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Original article

Relation between self-image score of SRS-22 with deformity measures in female adolescent idiopathic scoliosis patients



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ABSTRACT

Background: Adolescent idiopathic scoliosis (AIS) is a pathology which affects the individual's functioning in the widely understood physical, psychic, and social aspects. More attention should be paid to patients' perception of self-image when evaluating the spine deformity. The present retrospective study evaluated the associations between the deformity measures and self-image score as determined by the SRS-22 questionnaire in Chinese female AIS patients.

Hypothesis: The self-image score correlates significantly with deformity measures. The location of main curve apex and the number of curve could affect the self-image score.

Materials and methods: We retrospectively reviewed the records of 202 female patients, collected data on patient's age, body mass index, radiographic and physical measures and self-image score of SRS-22 questionnaire. According to the location of main curve apex and the number of curve, the patients were divided to different subgroups. Correlations between deformity measures and self-image score of different groups were evaluated by the Spearman correlation test.

Results: The self-image score correlated negatively with the main Cobb angle, apical vertebral translation (AVT), and razor hump height. There is no significant difference of self-image score between thoracic curve (TC) and thoracolumbar curve (TL/LC) subgroups. And the self-image scores of one-curve, two-curve and three-curve subgroups are similar.

Discussion: For Chinese female AIS patients in our study, self-image was found to correlate negatively with the main Cobb angle, AVT and razor hump height. And the location of scoliosis apex and the number of curve are not influencing factors of self-image perception.

Level of evidence: Level IV, retrospective study.

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1. Introduction

Adolescent idiopathic scoliosis (AIS) is a pathology which affects the individual's functioning in the widely understood physical, psychic, and social aspects. It has been widely recognized that more attention should be paid to the Health Related Quality of Life (HRQOL) in patients with scoliosis when evaluating the spine deformity [1,2].

The Scoliosis Research Society-22 (SRS-22) questionnaire is a widely accepted questionnaire used to assess the HRQOL for scoliosis patients. Self-image is a conceptual image, a part of the self-concept, and it involves attitudes, experiences pertaining to the body, abilities, and issues of physical power as well as notions about masculinity and femininity [3]. Organic diseases that affect

the body structure can alter the self-image and reactions to such alterations are influenced by patterns of development as well as by family and cultural attitudes. Research has demonstrated that body disfigurement, which can be seen in AIS, can have a consistent negative effect on the development of an individual's body image. This, in turn, can additionally result in decreased self-esteem and social confidence along with increased anxiety, depression and stress [4].

Physical deformities of AIS often include rib and scapular prominences, asymmetry in shoulder height, chest wall deformity, and shifts of the trunk and trunk deformity [5]. Thus, one of the most important goals of surgery is to improve physical appearance and prevent future deformity. From the patients' and parents' perspectives, feelings about appearance may play a considerable role in determining their willingness to undergo surgery.

The purpose of our current study was to further investigate the relationship between radiographic or physical parameters and patient-reported self-image outcome as determined by their responses to the SRS-22 questionnaire among the Chinese females

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with AIS. Furthermore, we hypothesized that the location of scoliosis apex and the number of curve could affect the self-image score.

2. Materials and methods

2.1. Patients

This is a retrospective study of patients from a single-center. We included data from the Chinese patients who first visited our orthopedic center and completed the SRS-22 self-administered questionnaire from May 2010 through December 2012. A total of 202 cases met our inclusion criteria: female, 10 to 18 years old with the AIS diagnosis. The following exclusion criteria were applied: male, combined with sagittal kyphosis or lordosis deformity, history of trauma or corrective surgery, having incomplete clinical and radiographic and SRS-22 questionnaire data. Ethical approval was provided by the local health ethics review board.

2.2. Assessment

All had full spine standing posterior–anterior preoperative spine deformity radiographs. The Cobb angles of all the curves, Risser sign, apical vertebral rotation (AVR), apical vertebral translation (AVT), shoulder height of right–left difference and trunk shift were measured and recorded from the preoperative radiographs. Physical measure of razor hump height, as well as height and weight were collected.

All the radiographic and physical parameters were measured according to the guideline of Scoliosis Research Society (SRS) Terminology Committee and Working Group [6]. Apical vertebral rotation is defined as the rotation degree of apical vertebra and is assessed using the method of Nash and Moe, which is used frequently in clinical practice as an easy and accessible estimate of vertebral rotation. Trunk shift measures the lateral horizontal distance of the C-7 midpoint from the central sacral line in the coronal plane of the X-ray. Shoulder height difference measures the height difference between the horizontal lines that pass through the highest point of each clavicle on the posterior–anterior X-ray. BMI (kg/m^2) was calculated as weight divided by the square of the height in meters.

According to the apex of main curve, we divided the patients into two subgroups: thoracic curve group (TC, apex: T2–T11/12) and thoracolumbar/lumbar curve group (TL/LC, apex: T12–L4). Differences of the deformity measures and self-image score of SRS-22 between the two groups and the correlation analyses between deformity measures with self-image score of each group were calculated.

Then, according to the number of scoliosis curve, we divided all the cases to three subgroups: one-curve group, two-curve group

and three-curve group. The differences of all the parameters among all the three groups were also evaluated.

The SRS-22 disease-specific HRQOL questionnaire is self-administered in 2 to 3 minutes. In this study, only the score of self-image domain was analyzed. The domain of self-image contains 5 questions and the score calculation was done as reported by Asher et al. [7].

2.3. Statistics

Means and standard deviations were calculated for age, body mass index (BMI), all radiographic and physical measures and for the self-image domain score of SRS-22 questionnaire. Differences of parameters between TC and TL/LC group were determined by the Independent-Sample Test. Differences of parameters among one-curve, two-curve and three-curve group were determined by the Anova analysis. The Spearman correlation coefficient was calculated to identify associations between the deformity measures and the self-image domain score of SRS-22 questionnaire. $P \leq 0.05$ was considered as statistically significant. Statistical measures were performed using Statistical Package for Social Science (SPSS, 19.0).

3. Results

3.1. All the cases

Means and standard deviations of age, BMI, radiographic and physical deformity measures, and self-image score of SRS-22 questionnaire are reported in Table 1. For all the 202 patients, a significant negative correlation, as indicated by Spearman correlation coefficient, was found between the self-image domain score of SRS-22 questionnaire and the main Cobb angle ($\rho = -0.395$, $P < 0.001$), AVT ($\rho = -0.290$, $P < 0.001$), and razor hump height ($\rho = -0.277$, $P = 0.034$). Other measures, including Risser sign, AVR, trunk shift and shoulder height difference were not significantly correlated with the self-image score.

The correlation analyses were also done between various radiographic and physical measures of all the AIS patients in the study. Only the razor hump height correlated significantly with the main Cobb angle ($\rho = 0.378$, $P < 0.001$) and AVT ($\rho = 0.337$, $P < 0.001$). Among the radiographic measures, the significant positive correlations were only found between the main Cobb angle and AVR ($\rho = 0.217$, $P = 0.001$), and between the main Cobb angle and AVT ($\rho = 0.472$, $P < 0.001$).

Then, the correlations of the age and BMI with self-image score were also analyzed. No significant correlation was observed between the age and self-image ($\rho = 0.046$, $P = 0.513$), BMI and self-image ($\rho = -0.06$, $P = 0.936$) in the study.

3.2. TC group versus TL/LC group

The description of patients' data of both TC and TL/LC subgroups are presented in Table 1. There were 123 TC and 79 TL/LC. Through

Table 1
Subject's description of all the cases and TC and TL/LC subgroups.

	All the cases (n = 202)	TC group (n = 123)	TL/LC group (n = 79)
Age (year)	14.18 ± 1.42	14.14 ± 1.72	14.24 ± 1.63
BMI (kg/m^2)	18.42 ± 2.44	18.38 ± 2.14	18.52 ± 2.52
Deformity measures			
Main Cobb angle (°)	45.32 ± 7.68	45.15 ± 7.99	44.58 ± 7.21
Risser sign (degree)	3.21 ± 1.27	3.28 ± 1.22	3.10 ± 1.32
AVR (degree)	1.76 ± 0.47	1.80 ± 0.40	1.70 ± 0.56
AVT (cm)	3.16 ± 1.53	2.98 ± 1.53	3.40 ± 1.50
Trunk shift (cm)	1.58 ± 0.96	1.40 ± 1.05	1.65 ± 0.94
Shoulder height difference (cm)	1.56 ± 0.77	1.30 ± 0.48	1.73 ± 0.91
Razor hump height (cm)	2.21 ± 0.95	2.03 ± 0.67	2.34 ± 0.84
Self-image score of SRS-22	3.08 ± 0.52	3.12 ± 0.51	3.04 ± 0.54

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