The effect of sports participation on body posture in student's: A scoping review.

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Abstract:

the object of this scoping review is to identify first the study designs and participant populations, second: types of specific methodology, third: common results, conclusions and recommendations from the body of evidence regarding our research question, is there a significant difference between sports participation and body posture in student's.

Key words:

Body Posture, Sport Participation, Postural Deformities, Schoolchildren, Posture.

ملخص:

الهدف من دراسة النطاق المعتمدة هو: أولا تحديد تصميم الأدبيات البحثية الموجودة و مجتمعات البحث قيد الدراسة، ثانيا: نوع المناهج المعتمدة ، ثالثا: النتائج والاستنتاجات والتوصيات المشتركة من مجموعة الأدلة المتعلقة بسؤالنا البحثي ، هل هناك فروق ذات دلالة بين التلاميذ الرياضيين و الغير الرياضيين بالنسبة للقوام.

الكلمات المفتاحية:

قوام الجسم، تشوهات القوام، التلاميذ الرياضيين، الغير رياضيين.

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Introduction:

Sports practice shapes the character of a young person, improves physical fitness and considerably affects the physical development and posture. The positive impact of physical activity on all aspects of health and fitness in children and adolescents has been demonstrated in many studies we aim to understand the effect of practicing sport on postural deformities in children.

Physical activity has an impact on the posture and physical development of a young organism. Sports training as a specific form of directional physical activity can exert a significant effect on the process of posture development of young men due to high training loads and repeated unilateral exercises

Some postural disorders are more common in certain sports fields, so it is assumed that the specific requirements of sport and training loads that occur during the execution of technical elements and prolonged repetition of these elements influenced the development of those postural disorders.

The most common postural abnormalities that occur in most sports are scoliosis and kyphosis, while lordosis occurs to a slightly smaller extent (Asghar & Imanzadeh, 2009).

The appearance of such postural disorders in sport is usually associated with the highly repetitive nature of sports. the early selection of certain sports entails involving children in the training process at a very early period in their childhood. In this period of development, the children's spinal column is affected by the influence of large loads that occur during the training process, which can lead to adaptive changes in skeletal and muscle systems and disrupt normal posturogenesis. This long-term exposure to such loads which affects the morphology of the bones that are still underdeveloped and the mechanical integrity of the bones can lead to the improper development of the spinal column (Wojtys, Ashton - Miller, Huston, & Moga, 2000). There is definitely a need for posture monitoring in sport, especially in young athletes. Previous studies on body posture mostly concerned adult sportsmen.

Previous studies have found an inversion effect for body-posture recognition; specifically, upright body-posture recognition has been found to be processed faster and more accurately than recognition of

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inverted body postures. These findings suggest that body postures may be processed in the configural manner, similar to face-processing, and that when body posture is inverted, participants exhibit impairments in processing such configural information (Reed et al., 2003).

Review question:

Following an individual review of the literature and a critical reading consensus was reached to determine the following research question; is there any effect of sports participation on body posture in student's

Inclusion criteria:

For inclusion in this scoping review, the prior research needed to study participants 12 years to 15 years old, participants in sports more than 3 years. Any observational or interventional study examining the relationship between body posture and sports was considered. Articles that either compared body posture change (eg, before and after a sport programs) or any comparative study were included. Articles needed to use a subjective or objective measure for body posture deformities

Types of Sources:

This scoping review will consider both experimental and quasi-experimental study designs.Qualitative studies will also be considered that focus on qualitative data.

In addition, systematic reviews that meet the inclusion criteria will also be considered, depending on the research question.

Text and opinion papers will also be considered for inclusion in this scoping review.

Search strategy/Source of Evidence selection:

The search strategy will aim to locate both published and unpublished studies. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy for this article. The search strategy, including all identified keywords and index terms, will be adapted for each included database and information source. The reference list of all included sources of evidence will be screened for additional studies.

The databases to be searched include (Researchgate,SNDL, ScienceDirect, SpringerLink, E-MAREFA, Arcif Analytics,Scopus,). Following the search, all identified citations will be collated and uploaded into Mendeley Version 1803 for windows.

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Quality of evidence:
Non-assessment of methodological quality and the risk of bias are consistent with current guidelines on conducting a scoping review. However, a focus of this scoping review was on methodology.

Mapping of studies (Author, Design, Population characteristics, Method, Results...):
The research of Kenanidis, Potoupnis, Papavasiliou, Sayegh et al. (2008) was aimed at evaluating and comparing the frequency of adolescent idiopathic scoliosis between two groups (athletes and non athletes) to determine whether the sports activities were associated with the development of adolescent idiopathic scoliosis. The results showed that in 99 cases (48 athletes and 51 non-athletes) adolescent idiopathic scoliosis was radiographically confirmed (Cobb's angle was greater than 10 degrees). There was no statistically significant difference between the groups of athletes and non-athletes and male sports groups and male non-athletes groups as well as female athletes and non-athletes groups regarding the frequency of adolescent idiopathic scoliosis. Based on these results, the authors concluded that systematic training was most likely not related to the development of adolescent idiopathic scoliosis and that active participation in sports did not seem to affect the level of the main scoliotic curve.
Scoliosis can be defined as a lateral curvature of the spinal column or an angular deviation of the normal position by one or more vertebral segments (Živković, 2009) where the angle of the curvature is at least 10 degrees (Cobb's angle) and often results in a visible rib crest when a patient performs a deep forward bend. (Weinstein, 1989 by Green, Johnson, & Moreau, 2009). Most authors have reported a higher incidence of scoliosis in dance, ballet, the javelin throw, table tennis, tennis, hurling, gymnastics and rhythmic gymnastics. However, it has not yet been proven that a particular branch of sport causes or contributes to the development and the occurrence of scoliosis. (Green, Johnson, & Moreau, 2009; Gielen & Van den Eede, 2008). It has been determined that most athletes diagnosed with scoliosis have an idiopathic scoliosis. (Schiller & Eberson, 2008) Becker (1986) conducted a preliminary study which assessed the occurrence of scoliosis in a group of adolescents who participated in competitive swimming programs. The author reported that 6.9% of the subjects had idiopathic structural signs in each group. Also,

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in each group he reported the incidence of mild functional scoliosis of 16%. Becker also found that in 16% of the participants who had mild functional scoliosis, the lateral curvature of the scoliosis towards the more dominant hand occurred in 100% of the cases.

This high incidence of scoliosis with a curve towards the dominant hand he attributed to muscle imbalance and the increased power of the dominant hand, which is often considered as a causal factor in the development of scoliosis, taking into account the high repetitive swimming activity and the subsequent adaptation of the vertebrae.

The high level of incidence of scoliosis was noticed in the dancers. In the study by Warren et al. (1986), which was based on a sample of 75 classical ballet dancers, scoliosis was noted in 24% of the cases, with 15 out of 18 (83%) dancers, in whom scoliosis was noted, had delayed menarche, compared to 31 out of 57 dancers (54%) in whom there was no scoliosis. Also, the dancers who had scoliosis had a higher percentage of secondary amenorrhea (44% compared to 31%) that lasted longer than the group without scoliosis. The incidence of scoliosis in families of dancers with scoliosis was 28% compared to 4% in families of dancers without scoliosis. In the author's opinion, dancers with delayed menarche are at risk of developing scoliosis and the development of fractures, and this risk increases with age. Delayed menarche and secondary amenorrhea are associated with hypoestrogenism and slowed bone growth. Considering the fact that ballet training begins very early as well as the application of a diet in order to maintain proper body weight, ballet dancers as a group may be subject to the residual effects of sexual maturation of bone growth. The influence of heredity and the environment, and also the specificity of sport, which involves the use of appropriate exercises and postural positions that affect the spinal column that is in the process of development, may have an effect on those with a predisposition for developing scoliosis. According to the authors, the influence of hormonal and nutritional factors on the development of the skeleton (particularly in adolescence) deserves further investigation.

The research conducted by Tanchev, Dzherov, Parushev, Dikov, & Todorov (2000), was aimed at determining the frequency of scoliosis in rhythmic gymnasts, analyzing its specific characteristics, and trying to present some etiological explanations for this specific form of scoliosis. Out of the overall sample of participants, scoliotic curves over 10 degrees (range of 10 - 30 degrees) occurred in 12% of gymnasts, which

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represents a large share compared to 1.1% of scoliosis that occurs in normal children of the same age, determined in the examination of 4800 children in Sofia by the same medical team. In their study the authors suggest three major factors that distinguish rhythmic gymnasts from their peers who do not participate in sports and that most likely contribute to the increased incidence of scoliosis among them: 1. general joint laxity as a hereditary factor; 2. slow growth and maturation as a result of physical, dietary and psychological stress, 3. continuous asymmetric loading of the spinal column. According to them, these three factors contribute the etiology of this scoliotic form and they are named a dangerous triad. Extended hypoestrogenism, that occurs as a complication of a weight loss, diet and physical training among young girls and women, leads to a delay of menarche, which together with the slow maturation leads to an increase in so-called "vulnerable years of development."

This abnormality, together with the asymmetric load of the spine that is a characteristic of the rhythmic gymnastics, exhibits an epiphyseal plate to longer undesirable effects of mechanical forces (pressure, stroke, microtrauma).

The study carried out by Meyer, Cammarata, Haumont, Deviterne, Gauchard et al. (2006) aimed to determine whether physical and sports activities have an influence on the development of idiopathic scoliosis.

The experimental group (201 adolescents with idiopathic scoliosis), and the control group (192 adolescents without scoliosis) completed the epidemiologic questionnaire. Those adolescents who trained gymnastics were mainly in they were just starting their gymnastics training. Since the laxity of the joints is considered one of the factors that influence the development of scoliosis, it has been tested on 42 girls with idiopathic scoliosis and in 21 girls in the control group. Adolescents with scoliosis, whether they were involved in gymnastics or not, showed a greater degree of joint laxity compared to adolescents from the control group who practiced gymnastics or not. The groups that were involved in gymnastics did not show higher values of joint laxity compared to other groups. Children with higher joint laxity may be attracted by the selection because of their ability to adapt to the specific demands of this sport. A girl with higher joint laxity may be more prone to idiopathic scoliosis.

Modi, Srinivasalu, Smehta, Yang, Song, & Woo Suh (2008) determined the existence of a significant scoliotic curve where the dominant hand is

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associated with the direction of the curve on the sample volleyball players. Cobb's angle was not statistically significantly associated with the length of the training. The curves were either thoracic or thoraco-lumbar.

To determine the incidence of scoliosis in volleyball players Yoo, Suh, Jung Hur, Chae et al. (2001) carried out a research on a sample of 116 volleyball players who had been involved in volleyball for more than one year. Out of the total number of participants, 60 of the participants (51.7%) had a trunk rotation angle greater than 5 degrees, while the control group recorded 2.5%. The number of athletes with an angle greater than 10 degrees (Cobb) was 6 (5.17%), while the value in the control group was 465 (1%). In the author's opinion, the volleyball team had a higher incidence of scoliosis and trunk asymmetry than the control group. The authors also concluded that asymmetrical muscle development can lead to mild scoliosis, but that it also has a potential for significant progress to be found in some cases of idiopathic scoliosis.

Potoupnis, Kenanidis, Papavasiliou, & Kapetanos (2008) investigated the case of female monozygotic twins of whom one suffered from idiopathic scoliosis and the other was not.

The opinion of the existence of a genetic predisposition towards the development of idiopathic scoliosis is widely accepted. According to the research, this case is unique because of the pair of female monozygotic twins who are top athletes, with whom there is a discrepancy in terms of the development of scoliosis. The twins, aged 13.5 who were top athletes in synchronized swimming, were clinically tested in a medical school check-up. Both girls were tested in a standing position in order to determine lateral contour asymmetry, trunk, shoulders and shoulder blades while also measuring limb length. The deep forward bend test (forward bending test) was performed to determine the existence of rib hump asymmetry.

The measurement results showed the existence of doubt whether one of the girls had developed scoliosis. Radiological assessment determined the existence of adolescent idiopathic scoliosis with Cobb's angle of the left thoraco-lumbar curve of 32 degrees. The clinical and radiological assessment of her sister did not show the existence of any spinal deformity. Given that the twins share the same genetic basis, and that both of them were exposed to the identical factors of synchronized swimming training, it could have been expected that both of them would

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have the same evaluation results for scoliosis. Since this was not the case, the authors concluded that adolescent idiopathic scoliosis was a multifactorial skeletal deformity, and that several factors (heredity, environment, etc.), which act together or separately might be involved in its development.

Hellstrom, Jacobson, Sward, & Peterson (1990) in their study radiographically evaluated the thoraco-lumbar part of the spine in 117 men and 26 female athletes and 30 non athletes who comprised the control group. The authors reported 2 to 3 times higher incidence of scoliosis in athletes than in the control group. Scoliosis is significantly more present in male gymnasts than in soccer players.

Result of this study:

The study designs identified in this scoping review were appropriate to use for the research question. The variety of study designs prevented data pooling and scoping review remained the most appropriate approach to synthesise the research. We can say the mapping of those articles shows that the different type of sport effect the body posture differently.

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