Maintaining physical condition during the recovery period of the macrocycle for 15-16-year-old cross-country skiers

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Abstract

Purpose: is to substantiate, develop, and test a method for structuring training during the recovery period of the annual training cycle, aimed at maintaining the achieved level of physical fitness of 15-16-year-old cross-country skiers.

Methods: Theoretical analysis of the research problem, pedagogical monitoring and experimentation, and methods of mathematical statistics.

Results: The aerobic cycle consisted of two weekly microcycles - each with 6 training days and 1 rest day. In addition to running on moderate terrain (up to 40 min), cycling (up to 150 min), and simulated walking with and without poles (up to 40 min), the microcycles included one maintenance static-dynamic strength workout (up to 60 min) before the rest day. Furthermore, during the second week of this cycle, work with high-threshold muscle fibers was added - jumping imitation exercises with poles on a gentle uphill slope, emphasizing push-off strength, and short (8-10 s) powerful uphill runs on steep inclines. While athletes trained once a day in the first week of this cycle, the second week included two days with two training sessions.

Conlcusion: At the same time, the proposed method of active training in the recovery period is suitable for skiers aged 15-16, who have a relatively small number of starts in the winter season compared to older age groups and do not experience fatigue at the end of the season. Furthermore, the strength-oriented training of athletes of this age elicits a greater response from the body due to the sensitive period of absolute muscle strength development, and the gentle load on the musculoskeletal system allows for its soft preparation for the main interval work in the subsequent period.

Keywords: : cross-country skiers, recovery period, macrocycle, physical fitness

Introduction

The essence of the proposed approach was to eliminate the period of passive rest for athletes in the annual training cycle. The structure and content of training sessions during the recovery period were proposed and substantiated, and an approach aimed at maintaining the physical condition of 15-16-year-old cross-country skiers during the recovery period of training was developed. The experiment conducted a comparative analysis of physical fitness indicators between athletes following the developed approach and those using traditional methodology. The advantage of the experimental group (EG) athletes in terms of physical fitness indicators after the recovery period was revealed. Statistically significant differences between EG and control group (CG) athletes after the experiment were found in indicators evaluating speed, strength abilities, and endurance. When utilizing 2 peaks of an athlete's form in annual training for successful participation at a high level in both roller ski competitions during the summer period and planned main events in winter, this methodology allows for compressing the preparation time to bring the athlete to the first summer peak of athletic form.

The training process over many years should be aimed at gradually increasing the workload as athletes progress from younger to older age groups. An athlete's level of physical fitness only improves if the training and competition loads correspond to the body's functional capabilities [1, 2].

In modern conditions, against the backdrop of increased competition, stricter requirements for the physical preparation of cross-country skiers, and intensification of the competitive process, training methods, including the recovery period, are constantly being improved [3, 4].

The recovery period plays a key role, as it allows the athlete's body to rest and recuperate after an intense ski season. In addition to physical recovery, psychological decompression is of great importance: the athlete does not need to constantly think about competitions, and training becomes less intensive [5].

Currently, there are various perspectives on organizing the training process during this period. Some specialists and coaches hold the opinion that an athlete needs passive rest and should completely cease training for 10 or more days. However, there is also an opposite viewpoint: a skier, especially in

Table 1. Average group indicators of control testing results after conducting the pedagogical experiment ($X \pm m$)

Group	Average indicators				
	100m Run (s)	*3 km Run (min, s)*	*Long jump (cm)*	*Push-ups (number of repetitions)*	*Sit-ups (repetitions in 1 min)*
CG	16.1±0.3	10:53±0.9	219±7.9	40±3.5	45±2.5
EG	15.7±0.2*	10:36±0.8*	225±9.0	42±2.0	49±3.0*

*Note: * indicates statistically significant differences between EG and CG at a 5% significance level*

childhood and adolescence, should not interrupt training activities, and rest should be exclusively active. When an athlete stops the training process for an extended period, the physiological changes achieved through training begin to disappear, and much faster than they were acquired [6]. After the cessation of training, the maximum oxygen consumption (VO2 max) begins to decrease as early as the 10th day and continues to decline without physical loads. The most significant decrease in VO2 max is observed from the 2nd to the 4th week without training. Studies indicate a 6% decrease in VO2 max after four weeks of inactivity. During prolonged breaks, the activity of oxidative enzymes also decreases, and glycogen reserves and blood volume diminish. Collectively, these changes negatively affect the athlete's maximum work capacity. After just 10 days, endurance begins to decline, and the amount of body fat increases. Considering the above, it is necessary to further study and test various approaches to organizing the training process during the recovery period of the annual training cycle

Methods

Methods of literature analysis, questionnaire survey, pedagogical observation, expert assessment, pulse measurement, pedagogical experiment, and mathematical statistics.

Results and discussion

During the study, an approach aimed at preserving the physical fitness of 15-16-year-old cross-country skiers during the recovery period of training was substantiated and developed. Its essence consisted of continuing training sessions, predominantly of a maintenance nature, using general physical preparation means, without the component of passive rest. For the first two microcycles, to provide psychological and physical relief after the competitive winter season, the following schedule was constructed for athletes: 7 days in the microcycle, of which 1 day was rest and 6 days were training. There was one training session per training day. The training consisted of two parts - 80 minutes of steady skiing using the freestyle technique or no more than 30 minutes of running + 20 minutes of stretching. Ski training alternated with running training, i.e., 3 days each per week.

In the second microcycle, 2 sets of special running exercises and fartlek on a slight incline with a duration of up to 1 minute were added to the running workouts. After stretching, strength training was conducted twice a week, on the third and fifth day of the microcycle. One strength training session was dynamic and lasted 30 minutes, consisting entirely of bodyweight exercises; the second strength training session was conducted in a statodynamic format in a toning mode for various muscle groups (8 series, 40 min). The day following the strength training sessions, the functional state of all muscle groups involved in the workout was assessed.

Starting from the third week, the power mesocycle began, and the duration of the microcycles changed. The microcycle now consisted of 4 days - 3 training days and 1 rest day. Ski training was discontinued. Two of the three training days consisted of one morning training session. The first day of the microcycle, the training session comprised four parts, excluding the mandatory cool-down: terrain running for 40 minutes; stretching for 15 minutes; special running exercises, 3 sets - 12 minutes; multiple jumps on a gentle uphill slope, 4 sets of 20-30-40 jumps. The second day of the microcycle consisted of three parts:

terrain running for 30-40 minutes; stretching for 15 minutes; dynamic strength work - exclusively using body weight and primarily focusing on muscle groups in better condition - 30 minutes. The third day of the microcycle consisted of two training sessions. In the morning, a 120-minute cycling session on varied terrain. The evening strength training session began with a running warm-up: terrain running for 20 minutes; static-dynamic strength work - also primarily targeting the most recovered muscle groups - 10-12 sets, 60-70 minutes.

A similar training plan for the experimental group was followed in four microcycles with small progressive changes - an increase in the number of jumps in multiple jump exercises and the number of sets in strength work. In the control group, athletes began training in the third week of the transition period, starting their usual aerobic work - light short-duration running and general physical preparation. The entire transition period for the control group consisted of aerobic work and one dynamic strength training session in each microcycle. After completing the strength cycle, the experimental group underwent an aerobic cycle to unload and restore the body's immune and endocrine systems, concluding the transition period.

The training load parameters were adjusted based on each athlete's individual assessment of their condition. With the completion of the aerobic cycle, the transition period ended. For the experiment participants, it smoothly transitioned into the preparatory period, and the athletes continued their strength work as planned. A verbal survey was conducted among the cross-country skiers participating in the experiment, asking them to assess their functional state. The athletes who trained in the experimental group reported no muscle pain, a psychological boost, and absence of fatigue. The athletes from the control group stated that they did not yet feel psychologically ready for the upcoming intensive work in the preparatory period. Additionally, some skiers from this group complained of heaviness and muscle pain.

After the recovery period, a control test was conducted. A comparative analysis of the test results of the first and second groups was performed to determine the effectiveness of the applied methods. The results of the control testing of the experimental and control groups after conducting the pedagogical experiment are presented in the table.

As a result of the control testing, it was revealed that all indicators in the experimental group were better than in the control group, ranging from 2.48% to 8.89% improvement. On average (based on the sum of all physical fitness indicators), the experimental group in the control testing after conducting the pedagogical experiment showed a 4.34% better result than the control group. Statistically significant differences between EG and CG athletes after the experiment were observed in indicators evaluating speed, strength, and endurance abilities.

Conclusion

Based on the derived regression equations, The structure and content of training sessions during the recovery period have been proposed and substantiated, and an approach aimed at maintaining the physical condition of 15-16-year-old cross-country skiers during the recovery period of training has been developed. Its essence lies in continuing training sessions, primarily focused on maintaining fitness, using general physical preparation methods, without a passive rest component.

When using two peaks of an athlete's form in annual training for successful participation at a high level in both roller ski competitions during the summer period and planned main events in winter, this methodology allows for shortening the preparation time to bring the athlete to the first summer peak of athletic form. In this case, the recovery period is practically reduced to a minimum and smoothly transitions into the preparatory period. Here, it is crucial for the coach, together with the athlete, to choose the optimal dosage of training effect, timely adjusting the preparation plan based on the athlete's well-being.

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