Planning loads of different intensity in the annual cycle of training highly qualified cyclists in the aspect of foreign research

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Abstract

Objective of the study was to identification of modern approaches to planning loads of different intensity in the annual training cycle of highly qualified cyclists.

Methods and structure of the study. Analysis of literary sources. More than 50 sources of foreign literature published in recent years were analyzed.

Results and conclusions. In the four load distribution options described in foreign publications (polarization, pyramidal, threshold and high-intensity models), the effectiveness of both the polarized and pyramidal options is noted. At the same time, the most important area of training activity is the use of large volumes of low-intensity training. In addition, it is also recommended to use short, moderate-intensity and high-intensity training sessions consistent with competition intensity. Optimizing training load prior to a major event using a compressed version of high-intensity overload training followed by a taper period provides improved performance levels in elite cyclists compared to traditional taper training.

Keywords: *cycling, highly qualified athletes, training loads, intensity zones, annual cycle, foreign research.*

Introduction. The volume and intensity of training loads are the main parameters taken into account when planning and managing athletes' training. Despite a large number of studies conducted in Russia and abroad, the discussion regarding the gradations of load intensity, their distribution in training cycles, and compliance with pedagogical tasks continues to this day. Moreover, the terms «periodization» and «programming»/«planning» are often used by foreign authors as interchangeable, although periodization (long-term general organization of training) should be distinguished from programming (short-term planning of individual training sessions and exercise complexes) [6]. The article was prepared based on the R & D materials of the thematic plan for conducting applied scientific research in the field of physical education and sports within the framework of the state assignment for scientific organizations and educational institutions of higher education subordinate to the Ministry of Sports of the Russian Federation for 2022-2024.

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Methods and structure of the study. Analysis of literary sources. More than 50 sources of foreign literature published in recent years were analyzed.

Results of the study and discussion. Traditionally, the literature identifies 3 main physiologically determined zones of intensity of physical activity in cyclic sports [9]. These zones (zone 1, 2 and 3) are determined depending on individual indicators of aerobic and anaerobic thresholds or threshold values of lactate levels in the blood and are taken into account when choosing a load distribution option [11].

In foreign literature, 4 options for distributing the intensity of training (IT) loads are currently identified: polarization, pyramidal, threshold and high-intensity models [11]. These and other works describe the features of their use. However, this raises many questions

about the possible distribution of loads at different stages of the annual cycle in cycling, in which there is currently a lack of knowledge on issues that determine the structure of traditional (ST) and block (BP) periodization. Long competitive seasons in cycling and tight competition schedules requiring frequent peaks in performance have led to a shift from traditional periodization (TP) (initially involving a period of high volumes of low-intensity training (LIT) followed by a period of volume reduction and an increase in the proportion of high-intensity training (HIT) in the immediate preparation for competitions) to block periodization (BP) of training [8].

Gal n-Rioja M. . et al. [3] point out that the use of a higher or lower volume of training depends on a number of factors, such as the stage of preparation during the season, age, and skill level of the athletes. For this reason, both volume and IT should be assessed and planned in combination with each other [4].

In both the pyramidal and polarized models of training intensity distribution, approximately 80% of the total training volume is spent in Zone 1. However, in the pyramidal RIT model, the remaining 20% of training is spent in Zones 2 and 3, while in the polarized RIT model, these 20% are performed mainly in Zone 3, with a smaller volume of training in Zone 2. In contrast, the threshold RIT model provides for a high proportion of training volume in Zone 2 (more than 35%), and the remainder in Zone 1. In addition, cycling also uses IT models that include loads in Zones 4 and 5 [7]. Recently, the issue of which IT variants provide the highest efficiency has been actively discussed [1, 2]. Both polarized and pyramidal IT are very effective variants of load intensity distribution. At the same time, the most important direction of training activity is the use of large volumes of LIT (Zone 1). However, it should also be noted that the distribution of loads in intensity zones 2 and 3 using both IT options depends on the training phase or preparation cycle and the specialization of the athlete at the competition distance. Most studies involving elite athletes report the use of pyramidal IT with a high proportion of high-volume LIT. For example, according to various data, cyclists participating in World Tour races are distinguished by a high annual training volume, conducted mainly in zone 1 (from 67% to 69%) and to a lesser extent in zone 2 (from 4% to 5%), zone 3 (from 3% to 4%), zone 4 (from 1% to 2%), zone 5 (from 0.3% to 1%). At the same time, competitions occupy from 9 to 12%, and other training – 10%. On the other hand, polarized IT is also an effective option for some elite athletes during certain periods of the annual cycle [3].

The distribution of training intensity in road cyclists, according to different authors, with block periodization is approximately: LIT - from 54% to 73.7%; moderate-intensity training (MIT) - from 0% to 33%; HIIT - from 9.4% to 35%; other training - from 5% to 12%; with traditional periodization: LIT - from 64% to 83.5%; MIT - from 2.5% to 27%; HIIT - from 2.3% to 9%; other training - 6.2%; with the daily planning model: LIT - from 49% to 66%; MIT - from 0% to 39%; HIIT - from 10% to 41% [3]. Thus, at the moment, there is no reason to believe that the use of any of the special periodization models (BP or TP) or the daily training planning model in qualified road cyclists is more effective than other options for improving performance and competitive efficiency. In addition, it is recommended to use various combinations of the pyramidal and polarized distribution methods of RIT, taking into account the results of daily monitoring of the state of preparedness [3]. To further improve the level of performance, cyclists, in addition to increasing the volume of LIT, are also recommended to use short MIT and HIT corresponding to the levels of competitive intensity.

Sprint is an important element in cycling, used at starts, breakaways from the group, pedaling uphill, finishes. Therefore, many sub-elite cyclists additionally use sprint training to increase the power and efficiency of pedaling [5]. In addition, sprint training is a softer strategy for maintaining physical performance while reducing the training volume during the transition period. Including sprint training (30-second sprints) in a low-intensity workout allows elite cyclists to maintain the necessary level of fitness during the first six weeks of the preparation period [12].

The current approach to achieving peak performance, called the taper period, is to use overload (forced load) training for 2-4 weeks followed by a gradual reduction in load over 1-3 weeks. However, the implementation of this approach, which requires a 3-7 week preparation period for the main competition, is practically impossible for many elite athletes due to the tight competition schedule. Therefore, rather than using a specific overload period before the taper period, an alternative approach is to use a taper period alone (simply reducing the training volume in cycling during the taper period by 21-60% over 8-14 days) [10]. However, implementing a pe-

riod of overload before tapering provides a higher increase in performance compared to using only a period of tapering.

Ronnestad B.R. et al. [10] proved that the implementation of a short period of bringing physical performance to a peak level during a 6-day period of using HIIT with an overload and a subsequent 5-day tapering period with a gradual decrease in the load by 55% allows to increase the indicators of peak oxygen consumption, maximum output power, and pedaling economy in highly qualified cyclists compared to traditional tapering (tapering). The traditional tapering period with a decrease in the training load by 40% takes 11 days. The stage of training cyclists preceding the overload and tapering (4 weeks) includes low-intensity training (LIT) 60-82% of the peak HR; moderate-intensity training (MIT) 83-87% of the peak HR; high-intensity training (HIT) 88-100% of the peak HR. In general, traditional tapering results in a greater reduction in total training load over an 11-day period compared to overload with tapering (by 35±8% and 17±21%, respectively). Interestingly, an 11-day period of high-intensity overload training followed by a reduction in training load during tapering in cyclists produces a similar performance-enhancing effect compared to a longer 5-week period of overload and tapering training used in other cyclic sports, such as triathlon. This is due to the fact that a longer overload period causes functional overstrain in athletes (a 2% decrease in maximum power), which does not allow supercompensation processes to develop during the subsequent tapering period. A significant reduction in performance during the overload period cannot be sufficiently compensated for during the tapering period. The risk of excessive performance decline after an overload period can be minimized by using a shorter overload phase that does not cause a deterioration in physiological performance parameters [10].

Conclusions. The four load distribution options described in foreign publications note the effectiveness of both the polarized and pyramidal RIT options. In this case, the most important direction of training activities is considered to be the use of high-volume LIT. In addition, it is also recommended to use short MIT and VIT corresponding to the competitive intensity. Optimization of the training load before major competitions using a compressed version of training with overload in the VIT format and a subsequent period of taper ensures an increase in the level of performance in highly qualified cyclists compared to traditional taper.

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