sambo and combat sambo) the level of fatigue decreased from 29 to 25 points and passed into a zone of moderate fatigue. These indicators demonstrate the growth of adaptation opportunities of the organism to intensive physical loads and increase the level of special endurance of the athletes using a crossFit-training (Table 1).

DISCUSSION

Results of the conducted researches prove the importance of the use of crossFit-training in the process of athletes' professional activity. It is known what the main criteria of athletes functional fitness to intensive physical activity are the following: economy of physiological systems functioning; the functional resistance of the organism to specialised physical activities [19]. Application of crossFit-training allowed athletes demonstrate authentically ($p < 0.01$) the best

evaluations of the reaction of the myocardium to specialised physical activity: the test with throwings of two sparring partners within 5 minutes. In sambo and combat sambo are found in athletes of experimental groups authentically ($p < 0.01$) better values of Sterkowicz special judo fitness test index. Evaluation of indications of this index was made taking into account the recommendations of scientists Franchini and Sterkowicz. [40]. The values received during the researches confirm about a higher level of special endurance development of the professional athletes using crossFit-training.

It should be noted that it is not recommended to refuse completely of standard techniques of increase in the level of athletes special endurance (including circuit trainings). It is revealed that athletes of control groups also demonstrated reliable ($p < 0.01$) decrease in time of recovery after the standard test with run load and the test with 60 throwings. According to the experts, recovery speed after training and competitive loads is the most important factor of influence on the achievement of progress by athletes [19, 20]. Circuit trainings of sufficient intensity exert a positive impact on the development level of athletes' special endurance. It is explained the rather high popularity of circuit trainings at many coaches, especially in the countries of the former USSR. It is known that circuit trainings were widely used in the Soviet Union in the seventies of the last century. Techniques of their use are already described in the scientific literature [41]. Scientists note that many experts and coaches are not interested in data of modern scientific research. Such coaches organise the long-term process of athletes' training on the basis of traditional (well known) techniques or being guided by own preferences [33]. Especially obviously this tendency is traced at coaches in combat sambo. Practical activities of such coaches are based on the existing traditions of training and subjectivity [42].

At the same time the last scientific researches of foreign scientists, coaches and experts do not attract attentions of the considerable part of Russian coaches by types of fight in various of sport version "toe-to-toe". Level of knowledge of coaches and athletes of new, modern methods of training is one of the factors of a successful performance of athletes (and neo-gladiators) at competitions [43, 44]. As

Table 1. Recovery indicators after athletes' test loads.

Groups of athletes (n = 90)	Informative indicators							
	Judo fitness-test		Test with 60 throwings		Standard run test		Throwings (5 minutes)	
	S	F	S	F	S	F	S	F
Group №1 (n = 15)	13.39 ±0.23	13.06 ±0.13	2.44 ±0.28	2.35 ±0.21	3.54 ±0.18	3.46 ±0.17	28	27
Group №2 (n = 15)	13.39 ±0.18	13,04 ±0.22	2.42 ±0.35	2.34 ±0.43	3.52 ±0.21	3.45 ±0.45	29	25*
Group №3 (n = 15)	13.40 ±0,33	13.23 ±0.16	2.43 ±0.12	2.35 ±0.27	3.53 ±0.16	3.44 ±0.21	29	28
Group №4 (n = 15)	13.41 ±0.15	13,11 ±0.18*	2.42 ±0.45	2.35 ±0.14	3.53 ±0.26	3.46 ±0.28	29	25*
Group №5 (n = 15)	13.40 ±0.36	13,25 ±0.24	2.44 ±0.18	2.36 ±0.31	3.52 ±0.23	3.46 ±0.13	29	29
Group №6 (n = 15)	13,39 ±0.21	13,12 ±0.14*	2.44 ±0.13	2.34 ±0.24	3.53 ±0.12	3.44 ±0.34	29	25*

Note: **S** the beginning of researches, **F** the end of researches, *accuracy $p < 0.01$

indirect confirmation of insufficient scientific and methodical qualification of the Russian coaches is the invitation in 2008 of Italian expert E. Gamba as head coach of national judo team of Russia [45].

Increase in level of special endurance and speed of execution method at athletes of combat sambo will be promoted by methods of intensive muscular training in combination with interval methods of training [20]. The interval method represents the attempt of increase in the level of athletes' endurance. It occurs due to the reduction of time for recovery between training influences. Therefore, crossFit-trainings are suitable for the development of these abilities in athletes. Experts note that question of the use of interval training in the course of training of the elite sambo athletes is not reported in scientific literature. The perspective direction can be considered an increase in the level of special physical training of sambo athletes due to use of various modes of interval strength training in training activity [3]. There are original researches recommending the use of swimming in the precompetitive training of sambo athletes. For an increase in the level of special endurance, it is recommended to swim 250 m with the maximum speed and to spend no more than 5 minutes for overcoming a distance [46]. Researches revealed that crossFit-training promote an increase in the level of athletes' functional fitness (the professional athletes and beginners of combat sambo) [33].

CrossFit-trainings are capable to provide athletes with the high level of organism functional fitness to intensive training and competitive influences. Such trainings significantly increase the level of development of other physical qualities (for example, muscle strength). High values of muscle strength indicators development have great value for combat sambo athletes [47]. High indicators of the strength of hacking will also be the necessary criterion of athletes' success definition factor for those who specialised in hacking and the rival's throwings: judo athletes, sambo athletes, etc. [48]. Some exercises from crossFit-training (jumps through barriers, throws of the stuffed ball) can help athletes of combat sambo with the development of explosive strength [49, 50].

It should be noted that crossFit-trainings at athletes of all experimental groups were performed with respect to the last scientific researches: it is recommended to choose special days for crossFit. The use of intensive functional training is not welcomed by experts in daily trainings [51]. Many experts pay attention to the need for accounting the ratio of physical activities and intervals of recovery in training process of professional athletes [52, 53].

CONCLUSIONS

Modern requirements of most federations of judo, sambo dictate need of search the opportunities of a significant increase in the level of

athletes' special fitness to the offensive style of competition. The special fitness is the level of athletes' special endurance development. At the same time, it is possible to note the absence of opportunities for further increase of training loads without prejudice to athletes' health. A search of new, scientifically based techniques

and programs of intensive functional training of athletes is necessary. Researches of authors of article demonstrate that use of crossFit-training in athletes training activity from different types of fight allows to achieve a significant increase in the level of special fitness to specialised physical impacts.

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