Clinical Study

Quality of life in normal and idiopathic scoliosis adolescents before diagnosis: reference values and discriminative validity of the SRS-22. A cross-sectional study of 1,205 pupils

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Abstract

BACKGROUND CONTEXT: The Scoliosis Research Society 22 Questionnaire (SRS-22) has shown to worsen with increasing deformity in adolescents with idiopathic scoliosis (AIS). However, all the studies have been performed on patients who have already been diagnosed and in relatively small samples.

PURPOSE: The purposes of this study were to evaluate a large sample of consecutive patients before diagnosis to develop reference values and check the discriminative validity and correlation with deformity of the SRS-22.

STUDY DESIGN/SETTING: This is a cross-sectional study, with patients referred to a specialized outpatient scoliosis rehabilitation institute.

PATIENT SAMPLE: The recruited subjects were 1,205 consecutive adolescents, 75% females (13.7±1.9 years), before their first scoliosis evaluation. Five subgroups were 0°–10° Cobb (normal) and 11° to 20°, 21° to 30°, 31° to 40°, and greater than 40° (AIS).

OUTCOME MEASURES: The outcome measure is based on the SRS-22.

METHODS: The SRS-22 was used to examine the differences between the domains of the five subgroups and total scores, and it was correlated with Cobb degrees and curve location. We used one-way analysis of variance and Spearman rho test.

RESULTS: Apart from the self-image domain in both genders and all subgroups, all other scores were greater than 4 points with small standard deviations. Females showed significant differences among groups for all domains and total score (p<.05). In males, function, pain, and mental health did not show statistically significant differences among groups (p>.1). All differences found were less than the minimally clinically significant change (0.5 points). The correlations with the severity of deformity measures were very low (r_s<0.289).

CONCLUSIONS: According to our results, deformity is apparently not a real issue for AIS before diagnosis made, treatment planned, and/or specialists interfere with their everyday life. Scoliosis Research Society 22 Questionnaire demonstrated some discriminative validity between small and large curves, but the differences found were small. © 2015 Elsevier Inc. All rights reserved.

Keywords: Adolescent idiopathic scoliosis; SRS-22; Discriminative validity; Reference sample; Quality of Life; Disability

Introduction

Deformity in adolescents with idiopathic scoliosis (AIS) has been proved to have a negative effect on the quality of life and can lead to psychological issues [1–3]; in particular, the previous studies reported that AIS are more likely to develop difficulty in peer relations, low self-esteem, and depression [4,5].

Radiological findings, and on top of all Cobb degrees, are the most well-known and studied standard for evaluating the severity of AIS and the most important outcome in a vast majority of the studies on AIS [6,7]. However, as of today, a possible link between Cobb degrees and psychological well-being has not been clearly defined [8].

To assess psychological well-being in AIS, authors in the literature have proposed the use of different tests such as the Short-Form-36, the Bad Sobernheim Stress Questionnaire, and the Scoliosis Research Society 22 Questionnaire (SRS-22) [9,10]. Currently, the SRS-22 is considered to be the standard to measure psychological well-being and quality of life in AIS [11]. Many of its psychometric properties have been checked, such as internal consistency, score distribution, reproducibility, responsiveness, and concurrent validity [8,10–14].

The SRS-22 has been developed as an outcome instrument [15]. However, it has also been used to judge the quality of life of patients preoperatively or to compare group of patients (discriminative validity) [11,16–18]. In these cases, reference normality and/or pathologic values before treatment are required as an anchor to compare the actual results. Moreover, discriminative validity has been checked, but not in large populations, mainly in high-degree curves and usually in patients already diagnosed and/or treated; all these situations may interfere with the reported results.

The aim of the present study was first to evaluate a large sample of consecutive patients before diagnosis to develop reference values of the SRS-22. Second, our purpose was also to check the discriminative validity and correlation with deformity of the SRS-22.

Materials and methods

Study design

In the present cross-sectional study, we observed levels of quality of life reported in a large sample of adolescents admitted consecutively to their first evaluation visit for scoliosis.

Participants

Of a whole sample of 8,886 patients evaluated for spinal deformities from October 2005 to December 2012, the study enrolled 1,205 consecutive adolescents, all referred to a tertiary referral outpatient scoliosis rehabilitation institute for a first visit with a scoliosis clinician (Figure).

EVIDENCE & METHODS

Context

The SRS-22, frequently used to evaluate domains of physical and mental function in patients with adolescent idiopathic scoliosis (AIS), has yet to be evaluated on a large scale, particularly at baseline (eg, first presentation before a diagnosis of AIS is made). The authors performed a cross-sectional study among more than 1,200 adolescents referred for evaluation for AIS but prior to diagnosis. The aim of the study was to evaluate discriminative capacity of the SRS-22 and correlate scores with the extent of spinal deformity.

Contribution

This investigation concluded that the SRS-22 showed some degree of discriminative capacity between small and large AIS curves. Scoliosis deformity does not appear to be perceived as an issue for patients with AIS prior to a firm diagnosis and the development of a care plan.

Implications

This work highlights the need for clinical sensitivity in the setting of establishing a diagnosis of AIS in adolescent patients. As many individuals do not seem to perceive they have a ''clinical issue'' prior to the firm diagnosis, appreciation for and sensitivity to the impact that such a diagnosis and treatment plan (including the specter of surgery) may have on a young person's psyche are of paramount importance. As a cross-sectional study, this work is unable to address longitudinal changes in the SRS-22 that may transpire following diagnosis. In addition, this study's design creates the potential for selection as well as information bias. The ethno-cultural and demographic contexts unique to this investigation might also limit the possibility for clinical translation to other populations with AIS.

—The Editors

To be included in the study, the idiopathic scoliosis patients had to be of an adolescent age, be able to read and answer the questionnaire autonomously, and consent to participate in the research. The recruited subjects were adolescents (aged 10 years and more), had no history of AIS diagnosis or treatment, and did not suffer from any significant medical illness. After being informed of the confidentiality of the responses and giving informed consent, the patients were asked to complete the SRS-22 as part of their scoliosis consultation. The questionnaire was given to the patients while they were in the waiting room together with their parents, before proceeding to their first evaluation visit. General information regarding the medical history and sociodemographic characteristics (age, sex, and
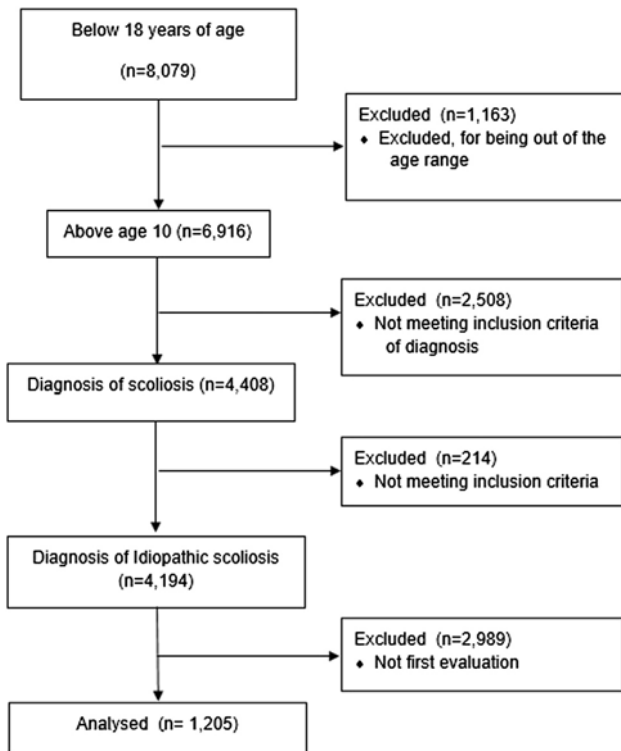
Figure. Flowchart of population selection.

presence of menarche and date) was collected, and Cobb angle degree was also determined. Using the Cobb method to measure the curve angle, the whole sample was divided into five subgroups: <10° Cobb (normal) and 11° to 20°, 21° to 30°, 31° to 40°, and greater than 40° (AIS). Considering the fact that in each group, the number of male and female participants was not balanced, the two genders were analyzed separately to control sex differences among groups.

Measurement instruments

The subjects were asked to fill in the validated Italian version of the SRS-22 [19], a self-administered instrument that contains 22 questions organized in 5 domains covering different aspects of the quality of life: function/activity, pain, self-image, mental health (5 items each), and satisfaction with treatment (2 items). In the present study, the patients did not answer the last two questions pertaining to

treatment satisfaction. The minimal clinical significant change was used to check the "strength" of the differences found among groups.

Statistical analyses

The data were analyzed using SPSS, version 20.0 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics regarding demographic data (age and gender), SRS-22 domains, and total scores of the five comparison groups were preliminarily calculated. Differences among the five groups' domain scores (function/activity, pain, self-image, and mental health) and total score were obtained by one-way analysis of variance. The analysis of variance was performed with Hochberg GT2 post hoc correction to prevent sample size effect. To control sex differences among groups, the two genders were analyzed separately. Last, Spearman rho (r_s) test was used to analyze the association between Cobb degree and SRS domains and total scores. The r_s values were interpreted according to the recommendations of Domholdt [20]. Statistical significance was achieved at p value of less than .05.

Results

The study enrolled 1,205 patients (mean±standard deviation of 13.7±1.9 years), 77% females (n=928) and 23% males (n=277) (Table 1). Apart from the self-image domain in both genders and all subgroups, all other scores were well greater than 4 points with small standard deviations. In the total population and in the female subgroup, statistically significant differences among groups for all the domains and the total score were found (all, p<.03) (Table 2). Regarding the male sample, function, pain, and mental health did not show statistically significant differences among the groups (all, p>.1) (Table 3). The value of differences between studied groups was never larger than 0.5, which is recommended as the minimum clinically important difference for SRS-22 domains, even if AIS patient with curves greater than 40° reported significant lower scores compared with normal. A negative significant but negligible correlation between the Cobb degree and all domains scores was found (all, r_s<0.289 and p<.001). We did not find any difference between groups stratified according to the curve localization (Table 4).

Table 1
Descriptive statistics of the study groups

Groups	Sex	Age (y)	Weight (kg)	Height (cm)	Risser	Cobb (°)
0°–10° (n=198)	130 F, 65.7%	13.0±1.8	48.6±16.6	158.1±15.9	1.1±1.5	6.9±3.4
11°–20° (n=413)	299 F, 72.4%	13.5±1.9	50.6±23.0	160.2±13.3	1.5±1.5	15.1±3.0
21°–30° (n=312)	265 F, 84.9%	13.9±1.8	50.5±11.7	160.8±10.5	1.7±1.5	25.0±2.7
31°–40° (n=158)	128 F, 81.0%	14.1±1.8	52.2±10.1	160.3±14.8	2.0±1.5	35.2±3.0
>40° (n=124)	106 F, 85.5%	14.2±1.9	54.1±16.0	159.2±12.5	2.1±1.5	51.8±11.8

F, females.

Table 2
Females

Groups	Function	Pain	Self-image	Mental health	Total
0°–10° (n=130)	4.4±0.3*	4.7±0.4*	3.8±0.5*,†	4.3±0.5†	4.3±0.3*,†
11°–20° (n=299)	4.4±0.7*,†	4.7±0.5*	3.8±0.5*,†	4.3±0.6†	4.3±0.4*,†
21°–30° (n=265)	4.4±0.4*	4.6±0.6	3.7±0.6†	4.3±0.6†	4.2±0.4†
31°–40° (n=128)	4.2±0.5	4.4±0.6	3.5±0.6	4.2±0.6†	4.1±0.5
>40° (n=106)	4.3±0.4	4.6±0.7	3.4±1.0	4.0±0.8	4.0±0.5

* Significant difference with 31° to 40° subgroup.
† Significant difference with >40° subgroup.

Discussion

This cross-sectional study examined the discriminative validity and correlation with Cobb angle of the SRS-22 in a large sample of consecutive neither treated nor diagnosed AIS.

Even if the SRS-22 questionnaire has been developed primarily as an outcome instrument [15], when it is used to check the quality of life of patients preoperatively and/or to compare group of patients (discriminative validity) [11,16–18], it is imperative to have reference normality and/or pathologic values before treatment as an anchor to compare the actual results.

This sample is highly representative of a general population of patients of a tertiary referral scoliosis clinic. In fact, they come from a general group of around 4,200 AIS. The participants completed the SRS-22 before their first clinical evaluation, without any treatment planning considered. This makes them highly selected and highly specific to constitute a reference group also for other studies in the same population. Moreover, they are fairly homogeneous, as the distribution of the anthropometric and demographic variables shows (Table 1).

The results demonstrated that the SRS-22 can have some discriminative validity between small and large curves as a whole and within the function, pain, self-image, and mental health domains, even if all results were well less than the minimal clinically significant change, recognized in 0.5 points. In this respect, Asher et al. [11] did not find any significant difference between 19 controls and 68 nonsurgical patients, whereas the 32 in the presurgical group had lower pain and self-image domains than the others and mental health domain versus controls. This study included patients who had already been treated and did not look specifically at subgroups according to the actual Cobb degrees, even if they found that the curve size (Cobb degrees) correlated with pain, self-image, and function. Parent et al. [21] evaluated 227 AIS females and found differences regarding pain (better for braced than presurgery subjects), self-image (better for observed and postsurgery than presurgery subjects), and satisfaction (better for braced and postsurgery than observation or presurgery subjects); all differences between subgroups were larger than 0.5 (minimal clinically important difference). They also analyzed patients according to curve severity and found that pain and mental health were worse for Cobb greater than 50° than with Cobb between 30° and 50°. Self-image and total scores were worse for those with Cobb greater than 50° than all the other subjects. Finally, Berliner et al. [8] evaluated 286 patients before treatment and divided them into 5 subgroups according to the Cobb angles (nonoperative 0° to 19° and 20° to 40° and preoperative 41° to 50°, 51° to 60°, and greater than 60°). They found significant differences for pain, self-image, and the total score; patients less than 40° demonstrated significantly less pain and better self-image.

The findings of our study are in agreement with the studies of Berliner et al. [8] and Parent et al. [22] that found evidence of the SRS-22 predictive validity with all domains. Nevertheless, because the difference is less than the minimal clinically significant change of 0.5, the clinical meaning of these differences can be questioned.

The most important difference of our study with the previous ones is the data collection, that was performed before the diagnosis was made by an expert physician and the treatment was planned. Obviously, all patients come from pediatricians and/or other professionals with a suspected

Table 3
Males

Groups	Function	Pain	Self-image	Mental health	Total
0°–10° (n=68)	4.3±0.5	4.7±0.5	3.7±0.6*	4.3±0.6	4.2±0.4*
11°–20° (n=114)	4.5±0.7*	4.7±0.5	3.6±0.6*	4.3±0.5	4.3±0.3*
21°–30° (n=47)	4.3±0.4	4.6±0.7	3.6±0.5	4.2±0.7	4.2±0.4
31°–40° (n=30)	4.2±0.6	4.6±0.4	3.4±0.5	4.1±0.8	4.0±0.5
>40° (n=18)	4.0±0.5	4.3±0.5	3.2±0.6	4.1±0.6	3.9±0.4

* Significant difference with >40° subgroup.

Table 4
Results stratified according to the curve topographical classification

Groups	Function	Pain	Self-image	Mental health	Total
Double/triple curves (n=586)	4.4±0.4	4.6±0.6	3.6±0.7	4.3±0.6	4.2±0.4
Single curve, thoracic (n=153)	4.3±0.4	4.5±0.6	3.7±0.6	4.2±0.7	4.2±0.4
Single curve, thoracolumbar (n=172)	4.4±0.8	4.6±0.4	3.6±0.5	4.3±0.6	4.2±0.3
Single curve, lumbar (n=96)	4.4±0.7	4.7±0.5	3.4±0.6	4.3±0.6	4.2±0.3

pathology, but diagnosis had not yet been confirmed. Moreover, treatment had been neither planned nor proposed, and this excludes the impact of specialists and treatment in the answers of patients. Another important difference is the wide population and the range of curves included, mainly in the conservative subgroups.

Before diagnosis, significant differences between groups were found, but with low correlations between deformity and SRS-22 domains. In this study, the correlations with the severity of deformity measures have been shown to be very low (-0.046 and -0.254) in AIS. The SRS-22 showed a lower discriminative validity to study AIS populations than that previously found. This result could be explained either by the large sample studied or by the absence of first diagnosis in our population. Also Parent et al. [22] found that the correlations between quality of life and deformity measures were low. The high scores showed that at the first visit, no domain appeared really compromised, with a ceiling effect. This result could be explained by the absent diagnosis, treatment plan, and/or expert physician interference. Before diagnosis, self-image also appears to be compromised in normal, whereas pain is also not a real issue in curves greater than 40°. To monitor potential variations in the scores, a longitudinal study should be designed.

Because these data could serve as a reference for other studies, we split the results according to the gender. Females had the same results as in the entire group, but it must be noted that they were 77% of the entire sample. The male subgroup was relatively underrepresented, and the absent results could even be because of statistical reasons and low sensibility. In any case, the number of males included (n=277) was higher than the biggest population studied until now.

In conclusion, even if there is some discriminative validity of SRS-22 between small and large curves, according to our data, it seems that scoliosis deformity is apparently not a real issue for patients before diagnosis is made, treatment is planned, and/or expert physicians interfere with everyday life of adolescents.

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