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Privileges of an Integrated Approach in Sports Morphology to the Analysis of the Physical Development of Juniors and Cadets Involved in Sports

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Abstract: Based on medical anthropology, one can judge the levels of physical development of an athlete, which allows you to control the health status of junior and cadet athletes at all stages of its development. The integrated approach of medical anthropology using sports morphology to the analysis of the physical development of juniors and cadets involved in sports makes it possible to achieve higher sports results and fully appreciate the positive dynamics of physiological development.

Keywords: sports medicine, sports anthropology, forecasting the capabilities of athletes, the selection of athletes, to research the physical development of the athlete cadet and junior.

Relevance. The success of athletes at high-level competitions is an important component of the country's international authority [19]. Achievement of high results in any kind of activity depends on many factors, the main of which is the maximum correspondence of individual characteristics of a person to the requirements of the chosen specialization [20,21]. Based on medical anthropology, one can determine the degree of physical development. Medical anthropology allows you to monitor the health status of junior and cadet athletes at all stages of its development. An integrated approach of medical anthropology with the use of sports morphology to the analysis of the physical development of juniors and cadets involved in sports makes it possible to achieve higher sports results and fully assess the positive dynamics of physiological development [9,20,21]. Anthropometric measurements supplement and clarify the data of somatoscopy, make it possible to more accurately determine the level of physical development of the subject. Repeated anthropometric measurements allow you to monitor the dynamics of physical development and take into account its changes in the process of systematic sports. The physique is understood as the size, shape, proportions and peculiarities of the relative position of body parts, as well as the peculiarities of the development of bone, adipose and muscle tissues. The total size of the body depends on its length and mass, the circumference of the chest. The proportions of the body are determined by the ratio of the sizes of the trunk, limbs and their segments. The girth of the body is measured with a measuring tape. The thickness of the skin and fat folds is measured using a special device - caliner. Body weight is determined on special medical scales, which ensure high measurement reliability. Achieving significant results in sports depends on many factors, the main of which is the maximum correspondence to the individual characteristics of a person. The emergence of a new scientific discipline, sports anthropology, was due to the need to study the patterns of changes in the morphological and

functional characteristics of athletes in connection with sports achievements to solve the following problems:

1. the initial selection of juniors and cadets in specific sports sections;
2. based on taking into account the peculiarities of the physique, choose an individual approach for training athletes;
3. on the way from a beginner to a qualified master to develop a certain physique in an athlete cadet and junior in various sports specializations;
4. in the choice of sports specialization and individualization of preparation for high achievements in various environmental conditions, cadets and juniors focus on the ecological zone.

In this regard, taking into account the requirements of a particular sport for the human body is the most important condition for the upbringing of highly qualified athletes [12, 13, 25]. Every sport has specific requirements for the equipment of the athlete. In addition to determining the so-called total body dimensions, it is necessary to investigate the ratio of individual links (kinematic pairs and chains), since they determine biomechanical adaptability to the implementation of the main “working movements” [17, 28]. Among the many indicators of the individual characteristics of the body of athletes, anthropomorphological signs are of great interest, since they can determine the manifestation of strength, speed, endurance, etc. [22, 25].

Anthropometric measurements allow obtaining objective data on important morphological parameters of the body - length, mass, chest circumference, etc. They are the basis of somatometric methods for studying the physical development of a person. [24, 27]. Body proportions can change under the influence of sports, and significantly depending on its type. The study of body proportions in athletes in connection with sports specialization allows to establish the characteristic features of the body structure, which can contribute to the achievement of high sports results and under certain conditions can become decisive [5]. So, for example, throwers, in comparison with runners and swimmers, have the greatest body length, leg and arm length, shoulder width and the width of the pelvis. Well-developed musculature of the upper limb and chest girdle, narrow pelvis and long legs determine the peculiar teardrop shape of the swimmers' body, which reduces the vortex resistance of the water and contributes to the lengthening of the "stride" during swimming. Relatively short arms affect the quality of the stroke (less resistance force shoulder, lower moment of inertia of the arm during transfer, etc.) [6]. The data of many studies in different countries of the world show that height, body weight and other morphological parameters play an important role in human physiology, and his health directly depends on these parameters [1].

The slight growth of a number of peoples in tropical countries is a consequence of a lack of protein in food. Being overweight significantly reduces life expectancy. In highland juniors and cadets, the growth and puberty processes are much slower compared to the inhabitants of the lowland and low mountain regions. The geographical conditions of any region leave their mark on the body of athletes [7, 8].

It is known that body proportions are not the same in different sex, age and ethnic groups [4]. They differ even within the same age-sex group, since they are influenced by both endogenous and exogenous factors.

Currently, some features of the physique have been studied in certain sports. Weightlifters tend to have unequal body proportions depending on the weight category. So, athletes of the lightest and featherweight weight categories - short-legged and broad-shouldered; light and featherweight weightlifters - medium-legged and broad-shouldered; members of all other weight categories have long legs and broad shoulders, i.e. are of the gigantoid type. Basketball players have predominantly long legs and narrow shoulders [2, 3].

The influence of sport on human body length cannot be considered proven, while the influence of body length on athletic performance (both in a positive and negative sense) is beyond doubt. While recognizing the importance of morphological indicators, it should be noted that the importance of individual anthropometric constants in various sports should not be overestimated. So, in basketball, volleyball, rowing, high growth is extremely necessary, and in long-distance running, boxing, skiing, body length is not essential [19, 27].

If we compare the sizes of the segments of the upper limb, it can be noted that gymnasts have the shortest shoulder and forearm, but the longest hand (important for gripping the apparatus). Basketball players are characterized by the longest shoulder length with an average length of the forearm and hand. Volleyball players have a long shoulder and (especially) a forearm with a relatively short hand [11, 28].

For weightlifters - world champions, positive relationships have been established between the structural features of the athlete's body and his achievements. For wrestlers, body proportions are determined not so much by the effectiveness as by the individual characteristics of the technique. It is easier for wrestlers with long limbs to perform techniques associated with the moment of twisting, bending, i.e. those in which the result mainly depends on the ability to create conditions of unstable equilibrium for the enemy. When performing overcoming work (overcoming the opponent's strength), apparently, wrestlers with short limbs will be in better conditions, since the effectiveness in this case will depend on the relative magnitude of muscle strength (the ratio of muscle strength to body weight). The longer the hand, the more convenient it is to grip the limbs and hold the opponent. It has also been established that the large length of the body and legs negatively affects the frequency of throws of the scarecrow; at the same time, there is a positive relationship between the number of throws of the scarecrow and the value of the ratio of arm length to leg length. The higher this index, the more throws are made per minute [11,12, 14, 15, 28].

In rowing, in addition to endurance, strength and speed of movement, the athlete must have sufficient weight and height. Athletes - rowers in their height significantly exceed the average growth of the population, especially this applies to athletes involved in rowing. To increase the distance traveled by the vessel per stroke, large levers are needed [23].

A positive relationship between the body and the results in all types of throwing and negative with the results in running, long jump and high jump was noted among decathletes. A correlation was found with the results in the sprint, a complex indicator, including sitting height, foot length, body weight, and with the results in running at medium distances, an indicator, including the ratio of arm length, leg length and segments, indicator the ratio of the girth of the shoulder and hip to the shoulder and pelvic diameters and the indicator of the ratio of height and weight.

It became clear that from the point of view of the laws of mechanics, the body that needs to be moved should have a smaller mass, and the body with which it interacts, on the contrary, should have a larger one. Therefore, for a runner (especially at ultra-long distances) and a jumper (especially in height) it is more advantageous to have a relatively lower body weight, and for a thrower - more.

Athletes-throwers are relatively tall with a large arm span, since achievements in throwing depend on size body. This is based on the fact that long levers increase the time of application of force to the projectile, and, consequently, its initial speed and range [10, 14, 17].

The anatomical features of athletes specializing in sprint distances were revealed in front of stayers, according to which the forefoot in male sprinters is longer than in long-distance runners of the same physique, and their ankle is located closer to the Achilles tendon. It turned out that these changes provide more efficient work of the flexors of the foot and other muscles of the lower leg, since the elongated forefoot allows the runner's leg to stay in contact with the surface longer and push harder [26].

Athletes show a more athletic type of constitution with active breathing, the lowest percentage of fat. With the help of factorial and discriminant analysis it was shown that successful judokas correspond to high strength and fatigue indicators [27]. It is still difficult to say whether these anatomical properties are innate, or whether a person is able to develop them through prolonged training, but this can be determined by observing the growing athletes.

Conclusions. The trend in the development of sports is such that the need for a certain physique is becoming more and more exclusive. The number of athletes who, in terms of their overall, biomechanical, aero and hydrodynamic characteristics, will not "fit" into the morphological model of the strongest athlete in this sport, will decrease.

At the moment, there is still no unified hypothesis on the cause of morphological differences, both among representatives of different sports, and among athletes of the same type, but with different sports qualifications. Some researchers give preference to the influence of physical exercises, others - to the selection and elimination of morphologically less suitable ones, and others see the reason in the combined action of these factors. Most of the leading anthropologists share the latter point of view.

Thus, the given data allow us to say that the size of the body and their ratio, if not determine, then in many respects contribute to the achievement of sports results.

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