Relationship of physical fitness profile and the number of technical error at the stages of ski training among high class skiers with different training load structures

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Abstract

Objective of the study was to assess the relationship between the profile of physical fitness and the number of technical errors made when passing training routes at the stages of ski training by high-class skiers who have a different structure of training loads at the stage of physical training.

Methods and structure of the study. Loads during two macrocycles (104 weeks) in eight adult men and five women of different ski specializations for 84 indicators were recorded daily. Testing was carried out according to the program of staged examinations of Russian national teams on 91 indicators - in May, July and October.

Results and conclusions. In the group of alpine skiers with a larger proportion ($p<0.05$) of low- and high-intensity aerobic exercise, but a smaller proportion of glycolytic-oriented means, athletes had better VO2max and anaerobic threshold indicators, while they made fewer technical errors when passing training routes, especially during the second half of the ski training stage.

High aerobic performance may be one of the factors that increases the efficiency of technical training by skiers in conditions of accumulation of fatigue during daily training sessions at the stage of ski training.

Keywords: *ratio of training loads, physical fitness profile,* $VO_{2max.}$

Introduction. The sports performance of high-class alpine skiers is largely determined by the effectiveness of the training process at the stages of ski training before the start of the competitive period [1]. The criterion for the effectiveness of ski training is the number of technical errors made by high-class skiers during training sessions on slopes of the required technical complexity: it is believed that the fewer errors, the more successful the process of technical improvement is [2].

The problem is to determine the training factors and structure of preparedness that would ensure the optimal readiness of skiers to solve the problems of technical and physical training directly at the stage of improving sports and technical skills (ski training).

When conducting this study, it was assumed that the ratio of aerobic and anaerobic training loads at the stage of physical training will have a direct impact on the dynamics of physical fitness indicators in the macrocycle and on the progress of technical improvement (the number of technical errors when passing training routes) at the stage of ski training.

Objective of the study was to assess the relationship between the profile of physical fitness and the number of technical errors made when passing training routes at the stages of ski training by high-class skiers who have a different structure of training loads at the stage of physical training.

Methods and structure of the study. 13 high-class alpine skiers took part in the scientific work (M – (n=8), age 28.8±6.1; weight 82.0±5.9; body length 178.7±4.5; F – (n =5) age 22.0±3.1; weight 66.7±9.7; body length 166.3±3.9), specializing in various disciplines of alpine skiing. Training loads during a central-

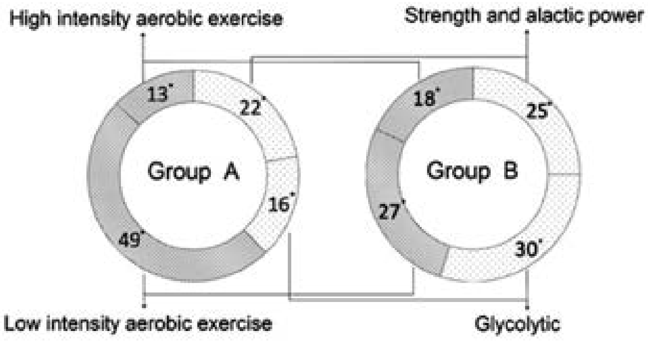

*Figure 1. Ratio (%) of loads by direction at the stage of physical training in two groups of high-class skiers on average for two control seasons. Note. * – differences between groups at p<0.05.*

ized form of training for 84 indicators were recorded daily for two year-long macrocycles in the following areas: "strength and alactic power" (strength exercises of varying intensity, cycling and running accelerations up to 40 s, jumping); "glycolysis" (long periods and complex coordination complexes 60-240 s with near-maximal and maximum intensity); "low intensity aerobic" (1-2 "zones"), "high intensity aerobic" (3-4 "zones").

Physical fitness testing was carried out three times: in May, July and October according to the program of staged comprehensive examinations (SCE), adopted for members of the sports team of the Russian Federation in alpine skiing according to 91 indicators, including, among others: maximum dynamic strength of the leg muscles on Hardware and software Biodex complex, as well as maximum alactic power (MAP), anaerobic threshold (AnT) and Maximum oxygen consumption (MOC) when tested on a bicycle ergometer.

The number of technical errors during the passage of training slopes was recorded by a qualified employee of a comprehensive scientific group at all ski training events in the period from July to October. Load, testing and error rates were averaged over both seasons. The significance of differences between group means of unrelated samples was determined using the Mann-Whitney test; related samples were determined by the Wilcoxon t-test.

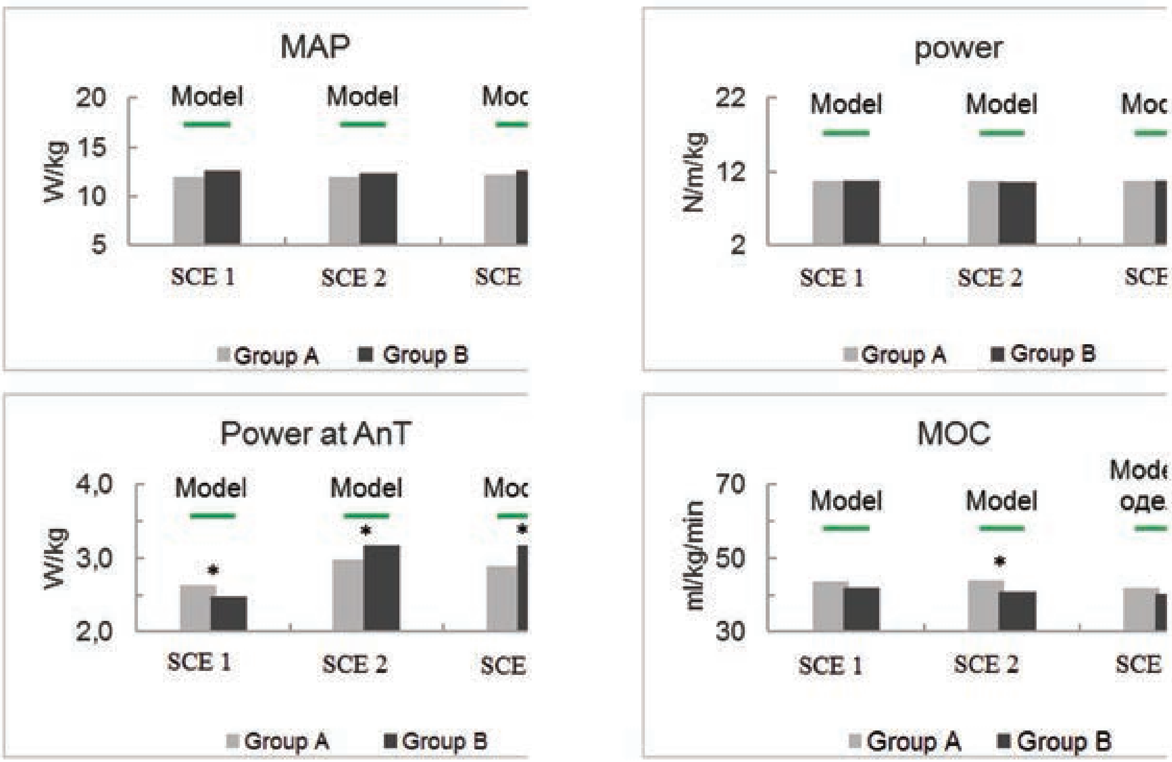

Figure 2. The relationship between the magnitude and dynamics of physical fitness indicators during staged comprehensive examinations (SCE) in May (SCE 1), July (SCE2) and October (SCE 3) in two groups of skiers, differing in load structure

Note: * – differences between groups at p<0.05; MAP – maximum alactic power; AnT – anaerobic threshold; MOC (VO_{2max}) – maximum oxygen consumption when tested on a bicycle ergometer.

Results of the study and discussion. According to the recording of training loads, the subjects were divided into two groups according to the criterion of the ratio of aerobic and anaerobic loads. The final ratio of load volumes at the stage of physical training is presented in Figure 1.

Athletes in group A had a larger (p<0.05) volume of low- and high-intensity aerobic training, but a smaller volume of "glycolytic" training.

Figure 2 shows the relationship between the magnitude and dynamics of MAP, AnT and MOC, demonstrated by high-class skiers of two groups in May, July and October.

The groups did not differ in the size and dynamics of MAP. Both groups improved AnT (p<0.05) during the physical training stage; in group B the increase was higher (p<0.05); in addition, alpine skiers and group A had greater AnT values after the ski training stage. Group A had a greater initial VO2max and VO2max after the ski training phase.

Figure 3 shows the average dynamics of technical errors in groups A and B by days of ski training at all training events at which control was carried out.

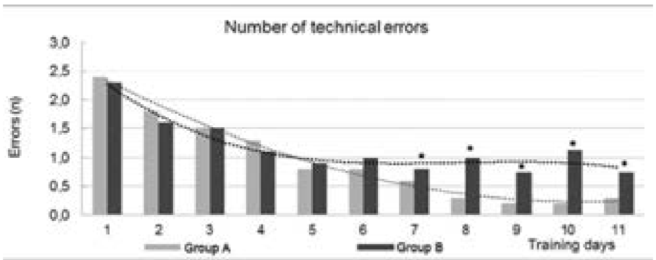

Figure 3. The average number of technical errors in groups of skiers A and B by day, recorded in July-October at all training events of the stages of ski training during two control seasons.

Note. * – differences between groups at p<0.05.

Athletes of group A had, on average, a smaller (p<0.05) number of technical errors on days 7–11 and on average for all stages of ski training.

Conclusions. It was found that in two groups of athletes training under similar conditions of centralized training, a larger proportion of high and low intensity aerobic exercise with a smaller proportion of glycolytic work, as well as with the same ratio of strength and alactic training volumes, allows athletes, on average, to have more high rates of aerobic performance before the start of the ski training stage and maintain such characteristics until the start of the competitive period. In addition, the structure of loads with a large aerobic component and higher aerobic power are probably factors that allow the GVK to make fewer technical errors when working on the track, especially in the second half of the ski stages of sports training.

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