

Prevalence and management of back pain in adolescent idiopathic scoliosis patients: A retrospective study

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J Théroux, S Le May, C Fortin, H Labelle. Prevalence and management of back pain in adolescent idiopathic scoliosis patients: A retrospective study. *Pain Res Manag* 2015;20(3):153-157.

BACKGROUND: Back pain (BP) has often been associated with adolescent idiopathic scoliosis (AIS), which is a three-dimensional deviation of the vertebral column. In adolescents, chronic pain appears to be a predictor of health care utilization and has a negative impact on physical, psychological and family well-being. In this population, BP tends to be persistent and may be a predictor of BP in adulthood.

OBJECTIVE: To document the prevalence and management of BP in AIS patients.

METHODS: A retrospective chart review of AIS patients who were referred to Sainte-Justine University Teaching Hospital (Montreal, Quebec) from 2006 to 2011 was conducted.

RESULTS: A total of 310 randomly selected charts were reviewed. Nearly one-half of the patients (47.3%) mentioned that they experienced BP, most commonly in the lumbar (19.7%) and thoracic regions (7.7%). The type of BP was documented in only 36% (n=112) of the charts. Pain intensity was specified in only 21% (n=65) of the charts. In approximately 80% (n=248) of the charts, no pain management treatment plan was documented.

CONCLUSIONS: The prevalence of BP was moderately high among the present sample of adolescents with AIS. An improved system for documenting BP assessment, type, treatment plan and treatment effectiveness would improve pain management for these patients.

Key Words: Adolescent idiopathic scoliosis; Back pain; Chronic pain; Pain management; Prevalence

Back pain in the adolescent population has generally been considered to be much less prevalent than in adults, and has often been associated with severe pathological conditions (eg, spondylolysis, spondylolisthesis, inflammatory diseases) requiring in-depth investigation (1-4). Fortunately, this condition has been widely studied over the past decade (5-14). The reported prevalence of back pain varies considerably (7% to 58%) and appears to be influenced by a number of factors such as age, sample size, the definition of low back pain used, recall period and data extraction strategies (15). A recent meta-analysis by Calvo-Munoz et al (16) investigating the prevalence of low back pain among children and adolescents reported a mean prevalence of nearly 40% in healthy adolescents. Studies have reported at least a 33% recurrence rate of episodic back pain in adolescents with back pain (7,10). Long-lasting back pain in children or adolescents appears to be a predictor of adult back pain (17-21). Unfortunately, back pain is experienced by most adults during their lifetime (22-24) and is the second most common reason that adults consult a primary care physician (23,25). Back pain in adolescents appears to be a predictor of increased health care utilization, and

La prévalence et la prise en charge des douleurs dorsales chez les adolescents ayant une scoliose idiopathique : une étude rétrospective

HISTORIQUE : Les douleurs dorsales (DD) s'associent souvent aux adolescents ayant une scoliose idiopathique (ASI), qui est une déviation tridimensionnelle de la colonne vertébrale. Chez les adolescents, la douleur chronique semble être prédictive de l'utilisation des soins de santé et nuit au bien-être physique, psychologique et familial. Au sein de cette population, la DD a tendance à être persistante et peut être prédictive de DD à l'âge adulte.

OBJECTIF : Attester la prévalence et la prise en charge de la DD chez les ASI.

MÉTHODOLOGIE : Les chercheurs ont réalisé une analyse des dossiers d'ASI orientés vers le Centre hospitalier universitaire Sainte-Justine entre 2006 et 2011.

RÉSULTATS : Les chercheurs ont analysé 300 dossiers sélectionnés au hasard. Près de la moitié des patients (47,3 %) indiquaient souffrir de DD, surtout dans les régions lombaire (19,7 %) et thoracique (7,7 %). Le type de DD n'était consigné que dans 36 % (n=112) des dossiers, et l'intensité de la douleur, dans 21 % (n=65) des dossiers. Dans environ 80 % (n=248) des dossiers, aucun plan de traitement de la douleur n'était consigné.

CONCLUSIONS : La prévalence de DD était modérément élevée dans le présent échantillon d'ASI. Un meilleur système pour consigner l'évaluation, le type, le plan de traitement et l'efficacité du traitement de la DD améliorerait la prise en charge de ces patients.

appears to have a negative impact on physical, psychological and family well-being (12,26,27).

Spinal asymmetry or scoliosis is a major risk factor for back pain in adolescents (14,28-31). The most common type of scoliosis in this population is adolescent idiopathic scoliosis (AIS) (32), which is defined by the Scoliosis Research Society (33) as a three-dimensional deviation of the spine of unknown origin associated with a Cobb angle >10° (34). The estimated prevalence of AIS is between 2% and 3% (35), and some studies have reported that back pain is twice as prevalent in AIS patients compared with nonscoliosis patients (29,36). Joncas et al (36) prospectively evaluated 239 AIS patients (mean age 14.4 years) presenting with double right thoracic-left lumbar scoliosis. More than one-half of their sample (54%) experienced back pain, most commonly in the lumbar region (30%) followed by the thoracic region (12%). The overall mean (\pm SD) pain intensity was 49.4 \pm 20 mm on a visual analogue scale ranging from zero to 100, which is considered to represent moderate-intensity pain. In contrast, Sato et al (29) conducted a large-scale cross-sectional epidemiological study in which all children in a defined area of Japan were asked to complete a take-home questionnaire

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TABLE 1
Scoliosis curve presentation (n=310)

	All (n=310)	Girls (n=278)	Boys (n=32)
Single curve (59.4%)			
Cervicothoracic	1 (0.32)	0 (0)	1 (3.1)
Thoracic	66 (21.3)	61 (21.9)	5 (15.6)
Thoracolumbar	98 (31.6)	87 (31.3)	11 (34.4)
Lumbar	19 (6.1)	15 (5.4)	4 (12.5)
Total		163 (58.6)	21 (65.6)
Double curve (36.4%)			
Thoracic-thoracolumbar	67 (21.6)	59 (21.2)	8 (25)
Thoracic-lumbar	46 (14.8)	43 (15.5)	3 (9.4)
Total		102 (36.7)	11 (34.4)
Triple curve (4.2%)	13 (4.2)	13 (4.7)	0 (0)
Total		13 (4.7)	0 (0)

Data presented as n (%)

TABLE 2
Narrated pain

	All (n=310)	Girls (n=278)	Boys (n=32)
Generalized back pain	57 (18.4)	51 (18.3)	6 (18.8)
Nonlimiting pain	64 (20.65)	61 (21.9)	3 (9.4)
Occasional pain	38 (12.3)	34 (12.2)	4 (12.5)
Limiting pain	12 (3.87)	11 (4.0)	1 (3.1)

Data presented as n (%)

regarding current and past back pain occurrences. All of the participants (n=43,630 students between nine and 15 years of age) were screened for scoliosis. The authors reported a 58.8% prevalence of back pain in scoliotic patients compared with 33% in nonscoliotic patients. This prevalence was similar to that reported by Joncas et al (36). When adjusted for sex and school grade, the scoliotic group had twice the prevalence of back pain (OR 2.10 [95% CI 1.18 to 3.72]; P=0.012), which lasted longer (36% versus 7.7%) and occurred more frequently (83.9% versus 60.1%) compared with the nonscoliotic group.

These findings on back pain in children and adolescents have recently led researchers to study different approaches for its prevention and treatment (37-39). Compared with adults (40-44), back pain management initiatives in children and adolescents have mainly focused on the effectiveness of exercises (45,46), back school (47,48) and spinal manipulation (47,49). A thorough review of the literature did not find any clinical guidelines regarding back pain management in adolescents. The implementation of clinical guidelines remains a challenge in day-to-day clinical practice (50,51). The treatments usually suggested for the management of back pain in adults are: short-term use of medication (acetaminophen) and spinal manipulation therapy; supervised exercises; cognitive-behavioural therapy; and a multidisciplinary approach that may consist of back school, workplace visits by an occupational therapist, etc (52-56). To date, no evidence-based recommendations for back pain treatments in children or adolescents with AIS have been published. The aim of the present retrospective study, therefore, was to document the prevalence and management of back pain in AIS patients.

METHODS

Patient charts were selected from the Centre hospitalier universitaire Sainte-Justine (Montreal, Quebec) orthopedic department Scoliosys® database. This database contains >4000 electronic charts of patients seen in the orthopedic department. From this database, 657 charts of patients with a diagnosis of AIS were randomly selected. These charts were then reviewed according to the inclusion criteria, which were: adolescents 10 to 17 years of age who had a diagnosis of idiopathic scoliosis between the years 2006 and 2011; and documentation of back pain, either directly from the attending physicians, a medical reference

TABLE 3
Pain management

	Girls	Boys
Medication	15 (5.4)	1 (3.1)
Physical therapy	38 (13.7)	4 (12.5)
Nonspecific exercises	3 (1.1)	0 (0)
Other	3 (1.1)	0 (0)
No management documented	219 (78.8)	27 (84.4)

Data presented as n (%)

(family physicians, pediatricians or physical therapists) or letters from parents. Exclusion criteria were: previous surgery (spinal fusion); and any pathological spinal anomalies, such as spondylolisthesis, that could be associated with back pain.

Data were collected regarding age, sex, menarche status, Cobb angle (the measure used to quantify the magnitude of spinal deformities), type of scoliosis (single or double curve) and scoliosis treatment recommendations (observation, brace or surgery). In addition, the charts were searched for pain-specific factors, including pain assessment, site, intensity, treatment and clinical efficacy of treatment, if documented.

Statistical analysis

Data were analyzed using descriptive statistics (frequency and distribution). Fisher's exact test was used to verify any association between back pain, type of scoliosis and Cobb angle.

RESULTS

Patient characteristics

A total of 310 patient charts met the inclusion criteria. The charts were mainly from female patients (89.7%). Mean (\pm SD) ages of girls and boys were 13.89 \pm 1.81 years and 14.47 \pm 1.46 years, respectively. Most girls (78.4%) had already reached menarche at the time of their first visit. Most patients had a Cobb angle <40° (84.2%). Overall, single curves were more prevalent (59.4%) than double, while the most prevalent areas of involvement were thoracic (21.3%) and thoracolumbar (31.6%) (Table 1). Among adolescents who presented with a double curve, the thoracic-thoracolumbar curve (21%) and the thoracic-lumbar curve (14.8%) were the most recorded patterns of presentation. Bracing was recommended for 22.3% of the patients, with a higher percentage among girls (23%).

Back pain

Nearly one-half of the patients (47.3%) had chart-documented back pain, either through a pain score or narrative, or reported by their family. The most painful area for both sexes was the lumbar region (22.6%). Table 2 shows the narratives used to describe back pain in the charts that were reviewed. Use of these narratives made it difficult to properly identify the site of pain. In fact, the association between the expression of pain and a specific spinal area was documented in <40% of the charts reviewed. Pain intensity was specified in only 21% of charts and was described as mild in 9.4% and moderate in 11%. Severe pain was documented in only 1% of the charts.

Whether there was a relationship between the site of back pain and the type of scoliosis was also investigated. A statistically significant association was found between thoracic pain and thoracic scoliosis (P=0.015). When there was documentation of thoracic scoliosis in the chart, there was an OR of 3.733 (95% CI 1.312 to 10.623) that the patient would complain of thoracic pain. Finally, there was no statistically significant difference between the intensity of pain and the severity of the Cobb angle.

Pain management

Table 3 lists the pain treatments according to sex. Pain management was documented in only 20% of charts. The main treatments identified for back pain management were analgesic or anti-inflammatory medication (5.2%), physical therapy (13.5%) and exercises (1%). No

information regarding the clinical efficacy of each of these treatments was found in the charts.

DISCUSSION

Our study demonstrates that back pain is prevalent in AIS patients and that its management is often suboptimal. When documented, back pain intensity was reported as mild or moderate, most commonly affecting the lumbar area. Narrative descriptions of the pain were often used in the charts that were reviewed.

Few studies have evaluated back pain in AIS patients (29,36,57-64). Among these, conflicting results regarding back pain prevalence were observed, and back pain management was not addressed. Furthermore, only two studies specifically investigated back pain and AIS (36,58) and they, too, failed to address pain management. A retrospective study by Ramirez et al (58) evaluated the charts of 2442 adolescent patients who were seen in a scoliosis clinic. The back pain prevalence was 32%. The authors concluded that this was similar to the rate observed in nonscoliotic adolescents. Furthermore, they did not investigate the relationship between the occurrence of pain and the type of curve. The wide age range in the Ramirez et al (58) study may explain the differences in prevalence observed between their study and the present study.

Joncas et al (36) prospectively evaluated 239 AIS patients presenting with double right thoracic-left lumbar scoliosis. More than one-half (54%) of their sample experienced back pain of moderate intensity, and the most commonly reported area of pain was the lumbar region. These results are similar to those of the present study.

Among the other studies that investigated the association between back pain and AIS, three focused on health-related quality of life issues; in these, back pain was estimated. Those studies assessed back pain prevalence in an adult population that had previously received a diagnosis of AIS (57,63,64) as adolescents. The other three studies evaluated back pain in adolescents who were surgical candidates, which usually implies a greater Cobb angle (59,61,62); however, these studies failed to address the issue of management. Sato et al (29) conducted a large-scale cross-sectional epidemiological study in which 43,630 students were screened for scoliosis. The authors reported a back pain prevalence of 58.8% in the scoliotic patients. In this group, back pain lasted longer and was associated with more frequent episodes. Although this prevalence is similar to that reported by Joncas (36), it is somewhat higher than that documented in the present study (47.3%). This difference may have occurred because Sato et al (29) did not report the curve severity in the scoliosis group and may, therefore, have included patients with a curvature of $<10^\circ$ and those requiring surgical intervention (higher Cobb angle).

Back pain management

Over the past decade, many clinical guidelines have been introduced to help physicians manage back pain (52,54-56,65,66). Those guidelines were eventually refined (66), and now the majority provide recommendations on the assessment and management of acute or chronic back pain (54,66). Nonetheless, the recommendations remain confusing regarding the implementation of the best pain management strategies, most likely because effective back pain treatment involves a multidisciplinary approach, which is lacking in most guidelines (66,67). The most common back pain management interventions are exercise therapy, multidisciplinary treatment (combined inpatient exercises, physical therapy, home exercises and usual care), combined physical and psychological interventions, short-term use of medication (acetaminophen, nonsteroidal anti-inflammatory drugs or opioid analgesics) and spinal manipulation (42,52,56,66,67). Furthermore, many guidelines now consider patients' expectations, beliefs and preferences (66). Unfortunately, the currently available guidelines were developed for adults (>18 years of age). Although pain management was not extensively recommended in the charts reviewed, the recommendations we did find were consistent with those suggested in the adult guidelines. A thorough review of the literature did not yield any specific guidelines or studies recommending guidelines for back pain management in adolescents. We believe that adult guidelines may not

be appropriately extrapolated to back pain management in adolescents and children. The studies published over the past decade mainly focused on the prevalence and risk factors for back pain rather than its management (1-3,5-9,11,13,14,16,20,21,28).

A recent meta-analysis of physical therapy for low back pain in nonscoliotic children and adolescents (68) concluded that a combination of therapeutic physical conditioning and manual therapy was the most effective approach for back pain in that population, though definitive conclusions were impossible due to the small number of studies (8) as well as control-group and other methodological limitations. Another systematic review (69) noted the absence of rigorous clinical trials investigating the efficacy of spinal manipulation for back pain management in children and adolescents.

Notably, since September 2012, the CHU Sainte Justine pediatric teaching hospital in Montreal, Quebec, has implemented a physical therapy referral program for AIS patients with concomitant back pain. This program has yet to be evaluated.

Strengths and limitations

Our study had several limitations. First, the data were obtained from only one pediatric hospital centre; thus, it is not possible to extrapolate our results to other hospitals treating adolescent scoliosis patients. Second, we collected data retrospectively; therefore, our results are limited by the several charts that had incomplete documentation. Third, it is possible that patients reported back pain that was not documented in the chart. If this was, in fact, the case, the back pain prevalence would be higher than we reported.

CONCLUSION

The results of the present study suggest that back pain is a condition experienced by many AIS patients and that pain management is suboptimal. Adolescent idiopathic scoliosis patients are often directly referred to a paediatric orthopaedic surgeon, who should routinely assess pain with a validated self-reported scale to record objectively the intensity and location of pain (70). When deemed necessary, functional measures should be used to assess progress, especially if pain management is recommended. These measures should be performed and documented by the attending physician managing the patient's pain as well as by other health professionals (nurses, physical therapist, chiropractor, etc). Scores and observations should be used to assess progress and treatment efficacy. Optimal back pain management is important, especially in children and adolescents, in whom the pain may be a precursor of adult back pain. Additional research regarding back pain management in this population is required. Future studies should look at back pain management with AIS patients in multiple diversified clinical centres to better understand its occurrence and management and suggest proper and personalized interventions.

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