Reliability and concurrent validity of the adapted Greek version of the Scoliosis Research Society-22r Questionnaire. A cross-sectional study performed on conservatively treated patients

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Abstract

Background: The Scoliosis Research Society-22r Questionnaire (SRS-22r) is a questionnaire assessing the health related quality of life of patients with scoliosis. Aim of this study was to evaluate the validity and reliability of the Greek Version of the SRS-22r in patients suffering from scoliosis who were treated conservatively.

Methods: The (translated and adapted) Greek versions of the SRS-22r together with the previously validated Short Form-36 questionnaire were mailed to 117 patients suffering from idiopathic scoliosis. Two weeks later, the Greek SRS-22r was mailed to the same patients once again. The internal consistency, reproducibility and concurrent validity were assessed.

Results: Factor analysis revealed a five–factor structure. The study demonstrated high Cronbach α coefficients for all but the 'Satisfaction with management' domain, when compared with the original questionnaire. Intraclass correlation was excellent regarding every domain of the SRS-22r. Concerning concurrent validity, one domain had excellent (r=0.75-1), thirteen domains good (r=0.50-0.75) and 16 domains moderate correlations (r=0.25-0.50) when compared with the relevant domains of the SF-36 questionnaire.

Conclusions: This Greek Version of the SRS-22r outcome instrument is a validated questionnaire which can be used to evaluate Greek-speaking patients suffering from Idiopathic Scoliosis who are being treated conservatively. Hippokratia 2012; 16 (3): 225-229

Key words: Scoliosis Research Society-22r, SRS-22r Patient Questionnaire, SRS-22r, SRS-22r validation, Greek language, adolescent idiopathic scoliosis

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The Scoliosis Research Society Questionnaire (SRS-22)[1] is a validated instrument which was developed in order to assess the Health Related Quality of Life (HRQoL) of paediatric patients suffering from spinal deformities who are being treated operatively. Nevertheless, it has been repeatedly used in adolescents who were treated conservatively as well[2-4].

Although SRS-22r was prepared having an English-speaking population in mind, the increasing number of multinational and multicultural research projects, made necessary the adaptation of this health status measure in order to be ready for use in many different languages[5]. The SRS-22r questionnaire has been recently translated and adapted into the Greek language, albeit in a study performed in a group of patients who had been treated only operatively[6].

Aim of this study was to estimate the reliability and concurrent validity of this translated Greek version of the SRS-22r questionnaire in patients suffering from idiopathic scoliosis who are being conservatively treated as well.

Materials and Methods

This study was approved by our Institution's Scientific Research Board and it was conducted between March 2007 and March 2008, in accordance with the World Medical Association Declaration of Helsinki of 1964 as revised in 1983 and 2000. The cross-cultural adaptation process was made according to the recently recommended guidelines of Beaton[5]. The initial translations of the SRS-22r into the Greek language which were made by two independent bilingual translators whose mother tongue was Greek were merged into one by consensus among them. Following that, two back-translations were evaluated by two independent translators whose mother tongue was English. An "experts' committee" (formed by a bio-statistician, two spine surgeons and all translators) consolidated all available versions of the translated questionnaire and developed what would be considered as this final version of the Greek SRS-22r (Appendix a).

This Greek version of the SRS-22r questionnaire, the validated into Greek SF-36 instrument[7,8] and an informed consent form, were mailed to 117 patients suffering from

Table 1: The results of Factor Analysis and Internal Consistency.

SRS-22r Subscale	Original Items	Cronbach α	Items suggested by Factor Analysis *	Cronbach α
Function	5, 9, 12, 15, 18r	0.780	5, 9, 14, 18r	0.737
Pain	1, 2, 8, 11, 17	0.785	1, 2, 8, 17	0.837
Mental Health	3, 7, 13, 16, 20	0.917	3, 7, 13, 16, 20	0.917
Self-Image	4, 6, 10, 14, 19	0.883	4, 6, 10, 12, 15, 19	0.897
Satisfaction with Management	21, 22	0.661	21, 22	0.661
Item #11 did not contribute to any construct * Items with factors loading > 0.3				

Table 2: Internal Consistency Reliability.

SRS-22 domain	a	SF-36 domain	a
Function/activity	0.737	**Physical function**	0.86
Pain	0.837	**Role – physical**	0.73
Self image/appearance	0.897	**Bodily pain**	0.71
Mental Health	0.917	**General health perception**	0.76
Satisfaction with Management	0.661	**Vitality**	0.74
(Cronbach α) (n=87)		**Social Functioning**	0.74
		Role emotional	0.70
		Mental Health	0.809

Idiopathic Scoliosis who had been conservatively treated and had been followed-up at the Scoliosis Outpatient Clinic of our Department for at least two years. Two weeks later, this questionnaire, albeit with the questions in different order, was mailed once again to the patients.

The internal consistency and reproducibility were determined by Cronbach α and Intraclass Correlation Coefficient (ICC) respectively. The concurrent validity of the SRS-22r questionnaire was assessed by comparing the patients' answers (Spearman's Rho correlation coefficient) with those of the validated in Greek SF-36 questionnaire. Standard statistical methods were used for descriptive statistics. The normality of data distribution was tested according to the 'Kolmogorov – Smirnov' test. The hypothesis of equality of means was discarded when the probability (p) of a type I error was ≤ 5 %. All statistical tests were two-tailed. Analyses were performed with the use of the SPSS statistical software (Version 12, Chicago-IL, USA).

Results

Ninety-six patients (82%) responded to the first set of questionnaires. Eighty girls and 7 boys of the first time respondents returned the second survey as well. Their age ranged from 12 to 18 years (14.78±1.81). Their mean Cobb angle was 23.66±8.49°. Thirty-five patients (40%) were under medical observation; the remaining 52 (60%) were being treated with a brace.

The majority of the examined items had similar to the original ones factor loads. Item #11 however did not contribute noticeably to any construct. With the exception of item #11, all other items had factor loads greater than 0.50. Items 12, 14 and 15 were loaded in constructs different than the original (Table 1). Cronbach α measurement for every subscale of our Factor Analysis was greater than 0.70. Excellent internal consistency (Cronbach α≥0.90) was achieved for the 'Mental health' domain and very satisfactory internal consistency (Cronbach α=0.80-0.89) for the 'Self-image' and 'Pain' domains (Table 2). The internal consistency for the two remaining domains was good (Cronbach α=0.50-0.79), reaching very satisfactory levels for the Function domain. Two domains of the SF-36 questionnaire had very satisfactory grading whereas the remaining six domains were graded as good (Table 2). The percentage of patients with floor effect was less than 6% in every domain of both questionnaires (Table 3). The SRS-22r domains demonstrated less floor effect than the SF-36 subscales although in the 'Function' domain, SRS-22r seems to suffer from serious ceiling effects. Four domains of SF=36 questionnaire demonstrated a high ceiling effect (Table 3). There were statistically significant correlations among most relevant domains of both questionnaires (Table 4). Moderate correlation (0.25-0.50) was demonstrated in 21 domains, good (0.50-0.75) in 8 and excellent (0.75-1.00) in one domain. The test-retest reproducibility was excellent in every domain of the SRS-22r questionnaire (Table 5).

Discussion

The SRS-22 questionnaire was initially developed for the assessment of the HRQoL of operatively treated patients with scoliosis[1]. However, it has been repeatedly

Table 3: Descriptive Statistics on Individual Domain Scores (n=87).

Questionnaire / domain	Domain Means*	Floor Score Minimum**	Percentiles					%With Floor Effect***	% With Ceiling Effect ***
			100	75	50	25	0		
SRS-22 domains									
Function /activity	4.8(0.29)	3.4	100	100	100	96	68	1.1	52.9
Pain	4.5(0.43)	2.2	100	96	92	88	44	1.1	18.4
Self image / appearance	3.9(0.83)	1.0	100	96	76	68	20	1.1	11.5
Mental Health	3.9(0.8)	1.0	100	92	84	68	20	1.1	8.0
Satisfaction with management	4.2(0.82)	1.5	100	100	90	80	28	1.1	31.0
SF-36									
Physical Functioning	91(16.2)	25	100	100	100	90	25	2.3	54.0
Role physical	90.8(21.2)	0	100	100	100	100	0	1.1	79.3
Bodily pain	88.5(14.5)	23	100	100	90	80	23	1.1	47.1
General health perception	83.7(15.21)	25	100	95	85	75	25	1.1	20.7
Vitality	71.8(19.9)	20	100	85	80	60	20	1.1	4.6
Social Functioning	86.7(22.25)	13	100	100	100	75	13	3.4	65.5
Role emotional	83.9(29.1)	0.00	100	100	100	66.6	0	5.7	71.3
Mental Health	73.2(20.26)	8.00	100	88	76	60	8	1.1	6.9

* The values are given as the mean with the standard deviation in parentheses
** The values are given as raw numbers
*** The values are given as %percentages
Ceiling effect : the percentage of patients reaching the highest score in each individual domain
Floor effect : the percentage of patients reaching the lowest score in each individual domain
In each domain a ceiling score 100 for SF-36 and 5 for SRS-22

used in patients conservatively treated as well[2-4]. Following its introduction[1] it has been properly adapted into several different languages[2,9-11] with studies performed in patients who had been treated either operatively[9-11] or conservatively[2-4]. The SRS-22r questionnaire has been recently translated and adapted into the Greek language, albeit in a study performed in a smaller group of patients who had been only operatively treated[6]. Through a successful cross-cultural adaptation process[5] our version of the SRS-22r questionnaire was adapted into the Greek language with satisfactory reliability and validity. Our study group was formed by patients who were conservatively treated.

Factor analysis revealed a five–factor structure, quite similar to the original instrument with the exception of four items. Item #11 did not contribute noticeably to any construct partly explained by the fact that Idiopathic Scoliosis is usually painless during adolescence. Items #12, #14 and #15 were also not loaded to the originally expected constructs (Table 1). Hashimoto et al[11] reported that item #11 did not belong to any of the subscales of the Japanese adapted version, while items #12 and #14 did not belong to the originally expected construct. Alanay et al[9] suggested the deletion of the item #15. According to Asher et al[12] retaining question #15 is recommended, unless a cultural variable substantially lowers the domain's psychometric properties. Deleting question #15 from this version of the Greek SRS-22r questionnaire worsened the

Table 4: Concurrent Validity of SRS-22 Domains with Relevant Subscales of SF-36 as determined by Spearman's Rho Correlation Coefficient (n=87).

SRS-22r Domain	SF-36 domain	Spearman's Rho	p
Function	Physical Function	0.39	0.001
	Role physical	0.51	0.001
	Bodily Pain	0.52	0.000
	Social function	0.41	0.001
Pain	Physical Function	0.19	0.074
	Role physical	0.3	0.019
	Bodily Pain	0.37	0.005
Self Image	Role physical	0.43	0.000
	General Health Perception	0.42	0.000
	Vitality	0.55	0.000
	Social function	0.53	0.000
	Mental health	0.63	0.000
Mental Health	General Health Perception	0.56	0.000
	Vitality	0.757	0.000
	Social function	0.51	0.000
	Mental health	0.65	0.000
Satisfaction with Management	General Health Perception	0.339	0.001
	Vitality	0.232	0.031
	Mental health	0.200	0.064

Table 5: Test-Retest Reproducibility as Determined by the Intraclass Correlation Coefficient (ICC) (n=87).

SRS-22r Domain	ICC
Function/activity	0.78
Pain	0.81
Self image/appearance	0.88
Mental Health	0.82
Satisfaction with Management	0.79

Cronbach α value of its subscale, hence it is not recommended.

This Greek version of the SRS-22r demonstrated good metric qualities; its mean overall Cronbach α value was lower than the original's (0.805 vs. 0.86)[13] and slightly lower than the refined SRS-22 (0,805 vs 0,822)[12], but better when compared with other adaptation studies[2,9,11]. This may be possibly attributed to cultural differences of the populations studied. The mean Cronbach α value of the Greek SF-36 (0.76) was lower than that of this Greek version of the SRS-22r but equal to this reported during the adaptation process of the SF-36 into the Greek language[8].

In contrast with all the other domains, the internal consistency of the 'Satisfaction with management' domain of this Greek version of SRS -22r was lower than that of other versions[9-11] but not from Chinese[2]. In our study we believe that this lower value is partly attributed either to the level of psychological adaptation and cultural norms of the younger Greek outpatients or it may well be the result of bias, as these patients were followed for at least 2 years in the outpatient Clinic of our department.

Asher et al[14] reported that the original SRS-22 suffered less from ceiling effects than the SF-36 subscales, which was also true for this Greek version of SRS-22r (Table 3). The ceiling effects of all the Greek SRS-22r domains were lower to those reported for the original English SRS-22r[12], with the exception of the 'Function' domain. The ceiling effect of this domain of the English SRS-22r was reported to be relatively high[12]. As the majority of this study's patients were suffering from mild Idiopathic Scoliosis, a relatively high percentage of 'high-score' answers was also inevitable for this Greek version.

The test-retest reproducibility of this Greek version of SRS-22r questionnaire was excellent. The ICC levels were greater than 0.75 in all domains (Table 5). The correlations of relevant domains of this Greek version of the

SRS-22r and the SF-36 were satisfactory, with the exception of the 'Satisfaction with management' domain (Table 4) that was also observed in the Chinese adaptation process. Lai et al[15] also reported that this domain had poor correlation with the SF-36 subscales. Although the use of the SF-36 seems not to be ideal for comparison with the SRS-22r, it was the only available adapted and validated into Greek language HRQL questionnaire and this made our choice limited.

This adapted into the Greek language SRS-22r questionnaire seems to be an instrument with adequate internal consistency; it is highly reproducible and therefore suitable for use in patients suffering from Idiopathic Scoliosis that are being treated conservatively and speak the Greek language.

Acknowledgement

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