Individual-integral assessment of preparedness and potential capabilities of a sports reserve in Nordic combined

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Abstract

Objective of the study was to to develop a methodology for individual-integral assessment of readiness and determination of the potential capabilities of a sports reserve in Nordic combined.

Results and conclusions. The developed methodology for individual-integral assessment of preparedness and determination of the potential capabilities of a sports reserve in Nordic Combined consists of a number of key procedural and substantive components: organization of systemic pedagogical control over the preparedness of athletes; creation of a formula for calculating the individual-integral assessment of readiness and determining the potential capabilities of combined athletes; determination of the influence of each type of preparedness of the biathletes; inclusion in the formula of additional variables with the appropriate coefficients; development of a formalized table to determine the level of individual-integral assessment of preparedness and potential capabilities of Nordic athletes; determining the evaluation criteria for each type of preparedness and the final coefficient of the potential capabilities of Nordic skiers.

Keywords: *fitness monitoring, potential assessment, sports reserve training, Nordic Combined.*

Introduction. In the last 10-15 years, the role of monitoring the preparedness and states of athletes at each stage of long-term training has significantly increased, which has recently been focused on obtaining objective information about the motor potential of a particular athlete [1].

It is generally accepted that a sports result is the quintessence or an integral indicator of the fitness of athletes. However, evaluating an athlete solely on sports performance, it is impossible to determine the contribution of each type of fitness to achieving a specific place in the competition.

Objective of the study was to to develop a methodology for individual-integral assessment of readiness and determination of the potential capabilities of a sports reserve in Nordic combined.

Results of the study and their discussion. Systematization of the results of previous studies [1-3] made it possible to develop an innovative methodology for individual-integral assessment of readiness and determination of the potential capabilities of Nordic skiers, which consisted of the most important components.

The first key component of the experimental methodology was called “Organization of systemic pedagogical control over the preparedness of athletes.” This component was considered as the most important prerequisite factor in creating a system for objectively determining the individual-integral assessment of the readiness and potential capabilities of Nordic skiers. To do this, it is necessary to determine the means, methods of pedagogical control, form batteries of tests and indicators characterizing the most important types of preparedness of the sports reserve in Nordic combined.

Next, it is necessary to decide on the program of operational, current, milestone examinations of athletes and examinations of competitive activity, as well as with the scientists who will conduct them.

After conducting any type of examination, it is necessary to process the received information about the preparedness of athletes as soon as possible and transfer it to the coach or customer of the event.

The next substantive component of the developed methodology was "Creating a formula for calculating an individual-integral assessment of preparedness and determining the potential capabilities of Nordic skiers." The first fundamental research in this direction in Nordic combined was the scientific substantiation by the employees of the winter sports sector of the Leningrad Research Institute of Physical Culture (hereinafter referred to as LRIPC) of the formula for determining the complex preparedness and potential capabilities of athletes in Nordic combined [2].

As a result of this study, LRIPC scientists developed a formula based on special nomograms for each type of preparedness. The described formula looked like this:

$$IC_{PO} \frac{C_{GPT} + C_{SPT} + C_{TT} + C_{FT\,X} + C_{PT}}{N} \quad (1)$$

The main variables in this formula were the individual-integral coefficient of potential opportunities (IC_{PO}), the coefficient of general physical training (C_{GPT}), the coefficient of special physical training (C_{SPT}), the coefficient of technical training (C_{TT}), the coefficient of functional training (C_{FT}), the coefficient of psychological training (C_{PT}), the number of coefficients used in the numerator of the formula (N).

However, the researchers of Tchaikovsky State Academy of Physical Culture and Sports (hereinafter – TchSPhESA) continued research in this direction [1], which made it possible to modernize the formula developed by the LRIPC specialists.

TchSPhESA employees justified that the effectiveness of pedagogical control increases if the technical readiness of athletes is divided into jumping (C_{JTR}) and cross-country skiing (C_{CTR}), and functional readiness - into the functional state of the cardiovascular and respiratory systems (C_{FSCVRS}) and the functional state of the neuromuscular system (C_{FSNMS}).

As a result of these innovations, the formula for determining the integral coefficient of potentialities has taken the following form:

$$IC_{PO} \frac{C_{GPT}+C_{SPT}+C_{JTP}+C_{CTR}+C_{FSCVRS}+C_{FSNMS}}{N} \quad (2)$$

At the same time, the researchers of TchSPhESA proposed to exclude the coefficient of psychological readiness from the formula, arguing that in order to determine the motor capabilities of athletes, it is enough to rely only on the results of psychophysiological indicators.

Determination of the influence of each type of readiness involved in the calculation of the individual-integral assessment of the readiness and potential capabilities of Nordic skiers.

Employees of the TchSPhESA regularly recorded cases when the values of the coefficients of each type of preparedness, used in the formula as variables, had significant differences among athletes compared with each other, and the values of the individual-integral coefficient of potential opportunities (hereinafter referred to as IC_{PO}) were equal.

For clarity, as an example, we will give the results of two combined athletes of the same age and stage of sports training.

Results of the first Nordic skier:

$$IC_{PO} \frac{C_{GPT}0{,}5 + C_{SPT}0{,}6 + C_{JTP}0{,}7 + C_{CTR}0{,}5 + C_{FSCVRS}0{,}5 + C_{FSNMS}0{,}6}{6} = 0{,}6 \quad (3)$$

Results of the second Nordic skier:

$$IC_{PO} \frac{C_{GPT}0{,}5 + C_{SPT}0{,}7 + C_{JTP}0{,}5 + C_{CTR}0{,}7 + C_{FSCVRS}0{,}7 + C_{FSNMS}0{,}5}{6} = 0{,}6 \quad (4)$$

As can be seen from the example, the first biathlete had a predominantly jumping type of competitive readiness, while the second had a predominantly cross-country skiing type. However, the values of ICPO in both athletes were the same.

Taking into account the results of a number of authors [4, 5], the TchSPhESA staff asked the question: how accurately does the modernized formula determine the potential capabilities of Nordic athletes?

As a result, the employees of the TchSPhESA conducted a factorial study with the determination of the influence of each type of preparedness (factor) on the final sports result [1]. The results of this study showed that the greatest contribution to the dispersion (22.1%) was noted in the factor "cross-country skiing technical readiness", a significant contribution to the dispersion (19.7%) was recorded in the factor "jumping technical readiness". The values of the influence of other factors on sports results were lower. Thus, the factor of the functional state of the cardiovascular

and respiratory systems influenced the sports result by 17.6%, and the factor of the functional state of the neuromuscular system - by 16.8%. The factors with the least influence on sports results in Nordic combined were special physical fitness - 14.6%, general physical fitness - 9.2%.

Inclusion in the formula of additional variables with appropriate coefficients.

The results of the conducted factorial research indicated the expediency of a new modernization of the formula for determining the IQPV by including the factor load of each type of readiness as additional variables. In this regard, the percentage contribution to the variance of each factor was converted into a numerical format, rounded to two decimal places.

After performing the above operations, the re-modernized formula for determining the ICPO began to look like this:

$$IC_{PO} = \frac{(C_{GPT}xF_{GPT})+(C_{SPT}xF_{SPT})+(C_{JTP}xF_{JTP})+(C_{CTR}xF_{CTR})+(C_{FSCVRS}xF_{FSCVRS})+(C_{FSNMS}xF_{FSNMS})}{N} \quad (5)$$

The following variables were added to the already existing variables in this formula: factor value of GPT (FGPT) with a constant value of the coefficient - 0.92, factor value of SPT (FSPT) - 1.46, factor value of JTR (FPTP) - 1.97, factorial value CTR (FCTR) - 2.21, factor value FSCVRS (FFSCVRS) - 1.76, factor value FSNMS (FFSNMS) - 1.68.

The results of the first combined skier after repeated application of the formula:

$$IC_{PO} = \frac{(0,7x0,92)+(0,6x1,46)+(0,7x1,97)+(0,5x2,21)+(0,5x1,76)+(0,6x1,68)}{N} = 0,98 \quad (6)$$

Results of the second biathlete:

$$IC_{PO} = \frac{(0,5x0,92)+(0,7x1,46)+(0,5x1,97)+(0,7x2,21)+(0,7x1,76)+(0,5x1,68)}{N} = 1,01 \quad (7)$$

The re-application of the modernized formula showed that the results of the second biathlete, who had predominantly a cross-country type of competitive preparedness, were, although not much, higher than those of the first athlete with a predominantly jumping type of competitive preparedness. By comparing the obtained results with the corresponding formalized evaluation table (nomogram), it was found that the potential of the first biathlete corresponds to the average level, and the result of the second is above the average level.

Thus, the conducted studies aimed at modernizing the formula for determining the ICPO have made it possible to increase the accuracy of the calculations.

Development of a formalized table to determine the level of individual-integral assessment of the preparedness and potential capabilities of Nordic skiers. To develop formalized tables, one should use the method of constructing a variation series with the determination of the number and width of intervals. Then you should determine the frequency of hitting the results in each interval. Thus, the scale can have a different number of intervals.

Determination of evaluation criteria for each type of fitness of athletes. To use this formula, it was necessary to find the actual results of the athlete in each of the indicators, the values of which corresponded to the values of certain coefficients (from 1.0 to 0.1), after which it becomes clear at what level of development - model, high, medium, low (or using another scale) - the studied quality or ability is found [1].

The final determination of the integral coefficient of the potential possibilities of Nordic skiers. The final operation of the methodology was the final calculation of the individual-integral coefficient of the potential capabilities of Nordic skiers, the value and level of which were determined by a specially developed formalized evaluation table.

Conclusions. The developed methodology makes it possible to more effectively evaluate the preparedness and determine the potential capabilities of Nordic skiers at the stages of long-term sports training, allowing for targeted correction and programming of the training process of the sports reserve in Nordic Combined.

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