

Features of the vital capacity of the lungs in athletes engaged in underwater apnea

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Professor **I.A. Tolstopyatov**¹
Associate Professor **E.V. Redi**¹
A.N. Lisovik¹

¹Reshetnev Siberian State University of Science and Technology,
Krasnoyarsk

Corresponding author: IRusslen90@mail.ru

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Abstract

Objective of the study was to assess the vital capacity of the lungs of athletes involved in underwater apnea among women and men of the highest sports skill.

Methods and structure of the study. Submarine athletes aged from 22 to 28 years (30 women and 30 men) took part in the experiment. All athletes were conditionally divided into three groups of 20 people (10 women and 10 men): group A – athletes specializing in underwater apnea, group B – athletes specializing in stayer distances, group C – athletes specializing in sprint distances. Each athlete studied has specialized in this discipline of underwater sports for at least five years, is a member of the national team of the Krasnoyarsk Territory and has a sports title of at least candidate master of sports.

Results and conclusions. The conducted research allows us to summarize that women and men involved in underwater sports and performing in the apnea discipline have high VC rates. Intense training regimes of highly qualified athletes in cyclic sports place increased demands on the external respiration apparatus, and scuba diving is precisely the sport where the cardiorespiratory system plays a significant role.

Keywords: *submarine swimmers, apnea, training process, morphofunctional characteristics, sports specialization, vital capacity, sports discipline, external respiration apparatus.*

Introduction. Scuba diving is a rapidly growing sport. The basis of scuba diving is the athlete diving and swimming across the surface of the water for a certain length in the shortest time while wearing a monofin. Also, underwater sports are characterized by diving underwater using special equipment, devices, apparatus and equipment [1, 3].

Literary data on the health status of submarine athletes and people involved in scuba diving are very scarce, which is due to the relative youth of this sport. Nevertheless, the results of research in this area make it possible to generally characterize the level of development of morphofunctional indicators of this contingent of athletes. The greatest interest was shown in the study of the function of external respiration - one of the most loaded systems in submarine swimmers [4]. Numerous studies have shown that diving athletes, due to systematic diving under water, had an increase in the vital capacity of the lungs (VC), an increase in the possible duration of stay under water during diving, an increased tolerance to hypoxia, and the ability

to maintain normal blood oxygen saturation for a long time during apnea [2, 5, 6]. However, there is very little scientific literature and studies of vital capacity indicators in submarine athletes specializing in the discipline of apnea, which served as the topic of our study.

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cators, the method of mathematical statistics. The vital capacity of the lungs was determined using a special device - a spirometer. The study was conducted in the morning, before training. The athletes were in a vertical position when exhaling maximally into the spirometer, using only one attempt. The method of mathematical statistics was used to establish the relationship and substantiate the results obtained. During the study, a correlation analysis of the relationship between sports performance and the level of development of the vital capacity of the lungs was carried out.

Results of the study and discussion. Sports training helps to increase the functional capabilities of the body, and they largely ensure the achievement of high sports results. With proper construction of the training process, taking into account individual anthropometric indicators, the reserve capabilities of the body increase, increasing its biological stability and system reliability. Studying the functional state of the external respiration apparatus is an important indicator in the training of an athlete.

The average VC at rest in female underwater swimmers specializing in underwater apnea (group A), sprinting (group C) and stayer (group B) disciplines are presented in table 1, men in table 2.

Table 1. Average VC at rest among female underwater swimmers specializing in underwater apnea, sprint and stayer disciplines

group A	group B	group C
4900 мл ³	4400 мл ³	3800 мл ³

Table 2. Average VC at rest among male underwater swimmers specializing in underwater apnea, sprint and stayer disciplines

group A	group B	group C
6700 мл ³	5400 мл ³	4900 мл ³

Analyzing the vital parameters of apnoic athletes, one can note the fact that these indicators are significantly higher than those of stayers and sprinters, which in turn indicates the high functionality of the respiratory apparatus. Intense training regimes of highly qualified athletes in cyclic sports place increased demands on the external respiration apparatus, and scuba diving is precisely the sport where the cardiorespiratory system plays a significant role.

In order to determine the extent to which apneic athletes need to develop their respiratory apparatus, a correlation analysis was carried out of the relationship

between the sports result (diving while holding the breath for the maximum number of meters) and the level of development of the vital capacity of the lungs. The analysis revealed a close correlation between the studied parameters in women specializing in underwater apnea ($r=0.79$). At the same time, among men the correlation coefficient was higher ($r=0.83$).

Conclusions. The study allows us to summarize that athletes specializing in underwater apnea have a larger lung volume than athletes specializing in stayer and sprint distances, both among men and women. This can be explained by the specifics of swimming underwater while holding your breath, where special requirements are placed on the work of a submariner in anaerobic conditions (the ability to hold your breath when diving to a length of 50 m or more).

The high correlation between sports performance and parameters of the vital capacity of the lungs in women indicates the need to develop the respiratory apparatus for apnoic athletes.

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