Health-related Quality of Life (SRS-22r) of Adolescents with Idiopathic Scoliosis in Korea

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Introduction

**Scoliosis**

A complex spine deformity involving three-dimensional deviation of the spinal axis by deformation with thoracic lordosis, lateral curvature, and vertebral rotation. 

(Trobish et al., 2010)

**Diagnosis**

By exceeding 10° of spinal curvature on an anterior-posterior X-ray image. 

(Trobish et al., 2010)
**Introduction**

**Adolescent idiopathic scoliosis (AIS)**

- One of the most common musculoskeletal problems in adolescents, and the prevalence rate of AIS is more than 80% of scoliosis cases.
- Causes are unknown.
- Age of onset 10 years of age to skeletal maturity.
- Predominant in females, about 3~5 times.

(Wick et al., 2009)
Introduction

Prevalence of AIS in Korea
- 0.35% (1998)
- 1.35% (2002)
- 6.17% (2008)
(Suh et al., 2011)

Prevalence of AIS in U.S.A
- 2~4% (2009)
(National Scoliosis Foundation and Depuy Spine, 2009)

Prevalence of AIS in Japan
- 0.87% (2011)
(Ueno et al., 2011)

1st Question:
What are the specific characters of AIS prevalence among Korean adolescents?
# Medical Treatments for AIS by Disease Severity

<table>
<thead>
<tr>
<th>Cobb’s angle</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>10°~25°</td>
<td>Mild Scoliosis</td>
<td>Observation</td>
</tr>
<tr>
<td>25°~45°</td>
<td>Moderate Scoliosis</td>
<td>Exercise, Good Posture, Electronic stimulation, Brace</td>
</tr>
<tr>
<td>&gt;45°</td>
<td>Severe Scoliosis</td>
<td>Operation</td>
</tr>
</tbody>
</table>
Introduction

Effects of AIS to Adolescents

Physical
- Limited physical activity cause of asymmetry of shoulder height, scapular, flank shape, hip height, & etc.
- Decreased body function, Muscular-skeletal pain

Psychological
- Decreased body-image
- Self-abasement, Depression
  - Decreased QoL

Social
- Impairment of interpersonal relationship, especially with peer
- Maladjustment at school

(Burns et al., 2009; Lee, 2008)
(Choi et al., 2011; Sapountzi et al., 2001)
(Kim, 2010; Park, 2009)
HRQoL

Assessments of health related quality of life have focused more on physicians and researchers because this allows assessment of a patient’s perception of adolescents with idiopathic scoliosis condition and medical treatment effects (Asher et al., 2006).

Scoliosis Patient Questionnaire : Version 30
SRS 24 Patient Questionnaire (Hafer et al., 1999)
SRS 22 Patient Questionnaire (Asher et al., 2000)

**SRS 22-revision Patient Questionnaire (Asher et al., 2006)**
A better understanding of the HRQoL of idiopathic scoliosis adolescents is needed to identify patient perceptions of their condition and treatment effects by severity of disease, which will contribute to improved care.

2nd Question: How is different the HRQoL by severity of IS?
To characterize disease severity in adolescents with idiopathic scoliosis (AIS) in Korea.

To characterize health related quality of life (HRQoL) by disease severity in adolescents with idiopathic scoliosis (AIS) in Korea.
Methods

• **Descriptive study design**
• Study participants: **110 adolescents with idiopathic scoliosis**
• Study location: an outpatient orthopedic clinic and a rehabilitation clinic in two (K, S) tertiary hospitals located in Seoul, Korea
• Data collection: From November 2010 to August 2012
• To recruit study participants, research assistants explained the purpose and intention of this study and asked for agreement to participate from adolescents and their legal guardians

(IRB #: K hospital 3-2010-0172, S hospital 4-2011-0682)
Study Participants

• **Inclusion criteria:**
  - primary diagnosis of AIS determined by expert clinicians
  - Cobb’s angle over 10°
  - age of 10-19 years old
  - participants and their legal guardians agreed to participate

• **Exclusion criteria:**
  - any diagnosable musculoskeletal disease except scoliosis
  - cognitive impairment causing inability to read and understand the questionnaires
Materials

- **Cobb’s angle & Type of treatment**
  - Collected from the medical records with the permission

- **HRQoL**
  - Used SRS-22r
  - Consists of 22 questions
    - function/activity (5 items), pain (5 items), self-image/appearance (5 items), mental health (5 items), and satisfaction with management (2 items)
    - Each item allowed 5 response levels from worst to best (scored 1-5)
    - Higher mean score indicates higher quality of life
    - Cronbach’s $\alpha$ of the measurement was 0.84 in this study
To assess differences in HRQoL (SRS-22r) according to severity of AIS, data were analyzed using PASW Window version 20.0
- Descriptive statistics
- Kruskal-Wallis tests
- Mann-Whitney U tests
- ANOVA $P$ values < .05 were considered statistically significant
The mean age of participants was 14.2 years (SD 2.17)

The mean age of AIS diagnosis was 12.5 years (SD 1.82)

### Table 1 General characteristics of idiopathic scoliosis adolescents by severity of disease

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Categories</th>
<th>Total (N=110) n (%)</th>
<th>Mild (n = 52) n (%)</th>
<th>Moderate (n = 46) n (%)</th>
<th>Severe (n = 12) n (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>21 (19.1)</td>
<td>13 (25.0)</td>
<td>6 (13.0)</td>
<td>2 (16.7)</td>
<td>0.315</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>89 (80.9)</td>
<td>39 (75.0)</td>
<td>40 (87.0)</td>
<td>10 (83.3)</td>
<td></td>
</tr>
<tr>
<td>Age at diagnosis (years)</td>
<td>10-12 (Late school age)</td>
<td>53 (48.2)</td>
<td>31 (59.6)</td>
<td>18 (39.1)</td>
<td>4 (33.3)</td>
<td>0.118</td>
</tr>
<tr>
<td></td>
<td>13-15 (Junior high school age)</td>
<td>49 (44.5)</td>
<td>18 (34.6)</td>
<td>23 (50.0)</td>
<td>8 (66.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16-19 (High school age)</td>
<td>8 (7.3)</td>
<td>3 (5.8)</td>
<td>5 (10.9)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Type of treatment</td>
<td>Observation</td>
<td>68 (61.8)</td>
<td>41 (78.8)</td>
<td>27 (58.8)</td>
<td>None</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Brace</td>
<td>3 (2.7)</td>
<td>None</td>
<td>2 (4.3)</td>
<td>1 (8.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physiotherapy</td>
<td>23 (20.9)</td>
<td>8 (15.4)</td>
<td>11 (23.9)</td>
<td>4 (33.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brace &amp; Physiotherapy</td>
<td>16 (14.5)</td>
<td>3 (5.8)</td>
<td>6 (13.0)</td>
<td>7 (58.4)</td>
<td></td>
</tr>
</tbody>
</table>
# Results (2)

## Table 2 HRQoL (SRS-22r) of idiopathic scoliosis adolescents by general characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Categories</th>
<th>HRQoL (SRS-22r) (N = 110)</th>
<th>( P ) Post-hoc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>4.18 (0.46)</td>
<td>0.061</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4.21 (0.35)</td>
<td></td>
</tr>
<tr>
<td>Age at diagnosis (years)</td>
<td>10-12 (Late school age)(^a)</td>
<td>4.30 (0.29)</td>
<td><strong>0.033</strong></td>
</tr>
<tr>
<td></td>
<td>13-15 (Junior high school age)(^b)</td>
<td>4.12 (0.43)</td>
<td>(a&gt;b)</td>
</tr>
<tr>
<td></td>
<td>16-19 (High school age)</td>
<td>4.15 (0.37)</td>
<td></td>
</tr>
<tr>
<td>Type of treatment</td>
<td>Observation</td>
<td>4.28 (0.31)</td>
<td><strong>0.025</strong></td>
</tr>
<tr>
<td></td>
<td>Brace</td>
<td>4.39 (0.33)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physiotherapy</td>
<td>4.03 (0.48)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brace &amp; Physiotherapy</td>
<td>4.12 (0.35)</td>
<td></td>
</tr>
</tbody>
</table>

*Post-hoc: Scheffe*
# Results (3)

Table 3 HRQoL (SRS-22r) of idiopathic scoliosis adolescents by severity of disease

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (N=110)</th>
<th>Mild (n = 52)</th>
<th>Moderate (n = 46)</th>
<th>Severe (n = 12)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Median (IQR*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRQoL (SRS-22r)</td>
<td>4.21 (0.37)</td>
<td>4.30 (1.36)</td>
<td>4.20 (1.45)</td>
<td>4.07 (2.05)</td>
<td>0.137</td>
</tr>
<tr>
<td>Function/activity</td>
<td>4.70 (0.40)</td>
<td>5.00 (1.40)</td>
<td>4.80 (1.60)</td>
<td>4.50 (1.80)</td>
<td>0.053</td>
</tr>
<tr>
<td>Pain</td>
<td>4.49 (0.54)</td>
<td>4.60 (1.80)</td>
<td>4.60 (2.00)</td>
<td>5.00 (2.20)</td>
<td>0.692</td>
</tr>
<tr>
<td>Self-image/appearance</td>
<td>3.69 (0.67)</td>
<td>3.80 (2.20)</td>
<td>3.80 (3.00)</td>
<td>3.00 (2.80)</td>
<td><strong>0.031</strong></td>
</tr>
<tr>
<td>Mental health</td>
<td>4.05 (0.57)</td>
<td>4.20 (2.40)</td>
<td>4.00 (2.00)</td>
<td>4.10 (2.80)</td>
<td>0.414</td>
</tr>
<tr>
<td>Satisfaction with management</td>
<td>3.95 (0.66)</td>
<td>4.00 (2.00)</td>
<td>4.00 (2.00)</td>
<td>4.00 (2.00)</td>
<td>0.782</td>
</tr>
</tbody>
</table>

*IQR: Inter-quartile range
• The age of AIS diagnosis is high during late school age (10-12 year-old, 48.2%) and junior high school age (13-15 year-old, 44.5%).

• However, in Korea, school screening regulations do not include scoliosis detection.

• Results suspicious for IS are occasionally reported to physicians from chest x-ray results of pulmonary tuberculosis school screening examinations.

• A chest x-ray for tuberculosis screening is recommended at ages 13 and 16 years for all adolescents in Korea. Therefore, many adolescents are initially diagnosed with AIS around 13 years old.
• In general, the American Academy of Pediatrics has recommended scoliosis screening at ages 10, 12, 14, and 16 years, and the Scoliosis Research Society has recommended annual scoliosis screening of all children age 10–14 years.

• The authors suggest that an effective school scoliosis screening program should be implemented in the Korea school screening regulations, and the specific time of scoliosis screening examination should be determined according to age specific characteristics of IS by gender difference.
• The self-image/appearance domain score was significantly different with different severity groups.

• Among SRS-22r sub-domains, the function/activity domain scored the highest value (4.7 out of 5).

• The self-image/appearance domain scored the lowest value (3.7 out of 5).

• The severe IS group had significantly lower scores than the mild and moderate IS groups.

• Study participants were mainly female adolescents interested in their body image as a developmental factor.

We should be aware of how IS adolescents perceive their self-image/appearance by the severity of their spinal curvature.
• The overall mean SRS-22r score was 4.2 out of 5 among study participants receiving conservative treatments.

• The mean SRS-22r score did not differ with IS severity in this study even though the mean score gradually decreased with increasing spinal curvature.

• May Causes
  ➢ The sample size was relatively small and the number of patients in each severity group was uneven
  ➢ All participants were conservatively treated

Larger and even sample sizes in each severity group could uncover a greater range of HRQoL characteristics in Korean IS adolescents.
Conclusion

• **Korean adolescents** with idiopathic scoliosis tend to be diagnosed at an **early pubertal period (late elementary school age)**. This indicates that the prevalent age for AIS is slightly earlier than 13 years old in Korean adolescents, demonstrating the need for early AIS screening examination.

• Total score of HRQoL (SRS-22r) was not influenced by disease severity, but **self-image/appearance was significantly different with differing severity**.
• Medical staff should be aware of the characteristics of Korean AIS and variation in the HRQoL characteristics of adolescents with idiopathic scoliosis based upon severity of AIS.

• To enhance the HRQoL of idiopathic scoliosis adolescents, medical staff should consider developing strategies tailored to individuals based on disease severity.
References


