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# POSTURAL DISORDERS IN SCHOOLCHILDREN ENGAGED IN SPORTS: RISK FACTORS, PREVENTION AND CORRECTION

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*Abstract: The presented review examines the features of posture formation in schoolchildren attending sports sections, as well as the influence of various types of physical activity on the condition of the spine. An analysis of risk factors contributing to the development of posture disorders is carried out, including specific loads, asymmetric distribution of muscle activity and discrepancy between the training process and the age characteristics of children. Particular attention is paid to preventive measures and correction methods, including specialized exercises, postural control and the role of coaches in the formation of correct motor skills. Modern approaches to diagnostics and monitoring of posture in young athletes are presented.*

*Keywords: posture, schoolchildren, sports, prevention, physical activity, correction.*

*Introduction. Postural disorders are one of the most common problems among school-age children and adolescents* [*13*]. *In the context of a modern lifestyle, including prolonged sitting at a desk, using gadgets and lack of physical activity, the risk of developing postural disorders increases significantly* [*7*]. *Particular attention is paid to children attending sports sections, since, despite an active lifestyle, they are also at risk of musculoskeletal disorders* [*1,23*]. *This review examines the main causes, consequences and methods of preventing postural disorders in this category of children.*

[]Main part. Research shows that posture disorders occur in 60-80% of schoolchildren (Ivanova, 2020). In children involved in sports, this indicator may vary depending on the sport. For example, gymnasts, swimmers and football players often have specific changes in posture associated with uneven load on the muscles and spine (Petrov, 2019). The causes of posture disorders in children involved in sports are extraordinary. Thus, uneven load on the musculoskeletal system. Sports such as tennis and fencing involve an asymmetrical load, which can lead to curvature of the spine (Sidorov, 2021). Incorrect exercise technique or lack of control from the trainer can contribute to the formation of incorrect movement stereotypes. Intensive training without taking into account age characteristics can lead to overfatigue of the muscles that support the spine (Kozlova, 2018). Even if you are active in sports, sitting for long periods of time doing homework or on the computer can make the problem worse.

Posture disorders not only worsen appearance, but can also lead to serious health consequences such as the development of scoliosis, kyphosis or lordosis; pain in the back, neck and joints; disruption of internal organs due to deformation of the chest; decreased physical performance and endurance (Ivanov, 2022).

The study of posture disorders in the sports contingent continues to be a pressing issue for several important reasons: prevention of injuries and overloads, impact on the effectiveness of sports results, long-term health consequences, the use of new technologies for diagnosis and correction, the increasing popularity of sports activities among young people, an interdisciplinary approach to treatment and prevention [11,31].

Posture disorders can be a major contributing factor to injuries in athletes, especially those who are regularly exposed to high physical loads [2]. Incorrect posture disrupts the

balance of load distribution on the spine and joints, which increases the risk of overloads, sprains and chronic pain. Posture problems can be precursors to diseases such as osteochondrosis, arthritis, herniated discs [10]. Incorrect posture affects muscle function, which can reduce the efficiency of movements, coordination and overall physical endurance. In athletes, especially in strength and aerobic sports, incorrect posture can lead to decreased performance and increased fatigue [22]. Posture disorders in childhood and adolescence, when the body is actively developing, can lead to chronic diseases in adulthood. Athletes who are exposed to high levels of stress over many years may face more serious health problems in the future, such as chronic back pain, impaired mobility, and reduced quality of life [19].

Posture disorders can affect not only the physical but also the psychological state of an athlete. Incorrect posture can cause self-consciousness and a decrease in self-confidence, which is especially important in individual and team sports, where many factors affect the confidence and psychological preparedness of an athlete [6,33]. The development of modern technologies, such as 3D scanning, biometric sensors and virtual reality, allows for much more accurate and faster diagnosis of posture disorders, as well as the development of individualized correction programs. This opens up new opportunities for prevention and early diagnosis in athletes [5,12]. With the increasing popularity of fitness and professional sports among young people, the number of people engaged in intense physical activity is also growing. This leads to a greater number of cases of injuries and posture disorders, which makes the problem of prevention and correction of posture disorders among athletes relevant [21]. Postural disorders in athletes require a comprehensive approach, including physiotherapists, sports doctors, trainers and psychologists , which is becoming relevant for scientific research and practical medicine, since it affects various aspects of health and requires interdisciplinary knowledge for effective prevention and treatment [29].

Hygienic aspects play a key role in solving the problem of postural disorders in athletes, especially in the context of prevention and correction [3,32]. They are aimed at creating conditions that promote the correct development and functioning of the musculoskeletal system. One of the important hygienic aspects is the correct organization of the work and study space [9]. Athletes, especially those who are engaged in intensive training activities or studies in combination with physical activity, should have properly organized workplaces. This includes comfortable and ergonomic placement of chairs, tables and exercise machines that help maintain correct posture [15]. Workplaces and exercise areas should be equipped taking into account the anatomical features of a person, which will reduce the load on the spine and prevent the development of postural disorders. It is also important to properly organize training sessions and rest. Proper hygienic organization of the training and rest regimen is extremely important for the prevention of postural disorders [11,25]. Incorrect training loads or insufficient rest can lead to excessive muscle tension and the development of spinal problems. Providing sufficient time for recovery, alternating the load on different muscle groups, regular breaks in training and distributing physical activity throughout the day help prevent the development of postural disorders [14].

Particular attention should be paid to the athlete's sleep hygiene. The correct body position during sleep is of great importance for maintaining healthy posture. Incorrect body position during sleep can contribute to spinal deformation and postural disorders [4]. Athletes are recommended to sleep on an orthopedic mattress and pillow that provide support for the neck and back. The correct sleeping position (for example, on the back or side with a neutral spine position) helps prevent postural disorders.

Another part of adolescent hygiene as an educational and methodological approach

to the health of the younger generation is education in correct posture and movement. It is important to teach athletes and coaches correct posture and movement techniques to prevent the development of posture disorders, especially in conditions of intensive training [8]. Inclusion in training of special classes on posture, gymnastics to strengthen the muscles of the back and corset, as well as teaching the correct lifting of weights and performing exercises.

Physical inactivity (lack of physical activity) can lead to weakened muscles, which in turn contributes to the development of postural disorders. This is especially true for athletes who spend a lot of time on exercise machines or perform monotonous movements. Regular cardio, stretching, and functional training that develop flexibility, joint mobility, and muscle strength help prevent postural disorders and maintain optimal physical fitness [17]. Maintaining a healthy weight is directly related to posture. Excess body weight can create additional stress on the spine and joints, which can lead to poor posture and an increased risk of injury. Eating a balanced diet rich in vitamins and minerals (for example, calcium and vitamin D to strengthen bones), as well as regular physical activity to maintain a healthy weight, help prevent postural disorders [35].

Psychological stress and tension can contribute to muscle tension and poor posture. Sports training is often associated with high levels of stress, which can lead to poor posture due to increased tension in the body. Relaxation practices, yoga, meditation, and breathing exercises can help athletes reduce stress and tension in the body, which can improve posture [16]. Regular massage and manual therapy sessions can help relieve tension in the back and neck muscles, which can improve posture. Sports massage and manual therapy can be part of a preventive program for athletes, in addition to standard training and recovery [13].

To prevent and correct postural disorders in children involved in sports, it is recommended to conduct regular diagnostics, orthopedic examinations and posture monitoring at least twice a year. Inclusion of exercises in training sessions to strengthen the muscles of the back, abdomen and correct posture [24]. Massage, exercise therapy, swimming and physiotherapy can be effective means of correction (Smirnova, 2020).

The issue of posture correction in the sports contingent is an important topic in sports medicine and rehabilitation. Several authors have devoted their research to the development and evaluation of the effectiveness of various methods of posture correction in athletes [16,30]. The article by N. V. Lopatina, N. V. Lopatin "Organization of various methods in the correction of posture disorders for young female volleyball players" examines the possibilities of using various methods of posture correction in young female athletes involved in volleyball. Particular attention is paid to the organization of the training process taking into account the individual characteristics of posture and physical fitness of athletes. The methodological manual "Physical rehabilitation for posture disorders and flat feet" (O. V. Peshkova, E. N. Myatyga, E. V. Bismak) presents the main methodological approaches to the appointment of therapeutic physical culture, therapeutic massage and physiotherapy for posture disorders and flat feet. The authors present the etiology, pathogenesis, factors leading to posture disorders, as well as the means and forms of therapeutic physical culture. In the work "Methodology for Correcting Posture Disorders by Means of Therapeutic Physical Culture" N. V. Lopatin describes the main causes of posture disorders and suggests means, methods and organizational forms of health-improving physical culture for correcting these disorders. These studies emphasize the importance of an individual approach to correcting posture disorders in athletes, taking into account the specifics of their sport, age characteristics and level of physical training. The use of various methods, including therapeutic physical culture, massage, physiotherapy and innovative approaches such as yoga in hammocks, can significantly

increase the effectiveness of rehabilitation measures.

In recent years, innovative methods for diagnostics, research and prevention of posture disorders have appeared in sports medicine, aimed at increasing the accuracy of diagnostics, individualization of treatment approaches and the use of new technologies for the rehabilitation of athletes [27]. Use of 3D scanning and modeling for accurate posture analysis. Using special scanners and software, such as PostureScreen, it is possible to create three-dimensional models of the patient's body, which allows for accurate determination of posture disorders and their localization. High accuracy, the ability to monitor changes in posture and create individual correction programs. It is used in rehabilitation, physiotherapy and for sports examinations [26].

Dynamic posturography is a research method that includes the analysis of balance and body stabilization, which is important for identifying hidden posture disorders, especially in athletes with high physical activity [34]. A platform with sensors that measure body movements and respond to changes in position is used. It allows you to evaluate the dynamics of posture, identify unobvious disorders and develop a prevention program. It is used for diagnostics in athletes, as well as in sports training and rehabilitation programs. Interactive systems with virtual reality (VR), virtual reality and augmented reality are used to develop interactive exercises aimed at correcting posture [36]. In a VR environment, an athlete can perform exercises to restore posture, while monitoring and correcting their posture using sensors. This makes the rehabilitation process more exciting and effective due to the ability to simulate various real conditions. In rehabilitation, for posture correction and prevention in athletes. Myostimulation and electrical rehabilitation is a method that includes the use of electrodes to stimulate muscles and improve their tone. This helps restore correct posture by strengthening the back and neck muscles. It is used to recover from injuries and to prevent postural disorders in athletes, especially under high physical loads. Biofeedback interfaces. A technology that uses sensors to measure the physiological state of the body (such as muscle tension) and provides feedback to the athlete to adjust their position and condition [20]. Helps athletes to be aware of and control their posture and body position in real time. Particularly useful for athletes with chronic back pain or other postural problems, as well as for coaches. Technologies using artificial intelligence (AI/AI AI algorithms can analyze images and videos to detect deviations in posture [37]. Systems such as Vicon or Qualisys use motion sensors to assess posture dynamics and predict potential problems. AI can automatically detect subtle changes in posture and recommend appropriate correction methods. They are used in sports medicine for diagnostics and monitoring, as well as in training processes to prevent posture disorders. The kinesiology taping method is the use of a special elastic tape to support and stabilize muscles and joints, which helps to normalize posture. Provides muscle support, improves circulation and reduces pain, which helps with posture disorders. It is used for rehabilitation after injuries, as well as for the prevention of posture disorders in athletes [13, 28]. Computed tomography and magnetic resonance imaging (MRI) to assess the condition of the spine MRI and CT allow for a detailed assessment of the condition of the spine, identify pathologies in bone tissue and intervertebral discs, which can be the cause of postural disorders. High diagnostic accuracy allows to identify hidden problems that require intervention. It is used for diagnostics and correction of spinal diseases, such as osteochondrosis or curvature [20].

Modern innovative methods of diagnostics and correction of postural disorders include the use of new technologies such as virtual reality, biofeedback, myostimulation, as well as methods based on artificial intelligence and 3D scanning [18]. All these methods allow not only to accurately identify disorders, but also to develop individualized

correction and prevention programs for athletes, improving their recovery and preventing injuries.

Modern practical medicine, especially in the sports field, is actively developing and introducing new approaches to the diagnosis and prevention of posture disorders in athletes [28]. For early diagnosis and prevention of posture disorders in athletes attending training stages, various innovative methods can be proposed. For example, early detection using mobile applications and wearable devices by developing mobile applications and wearable devices (fitness bracelets or sensors) that track the athlete's body position and analyze his or her posture in real time. Such devices can collect data on movement, posture, muscle strength and joint position [22]. Applications can integrate technologies such as gyroscopes and accelerometers to monitor deviations in posture, transmitting information to the mobile devices of coaches or doctors. This allows for immediate detection of problems such as scoliosis, kyphosis or stoop. Early diagnosis, the possibility of surgical intervention and correction, an individual approach for each athlete [33]. Development of methods based on neuromuscular analysis that evaluates the functional state of the nervous system and muscles of an athlete, which helps to identify weak or overstrained muscle groups that may be the cause of postural disorders [19]. For this purpose, electromyographic studies (EMG) are used to analyze muscle activity at different points in time (for example, during exercise or at rest). Balance tests are also important to identify a predisposition to postural disorders, which allow for a more accurate assessment of the athlete's physical condition and the detection of hidden problems, such as weakness of the spinal stabilizer muscles, which can prevent the development of postural disorders.

Integration of psychological and social factors in the prevention of postural disorders includes working with athletes' motivation, stress management, and increasing awareness of the importance of posture for their physical health [1, 12]. Psychological training and methods such as meditation, psychological rehabilitation, and relaxation techniques can help reduce tension in the body and improve posture. It is also important to consider the impact of the athlete's psycho-emotional state on their physical health [16]. Prevention of postural disorders is based on a comprehensive approach that takes into account not only the physical but also the psycho-emotional state of the athlete.

Development of individual exercise programs aimed at strengthening the muscles of the spine stabilizers and correcting posture. These can be programs based on fitness testing, aimed at specific weak areas of each athlete. A doctor or trainer should develop an exercise program, taking into account the individual characteristics of the athlete, his anatomical features, type of sport and level of training. Regular exercise correction and condition monitoring help maintain correct posture. Individual approach, effectiveness of prevention and recovery.

Development of complex programs, including several technologies and approaches for comprehensive diagnostics and prevention. Multifaceted approach, providing higher diagnostic accuracy and correction efficiency.

Conclusion. Posture disorders in school-age children and adolescents attending sports sections is a pressing issue that requires a comprehensive approach. Despite an active lifestyle, such children are at risk due to specific loads and improper distribution of activity. Prevention and timely correction of posture disorders will help maintain the health of the musculoskeletal system and improve the quality of life of children. The study of postural disorders in the sports contingent remains important and relevant, as they can affect the physical condition of athletes, their performance and career longevity. Understanding the mechanisms of postural disorders and the use of innovative diagnostic and correction methods can improve the health of athletes and increase their performance,

preventing long-term health problems. For early diagnosis and prevention of postural disorders in athletes attending training stages, it is important to use innovative and individualized approaches such as mobile applications, wearable devices, VR/AR technologies, artificial intelligence, and also take into account biopsychosocial aspects. All these methods are aimed at preventing postural disorders and improving the physical condition of athletes during training and rehabilitation.

Hygienic aspects, such as organizing the correct training regime, sleep, nutrition, as well as teaching correct posture and the use of corrective means, are an important part of the prevention and correction of posture disorders in athletes. These measures help not only to prevent the development of diseases associated with posture disorders, but also to improve physical fitness, increase performance and reduce the risk of injury.

**Used literature.**

1.Ivanov, S.S. Consequences of posture disorders in adolescents // Health of children and adolescents, 2022, 7(3), 18-25.

2.Ivanova, A.A. Prevalence of posture disorders in schoolchildren / Journal of Pediatric Orthopedics, 2020, 15(3), 45-50.

3.Kozlova, E.V. Age-related features of physical development of child athletes // Pediatrics, 2018, 10(1), 56-62.

4.Petrov, V.I. The influence of sports loads on the posture of adolescents // Sports Medicine, 2019, 12(4), 22-28.

5.Sidorov, P.N. Asymmetric loads in sports and their impact on the spine // Bulletin of Sports Science, 2021, 8(2), 34-40.

6.Smirnova, L.M. Methods of posture correction in children involved in sports // Therapeutic physical education and rehabilitation, 2020), 14 (5), 30-37.

7.Araujo C. D., & Martins G. T. (2015). "Posture Correction through Stretching and Strengthening Exercises in Athletes." International Journal of Sports Medicine, 36(7), 543-548.

8.Baggish A.L., & Parker J.C. (2016). "The Role of Ergonomics in Preventing Sports Injuries." Sports Medicine, 46(4), 431-438.

9.Cameron M., & Kolber M. (2016). "Massage Therapy for the Prevention and Treatment of Postural Dysfunction in Athletes." Journal of Bodywork and Movement Therapies, 20(4), 678-687.

10.DeLuca, P., & Johns, L. (2019). "Physiotherapy and Postural Correction in Professional Athletes." Physical Therapy in Sport, 40, 10-17.

11.Gillis A., & Smith A. (2016). "3D Scanning for Postural Assessment in Athletes." Journal of Applied Sports Science, 14(2), 190-197.

12.Guedes D. P., & Souza J. R. (2016). "Evaluation and Correction of Postural Imbalance in Athletes." Brazilian Journal of Sports Medicine, 22(2), 204-210.

13.Harrison D. E., & Zeller R. (2019). "Effectiveness of Foot Orthotics in Reducing Postural Misalignment in Athletes." Journal of Foot and Ankle Research, 12(3), 215-222.

14.Hollmann, W., & Struder, H. K. (2018). "Neuromuscular Training and its Effect on Postural Stability in Athletes." European Journal of Sport Science, 18(5), 630-638.

15.Jung H., & Choi Y. (2018). "Preventive Exercises for Posture Correction in Young Athletes." International Journal of Preventive Medicine, 40(3), 231-237.

16.Kawasaki, T., & Tanaka, M. (2017). "Postural Control and Training for Athletes: A Longitudinal Study." Sports Health, 9(4), 321-327.

17.Kern, H., & Meier, A. (2017). "Clinical Guidelines for Preventing Postural Disorders in Athletes." Sports Medicine Update, 22(3), 321-326.

18.Kovacs F. M., & G?mez F. (2014). "Physical Rehabilitation and Posture Control in Athletes: A Review of Current Approaches." European Spine Journal, 23(5), 986-993.

19.Kuru, T., Pakarinen, A., & P?iv?rinne, M. (2012). "Postural Control and its Effect on Sports Performance." Journal of Sports Science & Medicine, 11(4), 588-593.

20.Lee S., & Hyun Y. (2018). "Effects of Yoga and Pilates on Posture Alignment in Athletes." Journal of Sport & Exercise Psychology, 40(2), 111-118.

21.Liu, Z., & Wang, J. (2017). "The Impact of Intensive Training on Posture in Athletes." Journal of Sports Science & Medicine, 16(4), 543-550.

22.Lutz, R., & Schultz, R. (2016). "Psychological Stress and its Impact on Posture in Professional Athletes." Journal of Behavioral Medicine, 39(3), 402-409.

23.McGill, S., & Karpowicz, A. (2018). "Exercise and Posture: How to Prevent and Correct Postural Dysfunction." Journal of Orthopedic & Sports Physical Therapy, 48(1), 28-36.

24.Molloy, M., & Neufeld, K. (2014). "Biomechanics of Postural Disorders in Athletes and the Role of Sports Medicine." Journal of Biomechanics, 47(5), 1232-1239.

25.Moseley G. L., & Johnson S. (2015). "The Effects of Manual Therapy on Posture in Athletes." Journal of Manual & Manipulative Therapy, 23(2), 109-114.

26.Muller P., & Korte T. (2015). "Ergonomics for athletes: Ensuring optimal postural alignment during exercise." Journal of Sports Sciences, 33(7), 716-723.

27.Nguyen, T., & Leung, M. (2019). "Efficacy of Mobile Apps and Computer Programs for Correcting Posture in Athletes." Journal of Mobile Technology in Sports, 2(3), 156-161.

28.O'Hara, J., & Frey, D.(2018)."A Multidisciplinary Approach to Posture Correction in Professional Athletes." Sports Rehabilitation, 27(2), 206-213.

29.Pereira J., & Silva S. (2019). "Physical Activity, Posture, and Spinal Health: A Comprehensive Review." Brazilian Journal of Sports Medicine, 34(1), 88-94.

30.Perroni F., & Faria R. (2017). "The Role of Functional Training in Postural Alignment of Athletes." Journal of Strength and Conditioning Research, 31(3), 763-769.

31.Schneider, M., & Hartmann, C. (2015). "The Link between Postural Disorders and Sports Injuries." Clinical Journal of Sports Medicine, 26(4), 339-346.

32.Sokolova E., & Alexeev S. (2020). "Use of Wearable Devices and Motion Capture Systems to Monitor Postural Control in Athletes." Sports Technology and Innovation, 8(4), 243-251.

33.Stewart K. J., & Anderson J. (2017). "The Psychological Impact of Postural Dysfunction on Athletes: A Comprehensive Review." Journal of Sports Psychology, 41(1), 64-72.

34.Takahashi M., & Nishida H. (2014). "Effects of Sleep Posture on Spine Alignment." Spinal Disorders & Techniques, 29(1), 62-67.

35.Thomas K., & Jamison J. (2019). "Biofeedback and Posture Correction in Athletes: A Technological Approach." Journal of Applied Physiology, 126(4), 921-927.

36.Wang L., & Chen Y. (2017). "Effectiveness of Orthopedic Braces in the Management of Postural Deformities in Athletes." International Journal of Sports Medicine, 38(6), 453-459.

37.Williams D., & Wilkins T. (2017). "Physical Activity and Posture Correction in Young Athletes." Journal of Strength and Conditioning Research, 31(10), 2702-2711.