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Is physical activity contraindicated for individuals with scoliosis? A systematic literature review☆,☆☆,★

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Objective: The purpose of this study was to perform a systematic review of the literature and other authoritative sources for recommendations regarding the appropriateness of physical and sporting activity for those with scoliosis.

Methods: The literature was systematically searched in PubMed, the Cumulative Index to Nursing and Allied Health Literature, the Index to Chiropractic Literature, and the National Guidelines Clearinghouse from the earliest date of each database through July 2008. All languages and research designs were included. Web sites of respected organizations were searched for position/white papers on scoliosis and physical activity. Included articles were rated using the Oxford Centre for Evidence-Based Medicine criteria, and recommendations for physical activity were made using the Oxford Centre's criteria for grades of recommendation.

Results: Of 42 articles retrieved, 11 met the inclusion criteria. The Internet review of 18 organizations yielded no previous guidelines or position papers for physical activity and scoliosis. Recommendations were made from 3 level 3b studies and 8 level 5 studies; they

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include the following: (1) brace-treated and surgically treated scoliosis patients have demonstrated that they can physically participate in physical activities at the same level as nonsurgical patients (grade C recommendation); (2) nonsurgically treated patients are encouraged to participate in sports and physical activity and (3) scoliosis is not a contraindication to participation in most sports (grade D recommendation); (4) brace-treated scoliosis patients are encouraged to exercise with their brace on; however, exercise may also be done outside of the brace (grade D recommendation); and (5) physical activity may be commenced after surgery for scoliosis; however, no high-quality evidence exists that guides the timing of return to physical activity (grade D recommendation). A potential association between elite-level competition in specific sports at an early age and an increased prevalence of scoliosis has been reported (grade C recommendation).

Conclusion: This article offers evidence-based guidance to health care providers and to patients with scoliosis when making decisions to participate in physical and sporting activities.

Introduction

Scoliosis is commonly defined as a lateral spinal curvature of at least 10° (Fig 1) when measured with Cobb's method[1] and often results in a visible rib hump when the patient bends forward at the waist. Primary care providers and spine specialists often see patients with this condition. For those 16 years and younger, scoliosis has a prevalence of 2% to 3%,[1] with a lower prevalence of 0.3% to 0.5% noted for curves larger than 20°.[2] Scoliosis is present equally in males and females for curves of approximately 10°; but with larger curves, the prevalence for scoliosis is greater in females.[1] In the United States, approximately 500 000 adults have scoliosis.[3] Potential complications of scoliosis include back pain,[1,4] curve progression,[1] psychosocial effects,[1,5] and, in severe cases, pulmonary symptoms.[1,6,7] Although some cases of scoliosis are due to an underlying congenital anomaly or pathology, such as neurofibromatosis, connective tissue disorders, or spinal cord abnormalities,[4] most (65%) of the curves are idiopathic.[3]

According to the literature, conventional management options for patients with scoliosis are 3-fold: observation, bracing, and surgery.[8,9] During observation, for curves less than 25° in skeletally immature patients[8,9] and less than 45° in skeletally mature patients,[9] assessment is made over time via radiography to observe for progression of the scoliotic curve and any potentially related symptoms. When the curve progresses to 25°, patients are often treated with one of numerous braces available on the market in an effort to halt progression of the scoliosis.[8] Spinal fusion is the final option for patients with progressing scoliotic curves[8] greater than 40° to 50°.[10] Therapeutic exercises,[10,11] lateral electrical stimulation,[12] manual therapy,[13] a combination of manual therapy and rehabilitation exercises,[14] traction,[15] and acupuncture[16] are additional scoliosis interventions noted in the literature; however, insufficient evidence currently suggests the efficacy of these procedures in halting curve progression or restoring a normal curve, although some may aid in reducing pain associated with scoliosis.

Despite the many studies regarding scoliosis treatment or the management of associated pain, previous authors[4,10,17] have pointed out that little objective information is available to guide patients with scoliosis —or parents of young patients—about acceptable physical activities or if participation in sporting activities is prudent. Historically, in the United States, there are recommendations in the literature that people with scoliosis should not participate in exercise.[11,18,19] One of the earliest studies on scoliosis and treatment was a 1941 study published by the American Orthopaedic Association.[18] This group suggested that the use of exercise would worsen lateral curvatures for patients with idiopathic scoliosis. In 185 cases treated with exercise alone, approximately 60% of the patients experienced a worsening of the curve; and the curve remained unchanged in the remaining 40%. This article concluded that bracing and surgical fusion were the treatments of choice. The determinations made in this study eventually led to widespread recommendations for scoliosis patients to avoid sporting and exercise activities.[11,19] This may explain the scarcity in the literature concerning the appropriateness of exercise and sporting activities for patients with scoliosis.

At present, no published recommendations are found regarding the suitability of physical activity for those