

A comprehensive training program for orienteering athletes aged 18–20 years

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Abstract. *The purpose of the article was to experimentally evaluate the effectiveness of using a comprehensive strength training program for orienteering athletes 18–20 years old based on the CrossFit system.*

Competitive activity in orienteering is characterized by intense physical activity associated with movement over rough terrain with various types of soil and landforms (tall grass, blowdown, stone rivers, swamps, etc.) and intense mental activity, including a set of operations that provide targeted movement in unfamiliar areas using a sports map and compass.

Key words - orienteering, training.

I. INTRODUCTION

Competitive activity in orienteering is characterized by intense physical activity associated with movement over rough terrain with various types of soil and landforms and intense mental activity, including a set of operations that provide targeted movement in unfamiliar areas using a sports map and compass [1, 3].

The physiological background of competitive activity in orienteering is generally close to other sports, where endurance is a determining factor in physical fitness combined with speed-strength abilities, vestibular stability and coordination [6, 9, 10].

One of the conditions for achieving success in orienteering is to ensure a high level of physical fitness. Physical fitness of an athlete has a significant impact on the technique, tactics and psychology of orienteering [2, 6].

When it comes to general physical preparation, it should be borne in mind that human development is based on the phenomenon of the transfer of physical qualities. Therefore, it is possible to improve physical development much faster and with less effort, using, for example, cross-country courses for the development of endurance, resistance exercises for the development of strength, which is more difficult to achieve only by means of orientation [3, 5].

The general physical preparation of the orienteering athlete aims at the comprehensive development of the athlete. He needs to be strong, fast, agile, to have a variety of motor skills and to be able to successfully use them in sports activities [2, 4-7].

Currently, the CrossFit modern system is used for the development of general physical fitness. This system is based on a sequence of strength exercises consisting of constantly

changing functional exercises of high intensity, with the ultimate goal of improving general physical fitness, reaction, endurance and readiness for any life situation that requires active physical actions. Crossfit's peculiarity is its variability with the successful combination of diverse loads: power, anaerobic and cardioaerobic.

II. MATERIALS AND METHODS

The study was conducted on the premises of the South Ural State University (Chelyabinsk, Russia). The study involved orienteering athletes having a rank of at least I, aged 18–20 years. A total of 22 people were examined.

For athletes from the experimental group, regular training sessions using the CrossFit system (2-3 times a week) were included in the training process for six months. The control group had a traditional training system.

CrossFit training was applied depending on goals and training conditions. The following types of CrossFit workouts were conducted with a primary focus on:

- 1) developing strength;
- 2) developing endurance;
- 3) developing speed qualities and coordination abilities (exercises from weightlifting and gymnastics). The total time needed to complete the task was taken into account. Each athlete sought to complete exercises at maximum speed. With the improvement of physical fitness, the time spent on a certain set of exercises decreased;
- 4) combining CrossFit training with technical training (after the first exercise, the athlete takes a map and within a 30-second pause solves the problem of choosing the path to the next CP or other orientation tasks).

CrossFit training was conducted when modeling the competitive conditions using work with the map. A group of athletes three times performed a series of exercises at a high speed (pulse 170-180 bpm). A set of exercises consists of 5–10 exercises, including 100–200 m run. For a certain amount of time, it was necessary to perform a given number of movements, in a pause, select and draw a path to the next CP. After completing each round, the participants announced the time. The shift between physical and mental activity and the involvement of various muscle groups in the work favorably affected the ability to physical and mental relaxation.

III. RESULTS AND DISCUSSION

Analysis of the main results of the pedagogical experiment allows drawing the following conclusions: one of

the most effective ways to improve the physical fitness of highly qualified orienteering athletes is to use CrossFit training aimed at developing endurance, speed, agility, and strength. CrossFit training-based sets of exercises are proposed for orienteers aged 18–20 years, which allow intensifying training effects on speed-strength endurance, speed, and agility.

Tables 1 and 2 demonstrate the test results before and after the experiment in the control and experimental groups.

Table 1
Results of testing physical qualities before and after the experiment in the experimental group

Test	Before the experiment	After the experiment	p
Standing long jump, cm	263.4 ± 6.1	281.8 ± 5.8	> 0.05
Tenfold jump, cm	2723.3 ± 33.8	2812.2 ± 19.7	< 0.05
5000m cross-country race, s	1185.2 ± 24.3	1104.8 ± 25.3	< 0.05
5 × 30 m shuttle run, s	22.4 ± 0.9	20.2 ± 0.7	< 0.05
Push-ups, times	48.6 ± 2.4	59.8 ± 1.9	< 0.01
Stange's test, s	114.4 ± 3.4	122.1 ± 3.1	< 0.05
Gench test, s	42.8 ± 1.1	46.1 ± 0.7	< 0.05

Table 2
Results of testing physical qualities before and after the experiment in the control group

Test	Before the experiment	After the experiment	p
Standing long jump, cm	256.9 ± 8.3	263.6 ± 6.8	> 0.05
Tenfold jump, cm	2698.3 ± 32.1	2718.9 ± 26.4	> 0.05
5000m cross-country race, s	1202.3 ± 29.7	1197.6 ± 30.1	> 0.05
5 × 30 m shuttle run, s	21.9 ± 1.1	21.3 ± 1.4	> 0.05
Push-ups, times	45.1 ± 2.6	49.5 ± 1.8	> 0.05
Stange's test, s	109.7 ± 4.1	112.2 ± 3.3	> 0.05
Gench test, s	39.3 ± 1.2	41.4 ± 0.6	> 0.05

Table 1 shows that at the end of the experiment, the athletes of the experimental group experienced a significant increase in indicators in the following tests: tenfold jump ($p < 0.05$); cross-country race ($p < 0.05$); shuttle run ($p < 0.05$); push-ups ($p < 0.01$). Significant changes were also observed in the Stange's test ($p < 0.05$) and the Gench test ($p < 0.05$).

IV. CONCLUSION

In our work, we experimentally substantiated the effectiveness of using the CrossFit system, aimed at developing speed-strength endurance and speed. The results of the analysis of experimental data indicate that there were significant changes in the experimental group $p < 0.05$. The inclusion of the developed CrossFit training system allows to increase the efficiency of the training process and to achieve high results in orienteering.

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