Translation and Test-Retest Reliability of the Thai Version of the Scoliosis Research Society SRS-22r

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Abstract

This study aimed to evaluate the reliability and validity of the Thai version of SRS-22r questionnaire in patients suffering from idiopathic scoliosis who were conservatively treated by spinal bracing only. The Thai version SRS-22r and validated Thai version of SF-36 questionnaires were administered to 40 conservatively treated adolescent idiopathic scoliosis (AIS) patients. Internal consistency was determined with Cronbach's α coefficient. Intraclass correlation coefficient was used for test-retest reliability. Concurrent validity was evaluated by comparing SRS-22r domains with relevant domains in the SF-36 questionnaire, using the Pearson correlation coefficient. Statistical analysis was performed to assess reliability and validity. The resulting overall mean Cronbach's α coefficient of SRS-22r was 0.6. The mean intraclass correlation coefficient (ICC) of all domains of SRS-22r was 0.67, demonstrating good test-retest reproducibility. The concurrent validity, determined by the Pearson correlation coefficient between SRS-22r and SF-36 domains, had good correlation for 9 relevant comparisons (r = 0.50–0.75). Therefore, the Thai version of the SRS-22r questionnaire showed acceptable measurement properties and is considered suitable for use to assess the outcome of conservative treatment in Thai AIS patients.

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Introduction

The adolescent onset of scoliosis is termed adolescent idiopathic scoliosis (AIS) and is believed to develop from unknown origin in a majority of patients.[1–3] An individual with AIS who does not receive treatment could result in an increased curvature of the spine and pain.[4] Ultimately AIS can reduce these individuals' quality of life,[5] at a period of life with a plethora of emotions and moods.[6,7] Typically, determination of the condition severity through Cobb angle measurements[8] serves as a reliable outcome measure for both surgical and conservative treatments.[9-11]

Non-surgical treatments such as spinal orthoses are successful at reducing the continuation of curves.[12] A thoracolumbosacral orthosis (TLSO) worn for a majority of the day is a conventional treatment to reduce curve progression.[13] The overarching objective in conservative AIS treatment is to reduce the curve progression and prevent surgical intervention.[14] Although valid and reliable outcomes such as the Cobb angle are widely used in clinical practice, patient-reported outcomes are still warranted and provide a medium for patient expression.[15] The Scoliosis Research Society 22 (SRS-22) provides clinicians with a patient-reported outcome measure (PROM) which represents health-related quality of life (HRQoL) from the patients perspective.[16] The instrument has good validity for patients with varying curve magnitudes,[17] and performed well when evaluated for its sensitivity for detecting minimally important changes (MICs).[18]

Initially utilized as a patient-related outcome (PRO) for surgical intervenetions, the SRS-22 has also been utilized to evaluate bracing and exercise in AIS patients.[19] Originally developed in English, the SRS-22 has been translated into Danish, Japanese, and French, as well other languages.[20-22] The Thai SRS-22 has been used to evaluate outcomes related to a surgical intervention in this population,[23] hereby providing clinicians with an instrument for evaluating surgery. However, the validity of SRS-22 English version in the Function domain was low in internal consistency for patients younger than 18 years.[24] The results with the Spanish and Turkish transcultural adaptation studies were also low in internal consistency. [24] The revised Scoliosis Research Society-22 (SRS-22r) was conducted by Asher MA, *et al*[24] to improve the SRS-22 questionnaire regarding psychometrics, particularly in the Function domain internal consistency for patients younger than 18 years.[24] However, SRS-22r had not been translated to Thai language and validated for patients with idiopathic scoliosis. Furthermore, the utility of the instrument to evaluate conservative treatment options,

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such as the orthosis, is warranted and has yet to occur. Over the past year, the SRS-22r questionnaire in particular has gained acceptance and is widely used in English-speaking countries. In countries where English is not the native language, cross-cultural adaptation of the content is required. Thus, the objective of this study was to translate the SRS-22r questionnaire to Thai and evaluate its ability to provide an accurate indication of HRQoL.

Materials and Methods

Participants

Forty individuals with AIS were recruited and participated in the study which was approved by the Institutional Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University (Si. 582/2009). All subjects and parents agreed to participate in the study and provided written informed consent. Radiographic images were used in conjunction with a single physician diagnosis to determine the presence and levels of AIS severity. Participants ranged in age, with skeletal immaturity, 10-18 years of age, Cobb angle measurements between 20-45˚, and were conservatively treated by spinal bracing only. This research excluded all patients who were diagnosed with other types of scoliosis and treated by surgery. The SRS and Society of Scoliosis Orthopedic and Rehabilitation Treatment (SOSORT) guidelines were referred to during the inclusion criteria determination.[25,26] Each participant had previously received spinal orthosis treatment with a TLSO. The treatment comprised of patients wearing the device for the duration of the day with an allotted doffing time for bathing and personal hygiene. Participants had previously attended the clinic on a bimonthly basis for evaluation and device modification by the rehabilitation team.

Translation

The translation process was performed in a manner which focused on proper translation and cross-cultural adaption as encouraged by the World Health Organization (WHO).[27] Two native Thai speakers performed forward translation of the SRS-22r English version.[24] Both translations were then reviewed by translators and discrepancies were evaluated before a final instrument was created. This final Thai instrument was provided to two independent native English speakers who created backwards translations. A committee consisting of a physician, an orthotist and forward translators reviewed the Thai translation of the instrument which resulted in a 22 question instrument covering 5 total domains: Functional (5 items), Pain (5 items), Self-image (5 items), Mental health (5 items) and Satisfaction (2 items).

Evaluation

Correlating domain scores and determination of SRS-22r predictability were performed by comparing the Thai SRS-22r with the Thai Short-Form Survey (SF-36).[28,29] Study participants who returned to the clinic after 6-month orthotic treatment were asked to completed the first set of questionnaires, both the Thai SRS-22r and Thai SF-36. Thereafter, the second questionnaire which is Thai SRS-22r was mailed to participants who had completed the first set. The patients completed the second questionnaire and mailed it back to the researchers. The average response time between the first and second questionnaires was 14 days.[34,39]

Statistical analysis

Statistical analysis was performed using SPSS Statistics version 18.0 (IBM, Armonk, NY, USA). Reliability assessments were performed by calculating Cronbach's α, and intraclass correlation coefficient (ICC) values were determined to evaluate internal consistency and test-retest reproducibility of the aforementioned instruments. An internal consistency reliability (Cronbach's α) of 0.90 was defined as excellent internal consistency; 0.80-0.89, very satisfactory; and 0.50-0.79, good.[30] Test-retest reliability, determined by the ICC, was classified as excellent (>0.75) and good (0.40-0.75). Concurrent validity of the domains of Thai SRS-22r and Thai SF-36 was determined by using Pearson correlation coefficient, with a coefficient of ≥0.75 being excellent; 0.50-0.75, good; 0.25-0.50, moderate; and <0.25, poor.[31] A statistically determined difference was defined by a *P* value of less than 0.01. Related domains of both instruments were identified and compared using Pearson correlation coefficient.[29]

Results

Forty participants completed the first set of instruments and forty first-time instrument respondents completed and returned the second sampling of the survey with the mean age at time of instrument completion being 14.1±2.1 (mean±SD); this included 35 females (87.5%) and 5 males (12.5%).

Table 1 Descriptive statistics of individual domain scores, SRS-22r and SF-36.

Domain	Mean (SD)	Min, Max	%Floor[c]	%Ceiling[d]
SRS-22r[a]				
Functional	3.6 (0.6)	2.0, 4.6	2.5%	7.5%
Pain	4.1 (0.6)	2.8, 5.0	2.5%	10.0%
Self-image	2.9 (0.6)	1.0, 4.4	2.5%	2.5%
Mental health	3.5 (0.7)	1.6, 4.6	2.5%	10.0%
Satisfaction	3.9 (0.7)	1.5, 5.0	7.5%	15.0%
SF-36[b]				
Physical functioning	66.4 (21.9)	20,100	2.5%	5.0%
Role-physical	39.4 (33.9)	0,100	30.0%	10.0%
Bodily pain	71.6 (20.4)	25,100	2.5%	20.0%
General health	57.1 (21.5)	5, 90	2.5%	2.5%
Vitality	56.4 (21.2)	0, 90	2.5%	2.5%
Social functioning	72.5 (25.8)	0, 100	2.5%	27.5%
Role-emotional	70.0 (37.6)	0,100	15.0%	52.5%
Mental health	70.8 (20.7)	4,100	2.5%	2,5%

[a]SRS-22r scale: 5 = best, 1 = worst; [b]SF-36 scale: 100 = best, 0 = worst; [c]%Floor effect: percentage of patients reaching the lowest score in each individual domain; [d]%Ceiling effect: percentage of patients reaching the highest score in each individual domain; n=40.

Table 2 Internal consistency reliability (Cronbach's α coefficients) and test-retest reliability as determined by the Intraclass Correlation Coefficient (ICC).

SRS-22r Domain	Cronbach's α	Cronbach's α[24]	ICC	ICC[39]
Function/activity	0.77	0.78	0.77	0.78
Pain	0.64	0.85	0.64	0.81
Self-image	0.84	0.77	0.82	0.88
Mental health	0.72	0.82	0.69	0.82
Satisfaction	0.28	0.89	0.43	0.79
Mean	0.65	0.82	0.67	0.82

n=40; corresponding values from Asher *et al.*[24] and Potoupnis *et al.*[39]

Average brace time worn per day was 15.3±6.5 hours. The resulting scores are summarized in Table 1. For SRS-22r, all domains, aside from the Satisfaction domain, exhibited low levels of floor effect (<7%). Low-level floor effect was also observed in the SF-36 domains except for Role-physical and Role-emotional domains (>7%). All domains, with the exception of Self-image on the Thai SRS-22r, and four domains on the SF-36 (Role-physical, Bodily pain, Social functioning, Role-emotional), resulted in a high ceiling effect (>7%). Results of internal consistency and test-retest reliability of the Thai SRS-22r are provided in Table 2. The mean overall Cronbach's α coefficient of the SRS-22r was 0.65. Furthermore, the Cronbach's α coefficient was excellent for the self-image domain (0.84) and good for three of the remaining domains: Functional, 0.77; Pain, 0.64; Mental health, 0.72. Test-retest reproducibility correlations are provided in Table 2. The mean ICC for all domains of the Thai SRS-22r was 0.67, demonstrating a very satisfactory to excellent test-retest reproducibility. Function-activity and Self-image domains exhibited an excellent ICC of 0.77 and 0.82, respectively. Concurrent validity of the Thai SRS-22r when compared to the Thai SF-36 was good in nine domain comparisons (r= 0.50-0.75), moderate for 21 comparisons (r=0.25-0.50) with the remainder of comparisons having poor correlations (Table 3).

Table 3. Validity of dimensions of the SRS-22r domains and the relevant SF-36 domains: Pearson correlation coefficients (r).

SRS-22r domain	SF-36 domain	Pearson r	P value
Function /activity	Physical functioning	0.47	0.002
	Role physical	0.45	0.003
	Bodily pain	0.50	0.001
	General health perceptions	0.45	0.003
Pain	Physical functioning	0.47	0.003
	Role physical	0.25	0.126
	Bodily pain	0.55	< 0.001
Self-image /appearance	Physical functioning	0.34	0.030
	General health	0.45	0.004
	Social functioning	0.62	< 0.001
Mental health	Vitality	0.71	< 0.001
	Social functioning	0.61	< 0.001
	Mental health	0.77	< 0.001
Satisfaction with management	Physical functioning	0.05	0.783
	Role physical	0.12	0.455
	Bodily pain	0.19	0.230
	General health	0.10	0.533

Discussion

The Scoliosis Research Society 22 (SRS-22) was created to provide clinicians a health-related quality of life (HRQoL) outcome measure.[16] The SRS-22r instrument was translated in Thai and evaluated in a cohort of conservatively treated AIS patients. Internal consistency overall was lower than the English version of the SRS-22r, with our Cronbach's α being 0.65 and previous authors being 0.82.[24] The 'Satisfaction with management' domain had a low Cronbach's α coefficient of 0.28, which might be attributable to subtle cultural features of our study population. This particular domain showed lower internal consistency than that of other instrument versions.[32–35] Overall, the differences observed in our values might be attributed to our choice of treatment intervention as opposed to the translation itself. It is our belief that the lower values observed might be a result of the psychological status or cultural norms of Thai adolescents,[6] as the bracing procedure can alter psychological wellbeing.[5] Cosmesis of the brace itself might also explain some of the differences in domain values in our study. Test-retest reliability was greater than 0.75 for Function and Self-image domains, yet the ICC of all domains of our instrument was lower than the Greek version of the SRS-22r, as shown in Table 2.[39]

Our study showed a satisfactory concurrent validity of our instrument with the Thai SF-36. This is an important finding for clinicians with a vested interest in measuring HRQoL for AIS patients treated conservatively. Moreover, the Mental health domain showed excellent correlation with the respective domain of the SF-36, similar to previous literature.[36] Satisfaction domain values ranged from 0.05 to 0.19 were markedly low. Previous scholars have also observed a poor correlation amongst the satisfaction with management domain of the SRS-22 and respective domains of the SF-36.[29,37] Still, the SF-36 instrument has yet to be examined for validity in AIS patients. A Rasch analysis could provide a potentially more robust and precise assessment of the Thai SRS-22r.[40] Future research should consider the use of this probability statistical method for psychometric analysis of this important outcome measure.[38] The refinement of the Thai SRS-22r questionnaire in the Satisfaction with management domain are needed.

Conclusion

Bridging the gap between spinal orthosis treatment and a proper assessment of quality of life is critical to orthotic practice. The Thai SRS-22r questionnaire has adequate internal consistency, good to excellent reproducibility and validity. The use of this version of the instrument opens up an opportunity for local Thai clinicians to better evaluate outcomes of spinal orthoses. Future research should be directed at investigating the use of this instrument for AIS

patients with a variety of conservative bracing treatments.

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Conflict of Interest

None to declare.

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