

THE DEVELOPMENT OF ENDURANCE WITH INTERVAL METHOD FOR 16-18-YEAR SKATERS

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Abstract: Among the numerous tasks of sports training, physical development and functional readiness hold one of the first places. Physical development should be understood as a complex of factors, including anatomical morphological characteristics and level of physical qualities development (strength, speed, endurance, agility etc.). The article presents a study of increasing the level of endurance development of 16–18-year skaters with interval training method. To carry out an experiment we chose two groups of speed skaters in Specialized Children and Youth Sports School of the Olympic Reserve of speedskating who did not have any significant differences in indicators under the study. We proposed our methodology of endurance development for the experimental group. At the beginning and in the end of the experiment we conducted control tests. At the end of the experiment in the same conditions and also after a rest-day control tests were conducted. For comparison of results of the study we chose functional tests of cardiovascular system, which can be undertaken in standard (or laboratory) conditions: PWC 170 test and Harvard step test (IGST). The control group was training according generally accepted methodology of the Specialized Children and Youth Sports School of the Olympic Reserve. The experimental group was training according the following method. We proposed two mesocycle workouts based on two weekly microcycles:

- 1) Microcycle aimed at development of special endurance at the stage of special physical training;
- 2) Microcycle using training on the ice at the stage of special training.

According to the results of research using interval method with the designed complexes allowed significantly increase the level of endurance development within the shortest time period (8 weeks).

Keywords: endurance, interval method, microcycle, speed skating, Harvard step test, PWC₁₇₀, test athletes, training.

Introduction. In the theory and methodology of children and youth sports, problems of physical abilities development occupy one of the most important places, since many young athletes' body functions and systems have not been formed [3, 4, 9].

Among numerous sports training tasks physical development and functional readiness take one of the first places. Physical development should be understood as a complex of factors, including anatomical and morphological characteristics and physical qualities development level (strength, speed, endurance, agility and so on).

As it is known, the anatomical and morphological characteristics of individual to a great extent is predetermined by genetics. However, long-term purposeful training in speed skating has a significant impact on anatomy and morphology of athlete. In the sports training process physical qualities are also improved. Identification of the most effective tools and methods for their development is the subject of intensive research. [15].

In speed skating, endurance, especially local one, is one of the leading factors in achieving high sports results. Therefore, a significant place in the training of skaters is given to the

development of this very quality. One of the most effective methods in development endurance with qualified skaters is interval method [6, 10, 13].

We suggested that the use of specially designed microcycles of training aimed at developing endurance in 16-18-year-old skaters using the interval training method will contribute to a more effective endurance development.

Materials and methods. During our research, we used the following methods:

- 1) Scientific and methodological literature analysis;
- 2) Control tests;
- 3) Pedagogical experiment;
- 4) Mathematical statistics method

For the experiment in Junior Sports School of Skating two groups of skaters without the significant differences in an initial condition were recruited. For experimental group we suggested our endurance development methods. Control tests were carried out at the beginning and at the end of the experiment.

The experiment involved 20 boys - 10 people in each group. Age was 16-18 years, qualification – 1st degree and Candidates of Master of Sports.

At the beginning of the experiment verification tests were held in both groups after the day off. The entire experiment lasted 8 weeks. The total number of training sessions was 38. At the end of the experiment verification tests were held in both groups after the day off. To compare the results of the study, tests for the cardiovascular system functional study were selected, which can be held in standard (or laboratory) conditions: the PWC₁₇₀ test and the Harvard step test.

The control group was trained according to generally accepted methodology of Junior Sports School.

The experimental group was trained according to the following technique. Two mesocycles of training were suggested, which were based on two weekly microcycles:

- 5) Microcycle aimed at developing special endurance at the stage of special physical training (SPT);
- 6) Microcycle using ice training at the stage of special training (ST).

We used both microcycles for two months - November (SPT) and December (ST). The first mesocycle lasted from November 6 to December 2, the second - from December 4 to December 27.

In the first microcycle we offered jumping training sessions in the following sequence:

1st day: jumping exercises with maximum intensity and duration of 10-15 seconds.

2nd day: jumping exercises for local muscle endurance for two minutes after 3-5 minutes of jogging. For a training session 8-10 repetitions were performed, with a heart rate of 160-170 beats/min.

3rd day: interval work on a ladder.

4th day: recovery cross for 30-40 minutes at a heart rate of 110-130 beats/min and exercises for stretching, relaxation, flexibility (ESRF) for 15-20 minutes.

5th day: 1st day workout.

6th day: a combination of special-technical exercises alternating with light running.

7th day: day off.

Microcycle at the SPT stage

Monday

Warm-up: jogging for 10-15 minutes, flexing walking, technical imitation, “squats”, “pistols”.

Main part: Jumping imitation for 10 seconds, rest interval for 45 seconds. Repeat 12-15 times. 1-2 series. Heart rate - 130-180 beats/min.

The final part: jogging for 10-15 min., ESRF.

Tuesday

Warm-up: jogging for 10-15 minutes, combined developing exercises (CBD), "squats", "pistols".

The main part: jumping "kangaroo" for 2 min., jumping imitation for 1 min. The rest interval between them is 2-3 minutes. Make 6-8 series. Rest between series for 3-5 minutes.

The final part: jogging for 10-15 min., ESRF.

Wednesday

Warm-up: jogging for 10-15 minutes, "squats", "pistols".

Main part: interval work on a ladder – climbing up two steps at a time in a skater's semi-seat. Up pulse is 160-180 beats/min. Down pulse is 130-140 beats/min. The number of repetitions per workout is determined by the restoration of the heart rate to 130-140 beats/min during the run down at the selected pace.

The final part: jogging for 10-15 min., ESRF.

Thursday

Day of active rest.

Friday

Warm-up: jogging for 10-15 minutes, CBD, "squats", "pistols".

Main part: Jumping imitation for 15 seconds, rest interval – 45 seconds. Repeat 2-15 times. 1-2 series. Heart rate is 130-180 beats/min.

The final part: jogging for 10-15 min., ESRF.

Saturday

Warm-up: jogging for 10-15 minutes, flexing walking, technical imitation, "squats", "pistols".

Main part: An hour-long combination of CBD, special-developmental and special-technical exercises alternating with light jogging. The workout is performed at a pulse rate of 130-180 beats/min. The duration of the exercise is from 30 seconds to 5 minutes.

The final part: jogging for 10-15 min., ESRF.

Sunday

Day off.

In the second microcycle we offered classes of the following orientation:

1st day: training aimed at distances of 500 and 1000 meters;

2nd day: training aimed at medium distances (1500 m);

3rd day: long-distance training;

4th day: day off;

5th day - training aimed at medium distances;

6th day - long-distance training;

7th day - day off.

Microcycle at the stage of ST.

Monday

Warm-up: jogging for 10 min., CBD, "squats", "pistols", exercises to develop flexibility.

The main part: rolling 12-15 laps, 250 m on the move 8-10 times after 2 minutes of rest, slow skating 10-12 laps.

The final part: jogging for 10-15 min., ESRF.

Tuesday

Warm-up: jogging for 10 min., CBD, "squats", "pistols", special exercises.

The main part: skating at a slow pace 12-15 laps, interval running at 400 m, rest 11.5-2 minutes. The speed is equal to the average-distance speed when running for 1500 m. 2 series of 5-7 times with 8-10 minutes of rest between them. Slow skating 10-12 laps.

The final part: jogging for 10-15 min., ESRF.

Wednesday

Warm-up: jogging for 10 min., CBD, "squats", "pistols", special exercises.

The main part: skating at a slow pace 12-15 laps, skating 5 laps with a planned competitive speed at a distance of 5000 m. 3-5 series with a rest interval of 5-8 minutes between them.

Slow skating 10-12 laps.

The final part: jogging for 10-15 min., ESRF.

Thursday

Day of active rest.

Friday

Workout on Tuesday mode.

Saturday

Workout on Wednesday mode.

Sunday

Day off.

The pulse at the end of the exercises should be no more than 180 beats/min, the pulse after rest should not be lower than 130-140 beats/min.

In each mesocycle of training the first three weeks, the load gradually increased. On the fourth week, it went down (unloading).

Results. Application of the developed technique showed the following results.

The average PWC₁₇₀ in the control group increased by 10% (174.74 kgm/min), and in the experimental group – by 24% (428.85 kgm/min). The average value of Harvard step test in the control group increased by 3.4% (3.27 units), and in the experimental group – by 22% (21.71 units).

In the experimental group, the difference between the mean PWC₁₇₀ values at the beginning and at the end of the experiment became significant: $t = 4.52$, $p < 0.05$. The difference between the initial and final indicators of Harvard step test in this group also became significant: $t = 2.32$, $p > 0.05$. Thus, we can talk about the positive influence of the proposed methodology on the level of endurance development in speed skaters aged 16-18. Comparing the average PWC₁₇₀ and Harvard step test values of both groups at the end of the experiment (Table 1), we noted the significance of their differences. For PWC₁₇₀ indicators, t became equal to 2.66, and for Harvard step test indicators $t = 2.23$. Consequently, our methodology for developing endurance turned out to be more effective than the generally accepted one, and we can recommend it for use in Sport schools.

Table 1

Level of endurance development in experimental and control group at the end of the experiment comparison

№	Test name	Experimental group $M_{exp} \pm m$	Control group $M_{ctrl} \pm m$	t $t_{tab} = 2,1$	p
1	PWC ₁₇₀	2155.36 ± 74.04	1877.64 ± 73.81	2.66	$p < 0.05$
2	Harvard step test	116.93 ± 8.03	98.76 ± 1.31	2.23	$p < 0.05$

Conclusion: Thus, the use of the interval method with the use of the developed complexes allowed in the shortest possible time (8 weeks) to significantly increase the endurance development level. In our opinion, this testifies to the effectiveness of the implementation by athletes of the experimental group of our developed methodology.

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