MORPHOFUNCTIONAL EVALUATION OF PHYSICAL DEVELOPMENT OF SCHOOL-AGE CHILDREN

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ABSTRACT

The problem of age formation of anatomical and anthropological indicators remains an urgent task of the state program for the development of mass sports in the Republic of Kazakhstan.

The use of physical education for the harmonious development of the personality is closely related to the use of scientific advances accumulated in sports morphology. To reveal the potential of the organism by the methods of physical culture, it is necessary to know the laws of the rearrangements of systems that ensure its optimal functioning in different periods of ontogenesis.

For optimal functioning of the body, the volume of physical activity varies individually and is due to hereditary characteristics, sex, age and constitution.

In the era of physical inactivity and hypokinesia, deficiencies in the physical education of children lead to an increase in body weight due to "inert" tissues (fat component), which requires finding ways to prevent these effects, emphasizing the relevance of the research.

The anthropometric features of the physical development of children aged 8–17 years, depending on their age and gender, allow for a comparative assessment of their physical condition when exposed to certain sports, including age dynamics of body size, muscle strength.

The established sensitive periods in body size, strength of individual muscle groups will provide a scientific approach to building a long-term training of athletes and a targeted effect of various motor regimes on the formation of the physical characteristics of schoolchildren.

The developed estimated values of morpho functional indicators for age groups are used in school hygiene, sports medicine, age pedagogy and sports practice as criteria for assessing the physical condition of athletes.

Indicators of physical development, obtained on the basis of a survey of homogeneous groups, were representative material for a comparative analysis of schoolchildren carrying different motor loads.

Keywords: physical education, secondary school, morpho functional indicators.

INTRODUCTION

The question of a comprehensive and integrated study of the development of the child is presented in detail in the scientific literature. In the Republic of Kazakhstan, every year all children must undergo medical preventive examinations, including a control check of their physical development. As a rule, during such examinations, the state of a child's physical development is still assessed mainly on the basis of the relative size of his total body size in comparison with the average and age-sex norms.

Not limited to the three main features; - mass, density and body shape, which in turn are determined by the ratio of three total sizes - body length, chest girth and weight, (Bashkirov, 1962) of the functional features, he suggested measuring the excursion of the chest, vital capacity of the lungs, the strength of

individual muscle groups, the absolute values of adipose, muscle and bone tissue and the specific body weight. Therefore, the basis for the diagnosis of physical development is currently based on certain anthropometric characteristics of total body size, such as: length, body weight, chest circumference, which make it possible to judge the basic properties of the human body - density, shape, mass, etc.

Growth is a continuous process characterized by:

- a) endogeneity - external influences can only change the pace of growth processes, but not their essence;
- b) gradualness - there is a definite, not disturbed sequence of phases of development;
- c) harmony - the processes of growth and development of individual parts of the body are performed relatively synchronously;

- d) irreversibility - there is no reverse in age-related changes in the body.

Endogeneity, gradualness, irreversibility and harmony are determined by the genetic programming of growth processes that occur as a result of the influence of internal and external factors during the implementation of a hereditary program in specific environmental conditions. The study of growth processes is extremely important for elucidating the mechanisms of evolution, since the evolution of morphological characters is always carried out by changing the genetically determined growth and development. For indicators of growth rate, an analysis of empirically found annual increments on one or another trait is used, focusing on the age at which their maximum falls. In certain age periods, the growth rate falls and the processes of morphological differentiation, functional specialization of individual tissues, organs and body systems prevail. Periods of maximum increase in symptoms are called critical or sensitive.

METHODOLOGY

Between the ages of 13-16 years, significant growth of the body occurs in length, the rapid development of the respiratory apparatus and the cardiovascular system is noted, and the chest circumference increases markedly.

In the course of somatometric studies, standards have been developed that allow predicting the change in body size in some sports for 2-3 years ahead, however, this method is not universal. Great success is brought by the determination of body type, the level of metabolism with which various levels of strength and speed of nervous processes are associated, and, in addition, flexibility, endurance, a number of speed-strength indicators, and even cardiographic indicators specific to individual sports.

One of the attempts to adapt somatotypology to the needs of sports selection was the developed scheme for assessing somatic types in combination with a multi-stage assessment of physical development, including such concepts as: somatic status, biological age, biological maturity, pace of physical development, development option, etc. The leading idea in the development of the somatotyping scheme was the concept of the need for overall, compositional and proportional correspondence of the individual sport, i.e. constitutional compliance with the sport, the degree of load and biochemical

compliance with sporting achievement.

The object of the study was schoolchildren aged 8-17 years.

The first group consisted of children of 16-18 years of secondary schools with the generally accepted system of physical education (not athletes).

The first group received physical education lessons twice a week for 45 minutes. The total physical activity corresponded to the age and sex of the students. Movement exercises at this level of physical education were aimed at maintaining the physical qualities of children, working capacity, relaxation of mental stress. The pace of employment combines the alternation of low and medium intensity loads in accordance with the program approved by the Ministry of Education and Science.

The second group consisted of 1155 children involved in secondary schools with a sports bias (athletes). Special physical training consisted of physical education lessons and individual physical education classes or training according to the 2 hours scheme 2 times a week of general physical training and 2 times a week two hours of playing sports (volleyball, soccer, basketball, swimming) and athletics.

Children not involved in sports in secondary schools were: boys 764, girls 854. In the school with a sports bias examined children involved in sports for at least three years. Among them: boys 571, girls 584. In total, the group not involved in sports - 1618 students, and those involved in sports - 1155.

All the children studied were enrolled in general education schools. From sports specializations, players, volleyball players, basketball players and swimmers were examined. Football players, volleyball players, basketball players are characterized by a dynamic type, and swimmers are also dynamic in the aquatic environment.

All subjects were divided into 10 age groups, whose composition ranged from 159 to 166 people in groups not involved in sports, from 112 to 120 people in groups of athletes. The number of observables corresponded to the methods proposed for such studies by A.V. Stavitskaya and D.I. Aron (1959).

The following methods were applied in the work: anthropometric, analytical (fractionation of body weight); dynamometer; spirometric; statistical variation.

Indicators of somatometric and functional signs were recorded in a special map compiled for each subject.

All anthropometric measurements were carried out according to a unified method adopted by the Research Institute of Anthropology of Moscow State University. Lomonosov and described in detail Bunak (1960), Stavitskaya, Aron (1959), Fundamentals of sports morphology Kozlov, Gladysheva (1977). Anthropometrically determined: body length, total, longitudinal, transverse and girth body size and thickness of skin-fat folds. The study program included 51 somatometric characteristics. The longitudinal dimensions of the body were determined as derived values by the difference in heights of anthropometric points above the floor. Measurements of the heights of the anthropometric points were carried out by the metal anthropometer of the Martin system. The longitudinal dimensions of the body (length of the shoulder, forearm, hand, entire upper limb, thigh, tibia, whole lower limb) were determined using a metal anthropometer.

RESULTS

According to the results of the survey of the dynamics of the formation of anatomical and anthropometric indicators in children (boys and girls), engaged and not involved in sports with different motor conditions, a number of significant regularities were revealed.

The basis of the consideration of the situation is the analysis of the growth rate, which, according to Bunak (1960), most revealingly reflects the age dynamics of the organism, setting the postnatal period of ontogenesis of the three-phase growth type in humans.

The task of the study was not only to show the dynamics of the formation of anatomical and anthropological indicators in children engaged in and not engaged in one of the most important segments of ontogenesis, but also to identify the so-called sensitive periods of their development, i.e. time of maximum gains signs.

Many authors (Guzhalovsky, 1962; Volkov, 1968; Nikibiuk, 1978; Nayer, 1981; Shchedrina, 1982; Miklasiyevskaya, Solov'ev, Godina, 1988; Bralnina, 1995, etc.) showed that during sensitive periods the role of genetic factors decreases sharply, and the role of environmental factors increases. For planning the volume and intensity of physical exertion, knowledge of these periods is essential.

Our data on the growth rate of total body size does not disagree with the literature data. By some signs, such as body weight, there is a sharp drop in the growth rate after maximum growth. For example, in boys who are not involved in sports, at the age of 16 there is a maximum increase of up to 14%, and then at the age of 17 there is a sharp drop to 3.47%. In girls-athletes at the age of 12 years, the maximum increase occurs to 15.30%, and then at 13 years of age a sharp drop in the rate of growth to 7.81%. According to J. Tanner (1967), at the age of 17 and later the annual increments do not exceed 2%. According to our data, in the length of growth this indicator among non-athletes boys exceeds 2.09%. However, the increase in body weight at 17 years for boys-athletes and non-athletes remains high compared to the length of the body and amounts to 6.58% and 3.47%, respectively. In girls of the same age, according to this trait, at the age of 17 - 1.21% and 6.40%.

DISCUSSION AND CONCLUSIONS

Summarizing the above, it can be noted that the motor activity during sports has a stronger effect on the anatomical and anthropological characteristics of children. The time of occurrence of the maximum gains of genetically determined signs shifts in athletes to a later date, and the maximum gains of signs more susceptible to environmental influences depend on the specificity and time distribution of the loads in the training process of this sport. The data obtained confirm the results of other studies on children of different population groups that moderate exercise shifts the maturation of symptoms to a later date Barantsev et al., (1979), and too high (quantitative and time) loads inhibit the growth of D. Hare, (1971). At the same time, some authors hold the opposite opinion. So - I.V. Chebotareva, (1982) says that swimmers at 14-15 years ahead of non-athletes in terms of puberty and have

a uniform increase in functional parameters in the process of ontogenesis. According to Szabo, Meszaros, (1980), in athletes compared with non-athletes, acceleration of length and body weight was observed with the same build in boys. Girls, athletes, on the contrary, body size similar to non-athletes, but more leptomorphic.

The established parameters of physical development can be used in sports morphology, school hygiene, sports medicine, sports practice as criteria for assessing the physical condition of both athletes and those not involved in sports.

As a result of our research, we can draw the following conclusions:

The physical development of school-age children of two groups (girls and boys) in the period studied (8-17 years old) can be characterized as good and satisfactory.

The motor mode of a different orientation affects the rate of growth of body size, both in size and in time of occurrence of maximum gains. In children involved in sports, the maximum growth rate for most anatomical and anthropometric features falls on 11 years, while in non-athletes it falls on 12 years.

Children and adolescents involved in sports are characterized by more pronounced muscle and bone indicators with a low fat component, which also characterizes the harmony of their growth and development.

The morphological somatotype of children and adolescents involved in sports is characterized by a longer body and long upper and lower extremities, a large chest girth, which, in combination with body weight, is more significant in comparison with indices of those not involved in sports.

The developed evaluation parameters of the main indicators of physical development and maximum growth of morphofunctional characteristics can be used in sports morphology for preparing and giving lectures in general education, sports schools and universities, school hygiene, sports medicine, sports practice as criteria for assessing physical condition, development and organization the process of physical education of the younger generation.

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