

# Evaluation of Quality of Life (QoL) of Patients with Adolescent Idiopathic Scoliosis (AIS) after Surgical Correction

**Mohamed A Abdelaziz, MD., Sherif H Ali, MD., Mohamed Y Elqazaz, MD., Hassan Alshatoury, MD., Ali Abou-Madawi, MD.**

*Department of Neurosurgery, Suez Canal University, Faculty of Medicine, Ismailia, Egypt.*

## ABSTRACT

**Background Data:** Adolescent Idiopathic Scoliosis (AIS) is a spinal deformity that may interfere with patients' quality of life. Many previous studies tried to assess the health-related quality of life (HRQoL) using the patient-reported outcome measures. The Arabic version of Scoliosis Research Society 22 (SRS-22r) questionnaire is known to be reliable and a valid tool to assess the quality of life in patients with AIS.

**Purpose:** To evaluate quality of life of patients with AIS after surgical correction using the Arabic version of Scoliosis Research Society 22 (SRS-22r) questionnaire.

**Study Design:** Prospective cohort study.

**Patients and Methods:** Between 2016 and 2018, twenty-five patients were surgically treated for AIS with Cobb's angle >45 degrees. All patients underwent posterior derotation and instrumented correction and fusion technique. In this study, we used the Arabic version of SRS-22 questionnaire to evaluate the clinical patient's outcome. Whole spine plain X-ray was utilized to assess the radiological outcome. All patients underwent postoperative follow-up for at least 6 months with the SRS-22r questionnaire conducted in the last visit.

**Results:** Twenty-five patients were recruited for this study including 22 females and 3 males with mean age of  $14.7 \pm 1.7$  (range, 11–18) years. Significant improvement was reported 6 months after surgical correction in the following radiological parameters: Cobb's angle of the primary curve from  $55.81 \pm 8.72$  to  $7.98 \pm 2.26$ ; pelvic incidence from  $62.24 \pm 7.33$  to  $57.96 \pm 6.14$ ; pelvic tilt from  $26.14 \pm 3.41$  to  $20.76 \pm 3.74$ ; lumbar lordosis from  $33.21 \pm 8.63$  to  $36.6 \pm 8.79$ . The scores of functional activity, pain, self-image/appearance, mental health, and satisfaction were  $4.31 \pm 0.28$ ,  $4.57 \pm 0.27$ ,  $4.85 \pm 0.31$ ,  $4.85 \pm 0.17$ , and  $4.96 \pm 0.21$ , respectively, at the last follow-up visit. The total SRS-22 score was  $4.45 \pm 0.16$ . Correlation between different domains of SRS-22 questionnaire after surgical correction shows that only function/activity score revealed a positive significant correlation with the mental health domain ( $r=0.417$ ) ( $P=0.038$ ).

**Conclusion:** The Arabic version of SRS-22 questionnaire was very useful in terms of measuring patients' perceptions. Self-image domain was showing the highest increase among all other domains. (2019ESJ195)

**Keywords:** Spinal deformity, Scoliosis, AIS, SRS-22 questionnaire

Address correspondence and reprint requests: Mohamed A Abdelaziz, MD.  
Department of Neurosurgery, Suez Canal University, Faculty of Medicine, Ismailia, Egypt.  
E-mail: peeps\_010@yahoo.com

Submitted: November 28<sup>th</sup>, 2019.  
Accepted: December 29<sup>th</sup>, 2019.  
Published: January, 2020.

The article does not contain information about medical device(s)/drug(s).  
No funds were received in support of this work.  
The authors report no conflict of interest.

## INTRODUCTION

Idiopathic scoliosis is a complex 3-dimensional deformity of the spine and the most common type of all spine deformities.<sup>7</sup> The most common type is the Adolescent idiopathic scoliosis (AIS). It is a lateral curve of the spine with Cobb's angle of at least 10 degrees in an otherwise healthy child. The prevalence of AIS is 0.47–5.2% of adolescent population and school children.<sup>27</sup> Almost 80% of idiopathic scoliosis affects healthy people during puberty.<sup>14,22,28</sup>

Progression of spinal curves may result in several marked body deformities, asymmetric shoulders and waist line that lead to pain, spinal degenerative changes, limitations of life style activities, damaged body image, and pulmonary insufficiency in severe cases.<sup>2,24,26</sup> Moreover, AIS may interfere with quality of patient's life. Quality of life is affected because of not only physical, but also mental and social deprivations, low self-perceived image, low self-esteem, and lack of confidence.<sup>20</sup>

The majority of studies on AIS have mainly focused on surgical techniques and their outcomes and the prevention of curve progression. But studies on the clinical recovery, psychosocial status, and management satisfaction are scantily available. Recently, many patterns of patient evaluation measurements were described and designed for the assessment of functional status and health-related quality of life (HRQoL).<sup>12</sup>

The Scoliosis Research Society (SRS) 22 questionnaire has 5 domains: function/activity, pain, mental health, self-image/appearance, and satisfaction with management.<sup>11</sup> This questionnaire has been widely used all over the world. For AIS patients in Arabic-speaking population, the Arabic version of the SRS-22r questionnaire was developed and evaluated for reliability and validity using international standards. The SRS-22r was assessed for validity against the previously validated Arabic version of the SF-36 health survey. The Arabic version of the SF-36 health

survey is one of the most frequently used generic HRQL questionnaires and has reported similar reliability. Results showed that the Arabic version of the SRS-22r is reliable and correlates well with a widely used generic health questionnaire.<sup>9,16,23</sup> Nowadays, the SRS-22 became the most widely used outcome instrument for assessing adolescent idiopathic scoliosis and has been properly validated.<sup>4</sup>

The purpose of this study was to evaluate the quality of life of patients with AIS after surgical correction using Arabic version of Scoliosis Research Society 22 (SRS-22r) questionnaire.

## PATIENTS AND METHODS

This study was designed as a prospective cohort study. Twenty-five patients with the adolescent idiopathic scoliosis (AIS) were recruited for this study and had their surgical correction at Suez Canal University Hospitals, Ismailia city, Egypt. Inclusion criteria were as follows: patients who are 10–7 years old with AIS of both sexes, Cobb's angle  $\geq 45$  degrees, and all types of spinal curves according to Lenke's classification.<sup>17</sup> Exclusion criteria were as follows: types of scoliosis other than AIS, curves with Cobb's angle  $< 45$  degrees, previous spine surgery, and patients with general diseases that may preclude surgical management (blood coagulation disorder, active infection, etc.). Prior to surgery, patients were assessed clinically and radiologically. Clinical outcome parameters included the Arabic version of Scoliosis Research Society 22 (SRS-22) questionnaire for assessment of HRQL with 22 questions regarding patient-reported outcomes (PRO).<sup>9</sup> Maximum total score of the questionnaire is 5 with higher scores indicating better outcomes. Moreover, back pain was assessed using Visual Analog Scale (VAS) where patients quantify their pain on a graphical chart between pain-free (VAS 0) and intolerable pain (VAS 10).<sup>8</sup> Both these parameters were assessed pre- and postoperatively. In addition, clinical assessment of shoulder balance was done

according to Kuklo et al.<sup>15</sup> They defined shoulder balance as a <1 cm side-to-side difference between the shoulders on clinical examination in adolescent idiopathic scoliosis patients.<sup>15</sup>

All were submitted for whole spine X-ray views (Ap, Lat, Rt, and Lt Lat. bending) to evaluate coronal Cobb's angle, convexity of the curve, location of apical vertebra, longitudinal extent of spinal involvement (according to Lenke's system), thoracic kyphosis (TK), lumbar lordosis (LL), thoracolumbar kyphosis (TLK), pelvic incidence (PI), sagittal pelvic tilt (PT), sacral slope (SS), and sagittal vertical axis (SVA). 3D CT scan including cervical, dorsal, and lumbar spinal levels with axial, sagittal, and coronal views was done to evaluate vertebral structure, pedicles morphology, and trajectory of screw placement. MRI was done for evaluation of any associated neural axis abnormalities.

All patients underwent operation using general anesthesia. Patients were placed in prone position using Jackson's frame with protection of pressure points and external genitalia. Midline skin incision and dissection in layers was conducted. A standard exposure of spine was performed using anatomical subperiosteal dissection of the paraspinal muscles. A target level was identified either anatomically through the last rib identification or with fluoroscopy. Transpedicular polyaxial screws were inserted in an anatomical position using free-hand technique. Intraoperative fluoroscopy was utilized to ensure the trajectory and the length of transpedicular screws was adequate. Multiple bilateral Ponte osteotomies in the apical area were performed to facilitate the curve correction. Thereafter, correction was done using spine-to-rod method.<sup>21,24</sup>

The anatomically contoured titan rods were inserted in the heads of pedicle screws to correct the primary curve. Finally, after tightening the rods to screws' heads, a Stagnara<sup>25</sup> wake-up test was performed to evaluate the neurological function of the patients. If the result of the wake-up test is satisfactory, the posterior fusion of the instrumented area using autologous iliac

bone graft was implemented. The bed for graft was done according to Stagnara's method by splitting the spinous processes posterior laminar decortication.<sup>25</sup> Meticulous hemostasis was done using local and parenteral tranexamic acid (Cyklokapron). Closure in layers was done. After recovery, patients were admitted to the ward and no case needed ICU admission. In the second day after surgery, patients were encouraged to mobilize with brace. The mean hospital stay was  $5.7 \pm 1.2$  days ranging from 4 to 7 days. Patients underwent physiotherapy for 2 months.

Using pre- and postoperative X-ray, we measured the percentage of change in Cobb's angle and coronal and sagittal balances. After surgery, patients were followed up for at least 6 months. At the last visit, the previously measured radiographic parameters were taken again. Additionally, all patients were asked to complete the Arabic version of SRS-22 questionnaire. (Figure 1,2)

#### **Statistical Analysis**

The data regarding the patients' history, basic clinical examination, laboratory investigations, imaging results, and outcome measures were coded and entered using Microsoft Excel Software. Collected data was processed using SPSS version 19 (SPSS Inc., Chicago, IL, USA). The quantitative data was expressed as means  $\pm$  SD, while the qualitative data was expressed as numbers and percentages (%). Chi-squared test was employed to compare the collected data throughout the study. Linear correlation analysis was conducted using Spearman's correlation coefficient test. Results were presented in tables and graphs. A probability value of p-value < 0.05 was considered statistically significant.

## **RESULTS**

A total of 25 patients were enrolled in this prospective study with 6 months of follow-up. The age of participants was  $14.7 \pm 1.7$  (range, 11–17) years. Twenty-two (88%) the patients were females and 3 (12%) were males.

Radiological assessment of scoliosis curve showed that the most frequent type of spinal involvement according to Lenke's system was type 1 (56%) followed by type 5 (24%). The apex of scoliosis was reported frequently at the level of 9<sup>th</sup> dorsal vertebrae (32%), 11<sup>th</sup> dorsal vertebrae (24%), and 1<sup>st</sup> lumbar vertebrae (12%). The majority of the curves were on the right side in 17 (76%) patients. Thirteen patients did not suffer from shoulder imbalance (52%) (Table 1).

After 6 months of the surgical correction, there was a significant improvement in following radiological parameters: Cobb's angle of the primary curve from  $55.81 \pm 8.72$  to  $7.98 \pm 2.26$  ( $P < 0.001$ ); pelvic incidence from  $62.24 \pm 7.33$  to  $57.96 \pm 6.14$  ( $P = 0.002$ ); pelvic tilt from  $26.14 \pm 3.41$  to  $20.76 \pm 3.74$  ( $P < 0.001$ ); lumbar lordosis from  $33.21 \pm 8.63$  to  $36.6 \pm 8.79$  ( $P = 0.014$ ) (Table 2).

VAS showed marked improvement from  $3.41 \pm 0.64$  to  $2.48 \pm 0.58$  after 6 months of the surgical correction ( $P < 0.001$ ) (Figure 3). Surgical correction of our patients' scoliosis resulted in a

significant improvement regarding all domains of SRS-22 questionnaire: function/activity domain from  $3.08 \pm 0.28$  to  $4.31 \pm 0.28$ ; pain domain from  $3.52 \pm 0.34$  to  $4.57 \pm 0.27$ ; self-image from  $1.84 \pm 0.24$  to  $4.85 \pm 0.31$ ; mental health from  $2.54 \pm 0.38$  to  $4.85 \pm 0.17$  ( $P < 0.001$ ) (Table 3).

Correlation between different domains of SRS-22 questionnaire after surgical correction shows that only function/activity score has a positive significant correlation with the mental health domain ( $r = 0.417$ ) ( $P = 0.038$ ). Meanwhile, SRS-22 questionnaire total score has a positive significant correlation with all domains: function domain ( $r = 0.669$ ) ( $P < 0.001$ ); pain domain ( $r = 0.417$ ) ( $P = 0.038$ ); self-image domain ( $r = 0.384$ ) ( $P = 0.048$ ); mental health domain ( $r = 0.558$ ) ( $P = 0.005$ ) (Table 4).

There was no statistically significant difference between either gender or type of spinal involvement according to Lenke's system and the change in domains values from baseline (Table 5).

**Table 1.** Radiological assessment of scoliosis curve.

Variables	N (%)	
Lenke's system	Type 1	14 (56)
	Type 3	1 (4)
	Type 5	6 (24)
	Type 6	4 (16)
Apex	T6	1 (4)
	T7	1 (4)
	T8	2 (8)
	T9	8 (32)
	T10	2 (8)
	T11	6 (24)
	T12	2 (8)
	L1	3 (12)
Convexity	Right	19 (76)
	Left	6 (24)
Shoulder balance	Yes	12 (48)
	No	13 (52)

**Table 2.** Radiological parameters after surgical correction of scoliosis (N=25).

Variables	Preoperatively	Postoperatively	Test value	P-value
Primary curve Cobb's angle	55.81±8.72	7.98±2.26	4.37	<0.001 <sup>a</sup>
Thoracic kyphosis	35.21±9.9	36.5±6.20	1.14	0.252 <sup>a</sup>
Lumbar lordosis	33.21±8.63	36.6±8.79	2.46	0.014 <sup>a</sup>
Thoracolumbar kyphosis	25.66±10.82	29.01±6.74	1.78	0.074 <sup>a</sup>
Pelvic incidence	62.24±7.33	57.96±6.14	3.13	0.002 <sup>a</sup>
Pelvic tilt	26.14±3.41	20.76±3.74	4.37	<0.001 <sup>a</sup>
Sacral slope	35.47±6.93	34.96±4.04	0.11	0.92 <sup>a</sup>
Sagittal vertical axis	2.24 ± 3.79	-	-	-

<sup>a</sup> P-values are based on Wilcoxon's signed-rank test. Statistical significance at P < 0.05.

**Table 3.** Scoliosis Research Society (SRS) 22 questionnaire before and after surgical correction (N=25).

Variables	Preoperatively	Postoperatively	Test value	P-value
Function/activity	3.08±0.28	4.31±0.28	4.39	<0.001 <sup>a</sup>
Pain	3.52±0.34	4.57±0.27	4.38	<0.001 <sup>a</sup>
Self-image/appearance	1.84±0.24	4.85±0.31	4.41	<0.001 <sup>a</sup>
Mental health	2.54±0.38	4.85±0.17	4.39	<0.001 <sup>a</sup>
Satisfaction with management	-	4.96±0.21	-	-
Subtotal score	2.75±0.24	4.65±0.17	4.37	<0.001 <sup>a</sup>
Total score	-	4.45±0.16	-	-

<sup>a</sup>p-values are based on Wilcoxon signed-ranks test. Statistical significance at P < 0.05.

**Table 4.** Correlation between different domains of SRS-22 questionnaire after surgical correction.

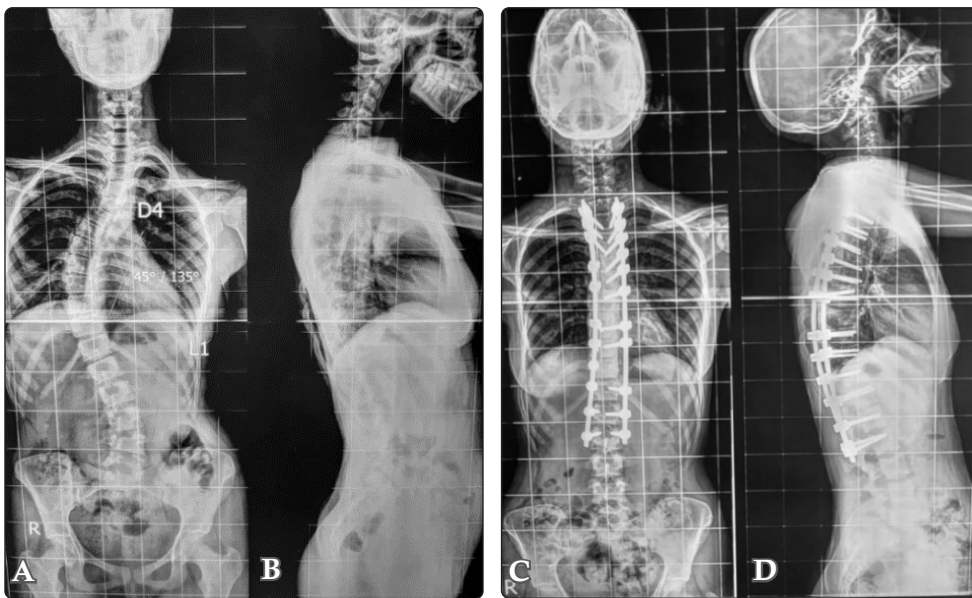
Parameters	Postoperative SRS-22 questionnaire domains				
	Function/activity	Pain	Self-image/appearance	Mental health	Subtotal score
Pain					
r	0.021	-	-	-	-
P-value	0.920 <sup>a</sup>	-	-	-	-
Self-image/appearance					
r	0.220	-0.04	-	-	-
P-value	0.292 <sup>a</sup>	0.827 <sup>a</sup>	-	-	-
Mental health					
r	0.417	-0.017	0.196	-	-
P-value	0.038 <sup>a</sup>	0.936 <sup>a</sup>	0.347 <sup>a</sup>	-	-
Subtotal score					
r	0.669	0.501	0.384	0.558	-
P-value	<0.001 <sup>a</sup>	0.011 <sup>a</sup>	0.048 <sup>a</sup>	0.004 <sup>a</sup>	-
Total score					
r	0.669	0.501	0.384	0.542	0.99
P-value	<0.001 <sup>a</sup>	0.011 <sup>a</sup>	0.048 <sup>a</sup>	0.005 <sup>a</sup>	<0.001 <sup>a</sup>

r: correlation coefficient. <sup>a</sup>P-values are based on Spearman's correlation coefficient. Statistical significance at P<0.05.

**Table 5.** Association between gender and Lenke system's and baseline values of SRS-22 questionnaire domains.

Parameters		Δ Function	Δ Pain	Δ Self-image/ appearance	Δ Mental health	Δ Subtotal score
Gender	Male	0.87±0.70	0.73±0.31	2.80±0.53	2.07±1.10	1.62±0.63
	Female	1.27±0.36	1.09±0.40	3.04±0.39	2.35±0.31	1.94±0.23
Test value		20	16.5	23.5	28.5	2
P-value		0.311 <sup>a</sup>	0.177 <sup>a</sup>	0.446 <sup>a</sup>	0.723 <sup>a</sup>	0.398 <sup>a</sup>
Lenke's system	Type 1	1.30±0.40	1.06±0.37	3.04±0.38	2.40±0.34	1.95±0.24
	Type 3	1.60±0.2	0.80±0.2	3±0.6	2.80±0.7	2.05±0.3
	Type 5	1.30±0.30	1.10±0.43	2.93±0.47	2.37±0.27	1.93±0.22
	Type 6	0.75±0.38	1.00±0.59	3.00±0.57	1.80±0.67	1.64±0.53
Test value		6.48	0.95	0.645	6.7	2.5
P-value		0.091 <sup>b</sup>	0.812 <sup>b</sup>	0.886 <sup>b</sup>	0.082 <sup>b</sup>	0.459 <sup>b</sup>

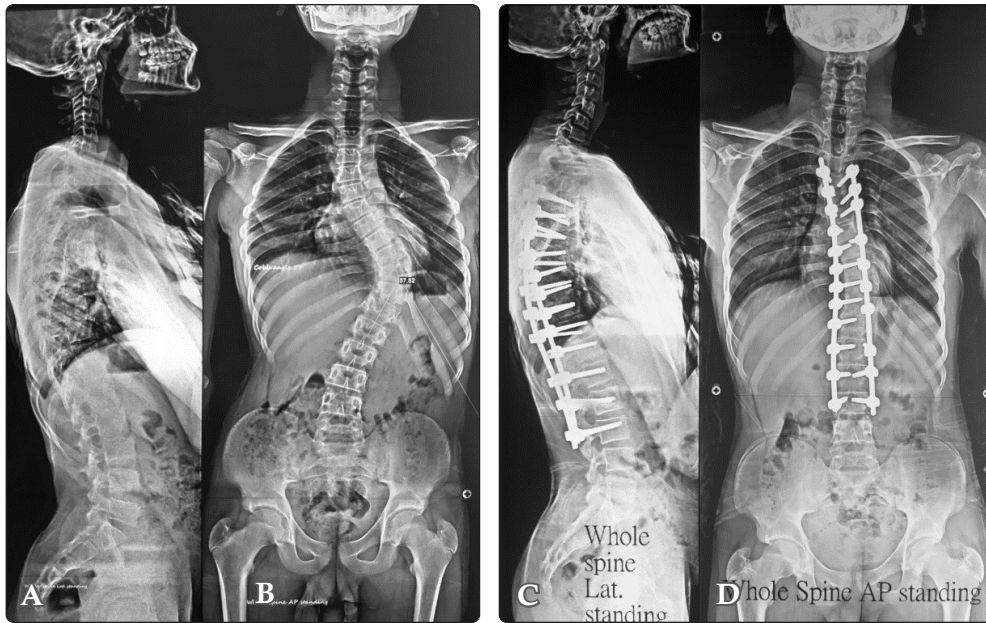
Δ: postoperative score–preoperative score. <sup>a</sup>P-values are based on Mann–Whitney *U* test. Statistical significance at *P* <0.05. <sup>b</sup>P-values are based on Kruskal–Wallis test. Statistical significance at *P*<0.0.



**Figure 1.** Whole spine radiographs of a 17-year-old female patient with AIS. Preoperative (A) anteroposterior; (B) lateral radiograph; six-month postoperative (C) anteroposterior; and (D) lateral radiographs. She suffered from Lenke-1, with right apex at D9 and preoperative Cobb's angle 45 degrees that improved to 7 degrees postoperatively. Threatening levels were fixed with 1.69 screw density.

Clinical assessment:

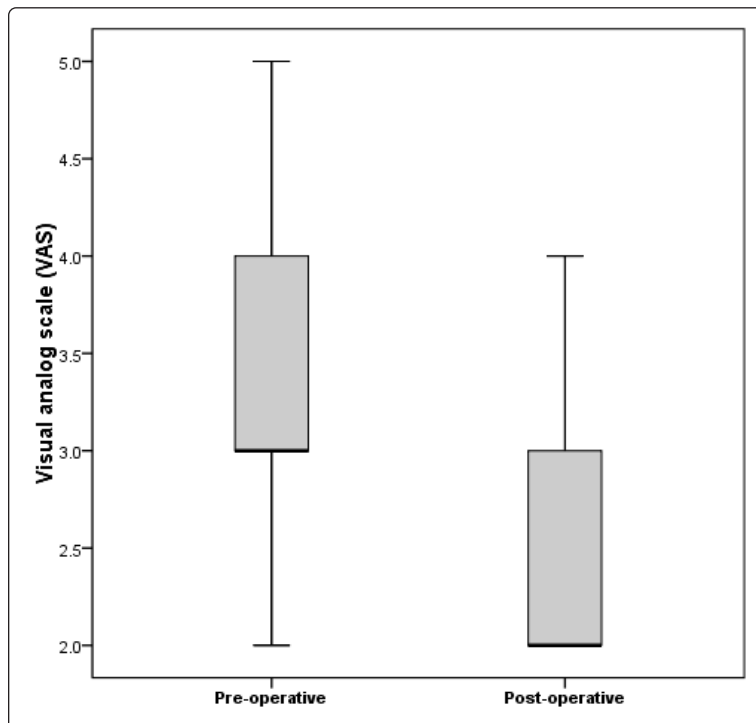
Parameters	VAS	Function	Pain	Self-image	Mental health	Subtotal	Satisfaction	Total
Preop	4	3	4	1.4	2.2	2.65		
Postop	2	4.4	4.6	5	4.8	4.7	5	4.5



**Figure 2.** Whole spine radiographs of a 16-year-old female patient with AIS. Preoperative (A) anteroposterior; (B) lateral radiograph; six-months postoperative (C) anteroposterior; (D) lateral radiographs. She suffered from Lenke-1, with right apex at D10 and preoperative Cobb's angle of 58 degrees that improved to 7 degrees postoperatively. Twelve levels were fixed with 1.8 screw density.

Clinical assessment:

Parameters	VAS	Function	Pain	Self-image	Mental health	Subtotal	Satisfaction	Total
Preop	3	3	3.4	1.8	2.8	2.75		
Postop	2	3.4	4.2	3.8	4.4	3.95	5	3.82



**Figure 3.** Back pain Visual Analog Scale (VAS) before and 6 months after surgical intervention.

## DISCUSSION

AIS is a challenging and troublesome deformity that affect different aspects of the patient's life. It is a disease that causes spinal deformity from age of 10 and over. In recent studies of health-related quality of life (HRQL), greater attention has been paid to the quality of life (QoL) of patients with AIS instead of focusing on the improvement of the rate of surgical correction. The adolescence age is a sensitive period of personal and psychological maturity, so many factors like a deformity and physical discomfort can affect the QoL of patients with AIS.<sup>10</sup>

Therefore, throughout this study, we aimed to assess the quality of life and the satisfaction of 25 patients with Adolescents Idiopathic Scoliosis (AIS) after surgical correction while comparing radiological findings before and after surgery.

Throughout the present study, it was found that mean age of participants was 14 years old with female predominance, reaching two-thirds of the study's population. This was similar to a study performed by Hisam et al.<sup>13</sup> who assessed 37 subjects having AIS and found that the age of the patients ranged from 14 to 37 years old with patients from 13 to 18 years old and females constitute two-thirds of their patients' population. Regarding clinical estimates related to scoliosis, it was found that the most frequent type of spinal involvement according to Lenke's system was type 1, followed by type 5. Mariconda et al.<sup>18</sup> in 2016 assessed a sample consisting of 87 patients, with follow-up data related to surgery for AIS, discovering that, throughout their study, type 3 was the most frequent type followed by type 1 and type 6. This mismatched finding may be due to the difference in the sample size.

AIS is considered as a complex three-dimensional deformity. Spinal deformity can affect patient's results on an HRQL questionnaire. The degree of Cobb's angle of the instrumented thoracic curve for postoperative patients with AIS is the main factor influencing QoL.<sup>10</sup> In 2002, Helenius et

al.<sup>12</sup> concluded that there is a significant negative correlation between the magnitude of thoracic curvature and scores for cosmetic patterns on the SRS-24.<sup>12</sup> Moreover, in our study, we had a negative correlation between magnitude of curvature and self-image domain on SRS-22.

Regarding the radiological parameters, it was revealed that surgical correction has elicited a significant decrease in Cobb's angle, pelvic incidence, and pelvic tilt with significant increase in the lumbar lordosis reflecting the hopeful outcomes of the spinal surgery. In Mariconda et al.'s<sup>18</sup> study, there was also a significant decrease in both thoracic and lumbar Cobb's angles with decrease in rib hump after 1-year follow-up from the surgical performance.

Throughout the 5 domains of the questionnaire, the satisfaction of patients after the surgical correction was considerably high reflecting the efficiency of the surgical outcomes and that was shown statistically through the present study results. Similar to our results, Merola et al.<sup>19</sup> reported that the scores of the 5 domains showed significant improvement after surgery in the longitudinal follow-up analysis. That was also in agreement with Alsiddiky et al.'s<sup>1</sup> result.

Ameri et al.<sup>2</sup> carried out a study on 40 adolescent patients with AIS who were of age 10 or older and reported that 20 patients were satisfied with their back shape after surgery using a questionnaire that assessed physical and psychological measurements. In 2015, Hisam et al.<sup>13</sup>, in study population of 44 patients with AIS who were under 18 years old, revealed that the patients were highly satisfied with their quality of life after surgery as indicated by the mean value of total SRS score of 4.1 and with all domains except for self-image after surgery. On the contrary, in the present study regarding the self-image domain, there was significant increase from 1.84 score preoperatively reaching 4.85 score postoperatively, showing the highest increase among all the other domains. In Alsiddiky et al.'s<sup>1</sup> study, they found that pain domain, self-perceived image domain, mental health domain, and SRS-22 global score was higher among patients with AIS.



SRS outcomes instrument had been established as the only standard, well-validated, and disease-specific questionnaire for AIS.

Although it is not typically the main factor for the patients with AIS to seek treatment, it is a critical factor to analyze in explaining the efficacy and outcomes of the surgical intervention.<sup>3</sup> In the present study, there was a significant decrease in the Visual Analog Scale used for measuring of back pain intensity, after the surgical correction. In 2011, Carreon LY et al.<sup>5</sup> found that surgical treatment in AIS significantly improves overall average pain domain scores at 2 years after surgery compared with scores reported before surgery. There was a significant improvement in all preoperative domains of the SRS-22 two years after surgical correction.

In 2016, Djurasovic et al.<sup>6</sup> found that patients with painful AIS can expect significant improvement in the pain level with surgical intervention and will show significant improvement in health-related QoL. Furthermore, Bastrom et al.<sup>3</sup> found that patients with postoperative pain scored significantly lower on the pain domain of the SRS-22 questionnaire and their scores in all other domains except for the function were lower than patients who did not show postoperative pain.

In this study, after surgical correction, the correlation between different domains of SRS-22 questionnaire shows that only function/activity score has positive significant correlation with mental health domain. Meanwhile, SRS-22 questionnaire total score has a positive significant correlation with all domains regarding function domain pain domain, self-image domain, and mental health domain. Alsiddiky et al.<sup>1</sup> found that there is negative moderate correlation of age with pain domain, while negative weak correlation with self-perceived image, function domain, mental health domain and management domain with significant difference was observed with SRS-22 global score.

Regarding the gender affection and correlation to the different domains, it is believed that gender is a factor affecting the psychology of patients

with AIS.<sup>10</sup> In 2015, Han J et al.<sup>10</sup> studied 685 patients with AIS using the Adolescent Health Survey (AHS) and reported that scoliosis was an independent risk factor for the frequently reported suicidal thoughts, more concern about abnormal body development, and a greater worry and concern about peer relations.

The sample size was not ideal to assess the actual effect of the surgery on the QoL. In addition, the study was conducted in a limited time span with short follow-up period. Thus, these limitations will be taken into consideration to avoid them in future studies.

Considering the scarcity of reports about evaluation of SRS22r, this study may be considered a breakthrough addressing the importance of evaluating the quality of life after surgical intervention to weigh our results precisely.

## CONCLUSION

The SRS instrument was very useful despite the culture-related differences in patients' perceptions. Definite differences were found in scores among all domains of SRS-22. Self-image domain exhibited the highest increase among all the other domains. Additionally, this study showed significant improvement in clinical and radiographic outcomes in AIS patients who underwent operation using screw-rod instrumentation.

## REFERENCES

1. Alsiddiky A, Aloqayli A, Ahmed A, Almousa N, Alshehri K: Scoliosis surgical treatment outcomes with relevance of quality of life (QoL), through SRS22; clinical recovery, psycho-social status and management satisfaction. *International Journal of Scientific Research* 5(3), 2016
2. Ameri E, Behtash H, Mobini B, Bouzari B, Tari V: Patient satisfaction after scoliosis surgery. *Med J Islam Repub Iran* 21(4):177-184, 2008

3. Bastrom TP, Marks MC, Yaszay B, Newton PO, Harms Study Group: Prevalence of postoperative pain in adolescent idiopathic scoliosis and the association with preoperative pain. *Spine* 38(21):1848–1852, 2013
4. Bridwell KH, Cats-Baril W, Harrast J, Berven S, Glassman S, Farcy JP, et al: The validity of the SRS-22 instrument in an adult spinal deformity population compared with the Oswestry and SF-12: a study of response distribution, concurrent validity, internal consistency, and reliability. *Spine* 30(4):455–461, 2005
5. Carreon LY, Sanders JO, Diab M, Sturm PF, Sucato DJ, Spinal Deformity Study Group: Patient satisfaction after surgical correction of adolescent idiopathic scoliosis. *Spine* 36(12):965–968, 2011
6. Djurasovic M, Glassman SD, Sucato DJ, Lenke LG, Carreon LY: Improvement in SRS-22R pain scores after surgery for adolescent idiopathic scoliosis. *Spine J* 16(10):S343–S344, 2016
7. Gorman KF, Julien C, Moreau A: The genetic epidemiology of idiopathic scoliosis. *Eur Spine J* 21(10):1905-1919, 2012
8. Glossary: *Spine J* 25:3200–3202, 2000
9. Haidar R, Kassak K, Masrouha K, Ibrahim K, Mhaidli H: Reliability and Validity of an Adapted Arabic Version of the Scoliosis Research Society-22r Questionnaire. *Spine* 40(17):E971-E977, 2015
10. Han J, Xu Q, Yang Y, Yao Z, Zhang C: Evaluation of quality of life and risk factors affecting quality of life in adolescent idiopathic scoliosis. *Intractable Rare Dis Res* 4(1):12–16, 2015
11. Hashimoto H, Sase T, Arai Y, Maruyama T, Isobe K, Shouno Y: Validation of a Japanese version of the scoliosis research society-22 patient questionnaire among idiopathic scoliosis patients in Japan. *Spine* 32:E141–E146, 2007
12. Helenius I, Remes V, Yrjönen T, Ylikoski M, Schlenzka D, Helenius M, et al: Comparison of long-term functional and radiologic outcomes after Harrington instrumentation and spondylodesis in adolescent idiopathic scoliosis: a review of 78 patients. *Spine* 27(2):176–180, 2002
13. Hisam MA, Siti NS, Jou NP, Ghaneshinee S, Shaharuddin AR, Azmi B, et al: Does the Quality of Life in Operated Patients with Adolescent Idiopathic Scoliosis correspond with the Radiographic Parameters? *Malaysian Orthop J* 9(2):37–40, 2015
14. Konieczny MR, Senyurt H, Krauspe R: Epidemiology of adolescent idiopathic scoliosis. *J Child Orthop* 7(1):3-9, 2013
15. Kuklo TR, Lenke LG, Graham EJ, Won DS, Sweet FA, Blanke KM, et al: Correlation of radiographic, clinical, and patient assessment of shoulder balance following fusion versus nonfusion of the proximal thoracic curve in adolescent idiopathic scoliosis. *Spine* 27(18):2013–2020, 2002
16. Lai SM, Asher M, Burton D: Estimating SRS-22 quality of life measures with SF-36: application in idiopathic scoliosis. *Spine* 31:473–478, 2006
17. Lenke LG, Betz RR, Harms J, Bridwell KH, Clements DH, Lowe TG, et al: Adolescent idiopathic scoliosis: a new classification to determine extent of spinal arthrodesis. *J Bone Joint Surg Am* 83(8):1169–1181, 2001
18. Mariconda M, Andolfi C, Cerbasi S, Servodidio V: Effect of surgical correction of adolescent idiopathic scoliosis on the quality of life: a prospective study with a minimum 5-year follow-up. *Eur Spine J* 25(10):3331–3340, 2016
19. Merola AA, Haher TR, Brkaric M, Panagopoulos G, Mathur S, Kohani O, et al: A multicenter study of the outcomes of the surgical treatment of adolescent idiopathic

- scoliosis using the Scoliosis Research Society (SRS) outcome instrument. *Spine* 27(18):2046–2051, 2002
20. Pehrsson K, Larsson S, Oden A, Nachemson A: Long-term follow-up of patients with untreated scoliosis a study of mortality, causes of death, and symptoms. *Spine* 17:1091-1096, 1992
  21. Ponte A, Orlando G, Siccardi GL: The true ponte osteotomy: By the one who developed it. *Spine Deformity* 6(1), 2–11, 2018
  22. Riseborough EJ, Wynne-Davies R: A genetic survey of idiopathic scoliosis in Boston, Massachusetts. *J Bone Joint Surg Am* 55(5):974–982, 1973
  23. Sabbah I, Drouby N, Sabbah S, Retel-Rude N, Mercier M: Quality of life in rural and urban populations in Lebanon using SF-36 health survey. *Health Qual Life Outcomes* 1:30, 2003
  24. Trobisch P, Suess O, Schwab F: Idiopathic scoliosis. *Dtsch Arztebl Int* 107(49):875–884, 2010
  25. Vauzelle C, Stagnara P, Jouvinroux P: Functional monitoring of spinal cord activity during spinal surgery. *Clin Orthop Relat Res.* 93:173–178, 1973
  26. Wafa M, Michael F, ELBadrawi A, ELOksh Y: Segmental Derotation Using Alternating Pedicular Screws in Treatment of Adolescent Idiopathic Scoliosis. *Egyptian Spine Journal* 2:1–6, 2012
  27. Weinstein SL, Dolan LA, Cheng JC, Danielsson A, Morcuende JA: Adolescent idiopathic scoliosis. *Lancet* 371:1527–1537, 2008
  28. Weiss HR, Goodall D: The treatment of adolescent idiopathic scoliosis (AIS) according to present evidence. A systematic review. *Eur J Phys Rehabil Med* 44(2):177–193, 2008

## الملخص العربي

### تقييم جودة الحياة للمراهقين ذوي اعوجاج العمود الفقري ذاتي العلة بعد التصحيح الجراحي.

**البيانات الخلفية:** اعوجاج العمود الفقري ذاتي العلة هو نوع من انواع تشوهات العمود الفقري التي تؤثر على جودة الحياة. حاولت العديد من الدراسات الطبية السابقة تقييم جودة الحياة المتعلقة بالصحة باستخدام قياسات للناتج عن طريق المريض. يعتبر استبيان رقم 22 لجمعية ابحاث اعوجاج العمود الفقري باللغة العربية اداة صالحة لتقييم جودة الحياة في حالات اعوجاج العمود الفقري ذاتي العلة.

**الغرض:** هدف هذا البحث هو تقييم نوعية الحياة المتعلقة بالصحة مع التدخل الجراحي للمراهقين ذوي اعوجاج العمود الفقري ذاتي العلة باستخدام استبيان رقم 22 لجمعية ابحاث اعوجاج العمود الفقري باللغة العربية.

**تصميم الدراسة:** دراسة مستقبلية لمرضى اعوجاج العمود الفقري ذاتي العلة

**المرضى و الطرق:** وقد تم عمل الدراسة لخمسة و عشرون مريضا يعانون من اعوجاج بالعمود الفقري بزواوية انحاء اكثر من 45 درجة وتم التدخل الجراحي لهم عن طريق تثبيت الفقرات الصدرية و القطنية باستخدام القضبان والمسامير من الخلف وذلك بمستشفى جامعة قناة السويس بواسطة اطباء قسم جراحة المخ و الاعصاب من 2016 الى 2018 . وتم استخدام استبيان رقم 22 لجمعية ابحاث اعوجاج العمود الفقري لتقييم المرضى اكلينيكيًا و استخدام الاشعة العادية للعمود الفقري لتقييم التدخل الجراحي مع متابعة المرضى لمدة لا تقل عن 6 شهور من الجراحة.

**النتائج:** هذه الدراسة تشمل 25 مريض منهم 22 انثى و 3 ذكور. وكان متوسط عمر المرضى عند اجراء الجراحة 14.7 سنة وتتراوح الالعمر بين 11 الى 18 سنة. وقد حدث تحسن ملحوظ بعد ستة اشهر من التدخل الجراحي في متوسط القياسات التالية: درجة الانحناء من 55.81 الى 7.98 و زاوية انحراف الحوض من 62.24 الى 57.96 و زاوية امالة الحوض من 26.14 الى 20.76 و زاوية انحناء الفقرات القطنية من 33.21 الى 36.6 . كما حدث تحسن في جميع مجالات الاستبيان بعد ستة اشهر من التدخل الجراحي على النحو التالي : تقييم النشاط والوظيفة 4.31 و تقييم الالام 4.57 و تقييم المظهر العام 4.85 و تقييم الصحة العقلية 4.85 و تقييم الرضا من التدخل الجراحي 4.96 وكان الناتج الكلي 4.45. و اظهرت هذه الدراسة وجود علاقة ايجابية بين تقييم النشاط والوظيفة و بين تقييم الصحة العقلية.

**الاستنتاج:** استخدام استبيان رقم 22 لجمعية ابحاث اعوجاج العمود الفقري صالح لتقييم المرضى ذوي اعوجاج العمود الفقري ذاتي العلة مع اختلاف ثقافات المرضى و تقييم المظهر العام اظهر اعلى نسب التحسن بين باقي مجالات الاستبيان. كما اوضحت الدراسة تحسن ملحوظ اكلينيكيًا و اشعاعيا بعد استخدام تثبيت الفقرات بواسطة القضبان والمسامير لعلاج اعوجاج العمود الفقري.