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## The Study of the Correlation Relationship of Morphofunctional Indicators Depending on the Sports Specialization of Highly Qualified Male and Female Submariners

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### ABSTRACT

Goal. The study of the correlation relationship of morphofunctional indicators depending on the sports specialization of highly qualified male and female submariners. Materials and methods. Mathematical processing of the results was carried out on a personal computer using the programs Microsoft Word and Microsoft Excel. The study involved athletes specializing in various disciplines of underwater sports. Results. Using correlation analysis, based on the morphofunctional characteristics of submariners, it was established: - swimmers who specialize in swimming in fins at stayer distances have an athletic build, an above-average body length and a relatively small body weight, which allows them to effectively overcome the resistance of the water environment. - swimmers-submariners sprinters have high indicators of length and body weight, which allows them to perform high-level work of speed and power orientation.

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indicators depending on the sports specialization of highly qualified male and female submariners.

### Introduction

The development of underwater sports is very rapid. Every year, athletes set new national, European and world records. To maintain the high positions won by the national team of the country at the world level, a new approach to the training process is needed. The results of the study of the morphofunctional characteristics of submariners allow coaches to determine the specialization for the athlete, which in the future, at the stage of improving the highest sports skills, will allow achieving the highest sports results. Sports training helps to increase the functional capabilities of the body, and they largely ensure the achievement of high sports results. With a competent construction of the training process, taking into account individual anthropometric indicators, the reserve capabilities of the body increase, increasing its biological stability and the reliability of the system.

### Goal

The study of the correlation relationship of morphofunctional

### Materials and methods

Anthropometry (from the Greek anthropos — man and metro-measure) is one of the main methods of studying the morphological features (individual and group) of a person.

a) measurement of body length (height):

Height is a fundamental indicator of physical development.

The examinee, straightening his chest, picking up his stomach, touches the vertical bar of the plastic height meter with three points (heels, buttocks, shoulder blades).

The movable coupling is brought into contact with the apical point of the head; the outer corner of the eye and the tragus of the ear are at the same horizontal level. Height is measured in centimeters (cm).

b) measurement of body weight (weight):

Weight expresses the total body weight, indirectly reflects the development of subcutaneous fat and musculoskeletal system. The weight was determined using electronic scales (in the morning, on an empty stomach, without clothes). The subject stands in

the middle of the scale platform; standing still, he measures his weight. Weighing is carried out with an accuracy of 50 g. Body weight is measured in kilograms (kg).

c) measurement of the circumference of the chest: the circumference of the chest was determined using a centimeter tape. The tape was applied from the back along the lower corner of the shoulder blades (with the arms spread apart), from the front - at the level of the nipples, the ends were connected and the result was measured.

In girls, a centimeter tape was placed in front of the mammary glands.

d) measuring the strength of the hands: Dynamometry-measuring the strength of the hands (kg) - was performed using a spring dynamometer. In the standing position, the subject takes the dynamometer, clasping it with his hand. The hand is pulled to the side to a horizontal position. The dynamometer is compressed with all its force. At the same time, you can not move from your seat, bend your arm at the elbow joint. The measurement was carried out three times, taking into account the best result of the strongest hand.

e) calculation of the weight-growth index (VRI): The weight-growth index was calculated using the following formula:

$$VRI = \text{Body Weight (g)} / \text{Height (cm)};$$

The index shows how many grams of body weight per 1 cm of body length.

f) calculation of the life index (ZHI):

The vital index (ZHI) or vital indicator was calculated using the following formula:

$$ZHI = ZHEL / \text{Body weight (kg)};$$

The vital index is used to determine the functional capabilities of the external respiratory system.

Correlation analysis of the relationship between athletic performance, body weight, height and BEL, among athletes swimming underwater exercises.

Mathematical processing of the results was carried out on a personal computer using the programs Mikrosoft Word and Mikrosoft Excel.

## Results

Given that the morphofunctional characteristics of submariners have not been studied, we decided to analyze the anthropometric indicators (Table 1).

**Table 1:** Indicators of physical development of submariners according to anthropometric data in women and men

Indicators	Women	Men
Height, cm	165-177	165-191
Body weight, kg	53-70	65-94
Circumference of the pile cage, cm	75-86	90-110
VRI	325-409	375-497
ZHI	58-81	75-84
Hand strength, kg (right hand)	27-32	45-52
Hand strength, kg (left hand)	25-29	43-50
ZHEL, ml <sup>3</sup>	3700-5000	5000-7830

To establish the correlation between the morphofunctional parameters of highly qualified submariners and their sports specialization, we adopted the following criteria for evaluating

the magnitude of the correlation coefficients (r):

- (r < 0.30) – low degree of dependence;
- (r from 0.31 to 0.50) – weak;
- (r from 0.51 to 0.70) – average;
- (r from 0.71 to 0.80) - good;
- (r from 0.81 to 0.90 and above) - strong.

The data on the relationship between the sports result and the anthropometric parameters of highly qualified submariners are presented in Table 2.

**Table 2:** Comparative analysis of the relationship between the sports result and the physical parameters of highly qualified submariners

Anthropometric parameters	Correlation coefficient	Correlation coefficient
Sprinters	Women	Men
height	0,32	0,43
weight	0,73	0,75
ZHEL	0,51	0,63
Stayers	Women	Men
height	0,21	0,30
weight	0,54	0,51
ZHEL	0,69	0,71
Submariners	Women	Men
height	0,30	0,29
weight	0,76	0,81
ZHEL	0,75	0,78

From the analysis of Table 2, it follows that a good relationship with the sports result among sprinters in men and women has a weight (r=0.75 and r=0.73), the average for both men and women has a vital lung capacity indicator (r=0.63, r=0.51). There is a weak correlation between men and women with height (r=0.43, r=0.32). Among stayers, a good correlation among men is the indicator of ZHEL (r=0.71), in women with this indicator there is an average correlation (r=0.69). The growth rate of both men and women has a low degree of dependence (r=0.30, r=0.21). Weight in this specialization of underwater sports, for men and women, has an average degree of dependence (r=0.51, r=0.54). In athletes specializing in scuba diving, there is a strong relationship with weight in both men (r=0.81) and women (r=0.76). Also, a good relationship, in men and women, can be traced with ZHEL (r=0.78, r=0.75). Low degree of correlation, in men and women, with growth indicators (r=0.29, r=0.30).

A weak correlation with height was observed in both men and women who specialize in stayer and sprint distances, as well as in men and women who specialize in scuba diving.

## Conclusion

Using correlation analysis, based on the morphofunctional characteristics of submariners, it was established:

- swimmers who specialize in swimming in fins at stayer distances have an athletic build, an above-average body length and a relatively small body weight, which allows them to effectively overcome the resistance of the aquatic environment.
- swimmers-submariners sprinters have high indicators of length and body weight, which allows them to perform high-level work of speed and power orientation.

For the first time, correlation relationships of morphofunctional indicators were revealed depending on the sports specialization of highly qualified male and female submariners.

### References

1. Analysis of the regularity of the increase in world records in underwater sports (swimming in fins). Moskovchenko O N, Tolstopyatov I A, Redi E V, Ivanitsky V V, Zakharova L V (2019) Theory and practice of physical culture 70-73.
2. Zhukova E S(2017) Improvement of competitive activity in high-speed swimming in fins for athletes aged 13-14 years / E S Zhukova, V E Aslayeva // Questions of functional training in sports of the highest achievements 35-40.
3. Kononova E V Adaptation of children and youth in modern socio-economic conditions based on health-technology/ Kononov E V(2015) Morphofunctional types of physical development of persons with different motional regime, Abakan 148-150.
4. Moskovchenko, O N (2014) Underwater sport and diving: textbook: Dictionary/sost. O. N. Moskovchenko, I. A. Tolstopyatov, A V Alexandrov. - 2nd Ed., reprint. and DOP. /Krasnoyar. GOS. PED. V. P. Astafyev Univ. - Krasnoyarsk 316.
5. Bendikova E(2014) Lifestyle, Physical and Sports Education and Health Benefits of Physical Activity / E Benedikova // European Researcher 69: 343-348.
6. Gaurav V(2014) Anthropometric characteristics of Indian volleyball players in relation to their performance level / V. Gaurav, A. Singh // Turkish Journal of Sport and Exercise 16: 87-89.
7. Morphofunctional markers of kinetic aptitude in a sport selection system(2018) Moskovchenko O, Ivanitsky V, Zakharova L, Tolstopyatov I, Kattsina T Journal of Physical Education and Sports 670-676.

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