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Research Article

MORPHOFUNCTIONAL CHARACTERISTICS OF THE HEALTH STATUS OF YOUNG SWIMMERS

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ABSTRACT

The influence of swimming on the somatometric and physiometric parameters of school-age children was studied. It is shown that systematic swimming exercises affect body weight, chest circumference, increase the muscle strength of the back and hands. The data obtained indicate that morphological changes in adolescents depend on the duration of swimming lessons. Swimming exercises have a healing effect, affect the functions of the cardiovascular and respiratory systems. The vital capacity of the lungs, the indicators of breath holding in adolescents involved in swimming, were higher than in non-swimming children.

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Blood pressure indicators after exercise indicate increased adaptive capabilities of the body of young swimmers, depending on the duration of swimming lessons.

The conclusion is made about the importance of a comprehensive study of somatometric and functional indicators of the body of children and adolescents involved in swimming to assess the individual level of their health.

KEYWORDS

Swimming, somatomedin indicators, children, teenagers.

INTRODUCTION

The study of the influence of sports physical activity on the characteristics of the morphofunctional development of children and adolescents is one of the topical issues of age-related physiology. School years are an important stage in a person's life. During this period, the development of physiological systems, especially the motor apparatus, is completed. In the process of forming the basic motor qualities, it is important to observe the adequacy of the load to the age-related functional capabilities of the body [12,2001], in addition, it is necessary to take into account the age-sex and individual characteristics of children and adolescents, as well as the reserve capabilities of their body at different stages of development.

Despite the large number of works devoted to the influence of physical activity on the development of children and adolescents, there is not enough data from a comprehensive study of somatometric and physiometric indicators under the influence of various sports, including systematic swimming.

The purpose of this work was to study the effect of swimming lessons on the morphofunctional development of children and adolescents.

MATERIALS AND METHODS OF RESEARCH

The study involved students involved in swimming in a specialized children's and youth school of the Olympic reserve in Andijan.

The first group included students of grades 1,3,4,5,6,8,9 involved in swimming.

In the second series, adolescents aged 13-14 were studied, depending on the duration of swimming lessons. In this series, one group (I) consisted of adolescents who have been swimming for 1 month (initial group). The second included teenagers who have been swimming for about 6 months. The third group consisted of teenagers who have been

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swimming for more than a year. Each group had 12-15 swimmers.

All subjects underwent somatometric and physiometric measurements.

Somatometric studies.

The measurements were carried out using carefully tested measuring instruments: scales, stadiometer, standing and manual dynamometers, centimeter tape.

Height measurement (body length) was carried out using a vertical stadiometer.

Determination of body weight was carried out without outerwear. Weighing was carried out on floor electronic scales with an accuracy of 0.1 kg.

The circumference of the chest was measured at rest (breath pauses), during inhalation and exhalation using a centimeter tape.

The muscle strength of the back and the muscle strength of the hands were measured using the deadweight and hand dynamometers.

Methods for assessing physiological functions.

To assess physiological functions, measurements of blood pressure (BP) and heart rate (HR) ± were performed using the Korotkov method.

Vital capacity (VC) was measured spirometrically.

Breathing rate and breath holding with a stopwatch.

Measurements were taken before and after standard physical activity. As a standard exercise.

LITERATURE REVIEW

Swimming is one of the effective means of promoting health and physical development of a person. Systematic swimming lessons have a number of physiological features, which are determined by many factors such as the physical properties of water, physical and chemical characteristics: bulk density, density, viscosity, the child's body when swimming, being in a horizontal position, functions in easier conditions compared to land. The relative incompatibility of the body in water unloads the musculoskeletal system, develops coordination of movements, and has a positive effect on the functioning of the cardiovascular system. The horizontal position of the body improves venous outflow and redistribution of blood within the vascular bed. The absence of static stresses, the massaging effect of the water flow provides additional blood flow to the internal organs, including the heart muscle from the vessels of the skin.

Staying in water also affects the thermoregulation of the child's body. Conducting swimming lessons in water with a temperature of 26-28, leads to an increase in metabolism, the development of an adequate response of the body to increased heat transfer. It is

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especially useful for improving the body's defenses against adverse external influences.

Swimming also affects the activity of the excretory organs, which function in water with a greater load than on land, which leads to an increase and improvement in the drainage function of the kidneys.

The aquatic environment has a significant impact on the function of the respiratory system. Mechanical impact, as well as the difference in water pressure on the upper and lower parts of the body leads to a significant increase in the strength of the respiratory muscles, chest mobility, VC, etc.

Swimming exercises have a positive effect on the state of the central nervous system, contribute to the formation of a balanced and strong type of nervous activity. Evidence of the healing effect of swimming can serve as examples of the treatment of certain diseases associated with metabolism, in the initial stages of diseases of the respiratory and cardiovascular systems, to improve and correct posture in scoliosis, lordosis, for the treatment of osteochondrosis [6,2005].

Currently, there are a sufficient number of works devoted to the study of the physical and functional fitness of swimmers [4,1996].

In the course of many years of swimming training, young swimmers aged 8-13 years old showed a pronounced decrease in heart rate compared to children not involved in sports; in children involved in swimming at the age of 12-13 years, a significant decrease in heart rate was revealed at the stage of special training.

In a state of relative rest, children from 8 to 13 years old who go in for swimming show a significant increase in heart rate.

As a result of numerous studies of sports selection in sports swimming, ideas have been formed about the specific requirements imposed by this sport on the body and motor abilities of athletes and a number of genetic morphological indicators have been determined that allow assessing the prospects of swimmers at a specific stage of long-term training [5,2006]. It has been shown that athletic achievements in swimming depend on the characteristics of the physique - body size, proportions, constitutional type, which determine buoyancy and hydrodynamic qualities and indirectly indicate strength (circumference dimensions of bodies, the value of muscle strength, composition of muscle fibers) and functional (VC, ratio of VC to body weight, active body mass, composition of muscle fibers) potencies of swimmers. The speed of swimming in different ways and at different distances also depends on the characteristics of the physique, physical and functional fitness.

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However, the forecast of sports fitness in terms of morphological and physiological indicators in swimming is still far from the requirements of the time. This is especially true for the forecast after the initial training period, the accuracy of such a forecast does not exceed 30-35%. Therefore, increasing the reliability and accuracy of an individual prediction of sports fitness after a period of initial training by including a complex of physiological and morphological indicators seems to be relevant.

Therefore, the study of physiological changes in the body of young swimmers is important for predicting the effect of this sport on the development of the child's body.

In this regard, the purpose of this study was to study the physiological and morphological criteria for the selection of students involved in swimming.

RESULTS AND DISCUSSION

In the first series of the study, the influence of swimming on the physical development of students of various classes was studied.

According to our data, the growth rates of children of primary school age involved in swimming practically did not differ from those of students in the control group: in the first grade it was 123.0 ± 1.5 cm, in the second - 133.0 ± 4.2 cm, in the 3rd 134.0±6.4 cm. Similar results were obtained when measuring body weight: 25.6±1.2 kg, 28.0±2.1 kg, 31.0±3.2 kg, respectively.

The volume of the chest in students of grades 1 and 3 at rest differed slightly: 59.3±1.7 cm and 61.6±2.5 cm, respectively. With a deep breath of 3rd grade students, it was 65.3±1.5 cm. This indicator was higher than in children of the 1st grade by an average of 3 cm. With a deep breath, a similar picture was observed. Significant changes were observed in students of the 4th grade: at rest 64.3±2.5 cm; with deep inspiration 68.6 ± 2.2 cm, deep exhalation 61.3 ± 2.2 cm.

The age period from 5 to 9 classes refers to adolescence. It should be noted that most modern teenagers spend almost all their time with the phone in their hands, as a result of which they develop hypodynamia - a lack of movement. One of the factors that strengthen the body is swimming, which affects not only the physiological, but also the psychological state of the body.

The growth of students in grades 8 was 153.0±1.2 cm, in grades 9 - 160.0±0.7. The body weight of students in grades 9 compared with students in grades 8 was on average 1.1 kg more. The volume of the chest at rest in 9th grade students was 0.7 cm more than in 8th grade students. Differences were also found in these indicators during deep inspiration and expiration.

When swimming, along with the foot, the hands also experience a large load. Therefore, carrying out

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dynamometry, the strength of the hands is an important indicator of the capabilities of the musculoskeletal system. It is known that when performing swimming movements with arms and legs, almost all the muscles of the body are involved in the work, which contributes to the harmonious development of muscles.

In our studies, the greatest increase in the strength of the hands was observed in students in grades 8-9. The strength of the right hand of pupils of the 8th grade averaged 17.6±1.8 kGm, the strength of the left hand was 13.3±0.5 kGm; in students of grade 9 26.3 ± 0.7 kGm and 21.8 ± 0.9 kGm, respectively.

Thus, swimming classes affect the morphological parameters of the body. An increase in growth, body weight and dynamometry of the hands in students of grades 8-9 was shown.

Swimming also has a positive effect on the functioning of the cardiovascular system: it improves blood circulation, optimizes heart rate and normalizes blood pressure. As a result of swimming, pressure decreases, the elasticity of blood vessels increases, and the stroke volume of the heart increases. Those who systematically go in for swimming have a decrease in heart rate to 60 or less beats per minute. In this case, the heart muscle works more powerfully and economically. Thus, positive changes in the work of the heart under the influence of swimming lead to a faster delivery of oxygenated blood to distant parts of the body and internal organs, which improves overall metabolism. However, it must be borne in mind that the child's heart quickly gets tired when stressed, is easily excited and does not immediately adapt to the changed load, the rhythm of its contractions is easily destroyed, so the teenager's body needs frequent rest. These features of the cardiovascular system of a teenager should be taken into account when choosing physical exercises [15.2013].

Indicators of maximum blood pressure in students of grades 8-9 practically did not differ: 95.0±3.4 mm Hg and 95.0±3.6 mm Hg, respectively. The minimum arterial pressure was 55.0±3.6 mmHg in 8th grade students and 60.0±2.3 mmHg in 9th grade students. The data obtained indicate the absence of deep differences among students of this age, which indicates a high reactivity of this indicator. Heart rate decreased with age.

During swimming, a person takes a full breath and exhale due to the pressure of the water. As a result, such breathing exercises strengthen the lungs, train the bronchi and alveoli, increase the elasticity of the lungs, increase the size of the chest and the vital capacity of the lungs.

The vital capacity of the lungs in 8th grade students was 2500.0±123.7 ml, in 9th grade students it was 2733.0±148.6 ml.

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In children of primary school age, this figure averaged 1466.6±41.2 ml in grade 1, 1600.0±50.0 ml in grade 3, and 1800.0±84.6 ml in grade 4. The respiratory rate decreased with age and amounted to an average of 20.3 ± 0.5 per minute in 9th grade students. With increasing age, along with a decrease in the frequency of breathing, the depth and its minute volume increase.

In the second series, the influence of the duration of swimming lessons on the physical development of adolescents was studied. As mentioned above, adolescents involved in swimming for 1 month (initial group), 6 months and more than 1 year.

The data obtained showed that in these groups of subjects, the growth was practically the same: in the first group it was 148.3±7.2 cm; in the second -148.5±3.3 cm; in the third -151.1±3.0 cm. Similar results were obtained when measuring body weight: in a child of the first group - 31.6 ± 7.2 kg; in the second -38.5±2.5 kg; in the third - 38.4±1.7.

Measuring the circumference of the thigh showed that as a result of prolonged training, it is significantly compacted in size. In adolescents of the first and second groups, these indicators are the same, and in swimmers of the third group, they are relatively higher (p ‹0.001). Large differences in the development of muscle strength were found in terms of back muscle strength. So, if in the initial group the muscular strength of the back was 29.4 ± 0.2 kg, and in the second - 32.9 ± 0.1 kg, then long-term systematic swimming lessons significantly increased this indicator in adolescents of the third group - 45.2 ± 0.1 kg.

The indicators of the volume of the chest at rest during inhalation and exhalation in adolescents of the first two groups practically did not differ, in the third group of subjects an increase in these indicators was observed (p<0.001).

The data of series 1 and 2 of experiments indicate that tangible morphological changes in the body in adolescents manifest themselves through fairly long swimming lessons.

Swimming is a sport that develops speed, coordination and strength abilities of the body. The elementary types of speed abilities include: the speed of a simple and complex motor reaction, the speed of performing an individual movement and the maximum frequency (tempo) of unweighted movements.

The physiological basis of speed abilities is the optimal level of excitability and functioning of the central nervous system, the perfection of the coordination mechanisms of the motor apparatus, the mobility of nervous processes, the ability of muscles to contract quickly and quickly move from excitation to relaxation. Speed abilities are brought up along with agility and coordination.

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The means of strength training include various exercises with overcoming opposition. Various isometric (static) exercises are also used.

The study of the effect of the duration of swimming lessons on the functions of the respiratory and cardiovascular systems showed that VC in the third group of adolescents was higher (2000.0 ± 200.0 ml) than in adolescents of the first and second groups (1600.0 ± 100.0 ml and 1600.0±220.0 ml respectively). The indicators of breath holding in young swimmers of the first and second groups are almost the same, and the indicators of the third group are significantly higher. This indicates that systematic swimming lessons for several years give good results for the development of the cardio-respiratory system ($p<0.01$).

The respiratory rate in swimmers of all three groups was almost the same after exercise. After physical activity, the children of the first group showed an increase in the frequency of breathing, and the children of the third group had slight changes in the respiratory rate, since their breathing was not as frequent as that of the swimmers of the first group.

The results of both series of studies showed that in a state of relative muscle rest, the rate of gas exchange and external respiration did not change significantly. These data indicate a high oxygen cost of a standard load in young athletes and its decrease in the middle and older age groups, which can be assessed as a consequence of age characteristics, as well as the result of training of highly qualified older athletes. This can be confirmed by more pronounced changes in pulmonary ventilation and respiratory rate in young athletes on a standard load. In athletes of the middle and senior groups, the increase in minute ventilation of the lungs was expressed to a lesser extent than this increase was achieved due to volume indicators as a result of a pronounced increase in respiratory volume.

The literature contains numerous data on the effective use of chronic (natural) and intermittent (experimental) hypoxia to improve the physical performance of athletes [1,2010]. However, the study of these issues in ontogeny under hypoxic effects is devoted to single studies [22, 2007].

It is known that the criterion for assessing overall performance is the level of maximum oxygen consumption (MOC), which depends on the functional reserves of the respiratory, circulatory and blood systems [3,2005].

In our studies, blood pressure indicators during standard physical activity indicate a normotonic type of reaction in athletes of all age groups. Systolic blood pressure before exercise in all groups of subjects is within the age limits, no significant difference was found between them.

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The diastolic pressure indicators in all age groups under these conditions also did not differ significantly. The level of systolic pressure after exercise indicates an increased adaptive capacity of the body of swimmers, depending on the duration of swimming. Thus, the systolic pressure of the swimmers of the 1st group is 114.9±3.8 mm Hg, this indicator in the swimmers of the 2nd group decreased to 111.6±1.6 mm Hg. In swimmers of the 3rd group, systolic pressure was 104.2±2.2 mm Hg.

The level of diastolic pressure in all three groups of subjects also tended to decrease. This is evidence that diastolic pressure is less reactive than systolic pressure.

As the cardiovascular system grows and develops, so do its reactions in children and adolescents to physical activity. The age-related features of these reactions are clearly manifested during the formulation of special functional ones aimed at identifying the state of the cardiovascular system, and in the process of performing physical exercises [24].

Thus, the data obtained indicate that the greatest change in hemodynamics is observed in groups that went in for swimming for a longer time.

Conclusion

A comprehensive study of such signs as body weight, height, blood pressure, heart rate, lung capacity, and other indicators as a result of systematic swimming lessons makes it possible to more fully study the health status of children and adolescents. At the same time, the development of these signs depends on the age and duration of these sports.

The data obtained allow us to conclude:

- Systematic swimming lessons affect the growth and development of children and adolescents.
- Swimming is especially important for strengthening the cardio-respiratory system.
- Along with a full-fledged balanced diet, the normalization of the study load, it is important to keep track of physical activity, depending on the age and condition of the body of children and adolescents.
- A comprehensive study of somatometric and functional indicators of the body of children and adolescents involved in swimming allows you to effectively assess the individual level of health of students.
- Swimming lessons are of health value.
- Systematic swimming lessons contribute to the harmonious physical development and the growth of its adaptive capabilities.

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