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ANALYSIS OF POSTURAL CONTROL DISORDERS IN PEOPLE WITH ORTHOPEDIC FOOT DISORDERS

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The integration of fascial techniques into kinesiotherapy programs for patients with low back pain has shown superior efficacy compared to standard rehabilitation protocols. This study evaluated the effects of combining these techniques on mobility and lumbar pain relief in a sample of 24 participants, divided into two groups: an experimental group receiving a combined program of physiotherapy and fascial mobilizations, and a control group undergoing standard physiotherapy. Assessments were conducted using the Visual Analog Scale (VAS) for pain intensity, the Schober test for mobility, and the Roland & Morris questionnaires for motor dysfunction. Results showed significant improvements in the experimental group regarding pain reduction and increased lumbar mobility. These findings suggest that fascial mobilizations could enhance physiotherapy outcomes, providing an effective strategy for treating low back pain. This approach not only offers rapid symptom relief but also shows potential for reducing recurrences and improving long-term patient quality of life.

Keywords: *postural control, orthopedic foot disorders, physiotherapy, recovery process, computerized stabilography, stability, balance, motor action, posture.*

IMPACTUL EXERCIȚIILOR FIZICE ASUPRA ÎMBUNĂTĂRII POSTURII ȘI REDUCERII SUPRAPONDEREI LA COPII

Conform datelor raportate în literatură, rata supraponderalității și obezității la copii este în continuă creștere. O tendință similară este observată în prevalența defectelor posturale. În studiile anterioare, numeroși autori au investigat factorii care contribuie la obezitate sau defecte posturale, deși de obicei se concentrează asupra acestor probleme separat. Defectele posturale reprezintă o altă problemă majoră de sănătate, afectând 30–69% dintre copii și adolescenți în Republica Moldova. Scopul studiului este evaluarea impactului exercițiilor fizice asupra corectării posturii și îmbunătățirii sănătății generale la copiii supraponderali. Obiectivul studiului a fost de a determina eficiența exercițiilor fizice în corectarea posturii incorecte și reducerea masei corporale la copiii supraponderali. Exercițiile fizice au avut un impact semnificativ asupra copiilor cu exces de greutate și postură deficitară, reducând greutatea și IMC-ul, precum și corectând unghiurile hiperkifozei toracice și hiperlordozei. Aceste rezultate demonstrează eficiența programului în reducerea greutății excesive și îmbunătățirea posturii.

Cuvinte-cheie: *control postural, afecțiuni ortopedice ale piciorului, kinetoterapie, proces de recuperare, stabilografie computerizată, stabilitate, echilibru, acțiune motorie, postură.*

Introduction

Obesity is defined as the excessive accumulation of body fat, associated with an increased risk of morbidity and premature mortality. Overweight and childhood obesity have become global issues and major challenges for public health [10, p. 2]. According to COSI data, the prevalence of overweight (including obesity) among children aged 7-9 years was 29% for boys and 27% for girls, while the prevalence of obesity was 13% for boys and 9% for girls. Overweight negatively affects multiple body systems, increasing the risk of developing conditions such as musculoskeletal, cardiovascular, metabolic, gastrointestinal, and respiratory disorders [7, p. 3].

The relationship between overweight and musculoskeletal problems, including poor posture, is well-documented, with overweight serving as a causal factor in the emergence of postural deficiencies, degeneration of bone processes, and back pain. The position of the body, defined by the alignment of body segments, is an essential determinant for maintaining musculoskeletal health. The prevention and early elimination of excess fat are crucial not only to avoid cardiovascular and metabolic diseases but also to prevent poor posture and its associated complications [2, p. 4].

Regular physical exercise plays an essential role in healthy growth and development and should be integrated as a natural component of a healthy lifestyle from childhood [3, p. 6]. Physical exercise is considered an effective non-pharmacological intervention for reducing health risks associated with excess weight, as well as a valuable tool for alleviating postural and musculoskeletal issues. It improves proprioception and body alignment, which can lead to better posture in daily activities, thereby contributing to the maintenance of spinal health and joint integrity [8, p. 10].

The combination of educational and therapeutic interventions has proven effective in preventing weight gain and the development of poor posture [1, p.5]. Body position is subject to significant variations influenced by factors such as sex, somatic type, age, ethnicity, psychophysical state, and environment, serving as a good predictor of current and future musculoskeletal health. According to some authors, optimal posture involves a neutral position of the pelvis, with slight lumbar lordosis and thoracic kyphosis, the head well-balanced, and the alignment of the ear, shoulder, hip, knee, and talus should be perfectly vertical [8, p. 13].

Correct posture in childhood promotes harmonious growth of the body, contributes to the normal development of internal organs, and optimizes motor activity efficiency, thereby stimulating the development of muscles, joints, and ligaments, and favoring skeletal growth [9, p. 87]. Postural disorders are among the most common yet underestimated health issues during school years, caused either by rapid growth or pathological conditions. If left untreated, these disorders can lead to decreased cardiorespiratory efficiency, worsening bone and back pain, displacement of internal organs, bone degeneration, and other musculoskeletal complications [5, p. 124].

Excess body mass can reduce body stability, leading to compensatory postural mechanisms such as increased lumbar lordosis and pelvic anteversion, which raises the risk of falling. A sedentary lifestyle contributes to weight gain by reducing regular physical activity, including participation in physical education classes, which further limits the recommended physical activity and amplifies the symptoms associated with obesity [4, p. 328]. Premature fatigue and respiratory difficulties often lead to reduced participation in physical and sports activities among obese children. Hypokinesia negatively impacts body posture, affecting its development according to the stages of osteogenesis, regardless of the presence of comorbidities. Moreover, the threats posed by the modern era of electronic devices contribute to decreased physical activity and the development of musculoskeletal disorders, creating a vicious cycle [1, p. 10].

Given the increasing significance of obesity and postural abnormalities as global public health concerns, it is essential to investigate the impact of body posture on obese children, taking into account their levels of physical activity.

Research materials and methods

The aim of this study was to evaluate the impact of physical exercise on correcting posture and improving overall health in overweight children.

The objective of the study was to determine the effectiveness of physical exercise in correcting poor posture and reducing body mass in overweight children.

The study hypothesizes that a structured exercise program will have a significant impact on reducing overweight and correcting poor posture in children, thereby contributing to an improvement in body mass index (BMI) and alleviating postural problems, ultimately promoting optimal physical health.

The study was conducted during physical education classes, with active involvement from teachers, who occasionally participated directly in the examination process. The screening program employed a clinical method for assessing the students. In addition to visual inspection in various positions, spinal functions were evaluated using techniques such as visual diagnosis, superficial and deep muscle palpation, examination of intervertebral joints through the „fork” method, palpation of spinous processes, and manual assessment of passive movements in the spinal joints.

The subjects of the study were boys aged between 10 and 13 years, a period characterized by significant

instability in physical and psychological development, making it conducive to the development of certain pathologies, particularly those affecting the musculoskeletal system. Special attention was given to students with musculoskeletal disorders, particularly those with orthopedic conditions of the pelvic limbs, especially unilateral ones, considering that the imbalance between the lower limbs inevitably affects the spine.

The study was conducted between February 2, 2024, and April 3, 2024, and included a posture correction exercise program with sessions lasting 20 minutes each, three times per week, over the course of 8 weeks. Given the known pathogenic mechanisms of postural disorders in children and adolescents, the following measures were recommended for comprehensive treatment: body position self-correction, therapeutic gymnastics, massage, and back muscle electrostimulation.

Analysis and interpretation of results

The posture characterized by pronounced lordosis was defined by abdominal protrusion and a pelvic tilt angle exceeding 60°. The inclusion of kinesitherapy in the rehabilitation treatment complex is justified by its ability to develop and improve the functional state of the muscular corset, strengthen muscles, and enhance the entire musculoskeletal system. The primary approach in the prevention of postural disorders is the regular practice of physical exercise. Kinesitherapy sessions were conducted under the supervision of a physiotherapist, with active involvement from parents in their child's physical education and the correction of problematic posture.

The corrective exercises designed to address postural disorders were symmetrical in nature. For children with spinal hypermobility, isometric exercises were recommended to stabilize the spine and strengthen the muscles forming the muscular corset. Dynamic and isometric exercises were combined with breathing exercises to train the muscles involved in respiration, including elements of self-extension on an inclined surface or with the use of a fitness ball. Individual correction programs were developed in accordance with general kinesitherapy recommendations for adolescents, alongside a set of specific recommendations for performing specialized corrective exercises.

These interventions were implemented in a complex manner, tailored to the nature of the identified functional disorders, with the differentiated application of kinesitherapeutic methods and tools forming the core of individual programs. The effectiveness of corrective measures was evaluated after a period of 3 to 4 months or longer of kinesitherapy. For this purpose, repeated clinical and instrumental investigations were conducted, and a comparative analysis of the data obtained with the initial data was performed. In the observation groups, as a result of the comprehensive posture correction, a trend toward stabilization of the vertical position was observed, and the orthostatic correction of the shortened extremity, identified in adolescents, significantly improved the stability of the vertical position.

The table presents the results of an initial and final assessment of a group of 6 subjects, where physical parameters were measured before and after a physical exercise program. The subjects' height increased slightly from 149.16±2.7 cm to 150.16±2.5 cm, but without statistical significance (t=0.27, P > 0.5) (Tab. 1, Fig. 1).

Tabel 1. Analysis of somatometric indices of the subjects included in the study.

Parameters	Initial assessment (n=6)	Final assessment (n=6)	t-student	P
Height (cm)	149,16±2,7	150,16±2,5	0,27	>0,5
Weight (kg)	56,1±1,9	51,5±1,5	1,91	<0,5
BMI	25,3±2,2	22,81±2,1	0,82	>0,5
Thoracic hyperkyphosis (degrees)	44±1,5	38,3±1,3	2,87	<0,01
Lumbar hyperlordosis (degrees)	35,5±1,7	30,5±1,5	2,23	<0,01

Note: n = 6; f = 5; t: 2,01; 3,36; 4,03.
P: 0,05; 0,01; 0,001.

Fig. 1. Interpretation of comparative data of Height parameters.

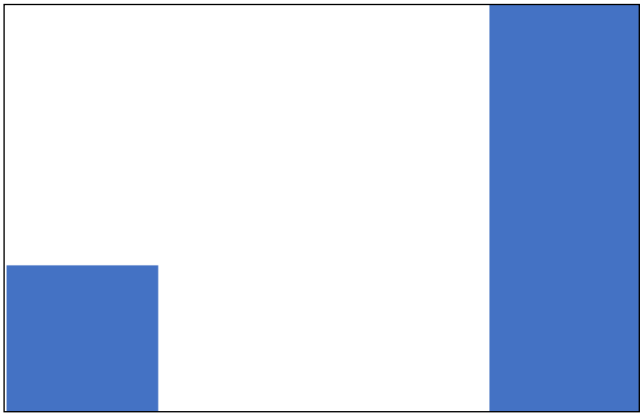


Fig. 2. Interpretation of comparative Weight data.

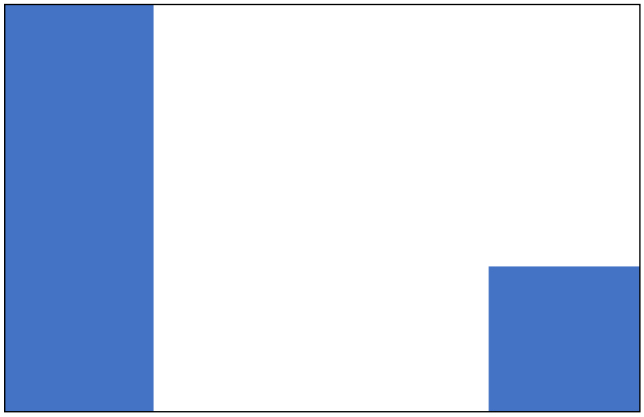


Fig. 3. Interpretation of comparative data of thoracic hypercyphosis (degrees).

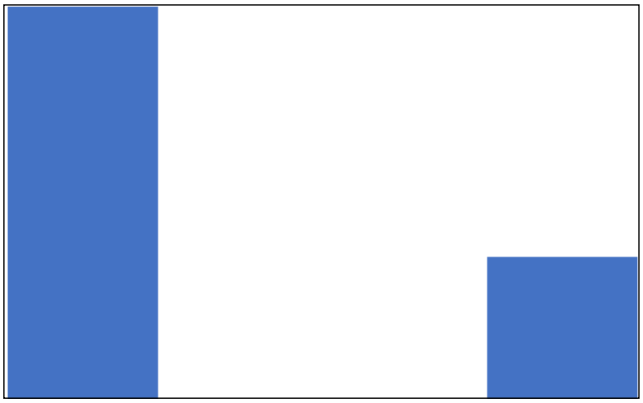
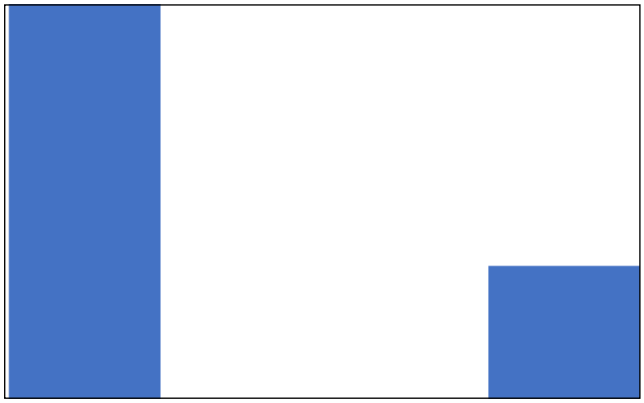


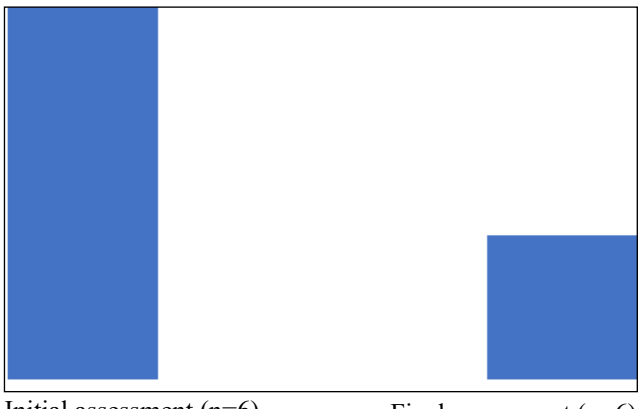
Fig. 4. Interpretation of BMI comparative data.



The subjects' weight decreased significantly from 56.1±1.9 kg to 51.5±1.5 kg (Fig. 2), which was also reflected in a decrease in body mass index (BMI) from 25.3±2.2 to 22.81±2.1, although this change was not statistically significant ($t=0.82$, $P < 0.5$).

However, the reduction in thoracic hyperkyphosis from 44±1.5 degrees to 38.3±1.3 degrees and hyperlordosis from 35.5±1.7 degrees to 30.5±1.5 degrees was statistically significant ($t=2.87$ and $t=2.23$, respectively, $P < 0.01$), indicating a clear improvement in posture (Tab. 1, Fig. 3).

Fig. 5. Interpretation of comparative data on lumbar hyperlordosis (degrees).



The impact of physical exercises on overweight children with poor posture was evident through the reduction in weight from 56.1 kg to 51.5 kg and in BMI from 25.3 to 22.81, suggesting a reduction in overweight (Tab. 1, Fig. 4).

Additionally, the exercises had a significant impact on posture correction, as demonstrated by the substantial decrease in the angles of thoracic hyperkyphosis from 44 to 38.3 degrees and lumbar hyperlordosis from 35.5 to 30.5 degrees, indicating an improvement in spinal alignment (Tab. 1, Fig. 5).

These results underscore the effectiveness of the physical exercise program in alleviating both excess weight and poor posture in children.

Conclusions

Corrective physical exercises, combined with specialized supervision and active parental involvement, have proven to be highly effective in correcting poor posture and reducing overweight in children, significantly contributing to the improvement of spinal alignment and overall body stability.

The implementation of a personalized kinesitherapy program, tailored to the individual needs of children, has demonstrated high efficacy in alleviating functional disorders and enhancing overall functional health, with results supported by repeated long-term clinical and instrumental evaluations.

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