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Functional Features Of Children With Down's Syndrome Before The Start Of Classes In Football Groups.

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ABSTRACT

An important marker of the development of medicine and society is the level of health of children with genetic pathology. This category includes children with Down syndrome. Objective: To assess the overall health of children with Down syndrome who are about to begin classes in a football group. The study took 28 children aged 11-12 years with Down syndrome not higher than average severity. The control group is represented by 31 healthy children aged 11-12 years. Children of both groups had low physical activity. Functional tests were applied, statistical processing of the results was carried out. Children with Down's syndrome have a predominance of sympathetic influences over parasympathetic ones. In children with Down syndrome, an excess weight-to-height ratio was found, which ensured their being in excess weight. This was accompanied by a tense adaptation of the circulatory system, which ensured that it was at the level of unsatisfactory adaptation. A comprehensive assessment of overall physical development made it possible to establish in children with Down's syndrome at the end of the observation a serious lag behind the values of control and indicated the risk of a low level of general physical development. It becomes clear that for children with Down's syndrome systematic and dose-related physical exertion is required, which can provide them with a health-improving effect.

Keywords: childhood, Down's syndrome, functional features, health.

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INTRODUCTION

An important indicator of the development of society and medicine in society is the level of health of children with various congenital pathologies, including genetically caused [1,2,3]. This category always includes children with Down syndrome [4]. It is known that the level of their health depends not only on their medical care, but also on the level of their motor activity [5,6]. The complexity of this issue is related to the fact that children with Down's syndrome are heavily burdened by many diseases [7,8]. Their course often has a progressive nature and is difficult to compensate [9]. Serious impact on their overall level of health is the degree of existing disorders in the central nervous system and cardiovascular pathology, which very often limit their life expectancy [10].

At present, science has an urgent need to continue collecting and comprehending information about the biological characteristics of a person in childhood, having various chromosomal abnormalities [11,12,13]. The most complete assessment of these manifestations is possible on children with Down's syndrome, who did not experience physical stresses higher than household. In this regard, the goal is to assess the overall health of children with Down's syndrome who are about to begin classes in a football group.

MATERIALS AND METHODS

The completed study was approved by the local ethics committee of the Russian State Social University on September 15, 2016 (protocol No. 9). The study was conducted on the basis of the Russian State Social University. We examined 28 children aged 11-12 years with Down's syndrome not above the average severity level before including their football team. The control group in this study is represented by 31 healthy children aged 11-12 years. Children of both groups had low physical activity. Before entering the study, they did not attend the sports sections and avoided physical exertion in physical education classes at school.

To assess the condition of the examinees, the following methods were used in the work:

The functional state of the circulatory system was evaluated by the method of [14].

Measure the height and body weight, determine the pulse rate and the level of blood pressure. To quantify the level of the functional state (FS) of the circulatory system in points, the following formula is used:

$$PS = 0,011 (HR) + 0,014 (SBP) + 0,008 (DBP) + 0,014 (Rev.) + 0,009 (MT) - 0,009 (DT - 0,27)$$

Rev. - age in years; SBP and DBP - systolic and diastolic blood pressure in mmHg; Heart rate - heart rate in bpm; MT - body weight in kg; DT - body length in cm. The evaluation of the level of adaptation of the circulatory system in the examined subjects was evaluated according to the scale below (Table 1).

Table 1. Scale for assessing the functional state of the circulatory system

No	Adaptation status	Values of FS in points
1	Satisfactory adaptation	to 2,60
2	The tension of adaptation mechanisms	2,60-3,09
3	Unsatisfactory adaptation	3,10-3,60
4	Disruption of adaptation	above 3,60

The functional state of the autonomic nervous system (vegetative Kerdo index) [14] was calculated using the formula: $(1-DD / HR) \times 100$, where DD is the diastolic blood pressure; Heart rate - heart rate. The following criteria were used for evaluation. The magnitude of the vegetative index of Kerdin ranges from -15 to +15 indicates a balance of sympathetic and parasympathetic influences.

The value of vegetative index Kerdo above + 15 indicates the predominance of the sympathetic tone of the autonomic nervous system. The value of the vegetative index of Kerdo is less than - 15, indicating the predominance of the parasympathetic tone of the autonomic nervous system. With a vegetative Kerdo index of zero, vegetative equilibrium takes place.

Evaluation of the weight-growth index [15]. The weight-growth index is an integral characteristic of development and reflects the formed level of metabolic processes. The criteria for its evaluation are presented in Table 2.

Table 2. The scale of body weight by weight-growth index

Weight-growth index (g / cm)	Body weight estimation
<310	Deficit
310-369	Reduced
370-480	Norm
481 - 540	Increased
>540	Excess

Assessment of the level of general physical development (indicators of the vegetative-vascular system). A number of simple definitions of indicators were used, which were introduced into the following formula:

$$Y = -0,615 \times X1 + 0,259 \times X2 - 0,322 \times X3 - 0,124 \times X4 + 0,148 \times X5 - 0,023 \times X6 + 54,21$$

where Y is the general physical state; X1 - age, years; X2 - body length, cm; X3 - body weight, kg; X4 - Heart rate at rest, bpm; X5 - systolic blood pressure, mmHg; X6 - diastolic blood pressure, mm Hg. The evaluation criteria are presented in Table 3.

Table 3. Scale of assessment of general physical condition

The level of general physical development	Values in points
High	More than 51
average	38-51
Low	Less than 38

The results of the study were mathematically processed with the calculation of the arithmetic mean (M), the error of the arithmetic mean (m) and the level of reliability in the t-test of the Student ($p < 0.05$).

RESULTS OF THE SURVEY

Data on the status of indicators taken into account in the children with Down's syndrome and control children examined are systematized in Table 4.

Table 4. Results of the health status assessment of children taken into the study

indicators	Observation groups	
	Children with Down's Syndrome, M±m, n=32	Control, M±m, n=31
Autonomic Kerdo index, points	15.8±0.38	3.7±0.18 p<0.01
Weight-growth index, g/cm	522.8±1.16	380.1±0.54 p<0.01
Functional state of the circulatory system, points	2.92±0.29	2.44±0.27 p<0.05
General physical development, scores	38.2±0.36	53.0±0.37 p<0.01

Legend: p - reliability of differences in values between observation groups.

The examined children with Down's syndrome noted an increased level of weight-to-height relationship, which was aggravated by their stress mechanisms of adaptation of the circulatory system. This

was followed in children with Down's syndrome by the prevalence of sympathetic influences over parasympathetic ones. In addition, they had a general physical state corresponding to the borderline between the middle and low levels.

In the control group, the normal value of the Kerdo index was noted, which indicated the stability of the balance between sympathetic and parasympathetic influences in the body of healthy children. This was accompanied by an optimum value of the weight-to-height ratio, which indicated the harmony of their growth and development processes [17, 18]. Also in the children of the control group, the circulatory system had a satisfactory adaptation to external factors [19,20]. This indicated its stably normal development and its adequacy of response to environmental influences [21]. Even with physical exertion on the body of healthy children, their overall physical development remained at a high level.

Observations carried out for children with Down's syndrome made it possible to identify shifts that could lead to deterioration of the indicators taken into account. Thus, the prevalence of their correlation between sympathetic and parasympathetic influences in the body had a risk to its deepening. As a result of low physical activity in children with Down's syndrome, an excess of weight and height indicators was able to ensure their transition to the status of overweight. This could be accompanied in these children by the excessive intensity of the adaptation of the circulatory system, which ensured its reaching a level of unsatisfactory adaptation [22] and contribute to a general weakening of their organism [23,24]. A comprehensive assessment of the overall physical development allowed children with Down's syndrome to have a low risk of developing. In the long term, this could be exacerbated by the processes of decompensation of all organs highly threatening with their consequences [25, 26]. For this reason, all examined children with Down's syndrome were taken to a football group after a survey to reduce their dysfunctions [27,28,29].

CONCLUSION

The preservation and restoration of the health of children with Down's syndrome is becoming increasingly important in developed countries due to the increase in their share in the population structure [30,31,32]. For this contingent, the decrease in motor activity becomes common, which increases the number of dysfunctions and complex pathology in it. In this regard, further search is needed for rational forms of treatment, prevention and health work with children with Down syndrome by increasing their physical activity. When assessing the health status of children with Down syndrome using integrated indices, the risk of low physical activity in this category of children was shown. They had a loss of balance of sympathetic and parasympathetic influences and a deepening of weight-growth disorders. This was accompanied by a risk of unsatisfactory adaptation of the circulatory system and a low level of general physical development. Based on the study, we can say that for children with Down's syndrome, regular physical activities are required, which can provide them with a health-improving effect.

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