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Review

Scoliosis incidence and treatment methods

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Abstract: Scoliosis is defined as a three-dimensional deformity of the spine that is of particular interest to the lateral curvature of the spine. Various types of treatment approaches have been recommended for patients with scoliosis. The aim of this study was to provide an up-to-date review of scoliosis, focusing on issues such as its incidence and treatment methods. The ISI-Thomson Web Of Science International Virtual Library was accessed for this review. The search criteria selected were 'title', 'abstract' and 'keywords'. In the ISI Thomson Web of Science virtual library platforms, the keywords in the articles search were "scoliosis incidence" and "scoliosis treatment". Over the years, different therapeutic strategies have been addressed for patients with scoliosis, they differ depending on the type of scoliosis, the patient's age and the available therapeutic means.

Keywords: *Scoliosis, Incidence, Physical Treatment*;

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1. Introduction

Scoliosis is defined as a three-dimensional deformity of the spine that is of particular interest to the lateral curvature of the spine. This condition can be classified into structural and unstructural scoliosis. Structural scoliosis can also be divided into idiopathic scoliosis (having a known cause) and non-idiopathic scoliosis (having an unknown cause) [1].

The incidence of scoliosis increases with age and varies in different countries between 2% and 13.6%, with the literature emphasizing that women are affected twice as often as men. The main causes of scoliosis are not well known, however, experts suggest that it may occur for reasons such as genetics, growth spurts, hormonal dysfunction, bone density change, body tissue abnormalities, biomechanical factors and central nervous system abnormalities. Specialists in Arab countries have conducted studies that found that the etiology of scoliosis includes 59% idiopathic scoliosis, 17% congenital scoliosis, 11% neuromuscular scoliosis and 13% scoliosis caused by unknown unclassified causes [1].

Adult scoliosis can be defined as a Cobb coronary measurement ≥ 10 ° in a patient with a mature skeleton. Experts define two common forms of scoliosis in adults: idiopathic scoliosis (AdIS) and degenerative scoliosis (ADS). AdIS is defined as a continuation of adolescent idiopathic scoliosis while ADS develops into adulthood due to the cascade of progressive degenerative changes [2].

ADS has a similar gender distribution and begins in most cases around the age of 50. Scoliosis occurs primarily at the lumbar level with distal ractional curves, occasional compensatory thoracic curves and, in most cases, limited rotation at the tip of the deformity.

Lateral subluxation is common and concomitant spondylolisthesis may be present. Cobb angles are usually below 40 ° in ADS, compared to measurements of> 50 ° as commonly seen in AdIS [3].
Idiopathic scoliosis occurs in approximately 80% of all pediatric patients with spinal deformity. Depending on the age of onset, it can be classified into childhood scoliosis (<3 years), juvenile scoliosis (4 to 9 years) and adolescent scoliosis (10 to 18 years). Other types of scoliosis that can be found in children are: neuromuscular scoliosis, congenital scoliosis, syndromic scoliosis and scoliosis associated with congenital heart disease or intraspinal abnormalities [4].
Congenital scoliosis (SC) can be defined as a lateral curvature of the spine due, in most cases, to malformations of the spine, its incidence being 0.5–1 / 1,000 at birth worldwide. Vertebral segmentation is a process that takes place between 20 and 35 days from conception in human embryonic development during this period forming somatic precursors of the ribs, striated muscles and the dermis of the back. This process is called somitoge nesis. Disruptive somitogenesis contributes to congenital vertebral malformations leading to CS. CS is known to be a heterogeneous disorder ranging from nonsyndromic CS to possible syndrome, which can lead to various major comorbidities [5].
Over the years, various therapeutic approaches have been used to treat patients with scoliosis, with an emphasis on adolescent idiopathic scoliosis, which includes the use of orthoses, exercise, water exercises [6-8], yoga, acupuncture and surgery. The degree of effectiveness of therapeutic methods depends on the severity of the curve, the age of the subject and the type of curve. Unfortunately, most treatment approaches vary from region to region and may depend on your doctor's preferences and experience [9].

Matherial and Methods

The ISI-Thomson Web Of Science International Virtual Library was accessed for this review. The search criteria selected were 'title', 'abstract' and 'keywords'.
In the ISI Thomson Web of Science virtual library platforms, the keywords in the articles search were "scoliosis incidence" and "scoliosis treatment".
In order to reproduce a quality narrative review, we wanted to use one of the most prestigious virtual libraries, where the selection criteria, the quality of the reviewers, the quality of the information, etc. are higher compared to other virtual libraries.
In order to carry out the review, only articles were selected that had as research direction the study of the incidence of scoliosis but also those that treated the treatment methods of this pathology.

Results and Discussion

Kostuik J.P. wrote an article in 1981 in which he pointed out that until then there were no data to confirm the incidence of scoliosis in adults and no association with back pain. To study the cause of lumbar pain associated with scoliosis in adults, a study of 5,000 intravenous pyelograms was performed. The incidence of lumbar and thoracolumbar curves was 2.9%, 159 of the 189 patients diagnosed with scoliosis were contacted. The percentage of back pain was 59%. Analyzing the intensity of the pain, 44% of patients reported mild pain, 49% reported moderate pain and only 7% of patients reported severe pain. It was also found that as the degree of curvature is directly proportional to the degree of pain. Patients with mild back pain showed smaller curves. [10].
Goldberg C.J. conducted a study in 2001 to investigate whether prosthetic policy centers have fewer patients undergoing prosthesis for adolescent idiopathic scoliosis than a center that does not have a prosthetic policy. The study included a total of 153 children, 11 boys and 142 girls, met the criteria. Forty-three of them (28.1%) underwent surgery. This has not been statistically altered by the rate of surgery reported at an orthosis center. If orthoses do not reduce the percentage of children with idiopathic scoliosis If orthoses do not reduce the proportion of children with idiopathic scoliosis and

reach adolescence they need surgery to correct deformities we can not say that the orthosis offers a significant benefit to patients and the community [11].

Qiu Y. studied the incidence and neurological risk factors for surgery designed to correct curves. 1373 cases were analyzed and it was concluded that: 1.89% represented the total percentage of cases with neurological deficiencies, of which 0.51% had mild deficiencies and 1.38% had severe deficiencies. Globally, neurological deficits amounted to the following values: 1.06% of patients with idiopathic scoliosis, 2.89% of patients with congenital scoliosis, 3.32% of patients with scoliosis, hyperkyphosis, and 1.38% of patients without hyperkyphosis. 3.69% of patients with a Cobb angle greater than 90 degrees and 1.45% of patients with a Coob angle less than 90. Analyzing the patients who underwent surgery, it was found that 1.68% of patients were underwent primary surgery and 5.97% of patients underwent revision surgery, the difference between these being a significant one. Analyzing adolescent patients with idiopathic scoliosis, it was found that 3.85% underwent combined procedures, 0.64% later procedures, while 0.82% underwent primary surgery. 8.33% of patients underwent revision surgery. Hyperkyphosis was observed in 4.17% of cases, while 0.61% of patients did not have hyperphyrosis. Regarding the incidence of patients diagnosed with congenital scoliosis, 7.23% of patients had Cobb angle values greater than 90, and 1.68% of patients had Cobb angle values less than 90 degrees [12].

In the study published in 2012, Saifi C. observed radiographs of the chest of 364 patients, 12 patients were analyzed (3.3%), namely six boys and six girls, who were diagnosed with congenital scoliosis confirmed by by radiological examination it was found that the incidence is much higher than the percentages reported in previous studies (0-1.4%). It was also found that 0.05-0.10% of the general population diagnosed with scoliosis requires surgery [13].

In 2013, Markus R. Konieczny conducted a study entitled Epidemiology of adolescent idiopathic scoliosis, emphasizing that adolescent idiopathic scoliosis is a common condition whose global prevalence is 0.47-5.2% [14].

Kalichman L. highlighted in his study that the most appropriate individualized treatment based on tests performed on each patient. It is also found that conservative treatment is more effective for patients diagnosed with AIS. The evidence for the effectiveness of specific exercise in AIS therapy is limited. If the physical tarapia is administered correctly it can prevent an intensification of the curvature. An important, noteworthy aspect is the effectiveness of physical exertion in improving respiratory function. Combining exercise with braces significantly increases the effectiveness of individual physical treatment. The author concluded that further well-designed, high-quality studies are needed to evaluate the effectiveness of conservative AIS therapy methods [15].

Zhu Z.Z. observed that the effectiveness of orthosis treatment decreases significantly when applied to patients with a magnitude of the curve between 40 and 50 degrees. Although most of these patients will inevitably undergo surgery, and therefore wearing a brace may not be the best alternative to surgery; there are patients who will stabilize with the orthosis device until the maturity of the skeleton, thus justifying this option for those patients who refuse surgery with curves between 40 and 50 degrees [16].

Mohamed E.A. tried an innovative approach, kinesio taping, for the treatment of various musculoskeletal disorders. The effects of this therapy are, in the first phase, to relieve pain or abnormal sensation that occurs on the skin or fascia, supports the muscles during movement, decongests the lymphatic fluid and edema in the fascia and joints. A study was performed that included 40 patients randomly divided into two groups. Group A underwent a treatment plan consisting of specific therapeutic exercises for scoliosis, while Group B underwent a treatment plan consisting of therapeutic exercises and kinesio taping. In order to measure the Cobb angle, the radiological examination was used, the intensity of the pain being evaluated before and at the end of the treat-

ment. There were significant reductions in Cobb angle and pain intensity at the end of the treatment for both groups. The intensity of the pain decreased significantly in group B. No significant differences were observed between the two groups when measuring the Cobb angle [17].

Piantoni L. also focused on the quality of life in 2018, highlighting that patients with idiopathic scoliosis of adolescents treated with orthoses reported a negative impact (53.5% overall) on the quality of life and satisfaction of treatment in terms of psychological aspects, motor, social and school environment [18].

Kuroki H noted in 2018 that in the past, numerous non-surgical treatments for adolescent idiopathic scoliosis (AIS) have been attempted, including exercise, physical therapy, electrical stimulation, and dental treatments, to delay or prevent the progression of the curve. Of these, dental treatment is the only widely accepted option that has been shown to be effective in altering the natural history of AIS [19].

In 2018 Karimi M.T. made a review of the literature trying to observe the conservative treatments applied in cases of scoliosis. Databases such as PubMed, ISI Web of knowledge, Google scholar, Ebsco, Embasco and Scopus were accessed for the study. The keywords used were: physical therapy, exercise, conservative treatment, orthosis. Following the research, 40 works were selected that addressed various conservative treatments used for patients with scoliosis. It has been noted that each paper addresses the use of different types of orthoses, some abortion studies and methods such as functional electrical stimulation and yoga exercises [1].

Aulisa A.G. concluded in a 2019 study that appropriate conservative treatment for patients with scoliotic curves who refuse surgery should be considered; the results will be better especially if the rotation is less than 20 and Risser is between 0-2 [20].

Karavidas N., outlines in an article published in 2019, the idea that the effectiveness of orthoses for idiopathic scoliosis in adolescents would not be real. Subsequently, well-documented studies have emerged and confirmed that orthoses can lead to decreased progression of scoliosis and delayed surgical treatment. There is no conclusive evidence to confirm the effectiveness of the straps used if the curvature exceeds 40 degrees. There is some evidence that in the case of thoracic curves and double curves over 30 degrees in the early stages, treatment based on the use of orthoses can be doomed to failure. It has also been shown that in the case of a curve with a high risk of progression, rigid orthoses are much more effective than soft orthoses for the night. Positive feedback in the case of orthosis treatment was observed in the case of its association with physiotherapeutic exercises specific to scoliosis [21].

Lotan S. emphasizes in a paper that conservative treatment remains controversial. The contribution of manual therapy techniques in the treatment of idiopathic scoliosis in adolescents has also been discussed, due to the benefits of observation in improving the quality of movements, in regulating muscle tone and in reducing pain [22].

In a study, Lang C.D. and collaborators wanted to identify the incidence of heart abnormalities in patients diagnosed with idiopathic scoliosis. 531 patients were analyzed between March 2009 and August 2017, concluding that the overall incidence of heart abnormalities amounted to 28.81% of the total number of patients with idiopathic scoliosis analyzed [23].

Parr A. spoke about the assessment and treatment of scoliosis, saying that the assessment of scoliosis should identify the structural curves, the underlying causes, the severity and the growth potential. Atypical curves and red flags should be excluded. The exclusion principles apply to patients with curves greater than 20 degrees, in patients with high growth potential (Risser 0-2) and for curves exceeding 40 degrees. Patients with a 20-40 degree curve can be successfully included in the study. surgery is indicated depending on the patient's antecedents, when the curve is> 40 degrees. Surgery can be divided into three groups: growth modulation, fusion-free instrumentation, and fu-

sion instrumentation. Early diagnosis and a thorough analysis of the status of the spine can improve outcomes [24].

Anari J.B. draws attention in 2020 to the wide range of approaches used to manage spinal deformity in children under the age of 10, which confirms the lack of consensus on the treatment of these extraordinarily complex and evolving conditions. In addition, Anari writes in the same article about the patient's deformity and the associated clinical problems that may involve the spine alone, the chest alone, or usually both. Additional challenges include bone quality, aberrant anatomy, impaired respiratory function and numerous medical comorbidities, all in the setting of a low body mass index and a thin envelope of soft tissue. This suggests a multidisciplinary approach that optimizes care by connecting experts to provide the child with a team-based approach to managing spinal deformity, growth, thoracic wall biomechanics, and pulmonary alveolar maturation [25].

Vollner F. stated in 2020 that idiopathic scoliosis is the largest group of all forms of scoliosis in the growth phase, accounting for 80-90%. A distinction is made between infantile (0-3 years), juvenile (4-10 years) and adolescent (> 10 years) idiopathic scoliosis, depending on the age at which the scoliosis appears [26].

In 2020, Vollner F. pointed out that idiopathic scoliosis is the most common form of scoliosis in the growth phase, accounting for 80-90% of all cases. Depending on the age of the patient, idiopathic scoliosis is classified into infantile (0-3 years), juvenile (4-10 years) and adolescent (> 10 years) idiopathic scoliosis [26].

The effectiveness of non-surgical treatments was evaluated in 2020 in the work of Schoutens C. It has been observed that in the case of symptomatic degenerative scoliosis in adults, the injectable treatment given in order to reduce the symptoms is ineffective. Evidence for orthoses and yoga was rated as of very low quality. No specific evidence has been identified for other treatments, including physical therapy and analgesics. Unfortunately, there are few data in the literature describing the efficacy of non-operative treatments in symptomatic degenerative adult scoliosis, the amount and quality of existing evidence of injections, braces and yoga being inconclusive to recommend the use of these methods [27].

Huang F.L. conducted a study in 2020 on high school students in Zhangshan City, Guangdong Province. In the study, the author included 41,258 students and lasted for a period of 2 years, from July 2015 to December 2017. Out of a total of 743 students diagnosed with scoliosis, with an incidence rate of 1.80%, it was found that 646 (86.9%) students were diagnosed with idiopathic scoliosis, 38 (5.1%) with congenital scoliosis and 59 (7.9%) with other types of scoliosis. He concluded that the incidence rate for scoliosis was 1.80% compared to healthy students [28].

J.W. Kwon published a study in 2021 in the journal Scientific Reports based on a 2010-2015 database, identifying a total of 1664 patients (aged 0-19 years) who were diagnosed with congenital scoliosis S. Overall average incidence rate congenital scoliosis in the period of 5 years was 3.08 per 100,000 people, with the highest and second highest rate at 0 years and 12-16 years, respectively. The stratified incidence rate by age ranged from 1.5 to 20.1 per 100,000 people among the normal age-appropriate population, with peaks at 0 years and the second increase in adolescence (12-16 years for men). ; 10-14 years for women). The average overall incidence rate of congenital scoliosis over a period of 5 years was 3.08 per 100,000 people. Only 5.5% of patients underwent surgery within 5 years of initial diagnosis [29].

Sgolastra M. highlighted in 2021 that when left untreated, idiopathic scoliosis could lead to disabilities resulting from back pain, cardiopulmonary dysfunction, exercise intolerance and psychosocial disorders, concluding that exercise is a crucial component of conservative treatment. to adolescent idiopathic scoliosis [30].

Fang M.Q. combined Schroth therapy with Chenau treatment on 192 patients with adolescent idiopathic scoliosis who underwent Cheneau treatment alone or in combination

with Schroth best practices (SBP) from June 2013 to October 2019. Conclusion of the study compared with single brushing, exercises Schroth plus bracing had a better effect on coronal balance. Schroth exercises improve the flat deformity caused by braces and positively influence the quality of life related to health in patients with adolescent idiopathic scoliosis who have been treated with Cheneau braces [31].

In 2021, Wang L. pointed out that manipulative spine therapy is commonly used in the treatment of adolescent idiopathic scoliosis. Some therapists also rely on scoliosis-specific physiotherapeutic exercises. The combination of these two modalities seems reasonable, but the effectiveness of this combination has never been rigorously tested [32].

Conclusions

The current social dynamics, with the new lifestyles imposed to be able to face the daily challenges, to become competitive, to integrate into the entourage, reshape, according to the laws of functional anatomy, the devices, structures and systems of the human body, especially those in rapid growth, such as those of children and adolescents. On the other hand, scientific evolution offers new ways of exploring the human body, which today we can see as previous generations of doctors would not have suspected possible, and we can discover structures or conditions that no one would have. imagined half a century ago.

Spinal diseases, although known since ancient times, remain, some of them, such as scoliosis, unresolved problems even today. This would not be a problem, but it is becoming one because the incidence of spinal disorders in children and adolescents, especially adolescents, is constantly increasing. The perspective on this issue changes a lot if we take into account the fact that these children are the adults of tomorrow, and the suffering and budget costs of social health insurance for the treatment of a sick, disabled generation, instead of a healthy, able-bodied generation. work and life, there are others.

Over the years, various therapeutic strategies have been addressed for patients with scoliosis. Correrrvative treatment consists of exercises and techniques designed to stop the progression of the curve, to improve lung function and to reduce back pain. Conservative treatment methods include the use of various orthoses, which not only help reduce the progression of scoliosis, but can also reduce it. Surgical treatment is indicated for severe cases in adolescents and adults when the deficit cannot be corrected through conservative treatment. In some cases, only surgical treatment can stop the effects such as worsening deformity, pain, respiratory failure and in isolated cases even paralysis.

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