



## TO STUDY CLINICAL UPDATE OF ADOLESCENT IDIOPATHIC SCOLIOSIS IN TERTIARY CARE HOSPITAL IN SOUTHINDIA

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### ABSTRACT

The prevalence of scoliosis, a lateral spinal deformity, rises with advancing age and spinal disc degeneration. The spine in humans performs numerous structural and physiological functions. Integrating the brain and nervous system with the axial skeleton and safe guarding the spinal cord are two crucial roles that the spinal column plays in all animals. The current study's objective was to provide a clinical update on idiopathic scoliosis in adolescents. Individuals with idiopathic scoliosis who were formerly currently treated at Sri Lakshmi Narayana institute of medical sciences in Pondicherry were invited to participate in this study. In total, 269 individuals with Idiopathic Scoliosis with a mean age (standard deviation) of  $16.5 \pm 2.1$  years met the inclusion criteria were included in this ongoing study which had the primary purpose to study genetics of idiopathic scoliosis. Of the individuals with Idiopathic Scoliosis, 129 individuals were untreated, 59 individuals had ongoing brace treatment, 35 individuals had previously been braced and 46 individuals were surgically treated. The scoliosis group had significantly lower scores compared with the individuals without scoliosis in the SRS-22r subscore ( $p < 0.001$ ) as well as in the separate domains of function ( $p = 0.009$ ), pain ( $p < 0.001$ ) and self-image ( $p < 0.001$ ). The EQ-5D index showed similar findings with the individuals with Idiopathic Scoliosis scoring significantly lower ( $p = 0.034$ ) compared to the healthy controls. Adolescents with idiopathic scoliosis are more likely to be satisfied with management.

**Key Words:** Adolescent idiopathic scoliosis, lumbar spondylosis, Health-related quality of life, Patient-reported outcome measures, Function Pain, Self-image.

### INTRODUCTION

The prevalence of scoliosis, a lateral spinal deformity, rises with advancing age and spinal disc degeneration. A three-dimensional torsional distortion of the spine that affects otherwise healthy people and is frequently found during periods of rapid growth is known as idiopathic scoliosis. [1] The spine in humans performs numerous structural and physiological functions. Integrating the brain and nervous system with the axial skeleton and safe guarding the spinal cord are two crucial roles that the spinal column plays in all animals. In addition to tumors and fractures, lumbar spondylosis,

stenosis, and segmental instability or deformity are prevalent diseases of the adult spine. Understanding comprehending health and disability has undergone a paradigm shift over the past few decades, with an increased focus on health-related quality of life (HRQoL) metrics and comprehending disability with regard to functioning after health changes.

The most prevalent paediatric musculoskeletal condition in children under the age of 18 is adolescent idiopathic scoliosis (AIS), which affects more than 29 million kids globally. Progressive, untreated AIS is

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linked to later life deformity, discomfort, and restrictive lung disease. Right-sided thoracic abnormalities are common for unknown reasons, however, curve patterns can vary. [2] The danger of significant deformity is greatest in children whose scoliosis worsens before the peak of growth velocity, but after skeletal maturity, the risk of "curve progression" dramatically declines. [3] It is possible to be prescribed orthotics, such as a back brace, to assist manage development until skeletal maturity rather than necessarily repair an existing abnormality. [4].

Bracing is said to have "failed" if, as determined by the iliac crest or hand X-rays, the curvature progresses to around 50 degrees before the closure of the growth plates. Surgery is the recommended course of action in this situation in order to reduce the deformity, fuse the affected vertebral bodies to stop further advancement, and provide balance of the head, shoulders, and trunk over the pelvis. Typically, during surgery, metal instruments are implanted to give the forces necessary to straighten and derotate the deformity. The current study's objective was to provide a clinical update on idiopathic scoliosis in adolescents.

## MATERIAL AND METHODS

Individuals with idiopathic scoliosis who were formerly currently treated at Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry were invited to participate in this study. Individuals were included if they had a diagnosis of Idiopathic Scoliosis on standing radiographs with a curve in the frontal plane of at least 10 degrees, measured according to the methods described by Cobb<sup>6</sup>, were between 12 and 18 years of age and were able to understand the language.

Individuals were excluded if they had signs or symptoms associated with scoliosis of non-idiopathic origin. In total, 269 individuals with Idiopathic Scoliosis with a mean age (standard deviation) of 16.5 ± 2.1 years met the inclusion criteria were included in this ongoing study which had the primary purpose to study genetics of idiopathic scoliosis.

Of the individuals with Idiopathic Scoliosis, 129 individuals were untreated, 59 individuals had ongoing brace treatment, 35 individuals had previously been braced and 46 individuals were surgically treated. The untreated patient group comprised of individuals who had not reached the Cobb threshold of 25° indicated for brace treatment, individuals who had reached skeletal maturity, those who had declined brace treatment, as well as individuals who were being planned for surgery.

The ongoing brace group had been undergoing treatment for a mean time of 1.6 ± 1.9 years and the previously braced group had, on average, ceased wearing the brace 1.8 ± 1.6 years previously. Bracing was recommended to adolescents with curves ranging from 25 to 40 degrees, where further skeletal growth was expected, as suggested by the Scoliosis Research Society.<sup>7</sup>

A full-time rigid thoracosacral (TLSO) orthosis was utilised by 39(30.2%) individuals in the ongoing brace group, and 56(43.4%) individuals in the previously braced group. Hyperextension night-time brace was utilised by 29(22.4%) individuals in the ongoing brace group and 5 individuals in the previously braced group (12.8%). Individuals wearing a full-time brace were encouraged to wear the brace for 20 h a day and for those with a night-time brace 8–10 h. Surgical treatment was recommended in larger curves (usually 45° or above), if progression was expected. Time after surgery for this group of 46 individuals was a mean of 1.4 ± 1.4 years.

## Radiography

Curve size was assessed in line with the Cobb measurement approach and turned into received from the radiograph available from the maximum recent medical comply with-up appointment previous to the date of questionnaire completion. Nine Cobb angles suggest (min–max) were for the subgroups as follows: untreated 30 (eleven–78) tiers, ongoing brace institution 34 (21–fifty seven) degrees, formerly braced organization 35 (25–50) degrees, and for the surgically handled group 24 (five–forty four) degree.

## Statistical analysis

Data are presented as the mean, standard deviation and range or number and percentage. The Chi<sup>2</sup> test was used for categorical data. Mann–Whitney *U* test and analysis of covariance (ANCOVA) were used for continuous data, with adjustments for age, sex, and exercise participation. Descriptive and demographic statistics between the four different scoliosis treatment groups were completed with analysis of variance (ANOVA) with post hoc analysis using Tamhanes test for BMI and curve size as equal variances could not be assumed according to Levenes test. Statistical analysis between these four groups was completed with ANCOVA with adjustments for age, sex, and body mass index (BMI).

For comparisons based on curve severity, individuals with ongoing or previous brace treatment as well as untreated individuals were stratified according to Cobb angles ( $\leq 30^\circ$  or  $> 30^\circ$ ) as well as larger angles ( $< 45^\circ$  or  $\geq 45^\circ$ ). Surgically treated individuals were stratified according to lowest fusion level (L2 as most caudal vertebra or below). Statistical analyses were performed with ANOVA. All analyses were performed using the Statistical Package for the Social Sciences (SPSS) statistical software for Windows (SPSS V26, IBM Corporation, New York, NY, USA).

## RESULTS

The idiopathic scoliosis individuals were significantly older, contained a larger proportion of females and were less likely to be currently participating in

exercise or sports compared to the healthy control group ( $p < 0.001$   $p = 0.024$  and  $p = 0.016$ , respectively).

**Table 1: Descriptive statistics for the scoliosis and healthy control groups**

	Idiopathic scoliosis Patients(269)	Healthy controls (N = 20)	P-value
Age	16.5 ±2.1years	15.0±2.2	<0.001
Male	256	56	0.024
BMI	17.8±3.2	17.9±3.2	0.59
Participating in exercise/sports	159	15	0.016
Curve size	32±11.3(11-78)	NA	

**Table 2: HRQoL comparisons between scoliosis and healthy controls**

	Idiopathic scoliosis Patients(269)	Healthy controls (N = 20)	P-value
SRS-22rfunction	4.65 ±0.49	4.56 ±0.32	0.009
SRS-22rpain	4.15±0.78	4.51±0.30	<0.001
SRS-22r self image	3.70±0.81	4.92±0.40	<0.001
SRS-22r mental health	3.77±0.74	4.23±0.65	0.053
SRS- subscore	4.15±0.56	4.67±0.22	<0.001
EQ-5D	0.96±0.08	0.97±0.05	0.034

The scoliosis group had significantly lower scores compared with the individuals without scoliosis in the SRS-22r subscore ( $p < 0.001$ ) as well as in the separate domains of function ( $p = 0.009$ ), pain ( $p < 0.001$ ) and self-

image ( $p < 0.001$ ). The EQ-5D index showed similar findings with the individuals with Idiopathic Scoliosis scoring significantly lower ( $p = 0.034$ ) compared to the healthy controls.

**Table 3: Descriptive statistics for scoliosis treatment groups**

	Untreated (N=129)	Ongoing brace treatment(N=59)	Previous brace treatment(N=35)	Surgically treated(N=46)	P-value
<b>Males</b>	75(58.1%)	50(84.7%)	32	46	0.005
<b>Age</b>	16.2±2.0	12.2±1.3	12.8±1.7	17.1±3.0	<0.001
<b>Weight</b>	66.4±9.7	41.9±9.0	48.2±12.6	57.6±13.6	<0.001
<b>Height</b>	168.7±9.8	165.5±9.3	160.0±6.1	180.0±8.6	0.10
<b>BMI</b>	20.1±3.6	15.5±3.8	20.2±3.2	19±3.0	0.012
<b>Curve size</b>	32.0±15.6(11-78)	23.5±4.8(21-57)	33.2±7.5	23.5±7.2	<0.001
<b>Age at surgery</b>	NA	NA	NA	12.3±1.6	
<b>Time after surgery</b>	NA	NA	NA	1.7±1.7	
<b>Time after brace start</b>	NA	1.3±1.6	NA	NA	
<b>Time after brace cessation</b>	NA	NA	1.6±1.3	NA	
<b>Brace duration start to finish</b>	NA	NA	2.0±1.1	NA	

Significant differences were detected between the groups with regard to proportion of females, age, BMI and curve size ( $p = 0.005$ ,  $p < 0.001$ ,  $p = 0.012$  and  $p < 0.001$ , respectively).

**DISCUSSION:**

In the present study SRS-23 scores within the self-image and pain domain, which is similar to Mariconda et al. results to detected reduced HRQoL pre-operatively in a cohort of adolescents with idiopathic

scoliosis ( $n = 87$ ) compared to age and sex matched healthy controls in physical domains of the SF-36 questionnaire as well as reduced. As estimated with the disease specific SRS-22r and the generic EQ-5D. The difference in the SRS-22r was mainly driven by the separate domains of function, pain and self-image, the mental health domain did not differ between the groups.

No differences were found between the scoliosis subgroups in terms of HRQoL, as shown by the EQ-5D or the SRS-22r subscore. Similar to other research, the

surgically treated group in the various SRS-22r categories exhibited lower function and pain levels compared to the continued brace group as well as lower function scores compared to the untreated group. However, these studies also found that patients who underwent surgery had higher self-image scores than those who underwent conservative treatment. Better self-image scores were only seen in surgically treated persons without prior brace treatment in the study by Bunge et al. [11] which may partially explain the discrepancy since the surgical group in the current study also included 24 previously treated individuals (28%).

In this study, persons who underwent surgery had worse function ratings, a lower SRS-22r subscore, and a lower self-image than their peers who underwent conservative treatment. This would imply that diminished function in those who have undergone surgery as opposed to those who have undergone conservative treatment is not only transient but also persists throughout adulthood. In Diarbakerli's study, those with a higher degree of caudal fusion also had lower EQ-5D scores, SRS-22r subscores, and pain and function subdomain scores.

Our findings demonstrate that, in contrast to both brace groups, the surgical group was more happy with their therapy despite a decrease in function and an increase in discomfort. Because of the immediate improvement in curve size on the frontal radiograph after surgery and improvements in aesthetic appearance, this is consistent with the findings from Colak TK et al. [12] study. During a 4-year follow-up, a Burstrom K et al. [13] analysis found that surgically repaired scoliosis patients had worse function (measured by the SRS-24) than healthy controls, which is similar to our findings. However, the levels of

discomfort, self-image, and HRQoL in the surgically treated scoliosis patients were higher than in the untreated scoliosis patients and were on par with those of healthy controls.

In the current study, a lower SRS-22r subscore indicating a worse HRQoL was found in the group with wider curves. This is consistent with the findings of the study by Berliner et al., which found that teenagers (n = 286) with curves less than 40 degrees had higher overall SRS-22r scores as well as better results in the pain and self-image subdomains [14]. In this study, differences in HRQoL were mostly caused by differences in the SRS-22r domains function, pain, and self-image which is in keeping with previous research [15]

A big distinction turned into seen in the self-image area, that's supported by means of different research that have shown true correlations among self-image and medical and radiographic deformity. The present day have a look at confirmed differences in SRS-22r subscore when scoliosis people were stratified by using curve size at each 30 and 45 ranges.

#### CONCLUSION:

Differences within the EQ-5D have been, but, most effective detected with stratification above and below 45 tiers, indicating that this final results degree can be less touchy in detecting HRQoL adjustments within this population group. Adolescents with Idiopathic Scoliosis had a lower health-related quality of life compared to healthy controls as measured by both scoliosis specific and generic outcome measures. Adolescents with idiopathic scoliosis are more likely to be satisfied with management..

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