Original Article

Organization of the training process of female skiers within a full-year conditioning cycle

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Abstract:

Problem statement. The issues of increasing sport performance, growing costs, and difficulties in material support require the urgent and intensive search for optimal ways of training organization which will provide high sport performance mainly due to enhanced sports training methods. **Approach.** The paper discusses main characteristics of training programs for female junior ski racers and highly-skilled female athletes, and covers the analysis of functional fitness in female ski racers within a full-year cycle of conditioning. The purpose of our research was to study the conditions of special fitness formation in highly-skilled female ski racers within the full-year cycle of conditioning. The object of research was the correlation between dynamics of female athletes' state and given training loads within the full-year cycle. The results of research suggest that the training programs for Masters of Sport have higher total values (range and intensity of training impacts) and higher "concentration" of these impacts within load cycles. **Conclusion.** The indicators of both special and functional fitness should be taken into account in order to build an optimal structure of the training process.

Key words: overall physical conditioning; special physical conditioning; preparation period; competition period.

Introduction

Permanent enhancement of training process design techniques in various groups, kinds of sports, and sport disciplines determines the modern status of sports training (Sybil et al., 2015).

In most kinds of sports only 20-25% of national junior record-holders have kept their positions after passing into adult category. During the many years of sport training process the major losses occur when an athlete passes from the junior category to realization of the accumulated potential. The modern level of sport achievements enforces the specialists to develop an efficient training process design (Ermolaev, 2006; Nikolaev, 2002). Based on the process design logic the main units of the training process structure are now not small training cycles (microcycles) as it used to be, but longer preparation stages. The reasonable design of these stages is possible provided that the laws of skiers' long-term adaptation to the training impacts are well-explained and justified (Sandbakk et al., 2016). The results obtained from the studies in this area prove that this conception should be implemented in training practice (German, 2011; Ramenskaya & Batalov, 2005).

Material & methods

The methods were chosen based on the research objectives:

1. To determine the structure of loads and skilled female athletes' levels of fitness.
2. To reveal the correlation between special fitness components and parameters of the loads.
3. To study instructional conditions improving the effectiveness of female skiers' special fitness forming within the full-year cycle.

We selected and used the methods that had been tried and tested in scientific studies and sport practice, and had been proved to be effective (Abdeev, 1994; Afanasiyev, 1986; Verkhoshansky, 1984).

Participants

The study involved 24 female students (aged 16-18) of South Ural State University who were engaged in ski racing and had different levels of skill. All girls were keeping sport diaries. The sport diaries contained the 2-year data on specifics of training. The instructional observation was performed during competitions, physical examinations, and training sessions of skilled female ski racers.

The following parameters were registered: volume of training loads, intensity of training loads, training process design specifics within different stages of the full-year cycle, conditions of competition organization, and medical and biological examinations (Trifonova & Trebenok, 2007; Yakovlev V., 2006; Yakovlev B., 2007).

Measures

Using the stated indices made it possible to reveal the main parameters of programs of different training cycles and features of their implementation under various conditions and to assess the progress of fitness within different variants of training process organization. Education test checking was applied in order to obtain objective information on the level of skiers' overall and special physical fitness (Figure 1).

Fig. 1. Indices of overall and special physical fitness

Note: MS – Masters of Sport; CMS – Candidates for Master of Sport and First-Class athletes.

1 – standing long jump; 2 – decuple jump; 3 – sit-ups on the incline for 30 seconds; 4 – push-ups (number); 5 – vertical hanging for as long as possible; 6 – 2000m cross-country running; 7 – 3000m cross-country running; 8 – 10,000m roller skiing.

The integral indicator of fitness was based on the results of the official events.

Methods

In order to obtain the most objective data the checking procedure was standardized (tests were performed under the comparatively same conditions and at the same time of the day when the athletes had relatively recovered) (Figure 1).

The educational experiment was the main method of research and was conducted during two full-year conditioning cycles (May 2011 – May 2013).

The first stage. The first stage implemented within the framework of the 2011-2012 sport season was dedicated to a fundamental assessment of athletes' fitness. The participants were divided into two groups, 12 girls each: the first group, further referred to as the CMS, consisted of First-Class athletes and Candidates for Master of Sport; and the second group, further referred to as the MS, consisted of skilled Masters of Sport. The study was conducted at the end of the off-snow training (October) and during the contest period (January). The results of control training sessions and competitions held in the stated time periods indicated that the athletes had high levels of skill and fitness.

During the studies we took the main parameters of the training process within the full-year cycle; the chosen parameters reflected the character, aim, and intensity of the training loads for each period and month. The analysis of the given loads was based on the ski-race-specific periodization and implied that the full-year cycle was divided into training periods and stages.

The second stage. The second stage was conducted during the 2012-2013 full-year macrocycle. The educational experiment involved equally trained athletes. The main parameters of the training process were almost similar in both groups under study. For the experimental group the training program was corrected, and the indicators for stage-related control were determined.

The analysis of the applied loads in each period and at each stage was performed for two groups of skilled athletes. The studies and experiments were approved by the Department of Physical Education and Health of South Ural State University.

One of the ways to solve the problem of training organization is to find the criteria of special working capacity and related factors in highly-skilled athletes (the MS) and junior athletes (the CMS) (Hébert-Losier et al., 2016). This creates objective prerequisites for developing the justified criteria of selection of athletes on the one hand, and for forming higher levels of sport mastery in these athletes on the other hand; the latter means justification of model characteristics for both certain level of fitness and training programs as well as various training cycles (Povareschenkova & Avdeeva, 2006; Bompa, 2001).

Results & discussion

The fundamental analysis revealed that the training programs within the full-year cycle are characterized by the following parameters:

1. In comparison with the junior group the MS had higher volumes of cyclic (1.4 – 1.5 times) and acyclic (1.0 – 1.2 times) training means at almost equal number of training sessions, which determines the high “dose” of impact.

2. For the MS, 42.0-42.5% of applied training loads were within the second intensity zone (heart rate: 140-160 bpm), and 27.0-28.1% were within the third intensity zone (heart rate: 160-180 bpm). For the CMS, the applied loads were distributed as follows: the first intensity zone – 18.0-19.2%; the second intensity zone – 58.0-58.4%; the third and fourth intensity zones – 18.0-18.3% and 3.0-3.9%, respectively. Along with that, the number of starts for the MS was 1.0-1.5 times higher, and the race distance (5; 7.5; 15; 20 km) was 1.5-1.7 times longer than the one for the CMS (5; 7.5; 15 km) (fig. 2).

Fig. 2. The ratio of loads of various intensity in female ski racers within the full-year cycle ($M \pm m$)

Note: a – total volume of cyclic load (km); b – 120-140 bpm (the first intensity zone); c – 140-160 bpm (the second intensity zone); d – 160-180 bpm (the third intensity zone); e – 180-200 bpm (the fourth intensity zone).

In the MS the changes of the main parameters of training loads is more expressed. The difference between minimum and maximum monthly volumes of cyclic training means is 5.0-5.2 times (4.0-4.3 times in the CMS). Within the week microcycles the difference is 4.5-4.8 times. For the MS, the third and fourth intensity zone loads may not be applied at all in some cycles (May) or have the volume of up to 27.0-28.1% of all cyclic exercises in some contest period mesocycle (February - March). For the CMS, the volume of these loads varied from 1.5-6.0% in May to 44.4% in February. The training loads differed for the MS and the CMS based on the exact period. The distribution of the loads according to intensity is presented in table 1.

Table 1. Volumes of different intensity zone loads for the MS and the CMS during the preparation and contest periods

	Preparation period		Contest period	
	MS	CMS	MS	CMS
1 st intensity zone	22.9-24.0%	18.9-20.0%	19.1-19.3%	12.6-13.4%
2 nd intensity zone	44.3-45.0%	57.6-60.0%	38.9-39.0%	43.7-50.0%
3 rd intensity zone	26.7-27.6%	19.9-19.2%	29.3-30.0%	12.3-13.0%
4 th intensity zone	4.9-5.0%	3.0-3.5%	13.0-13.4%	5.0-5.8%

The obtained results indicate the following specifics of the training programs of preparation and contest periods within the full-year cycle:

- For the MS, the volume of cyclic training means during the preparation period was 1.4-1.5 times higher as compared to the CMS; during the contest period the volume of these means for the MS was 1.3 times higher than for the CMS.
- The volume of acyclic training means during the preparation period was 1.4-1.5 times higher for the CMS than for the MS.
- The number of training days during the same period was 1.2 times lower for the MS as compared to the CMS.

Conclusions

The training programs for Masters of Sport have higher total values (range and intensity of training impacts) and higher “concentration” of these impacts within load cycles.

Optimal training process structure for skilled athletes should not be organized considering only the morphometric training impact data; the indicators of special and functional fitness should also be taken into account.

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