

Dynamics of special endurance of athletes aged 13-15 years under the influence of the program of the Cossack duel

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Author contributions: A - Study design; B - Data collection; C - Qualitative analysis; D - Manuscript preparation; E - Funds Collection

Abstract

Background and Study Aim

National sports are gradually spreading around the world and becoming international. One of such sports is the Cossack duel - a national martial art in Ukraine. In addition to the purely sports component, this sport has national traditions of educating healthy youth. The purpose of the study is to identify the impact of the Cossack duel program on the special endurance of athletes aged 13-15 year.

Material and Methods

Athletes (n = 6, age - 13-15 years) of the Cossack duel department of the sports school № 6 (Kharkiv, Ukraine) took part in the study. The children's parents agreed to participate in the study. The study was conducted with athletes of the basic training group on the Cossack duel (sports school №6, Kharkiv, Ukraine) for two years. At the beginning, a preliminary test of the level of special endurance of athletes was conducted. In the end, the final testing of the level of special endurance development of young athletes was conducted. SPSS was used to process the test results. The confidence level is 0.05.

Results

It is established that for two years of using the author's program the density of shock actions of athletes has increased significantly. This is manifested in an increase in the number of blows to the bag with his hands and feet ($p < 0.001$). It was found that the load of maximum intensity during one round caused significant changes in the cardiovascular system. These indicators were almost indistinguishable (0.7%). The process of restoring heart rate has become more advanced. After 60 sec. recovery difference was 13.2%, and after 120 sec. - 16.1%.

Conclusions

One of the main factors in the training of athletes in the Cossack duel is special endurance. Among the effective methods of improving special endurance are interval and interval-circle training methods. To control the development of special endurance of athletes, it is advisable to use a 1.5 - minute test with the performance of shock actions with hands and feet on a punching bag. Criteria for assessing special endurance should be the intensity of the kicks, heart rate. It is necessary to remember the harmonious upbringing of the individual, to apply health-preserving technologies, to pay great attention to the upbringing of young people in the spirit of respect for national traditions.

Keywords:

basic training, national sport, spike motion, evaluation criteria.

Introduction

National sports are gradually spreading around the world and becoming international. One of such sports is the Cossack duel - a national martial art in Ukraine. In addition to the purely sports component, this sport has national traditions of educating healthy youth. Over the past few years, this type of martial arts has developed rapidly in various countries around the world. This has led to increased competition in international competitions, forcing athletes and coaches to find ways to optimize the training process. One of the key components of athletes' fitness is special physical fitness. It is the high level of special physical fitness that helps athletes realize their technical and tactical potential in competitive fights.

The level of special endurance of athletes is the key to success in competitions. This is noted in various studies [1, 2]. The authors emphasize that high-intensity interval training improves certain

important variables related to aerobic and anaerobic rates.

Many specialists have dealt with the problem of special physical training in various types of martial arts. Golokha [3] studied the problem of special endurance of judokas. The author identified effective means of increasing special endurance. The author considered exercises that cause maximum performance of the cardiovascular and respiratory systems. In other studies [4, 5], the authors analyzed the process of special physical training of kickboxers aged 15-16 years. The authors cited areas for optimizing the special physical training of athletes.

Some experts have studied changes in the functional systems of athletes in martial arts under the influence of special loads. The study of the respiratory system of kickboxers allowed Volodchenko [6] to determine the significant advantage of the capabilities of this functional system compared to standard criteria. Romanenko [7] determined that the same loads in junior taekwondo athletes of the same age and qualification can cause

different changes in the cardiovascular system. The author emphasizes the need for operational control to correct the training program. Pashkov and Palij [8] studied the response of taekwondo athletes aged 12-14 years to special physical activity. The authors propose their own method of improving the endurance of athletes, which increases the level of adaptation and economization of taekwondo. Rovnij et al. [9] considered the use of modern technologies for controlling heart rate under the influence of loads in martial arts. The authors offer a software application for registration and analysis of training load in martial arts using mobile devices. Romanenko and Golokha [10] studied the heart rate of experienced taekwondo practitioners. The authors propose to use the data obtained in monitoring the current state of athletes.

An equally important component of building programs to increase the endurance of young athletes in martial arts is its health component. Boguszewski et al. [11] assessed the health of students involved in sports and martial arts. The authors believe that lifestyle is one of the main factors in maintaining good health and mental and physical working capacity. Another study [12] found a positive correlation between martial arts practice and martial arts, health behaviors, and higher self-esteem quality scores. Kotarska et al. [13, 14] also believe that martial kinds of sport and martial arts have a special educational potential in the field of forming positive patterns of behavior regarding health and quality of life. Another study emphasizes that martial kinds of sport and martial arts see health as a goal of improvement [15]. In these respects, the Cossack duel is fully consistent with the above conclusions. Confirmation of the importance of raising healthy children in the days of the Cossacks is the research of other authors [16-18]. A motivational component to involve children in the Cossack duel is to watch international competitions on the website World Cossack Fight Federation [19].

An analysis of the publications available to us indicates that almost no research has been conducted on the training of athletes in the Cossack duel. The purpose of the study is to identify the impact of the Cossack duel program on the special endurance of athletes aged 13-15 years.

Material and Methods

Participants.

The study involved athletes (n = 6, age - 13-15 years) of the Cossack duel of the sports school №6 (Kharkiv, Ukraine). The children's parents agreed to participate in the study. The study was approved by the Ethics Committee of University and conformed to the Helsinki Declaration.

Research design.

The study was conducted for two years. At the

beginning, the level of special endurance of the fighters of the basic training group was tested. In the end, the final testing of the level of special endurance development of young fighters was conducted. Then the dynamics of indicators of special endurance of athletes under the influence of the author's program was studied. The training program was based on the curriculum of the Cossack duel for sports schools [20]. The key place in the author's program was occupied by sets of exercises that were to be performed by the interval-circular method.

The study of the level of special training of athletes was performed using a 1.5-minute test. In the conditions of this test there was performance of punching work on a punching bag with the maximum possible intensity. The kicks were to be inflicted with the hands and feet in a ratio of 70-80% to 30-20%, respectively (Figure 1). The 1.5-minute period corresponds to one competitive round for athletes in this age group. During the test, the number of kicks with the hands and feet and their sum were counted. In the study of special physical training of athletes are used similar tests in the practice of such kinds of sport which have in the basis kicking actions (like marital arts) [21, 22].

Test - heart rate (HR).

The test was used to determine the effect of exercise on the cardiovascular system and its ability to recover after exercise. Heart rate was measured before and after exercise (immediately after exercise; 60 seconds; 120 seconds). Each time the number of heartbeats was counted for 10 seconds. Then the result was multiplied by six.

Exercise complexes.

Complexes of exercises were used to improve the level of endurance development of young fighters. Complexes of exercises are built on the principles of interval-circular training. Two complexes were developed: the first – consisted mainly of general training facilities; the second – consisted of special and competitive means. The intensity of exercise in the complexes was moderate (heart rate was about 150 beats / min).

The first set consisted of 10 exercises. The complex had a general preparatory orientation. Athletes performed it in the second half of the main part of the training session once at the end of the weekly microcycle. (Figure 2).

The cycle of exercises was repeated 3 times. There were 15 seconds to rest between the exercises. 5 minutes were allotted for rest between circles. Content of exercises:

- Cadence Push-Up Test, quantity of times (45 sec.);
- Eurofit Sit Up Test (for 45 sec.), quantity of times – (using 15-20% of his own weight);
- Box Jumps 30 cm (45 sec.);



Figure 1. 1.5-minute test, a study of the level of special training of young athletes.



Figure 2. Complex of exercises №1 general preparatory orientation.

- Trunk Lift Test, quantity of times – using 15-20% of his own weight of medium intensity (45 sec.);
- running on the tatami (45 sec.);
- lifting dumbbells with straight arms up using 15-20 % of his own weight (45 sec.);
- squats with dumbbells using 15-20% of his own weight (45 sec.);
- Pull Up Bar-Straight Leg Hanging Leg Raises, quantity of times (45 sec.);
- Battle Rope Exercise (45 sec.);

- Burpee exercise (45 sec.).

The second complex had a special preparatory focus. The set of exercises was performed once at the end of the weekly microcycle. Dosage was – 3 rounds with a rest interval of 5 minutes. Exercises between stations were performed in the absence of rest between circle exercises. The following exercises were used here:

- Jump Rope (3 minutes);
- battle with the shadows (1.5 minutes);

- exercises in the racks for two athletes (30 seconds in attack, 30 seconds in defense of 3 approaches);
- running on the spot - the athlete performs direct kicks in front of him (1.5 minutes);
- movement in the stances - the athlete performs protective actions; at the signal - the athlete performs acceleration on a combination of strokes) (1.5 minutes);
- exercises on the bag in the stances - the athlete performs alternating kicks at short and long distances (3 approaches of 30 s);
- imitation of kicks - the athlete alternately performs exercises with arms and legs (3 approaches of 30 s);
- exercises with a skipping rope (3 minutes).

Athletes performed these tasks once in a weekly microcycle on the last training day of the weekly microcycle (Friday). Changes were made to the first and second complexes. The first complex was performed in the preparatory period of the macrocycle, and the second - in the competition. The structure of microcycles depended on the period of the macrocycle.

The interval method was used to improve general and special physical fitness. The method was aimed at developing the speed and strength abilities of athletes. Depending on the period of the macrocycle, training aids also varied from mostly general preparatory to mostly competitive (Figure 3). Training sessions of this direction were held on the third day of the weekly microcycle - Wednesday.

On other days (Monday, Tuesday, Thursday) technical and tactical trainings were held. At the end of the study, the final endurance testing of athletes took place.

Statistical analysis.

The SPSS program was used. Indicators were determined: standard deviation - σ , Student's t-test. The level of reliability is selected $p < 0.05$.

Results

The dynamics of the development of special endurance of fighters are shown in tables 1, 2. Table 1 shows the dynamics of the impact of athletes. In two years, the density of athletes' strikes has increased significantly. This is manifested in an increase in the number of kicks to the bag with his hands and feet ($p < 0.001$). These indicators characterize a significant improvement in the special endurance of athletes.

One of the informative criteria for assessing the special endurance of athletes is the ability of the body's functional systems to recover quickly after exercise. We studied the functional state of the cardiovascular system under the influence of special loads. Spike motions were performed and the ability of the cardiovascular system to recover was assessed. Table 2 shows the dynamics of the cardiovascular system of athletes under the influence of special loads in percentage terms. From the data in table 2 it is seen that the load of maximum intensity during one round caused significant changes in



Figures 3. Using the competitive method in the training program of young athletes.

Table 1. Dynamics of special endurance of athletes

Indicator	$X \pm \sigma$ at the beginning of the experiment	$X \pm \sigma$ at the end of the experiment	t	p
Kicks by hands, number	104.0±4.44	121.8±3.97	6.98	<0.001
Kicks by feet, number	16.8±4.45	34.2±5.27	6.17	<0.001
Sum of kicks, number	120.8±7.92	156.0±6.83	8.20	<0.001

Table 2. Dynamics of functional fitness of athletes

Indicator	Heart rate at the beginning of the experiment	Heart rate at the end of the experiment	Difference in heart rate, bpm	Difference in heart rate %	t	p
Heart rate before the load, bpm	121.2±4.65 100%	118.8±3.84 100%	2.4	0	0.97	>0.05
Heart rate after the load, bpm	162.0±11.15 133.7%	158.0±6.32 133.0%	4.0	0.7	0.77	>0.05
Heart rate after 60 sec. after the load, bpm	140.3±15.77 116.5%	123.0±3.21 103.3%	17.3	13.2	2.59	<0.05
Heart rate after 120 sec. after the load, bpm	129.7±10.48 107.7%	109.0±3.78 91.6%	20.7	16.1	4.57	<0.01

the cardiovascular system. These indicators were almost indistinguishable (0.7%). Heart rate recovery processes have become more sophisticated. After 60 sec. recovery difference was 13.2%, and after 120 sec. – 16.1%.

Analysis of the results of the study of the dynamics of functional fitness of athletes confirmed the data of preliminary calculations (table 2). The first two indicators did not reveal a significant difference in the dynamics of functional changes (indicator of cardiovascular system). This is confirmed by the level of significance of heart rate indicators. But there is a significant improvement in the recovery process: after 60 sec.; after 120 sec.

The results of the study show that in two years, athletes have increased the intensity of kicks when working on a punching bag. At the same time, they had positive changes in the functioning of the cardiovascular system during the recovery, after performing special loads. All this testifies to the effectiveness of the author's training program to improve special endurance.

Discussion

We assumed that the use of interval and interval-circular training methods with a gradual increase in the intensity of exercise will have a positive effect on the special endurance of young athletes. The results of this study prove the ability of our program and complement the results of previous studies by other experts [1, 3, 5].

One of the components of special training of athletes in martial arts is the ability to quickly restore the functional systems of the body after exercise. After the experimental program, the functioning of the cardiovascular system of athletes has undergone significant positive changes. This is important to increase the level of fitness of athletes, to strengthen their health. A similar problem has been considered in other studies [2, 13-15].

The authors emphasize that during this period of training, the health indicators of young athletes become important.

The results of our study complement the results of previous work of experts on the control of special physical fitness of athletes [21, 22]. The authors note that there is mandatory monitoring in training programs for young athletes.

It should be noted another component of the education of young athletes, which is no less important for the formation of the personality of athletes: the education of young athletes in the spirit of national traditions. In the educational and training process and in competitive activities in the Cossack duel, special attention is paid to respecting national traditions of educating healthy youth. A number of researchers have dealt with similar problems of youth education [16-18]. The authors emphasize that national sports have an educational component of respect and pride for loved ones and their country.

Conclusions

- one of the main factors of sportsmanship of athletes in the Cossack duel is special endurance;
- among the effective methods of improving special endurance in the Cossack duel are interval and interval-circle training methods;
- in a complex of exercises of an interval-circular method it is possible to include general-preparatory, special and competitive means of training;
- to control the development of special endurance of athletes aged 13-15 years in the Cossack duel, it is advisable to use 1.5 - minute test with the performance of kicks with hands and feet on a punching bag. This is in line with the rules of one round of competition for athletes of this age group;
- criteria for assessing the special endurance of athletes should be the intensity of percussion, heart rate. Heart rate is measured: before exercise;

immediately after loading; after the exercise in one and two minutes. This test characterizes the athlete's ability to recover;

- when training athletes in the Cossack duel, it is necessary to remember about the harmonious upbringing of the individual, to apply health-

preserving technologies. It is necessary to pay special attention to the education of young people in the spirit of respect for national traditions.

Conflict of interest

The authors report no conflict of interest.

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Cite this article as:

Plokhikh A, Ogar G. Dynamics of special endurance of athletes aged 13-15 years under the influence of the program of the Cossack duel. *Pedagogy of Health*, 2022;1(1):11–17.

<https://doi.org/10.15561/health.2022.0102>

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Received: 25.05.2021

Accepted: 25.06.2021; Published: 18.01.2022