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Health-Promoting Principles of Conducting Sports Training with Children with Musculoskeletal Disorders

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Abstract: The article is devoted to the differentiated approaches to the training process and rehabilitation methods for musculoskeletal disorders in young athletes by means of therapeutic physical training.

Keywords: Sport, Rehabilitation, Musculoskeletal System, Therapeutic Physical Training, Scoliosis, Flat Feet.

Introduction

Today, the problem of musculoskeletal system (MSS) disorders in children is considered relevant worldwide. The prevalence of MSS injuries is also increasing among children engaged in sports. Comprehensive diagnosis and rehabilitation of young athletes remains one of the most important issues in pediatric sports medicine [1]. The emergence of modern diagnostic equipment (computer optical tomography, stabilometry, magnetic resonance imaging) and new approaches to rehabilitation therapy for MSS disorders in children (various types of massage, post-isometric relaxation, manual therapy) necessitates monitoring the health of athletes and developing corrective rehabilitation programs for MSS diseases and injuries in young athletes [2].

Research Objective: To develop differentiated approaches to the training regimen and scientifically substantiate a physical rehabilitation program for young athletes with MSS disorders.

Research Objectives:

To assess the MSS status of athletes aged 8–14 years engaged in various sports.

To develop a physical rehabilitation program for children with MSS disorders participating in sports at Children's and Youth Sports Schools (CYSS) [3].

To evaluate the effectiveness of a posture disorder prevention program before and during sports activities, taking into account the differentiated approach to the training regimen.

To determine the effect of the proposed rehabilitation program on the dynamics of the morphofunctional status of the MSS.

Materials and Methods

The study involved 60 participants aged 8 to 14 years with MSS disorders who were engaged in sports at CYSS in Tashkent during 2023–2025. The Main Group (MG) consisted of 30 individuals in whom MSS disorder correction was carried out according to individual programs incorporating elements of manual therapy [4]. The MG was divided into two age subgroups: younger age (8–10 years) and middle age (11–14 years). The Control Group (CG) also consisted

of 30 individuals who received a traditional therapeutic gymnastics (TG) complex; they were also divided into two age subgroups: younger age (8–10 years) and middle age (11–14 years) [5].

Examination of sports-active children was conducted both according to general medical examination guidelines and with a thorough examination based on the existing MSS pathology [6]. During 2023–2025, the MSS status of young athletes in the MG and CG was assessed. Clinical examination was performed using anamnestic analysis, visual inspection, palpation, manual diagnostics, and somatometry; the functional status of the locomotor system was determined; instrumental diagnostics were carried out using radiography, ultrasound examination, and computer optical tomography [7].

Results and Discussion

The largest proportion in both the CG and MG was composed of fencers — 27.5% and 18.3%, respectively; gymnasts — 8.4% and 18.3%; football players — 17.7% and 14.4%; rhythmic gymnastics girls — 16% and 10.6%; track and field athletes — 4.7% and 8.6%; various wrestling disciplines — 9.5% and 6.7%; swimmers — 6.4% and 4.8%; volleyball and basketball players — 3.8% and 5.8%; table tennis players — 3.8% equally in both groups; academic rowing — 1.9% equally in both groups; draughts and chess players (13.5%) were present only in the MG. It is evident that the majority of children with MSS disorders in the study were young athletes engaged in acyclic sports [8], [9], [10].

In addition to somatoscopic, somatometric, and functional assessment of the MSS status of young athletes, objective assessment methods were also applied. The diagnosis of scoliotic disease and cervical spinal instability in young athletes was confirmed radiologically. In 40% of athletes, posture disorders in the frontal plane, posture disorders in two planes, and scoliotic posture (scoliotic component) were confirmed using computer optical tomography [11]. A complete medical examination, somatometry, and functional examination of spinal mobility, as well as assessment of trunk muscle strength endurance, were performed in both groups before and after the treatment course [12].

Regulation of the Training Process. Loads were dosed taking into account the athlete's posture condition and age. Including exercises aimed at strengthening the back and abdominal muscles in the training program helps maintain correct posture. Excessive loads on the spine, particularly in the 8–12 age group, were eliminated due to the risk of deteriorating body posture [13].

Alternating static and dynamic exercises was recommended: for example, incorporating stretching and stabilization exercises during wrestling sessions to prevent muscle overstrain and maintain joint control. Prolonged static posture holding was avoided during sessions to prevent excessive spinal compression [14].

For CG athletes, TG was applied using the group method — a methodology developed for correcting posture disorders and first-degree scoliosis. The duration of one session was 40 minutes; the treatment course consisted of 12 sessions over 8 weeks. For MG children, individual TG was applied; its basis was the principle of preliminary stretching of shortened muscles and relaxation of spasmodic muscles, breathing exercises, and post-isometric relaxation exercises; this was followed by exercises aimed at stabilizing and strengthening the spinal column and muscular corset, as well as forming a correct movement stereotype. The session duration was 35 minutes; the treatment course consisted of 10 sessions over 2 weeks [15].

Conclusion

The prevalence of MSS disorders among young athletes engaged in various sports is increasing. In particular, posture disorders in the frontal and sagittal planes range from 59 to 72.2%, scoliotic disease — from 6.7 to 12.5%, and flat feet — from 18.4 to 26.3%. Comprehensive

diagnosis and rehabilitation of athletes remains one of the most critical issues in pediatric sports medicine.

The restorative treatment program for MSS disorders includes: diagnostic monitoring, an intensive correction system, a system for stabilizing and enhancing the effect, and a system of preventive measures.

Following restorative treatment courses for young athletes with MSS disorders, the pain syndrome in children aged 11–14 decreased by 29.3%. Somatometric indicators (pelvis, scapula, and lower limb delta) in children aged 8–14 in the main group improved at a high level of statistical significance compared to the control group.

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