

# Relationship of morphofunctional indicators with indicators of general physical training of mongolian wrestlers according to the results of multiple regression analysis

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## Abstract

**Objective of the study** was to identify the relationship between morphofunctional indicators and indicators of general physical fitness of Mongolian athletes.

**Methods and structure of the study.** The work analyzes the most important characteristics and indicators of the body condition (anthropometric data, body composition data, functional parameters) of highly qualified athletes, providing significant connections with physical fitness tests. To achieve this goal, 181 highly qualified athletes, mainly involved in martial arts, were examined.

**Results and conclusions.** Based on the results of multiple regression analysis, morphofunctional models of the motor qualities of Mongolian highly qualified athletes were built, which are based on morphological characteristics, body composition indicators obtained using the bioimpedansometry method, and functional characteristics that can be used in sports selection, at the initial stage of preparation and at the stage of individualization sportsmanship in a long-term training process.

**Keywords:** functional indicators, athletes, physical training.

**Introduction.** Monitoring the effectiveness of training processes, along with studying the physical and functional fitness of athletes, involves identifying the relationships between the morphological and functional parameters of the most successful individuals [1-9].

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**Methods and structure of the study.** The paper analyzes the most important characteristics and indicators of the body condition (anthropometric data, body composition data, functional parameters) of highly qualified athletes, providing significant links with physical fitness tests. To achieve the set goal, 181 highly qualified athletes were examined, mainly those involved in martial arts.

**Results of the study and discussion.** The influence of morphofunctional characteristics and indicators of body component composition on the results of the «Standing long jump» test.

Results of multiple regression analysis, in which the independent variables are morphological and functional characteristics, assessments of body component composition, and the dependent variables are the indicators of motor activity according to the results of the «Standing Long Jump» test, which characterizes the explosive strength of the leg muscles of Mongolian athletes.

According to the results of multiple regression analysis, it was revealed that a person's ability to jump from a place for a distance, which determines the explosive strength of the lower limb muscles, is most



closely associated with such indicators as the length of the lower limbs, the index of the length of the lower limbs to the body length ( $R = 0,765$ ,  $p < 0,000$ ), hip circumference, lean mass ( $R = 0,460$ ,  $p < 0,005$ ), peak expiratory volume flow rate ( $R = 0,610$ ,  $p < 0,0046$ ). The results of the «Standing Long Jump» test have a positive relationship with the values of the length of the lower limbs ( $\beta = 1,151$ ,  $p = 0,002$ ), hip circumference ( $\beta = 0,364$ ,  $p = 0,000$ ), lean mass ( $\beta = 0,194$ ,  $p = 0,033$ ), peak expiratory flow rate ( $\beta = 0,499$ ,  $p = 0,022$ ). Skeletal muscle mass is also positively, although insignificantly ( $\beta = 0,028$ ,  $p = 0,682$ ), associated with this motor quality. Negative relationships were noted for the values of BMI ( $\beta = -0,173$ ,  $p = 0,032$ ), as well as the index of the length of the lower limbs to the body length ( $\beta = -0,434$ ,  $p = 0,024$ ). Other analyzed indicators did not have a reliable significant effect on this motor quality. Thus, the constructed model for the indicator «Explosive power of the lower limb muscles» is determined, first of all, by the length of the lower limbs, hip circumference, respiratory system indicators and muscle mass.

The influence of morphofunctional characteristics and indicators of body component composition on the results of the «Shuttle run - 10x3» test.

Results of multiple regression analysis of the Shuttle Run 10x3 m test indicators, which determine the dependence of coordination abilities on morphofunctional characteristics and body component composition assessments.

It was revealed that the results of the Shuttle Run 10x3 m test are associated with such indicators as the diameter of the distal part of the shin and the sagittal diameter of the chest with a high degree of reliability ( $R = 0,752$ ,  $p < 0,000$ ). It should be noted that the indicators of coordination abilities are inversely related to the amount of time spent on this test. Therefore, the results of the Shuttle Run 10x3 test are positively influenced by the diameter of the distal part of the shin - the width of the ankle ( $\beta = -0,351$ ,  $p = 0,003$ ).

The sagittal diameter of the chest has a negative effect on coordination abilities, although the  $\beta$  coefficient is positive ( $\beta = 5,938$ ,  $p = 0,008$ ). It should be noted that there is a positive, albeit unreliable, tendency for the relationship between such indicators as BMI, leg length, exhalation POS, and a negative one for thigh circumference with the quality of agility. No reliable dependencies were found between the coordination abilities indicator and other functional char-

acteristics and indicators of body component composition.

Thus, the model for the quality of agility is based with a high degree of reliability on the diameter of the distal part of the shin as an indicator of the development of the skeletal system and the sagittal diameter of the chest, which may be associated with a more convex shape of the chest and better ventilation of the lungs.

The influence of morphofunctional characteristics and indicators of body component composition on the results of the strength endurance test «Bending arms in a lying position for 30 sec».

Results of multiple regression analysis of the parameters of the test «Bending of arms in a lying position for 30 seconds», which determine the strength endurance of the body, from morphofunctional characteristics and assessments of the component composition of the body. According to the results of multiple regression analysis, reliable relationships were found between strength endurance and such parameters as body weight, chest circumference, shoulder circumference in tension, diameter of the distal part of the shoulder, fat fold on the back of the shoulder, bone structure index ( $R = 0,811$ ,  $p < 0,000$ ); skeletal muscle mass (SMM), lean mass (LM), basal metabolism (BM) ( $R = 0,383$ ,  $p < 0,000$ ); peak expiratory flow rate, wrist dynamometry ( $R = 0,695$ ,  $p < 0,000$ ). At the same time, the results of the strength endurance test «Barbell curl in a lying position for 30 seconds» are positively influenced by the values of chest girth ( $\beta = 0,423$ ,  $p = 0,039$ ), shoulder girth in a tense state ( $\beta = 0,302$ ,  $p = 0,044$ ), diameter of the distal part of the shoulder ( $\beta = 5,084$ ,  $p = 0,014$ ), skeletal muscle mass ( $\beta = 0,213$ ,  $p = 0,003$ ), lean mass ( $\beta = 0,424$ ,  $p = 0,000$ ), basal metabolic rate ( $\beta = 0,378$ ,  $p = 0,000$ ), peak expiratory flow rate ( $\beta = 0,201$ ,  $p = 0,001$ ), and wrist dynamometry ( $\beta = 0,283$ ,  $p = 0,009$ ). Negative influence on this quality is exerted by body weight ( $\beta = -8,981$ ,  $p = 0,002$ ), bone structure index ( $\beta = -5,069$ ,  $p = 0,013$ ).

Thus, the model characteristics for the quality of strength endurance of the body are, first of all, the indicators of the muscular and respiratory systems of the body.

Conclusions. Based on the results of multiple regression analysis, morphofunctional models of the motor qualities of highly skilled Mongolian athletes were constructed, which are based on morphological features, body composition indicators obtained us-



ing the bioimpedancemetry method, and functional characteristics and can be used in sports selection, at the initial stage of preparation and at the stage of individualization of sports skills in the long-term training process.

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