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Original Article

Reliability and validity of the Arabic version of the Swiss spinal stenosis questionnaire among Saudi patients with lumbar spinal stenosis

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ABSTRACT

Objectives: The Swiss spinal stenosis questionnaire (SSSQ) is a standard tool to assess the severity of symptoms, physical function characteristics, and satisfaction in patients suffering from lumbar spinal stenosis. The aim was to perform a cross-cultural adaptation and validation of the Arabic version of the SSSQ and test it on Saudi patients with lumbar spinal stenosis.

Methods: One hundred and twenty participants were recruited for this cross-sectional trial from January 2021 to December 2022. The cross-cultural adaption procedure utilized the American Association of Orthopedic Surgeon Outcomes Committee Method. All patients completed the Arabic version of the SSSQ and SF-12 preoperatively and 6 months postoperatively. The intra-class correlation coefficient (ICC), Cronbach alpha (CA), and Pearson correlation coefficient were used to verify the validity and internal consistency.

Results: We analyzed the results of 120 patients. The average age was 64 ± 6.4 years (55–75 years). The SSSQ's total domain CA was 0.90. On the other hand, the functional disability scale (Q8-12) and the symptom severity scale (Q1-7) had corresponding CA of 0.88 and 0.92, respectively. The ICC was 0.92, 0.93, and 0.84 for all items, symptom severity scale, and functional disability scale, respectively. High Pearson correlation coefficients were found between the SF-12 score and the total score of the SSSQ (0.69).

Conclusion: The Arabic version of the SSSQ is a reliable and valid instrument and can be applied to evaluate the surgical outcome of patients with lumbar spinal stenosis.

Keywords: Quality of life, Reliability, Spinal stenosis, Saudi Arabia, Swiss Spinal Stenosis Questionnaire

INTRODUCTION

Jensen *et al.* reported a lifelong prevalence of degenerative lumbar spinal stenosis at 11%, 8%, 10%, and 8% among Japanese, Canadian, American, and Turkish populations, respectively. Studies on adults over 60 years of age have shown that 20% of them had spinal stenosis evidence on magnetic resonance imaging, whereas more than 80% do not exhibit symptoms.[1,2] The international clinical diagnosis consensus of lumbar spinal stenosis suggests that 80% of patients usually present with leg or buttock pain and motor or sensory disturbance while walking.[3] They

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have symmetric foot pulses. Occasionally, to feel relieved, they flex the lumbar spine forward.[4] The Swiss Spinal Stenosis Questionnaire (SSSQ) has been implemented[5] to quantify surgical outcomes. In 1995, Stucki *et al*. developed a new disease-specific instrument measure for outcome assessment of surgery for degenerative lumbar spinal stenosis. It is divided into three domains: The patient's satisfaction with therapy, the physical function, and the intensity of symptoms.[6] Testing has shown that construct validity is a dependable method that is well suited to the study population.[7]

The SSSQ has already been translated and culturally adapted into various languages, including German, Iranian, Spanish, Polish, French, and Japanese.[8-14] The purpose of this study was to evaluate its validity and reliability by translating its original English version into Arabic and culturally adapting this new version among the Saudi-Arabia population.

MATERIALS AND METHODS

This study was approved by the author's institution review board. All participants signed an informed consent form to participate and publish anonymous clinical data. There were 49 (41%) males and 71 (59%) females, and the average age was 64 ± 6.4 years (55–75 years). The patients were recruited prospectively from January 2021 to December 2022. Seven patients declined to participate.

The inclusion criteria were the patients aged from 55 to 75 years old with degenerative lumbar spinal canal stenosis who underwent surgery. The exclusion criteria were the patients with spinal fractures, infections, or tumors. One hundred and twenty patients were asked to complete the Arabic version of the SSSQ and SF-12 questionnaires before and 6 months after the surgery. From an ongoing project that included patients who underwent surgery for spinal stenosis, we recruited the participants for the validation process.

Different methods have been described in the literature to evaluate a health status questionnaire: criterion validity, floor and ceiling effects, content validity, construct validity, internal consistency, reproducibility, responsiveness, and interpretability.[15]

In the current study, the floor and ceiling effects, construct validity, and internal consistency have been applied.

The SSSQ

This score provides a disease-specific tool for evaluating surgical outcomes for degenerative lumbar spinal stenosis patients. It integrates two subscales to assess symptom severity and functional disability related to the disease. The symptom severity scale has seven questions; the first six have a score range of 1–5, while the seventh question only has three possible answers.

The functional disability scale comprises five questions, each scored from 1 to 4. The higher scores denote greater symptom severity, representing greater disability.

Translation and cultural adaptation

The American Association of Orthopedic Surgeons Outcomes Committee method was used to perform the cross-cultural adaptation process.[16] The translation process of the original version of the SSSQ was carried out independently by two qualified nurses who have excellent knowledge of the medical English language. Then, two distinct bilingual PhD students examined these two independently translated surveys. The two translators and PhD students sat together to synthesize a common translation version of the SSSQ. Then, the back translation was performed independently by two professional translators. This process aims to check the validity and ensure that the translated questionnaire reflects the same items as the original version.

Finally, a meeting was organized with different health professionals to analyze the translated questionnaires in different aspects, mainly the level of clarity, conceptional understanding, and common language. Misunderstanding wording, grammatical difficulties, and ambiguous meanings on the questionnaire were identified and resolved.

The SSSQ was pretested on 20 participants to check for its clarity. After completing the updated questionnaire, each participant was interviewed to determine their thoughts on each item. The subjects' feedback was explored, and their responses to the questionnaire were examined to determine whether there was a high proportion of missing or single responses.

Test–retest reliability

Participants were asked to complete the Arabic version of the SSSQ twice within 72 h. The reliability was tested using the intra-class correlation coefficient (ICC).

Statistical analysis

The Statistical Package for the Social Sciences software version 19 (IBM Corp., Armonk, NY, USA) was used for data analysis. The Kolmogorov–Smirnov test was utilized to assess the normality of data distribution. The test was run on the SF-12 and SSSQ scores for all patients preoperatively and postoperatively. The internal consistency was tested using Cronbach's alpha (CA). The validity was tested using the Pearson Correlation Coefficient, and values of ≥0.4 were considered acceptable. A $P < 0.05$ was considered statistically significant.

The ceiling and flooring effects were calculated by the percentage frequency of the respondents' lowest or highest possible score. The ceiling and flooring effects of more than 15% were significant.

The CA coefficient is used to calculate internal consistency. Most social science research scenarios consider a reliability coefficient of 0.70 or above to be "acceptable." ICC values varied from 0 (totally unreliable) to 1 (perfectly reliable), with values above 0.80 considered evidence of excellent reliability.

RESULTS

One hundred and twenty patients with degenerative lumbar spinal canal stenosis completed the Arabic version of the SSSQ and SF-12 preoperatively and six months postoperatively. The demographic data of all patients are shown in Table 1. The average age was 64 ± 6.4 years (55–75 years), and the average body mass index was 32.2 ± 2.5. The ceiling effect postoperatively was negligible. Moderate floor effect was noticed in the patient's response postoperatively in four questions (Q2, 4, 5, and 12), ranging from 20% to 25%. Regarding the SF-12, mean domain scores ranged from 54 to 75. There were no floor effects noted. There were ceiling effects for three domains: Role-physical, social functioning, and role-emotional (50%, 45% and 65%, respectively).

Tables 2 and 3 show the average distribution of quality of life (QoL) measured by the Arabic version of the SSSQ pre- and postoperatively.

Table 4 shows the Pearson Correlation Coefficients between the Arabic version of the SSSQ and corresponding SF-12 domains with a significant correlation in all domains ($P < 0.01$).

Tables 5 and 6 show the reliability coefficients and ICC for the SSSQ subscales. The CA was 0.90, 0.92, and 0.88 for the total, symptom-severity scale, and functional disability scale, respectively.

DISCUSSION

According to a general guideline released by Altman, a sample size of at least 50 patients is sufficient for determining the minimally important difference for measuring the features of health status surveys.[17] The SSSQ is a validated instrument-specific questionnaire to evaluate the health-related QoL and surgical outcomes among patients with spinal canal stenosis.[6] The SSSQ has been translated and validated in different languages. As far as we know, no validation was

Table 1: Demographic data of the 120 patients.

	n	Minimum	Maximum	Mean	Std. deviation
Age (years)	120	55	75	64	6.4
BMI	120	22.9	38	32.2	2.5
Instrumented Level	120	1	5	1.3	0.2

BMI: Body mass index

Table 2: The distribution of the Swiss Spinal Stenosis Questionnaire preoperatively of the 120 patients who completed the questionnaire.

	n	Range	Mean	Std. deviation	Ceiling (%)	Floor (%)
Swiss Spinal Stenosis Questionnaire						
Q1	120	1–3	2	0.51	0	0
Q2	120	1–3	2.3	0.41	2	2
Q3	120	1–3	2.1	0.60	16	0
Q4	120	1–4	2.1	0.40	11	3
Q5	120	1–3	2.4	0.42	20	2
Q6	120	1–4	1.9	0.40	0	1
Q7	120	2–3	1.5	0.53	8	3
Q8	120	1–4	2.2	0.56	16	3
Q9	120	0–3	1.3	0.76	3	1.3
Q10	120	0–3	2.8	0.52	5	0
Q11	120	1–3	2.7	0.33	12	0.4
Q12	120	1–4	2.5	0.84	11	0

Table 3: The distribution of the Swiss Spinal Stenosis Questionnaire (Q) postoperatively of the 120 patients who completed the questionnaire.

	n	Range	Mean	Std. deviation	Ceiling (%)	Floor (%)
Swiss Spinal Stenosis Questionnaire						
Q1	120	0–3	0.87	0.57	0	0
Q2	120	0–2	0.8	0.51	2	3
Q3	120	0–2	0.5	0.81	0	19
Q4	120	0–2	0.9	0.41	3	12
Q5	120	0–2	0.3	0.34	2	24
Q6	120	0–3	0.8	0.61	0	0
Q7	120	0–1	0.5	0.36	1	7
Q8	120	0–2	0.3	0.77	0	20
Q9	120	0–2	0.3	0.84	1	5
Q10	120	0–3	0.8	0.45	0	8
Q11	120	0–2	0.9	0.23	0.5	10
Q12	120	0–2	0.6	0.76	0	11

Table 4: Pearson correlation coefficients between Swiss Spinal Stenosis Questionnaire and SF-12 domains (n=120).

	Total (item 1–12)	Symptom-severity scale (1–7)	Functional disability scale (8–12)
Physical activity (CI)	0.68* (0.65–0.72)	0.64* (0.61–0.67)	0.69* (0.66–0.72)
Limitation-activity (CI)	0.76* (0.73–0.80)	0.84* (0.81–0.87)	0.65* (0.62–0.68)
Physical pain (CI)	0.47* (0.44–0.5)	0.45* (0.42–0.48)	0.50* (0.47–0.53)
Health perceived (CI)	0.74* (0.71–0.77)	0.65* (0.62–0.68)	0.78* (0.75–0.81)
Vitality (CI)	0.57* (0.53–0.61)	0.65** (0.62–0.68)	0.47* (0.44–0.5)
Life and relationships with others (CI)	0.58* (0.55–0.61)	0.65* (0.62–0.68)	0.57* (0.54–0.6)
Mental health (CI)	0.59* (0.55–0.62)	0.54* (0.51–0.57)	0.65* (0.62–0.68)
Limitations-mental state (CI)	0.64* (0.6–0.67)	0.64* (0.61–0.67)	0.65* (0.62–0.68)
SF-12 total (CI)	0.69* (0.66–72)	0.75* (0.72–0.78)	0.67* (0.64–0.7)

CI: Confidence interval. *Correlation is significant P<0.001 level (2-tailed), **Correlation is significant P<0.01 level (2-tailed)

Table 5: Reliability coefficients obtained from cross-cultural adaptation of the Swiss Spinal Stenosis Questionnaire.

Swiss Spinal Stenosis Questionnaire	Number of items	Arabic adaptation in Saudi Arabia
Total	12	0.90 (0.86–0.93)
Symptom-severity scale (CI)	7	0.92 (0.89–0.949)
Functional disability scale (CI)	5	0.88 (0.84–0.91)

CI: Confidence interval

Table 6: Test–retest reliability of the Swiss Spinal Stenosis Questionnaire.

Swiss Spinal Stenosis Questionnaire domains	Number of Items	Intra-class correlation coefficient
Total	12	0.92 (0.89–0.949)
Symptom-severity scale (CI)	7	0.93 (0.9–0.959)
Functional disability scale (CI)	5	0.84 (0.80–0.88)

CI: Confidence interval

done on Arabic patients. This is the first study conducted cross-culturally translating the English version of the SSSQ to the Saudi Arabian language among patients with spinal canal stenosis in Saudi Arabia, also, doing adaptation and validation of the Arabic version. Because the cross-cultural adaption procedure was carried out in the two largest spine centers in the Saudi capital city, which had referrals from all over the country, the study sample is typical of the Saudi population. The questionnaire reliability was measured using the test–retest reliability, internal consistency coefficient, construct validity with a factorial analysis, face and content validity assessed by an expert team, and concurrent validity using the short form-12 on 120 patients with spinal stenosis.

The current study has excellent internal consistency, with a CA value of 0.90 for the total score (Q1-12) and good internal consistency with CA values of 0.92 and 0.88 for the symptom-

severity scale (Q1-7) and functional disability scale (8–12), respectively. It has been found that by removing question numbers 1 and 12, the CA is slightly increased to 0.93.

The results of this study suggested that the adaptation and development of the Arabic version of the SSSQ were successful. The questionnaire has high reliability and internal consistency in Saudi patients with spinal canal stenosis.

The original English version of the SSSQ outcome instrument validated by Comer *et al*. presented a high Person Separation Index of 0.825 for the symptom severity scale (Q1-7) and the functional disability scale, indicating a reliable scale enough to distinguish between groups of patients. The Cohen's kappa coefficient for each individual item ranged from 0.60 to 0.95.[7]

Marchand *et al*. carried out validation and cultural adaptation research for the French version of the Spinal Stenosis Questionnaire. They reported excellent test–retest reliability for the total score and for every subscale individually (all ICCs >0.90). The internal consistency for the symptom severity subscale is high, with a Cronbach coefficient of 0.916.[14]

Heshmati *et al*. conducted a validation study for the Persian version of the SSSQ among 104 Iranian patients. The CA was more than 0.9 for all the items, and the ICC was about 0.90 for all the items. The CA and intraclass correlation for the symptom severity scale (Q1-7) and functional disability scale were 0.942, 0.957, 0.891, and 0.918, respectively.[10]

In the current study, a test–retest process was performed to assess the reliability of the Arabic version of the SSSQ. Internal consistency was found to be excellent for the total score (Q1-12) and symptom severity scale (Q1-7), with ICCs at 0.92 (confidence interval [CI]: 0.88–0.93) and 0.93 (CI: 0.89–0.95), respectively. A modest internal consistency was found for the functional disability scale (Q8-12).

Based on our results, the correlation between the SSSQ and the SF-12 questionnaire was found to be acceptable in many domains. There is a strong positive correlation between the health-perceived domain of SF-12 with the functional disability scale (Q8-12) and the symptom severity scale (Q1-7), and the total score of the Spinal Stenosis Questionnaire. In addition, a strong correlation was noticed between total SF-12 and total Spinal Stenosis Questionnaire scores.

The major strength of the current study is that it was conducted in the two major centers specializing in spine surgery in Saudi Arabia. The results are further strengthened by the relatively large and homogeneous sample size. Despite the thorough analysis of a sizable data set, the resolution of patient information provided by administrative claims data is considered the primary drawback of this study.

CONCLUSION

The Arabic version of the SSSQ is a reliable and valid instrument. It can be applied to evaluate the QoL in Saudi patients with spinal stenosis.

Recommendation: Implementing SSSQ among Saudi patients with lumbar spinal canal stenosis to measure quality-of-life QoL. Future studies may be performed using the Arabic model of SSSQ to evaluate the patient's satisfaction with surgery.

Ethical approval: Research has been performed in accordance with the Declaration of Helsinki and approved by the institutional review board and ethical committee of College of Medicine, King Saud University under project number (IRB Project No. E-23-0738, 15 October 2023).

Declaration of participant consent: The author certifies that he has obtained all appropriate participant consent forms. In the form, the participants have given their consent for their images and other clinical information to be reported in the journal. The participants understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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