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General Assessment of The Health Status of Children with Down Syndrome Who Have Low Physical Activity.

Makhov AS, and Medvedev IN*.

Russian State Social University, st. V. Pika, 4, Moscow, Russia, 129226

ABSTRACT

A serious indicator of the welfare of society in economically developed countries is the level of health of children with genetic pathology. This category, as an important social marker, includes children with Down syndrome. Objective: To assess the overall health of children with Down syndrome who do not regularly engage in physical activity. The study took 32 children 11-12 years old with Down's syndrome not above 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. All children were examined at the end and after 6 months. After 6 months. Observations in the experimental group noted a shift in the relationship between sympathetic and parasympathetic influences in the body to the apparent prevalence of the former. In children with Down's syndrome, an increase in the weight-to-height ratio was found, which ensured their transition to the status of overweight. This was accompanied by an increase in the tension in the adaptation of the circulatory system, which ensured that it reached a level of unsatisfactory adaptation. A comprehensive assessment of the overall physical development made it possible to establish a negative dynamics in children with Down syndrome by the end of the observation. The obtained result was inferior to the control values by 42.7% and indicated the achievement in the experimental group of a low level of general physical development. It becomes clear that for children with Down's syndrome systematic and dose-related physical loads are required that can provide a health-improving effect and are designed to slow down negative changes in their body caused by chromosomal pathology.

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

**Corresponding author*

INTRODUCTION

A serious indicator of the welfare of society in economically developed countries is the level of health of children with various congenital pathologies, including genetically caused [1-3]. This category, as an important social marker, includes children with Down's 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]. Modern medicine has an urgent need to continue collecting and comprehending information about the biological characteristics of a person in childhood, having various chromosomal abnormalities [11-13]. 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 connection, the goal is to assess the overall level of health of children with Down syndrome who do not regularly engage in physical culture.

MATERIALS AND METHODS

The 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. The study took 32 children 11-12 years old with Down's syndrome not above average severity. The control group is represented by 31 healthy children aged 11-12 years. Children of both groups had low physical activity. They did not attend the sports sections and avoided physical exertion in physical education classes at school. All children were examined at the end and after 6 months. During the time between the two examinations, the children in both groups remained clinically healthy. To assess the condition of the examinees at the end and after six months, the following methods were used in the work:

1. Assessment of the functional state of the circulatory system was carried out by the method of [22].

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

| № | Adaptationstatus | Values of FS in points |
|----------|--------------------------------------|-------------------------------|
| 1 | Satisfactoryadaptation | to 2,60 |
| 2 | The tension of adaptation mechanisms | 2,60-3,09 |
| 3 | Unsatisfactoryadaptation | 3,10-3,60 |
| 4 | Disruptionofadaptation | above 3,60 |

2. The functional state of the autonomic nervous system (vegetative Kerdo index) [22] 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 the value of the vegetative Kerdo index, there is a vegetative equilibrium.

3. Evaluation of the weight-growth index [23]. 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 |

4. Assessment of the level of general physical development (indicators of the vegetative-vascular system) [24]. 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 AND DISCUSSION

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

Table 4: Results of the evaluation of the health status of children taken into the study

| indicators | Observation groups | | | |
|--|--|---------------------------|--------------------|----------------------------|
| | Children with Down's syndrome, M±m, n=32 | | Control, M±m, n=31 | |
| | outcome | at the end of observation | outcome | at the end of observation |
| Autonomic Kerdo index, points | 14.8±0.32 | 15.8±0.38 $p < 0.05$ | 3.7±0.18 | 3.6±0.25 $p_1 < 0.01$ |
| Weight-growth index, g/cm | 512.7±1.24 | 542.9±0.85 $p < 0.05$ | 380.1±0.54 | 385.1±0.67 $p_1 < 0.01$ |
| Functional state of the circulatory system, points | 2.91±0.28 | 3.12±0.33 $p < 0.05$ | 2.44±0.27 | 2.50±0.39 $p_1 < 0.01$ |
| General physical development, scores | 39.6±0.38 | 37.0±0.26 | 53.0±0.37 | 52.8±0.42 $p_1 < 0.01$ |

Conventions: p - reliability of differences in baseline values and values at the end of the observation in both groups; p_1 - reliability of differences in indicators at the end of observation between groups. The reliability of differences between groups in terms of outcomes was not obtained.

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 accompanied in children with Down's syndrome by the risk of 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. Observation of the dynamics of children in both groups made it possible to identify the features of changes in their indicators taken into account. In the control group, the stability of the Kerdo index was noted in half a year, which indicated the stability of the balance between sympathetic and parasympathetic influences in the body of healthy children. This was accompanied by the invariance of the magnitude 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, after six months, the circulatory system retained its satisfactory adaptation to external factors [19,20]. This indicated a stable normal development and its adequacy to environmental impacts [21]. Even with low physical loads on the body of healthy children, their overall physical development remained at a high level.

Observations carried out for children with Down syndrome have made it possible to identify a tendency for them to worsen the indicators taken into account. So, after 6 months. Observations in the experimental group noted a shift in the relationship between sympathetic and parasympathetic influences in the body to the apparent prevalence of the former. As a result of low physical activity in children with Down's syndrome, an increase in weight and growth rates of 5.7% was found, which ensured their transition to the status of overweight. This was accompanied in these children by an increase in the intensity of the adaptation of the circulatory system (by 7.2%), which ensured its reaching a level of unsatisfactory adaptation [22] and a general weakening [23,24]. A comprehensive assessment of the overall physical development made it possible to establish a negative dynamics in children with Down syndrome by the end of the observation. The obtained result was inferior to the values of the control by 42.7% and indicated the achievement in the experimental group of a low level of general physical development highly threatening with its consequences [25,26].

Thus, low physical activity in children with Down syndrome has a pronounced negative effect on health in general.

CONCLUSION

The problem of preserving and restoring 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. For this contingent, the decrease in motor activity becomes common, which increases the number of dysfunctions and complex pathology in it. In this regard, it becomes necessary to further search for rational forms of treatment and prevention and health work with children with Down syndrome with the help of physical exercises. 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. After 6 months. observations of physically inactive children with Down's syndrome revealed a loss of balance of sympathetic and parasympathetic influences and a deepening of weight-growth disorders. This was accompanied by their achievement of an 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 systematic and dose-related physical exertion is required, which can provide a health-improving effect designed to slow down negative changes in their body caused by chromosomal pathology.

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