

THE IMPACT OF THE MUSCULOSKELETAL SYSTEM CONDITION ON THE PHYSICAL DEVELOPMENT LEVEL OF SCHOOLCHILDREN

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Abstract. *One of the prominent health issues identified during preventive examinations in students is the problem of musculoskeletal system disorders. An analysis of the prevalence of posture violations and their physical level characteristics was conducted, comparing children with normal and disharmonious physical development. In the assessment of children's physical development, it was found that in the group with posture disorders, the number of students with excess weight and weight deficit is higher than in the healthy group.*

Keywords: *schoolchildren, physical development, musculoskeletal system.*

Relevance: Physical development is one of the most important indicators of children's and adolescents' health [3,12]. The assessment of physical development in a rapidly growing child's body is conducted during comprehensive medical examinations. It is mandatory before entering school and in specific "mandated grades" - third, sixth, and eighth [1,6]. One of the leading health issues identified in students during preventive examinations is the problem of musculoskeletal system disorders. The number of students with signs of posture violations is currently increasing, and they constitute the majority of so-called students with signs of health disorders or pre-disease conditions [2,3,10].

The posture of an individual not only holds aesthetic significance but also exerts an influence (positively or negatively) on the position, development, condition, and function of various organs and systems in the human body [4,11]. Incorrect posture hinders the functioning of the heart, lungs, gastrointestinal tract, leading to reduced lung capacity, decreased metabolism, headaches, and increased fatigue [5,9].

Among school-age students, the most common disorders of the musculoskeletal system are posture violations and scoliosis. The transition from a state of health to illness goes through several stages, during which the body attempts to adapt to new conditions by altering the level of functioning and tension of regulatory mechanisms. The following types of adaptive reactions are distinguished: normal adaptive reactions, stress of adaptation mechanisms (short-term or unstable adaptation), overstrain of adaptation mechanisms, and their failure [7,8].

Research Objective: To assess the condition of the musculoskeletal system and the impact of its changes on the level of physical development in school-age children (10–14 years).

Materials and Methods: A total of 436 children aged 7 to 12 years, attending general education schools, were examined, including 30 girls (47.6%) and 33 boys (52.4%).

The assessment of children's physical development included a standard examination and analysis of anthropometric indicators. Standardized scales were used to measure body weight, and a standard stadiometer was used to measure body length. The assessment of physical development was conducted in accordance with the growth standards of the World Health Organization (2006) using the WHO AnthroPlus program (2009).

The diagnosis of posture disorders in children involved visual inspection and the performance of a series of tests (such as the Adams test for detecting scoliosis) to diagnose disorders. If necessary, X-rays (CT, MRI) were conducted. During the posture examination, attention was paid to criteria such as the position of the shoulder blades (in diseases, they are at different levels, unevenly spaced from the spine), deviation of spinous processes from the midline, asymmetry of buttock folds, the level of popliteal fossae, the shape of the chest (convex or concave), and the symmetry of the ribs.

Research Results: Following the examination of the children, it was found that 298 (68.3%) students had a normal posture, while 138 children (31.65%) exhibited posture disorders, including 78 girls (56.5%) and 43.4% boys.

It was established that posture disorders are more prevalent in girls than in boys ($p < 0.05$). The identified types of posture disorders included the most frequently observed asymmetry of the shoulder girdle, which was detected in 11 students (58.0%). Winged scapulae were identified in five students (26.3%), while four (21.1%) exhibited kyphosis. Other posture disorders such as lordosis, kyphosis, and scoliosis were observed in 18%, 21%, and 26% of cases, respectively.

Regarding chest shape disorders, 'pigeon chest' was most commonly noted (13.2%), while 'cobbler's chest' (1.1%) and the presence of 'pectus excavatum' (0.1%) were observed in isolated cases.

It was also revealed that a higher percentage of children had 'O'-shaped legs (8.9%), while 'X'-shaped legs were six times less common (1.5%). Flattened and flat feet were characteristic of 14.3% of the children.

When assessing the physical development of children, it was found that in the group with posture disorders, the number of students with excess weight and weight deficit was higher than in the healthy group ($p < 0.05$). These data confirm the fact that posture disorders are more common either in underweight children or in those who are excessively overweight for their height and body type.

Upon categorizing children based on their developmental level, it was determined that posture disorders and leg deformities were more prevalent among children with accelerated development, while foot disorders and abnormal chest shapes were more frequently identified in children with delayed development.

The skeletal system of younger schoolchildren is in the process of formation: the ossification of the spine, chest, pelvis, and limbs is not yet complete, and there is a considerable amount of cartilaginous tissue in the bone structure. It is essential to take this into account and consistently ensure proper posture, stance, and gait among students.

Conclusion: Thus, schoolchildren exhibit specific changes in physical development, with a tendency towards weight reduction and decreased height. Most anthropometric parameters are characterized by increased intragroup diversity. The conducted research shows that incorrect posture is associated with certain findings.

Data analysis allows us to conclude that musculoskeletal system disorders are correlated with the child's developmental level. It was found that in the group with posture disorders, the number of students with excess weight and weight deficit was higher than in the healthy group ($p < 0.05$). There is a direct correlation between the level of physical development and posture disorders: the more physically harmonious the child, the less likely they are to have posture

disorders, and the more dissonant the child, the more likely they are to have posture disorders ($p < 0.001$).

Therefore, to ensure normal growth and the formation of the musculoskeletal system in children, educational institutions need to adhere to hygienic measures, such as organizing rational physical activity and ensuring proper seating with furniture, as well as observing sanitary norms when lifting weights.

The implementation of these measures should be monitored not only by educational institution staff but also by the parents of these children, overseeing the children's posture while sitting, standing, and walking.

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