Model characteristics of morphological indicators of the body composition of ski jumpers and nordic combined skiers

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A.A. Ryabov[1]
Postgraduate student **E.K. Ryabova**[1]
Dr. Hab., Associate Professor **V.V. Zebzeev**[1]
PhD, Professor **V.N. Chumakov**[1]
[1]Tchaikovsky State Physical Education and Sport Academy, Tchaikovsky

Corresponding author: zebzeev85@mail.ru

Abstract

Objective of the study was to determine the model characteristics of the morphological indicators of the body structure of ski jumpers and nordic combined skiers.

Methods and structure of the study. The scientific work involved 13 ski jumpers, including 7 women and 6 men, 15 nordic combined skiers, including 9 women and 6 men. The bioimpedance method implemented in the professional analyzer InBody 720 was used to identify the morphological features of the body structure and analyze the body composition of highly skilled ski jumpers and Nordic skiers.

Results and conclusions. Analysis of the results showed that the model characteristics of the morphological parameters of the body composition of Nordic skiers differ from ski jumpers. So, ski jumpers are 2 cm higher than the Nordic skiers. The weight of Nordic skiers is 2.5 kg more than that of ski jumpers. In women, according to these indicators, the results are approximately the same. A significant difference was revealed in the indicator of women's muscle mass: biathletes had 2.45 kg more than ski jumpers. A comparative analysis made it possible to determine the deviations of each indicator of body composition from the model one and to focus further work on solving the identified problem.

The results obtained create the necessary conditions for individual training and implementation of a differentiated approach to improving the sports skills of ski jumpers and nordic combined skiers.

Keywords: *model characteristics, morphological indicators, ski jumping, nordic combined.*

Introduction. In elite sport, the use of model characteristics allows timely and objective assessment of the athlete's condition and making corrective changes to the sports training plan due to the targeted implementation of the principle of an individual approach that takes into account the specifics of sports activity to the maximum [3, 4]. According to many authors (V.V. Zebzeev (ski jumping); G.V. Barchukova (table tennis); A.Yu. Dyachenko, A.S. Fedotov (rowing); V.G. Lunichkin, S.V. Chernyshev (basketball), the model characteristics of athletes have a great influence on sports results; on the dominance of certain physical qualities in the body; on the speed of recovery; on the response of the body to physical activity; on the manifestation of the physical qualities of an athlete under load [1, 2, 6, 7].

When determining the model characteristics of athletes, it is important to take into account the morphological features of the body structure, which allows us to approach the issues of sports selection and individualization of the training process in a differentiated way. Currently, to assess the effect of systematic training on the body composition of athletes, professional body composition analyzers based on the method of multifrequency analysis of bioelectrical resistance (bioimpedancemetry) are widely used [4, 5].

Objective of the study was to determine the model characteristics of the morphological indicators of the body structure of ski jumpers and nordic combined skiers.

Methods and structure of the study. The scientific study was carried out on the basis of the federal center for training in winter sports "Snezhinka" named after A.A. Danilova FSBEI HE «Tchaikovsky State Physical Education and Sport Academy». The reference parameters were taken as the morphological indica-

tors of the body composition of the winners and prize-winners of the All-Russian competitions (Russian Ski Jumping Championship, Russian Cup Final in Ski Jumping, Russian Championship in Nordic Combined, Russian Championship in Nordic Combined). A total of 13 ski jumpers were examined, including 7 women and 6 men, 15 Nordic skiers, including 9 women and 6 men.

The bioimpedance method implemented in the professional analyzer InBody 720 was used to identify the morphological features of the body structure and analyze the body composition of highly skilled ski jumpers and Nordic skiers.

The following indicators of body composition of athletes were studied: height (cm), weight (kg), muscle mass (kg), fat mass (kg), minerals (kg), proteins (kg), extracellular fluid (l), body mass index (kg/m2), muscle mass of the right arm (kg), fat mass of the right arm (kg), muscle mass of the trunk (kg), fat mass of the trunk (kg), muscle mass of the left arm (kg), fat mass of the left arm (kg) , muscle mass of the right leg (kg), fat mass of the right leg (kg), muscle mass of the left leg (kg), fat mass of the left leg (kg).

The data obtained were subjected to statistical processing and determined using the method of sigmal deviations from the arithmetic mean of the sample.

Results of the study and their discussion. As a result of the study, model characteristics of the morphological indicators of the body composition of ski jumpers and Nordic skiers were determined (see table).

Analysis of the results showed that the model characteristics of the morphological parameters of the body composition of Nordic skiers differ from ski jumpers. So, ski jumpers are 2 cm higher than the Nordics. The weight of Nordic skiers is 2.5 kg more than that of ski jumpers. In women, according to these indicators, the results are approximately the same. A significant difference was revealed in the indicator of women's muscle mass: biathletes had 2.45 kg more than ski jumpers. Interestingly, in both men and women, the muscle mass index of the legs (both right and left) in ski jumpers is higher than in Nordic skiers.

Conclusions**.** Thus, the development of model characteristics of morphological indicators of body composition is an important point of analytical work. After determining the model characteristics, it became possible to compare the actual body structure indicators of ski jumpers and Nordic skiers with their reference parameters. This will allow determining the deviations of each indicator of body composition from the model and focusing further work on solving the identified problem.

Model characteristics of morphological indicators of the body composition of winners and prize -winners of all -Russian competitions

Indicators	Nordic combined	Ski jumping	Nordic combined	Ski jumping
	Men		Women	
Growth, see	176 ±1,5	178 ±1	169±1.5	168,5± 1,5
Weight, kg	66,5 ±1,5	63±1	56,75± 1,05	56,5± 1,05
Muscle mass, kg	35,35±1,15	34,7±1,1	29,3± 0,8	26,85±1,05
Fat mass, kg	5,0±0,2	4,55±0.25	9,5± 0,6	8,5± 0,4
Minerals, kg	4,2±0,1	3,95±0,15	3,235±0,225	3,32± 0,24
Proteins, kg	12,5±0,4	11,75±0,45	9,35± 0,35	9,5±0,8
Extracellular fluid, l	45,65±1,45	42,05±1,5	35,0± 0,1	33,4± 0,6
BMI (kg/m^2)	19±0,6	21,5±0,5	20,5±0,4	19,3± 0,4
Muscle mass of the right arm, kg	3,07±0,18	3,84±0,28	2,255± 0,075	2,4± 0,26
Fat mass of the right arm, kg	0,15±0,05	0,2±0,1	0,6±0,1	0,5±0,2
Muscle mass of the left arm, kg	2,975±0,155	3,9±0,29	2,25±0,09	2,335±0,235
Fat mass of the left arm, %	0,15±0,05	0,25±0,15	0,65±0,05	0,5±0,2
Muscular mass of the body, kg	25±0,9	28±1,1	21,2±0,9	20,05±0,85
Body fat mass, kg	2,25±0,35	1,65±0,35	4,95±0,35	3,75±0,3
Muscle mass of the right leg, %	9,83±0,51	10,24±0,26	7,225±0,375	7,73±0,37
Fat mass of the right leg %	0,95±0,15	1,15±0,15	1,8±0,1	1,55±0,25
Muscle mass of the left leg, %	9,785±0,665	10,05±0,24	7,07±0,37	7,85±0,29
Fat mass of the left leg, %	0,95±0,15	1,05±0.15	1,85±0,05	1,3±0,2

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