ORIGINAL ARTICLE

A validation study of the Iranian version of STarT Back Screening Tool (SBST) in lumbar central canal stenosis patients

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Abstract

Background This study aimed to translate and validate the STarT Back Screening Tool (SBST) in Iran.

Methods This was a prospective clinical validation study. The translation and cross-cultural adaptation of the original questionnaire was performed, and a total of 269 patients with lumbar central canal stenosis were asked to respond to the questionnaire at their first visits. Patients also were asked to complete the Oswestry Disability Index (ODI). Reliability was assessed by internal consistency using the Cronbach's alpha coefficient. Validity was evaluated by performing convergent validity and responsiveness to change.

Results Mean patient age was 58.6 [standard deviation (SD) = 10.9] years; 56.5 % were women. According to patients' imaging, they were diagnosed as grade 1 ($n = 86$), grade 2 ($n = 107$), and grade 3 ($n = 76$). In general, the SBST showed good psychometric properties.

Cronbach's alpha coefficient for overall scale (Q1–Q9) and psychosocial subscale (Q5–Q9) was 0.82 and 0.79, respectively. The ODI correlated strongly with overall SBST scores, lending support to its good convergent validity ($r = 0.81$; $P < 0.001$). Responsiveness to change also indicated desirable results.

Conclusion In general, the Iranian version of the SBST performed well, and findings suggest that it is a reliable and valid measure for screening low back pain in patients with lumbar central canal stenosis in primary care settings.

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Background

Low back pain (LBP) is a common, weakening, musculoskeletal disorder and is a widespread and expensive problem in Western industrialized countries [1]. Lumbar central canal stenosis (LCCS) is a common degenerative disease resulting in LBP in the elderly and caused by impingement of the spinal canal. LCCS characteristically causes neurogenic intermittent claudication, radicular pain, and sensory and motor disturbances in the lower extremities [2]. Patients are concerned about their daily living conditions, and clinicians require practical tools to help quickly identify LBP subgroups requiring early, targeted, secondary prevention. In response to this challenge, several questionnaires have been developed for screening LBP, such as the Orebro Musculoskeletal Pain Screening Questionnaire (OMPSQ). To identify subgroups of LBP patients to guide initial decision making regarding screening, the STarT Back Screening Tool (SBST) was developed. It is a simple, concise, self-administered outcome questionnaire for screening patients with LBP [3–6]. It is available in a number of languages, including English, French, Spanish, and Danish [6–10], and was utilized by investigators [11].

The aim of this study was to translate the SBST from English into Persian and validate and use it in studies for screening LCCS patients in Iran. Currently, there is no such questionnaire available in Iran.

Methods

The questionnaire

The SBST was designed for the purpose of evaluating screening LBP. It consists of nine questions and queries for radiating leg pain and pain elsewhere, disability (two items regarding difficulties with dressing and walking taken from the Roland and Morris Disability Questionnaire), fear (one item from the Tampa Scale of Kinesophobia), anxiety (one item from the Hospital Anxiety and Depression Scale), pessimistic patient expectations (one item from the Pain Catastrophizing Scale), and mood (one item from the Hospital Anxiety and Depression Scale), and how much the patient is bothered by the pain (from Dunn and Croft, 2005). All nine items use a response format of agree or disagree, with the exception of being bothersome, which uses a Likert scale. The questionnaire is designed to classify patients into three risk categories for targeted primary care management: low, medium (physical indicators), and high (physical and psychosocial indicators). The SBST produces two scores: overall and distress subscale. The overall score is used to separate the low-risk from the medium-risk subgroup. Scores range from 0 to 9 and are produced by adding all positive items. Patients who achieve a score of 0–3 are classified as low risk and those who score 4–9 as medium risk. The distress subscale score, which incorporates the remaining five (fear, anxiety, catastrophizing, depression, and bothersome), is used to identify the high-risk subgroup. Scores on this subscale range from 0 to 5, with patients scoring 4 or 5 being classified as high risk (Fig. 1) [6].

The Ethics Committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran, approved the study. All participants underwent a complete clinical examination for LCCS, including clinical symptoms, neurological examinations, and imaging studies on plain radiography, computed tomography (CT), and magnetic resonance imaging (MRI) of the lumbar spine. They had the typical symptoms of LCCS, such as neurogenic intermittent claudication and leg pain and/or numbness. In all cases, the diagnosis was confirmed by more than one spine surgeon. The stenotic level(s) was analyzed on MRI or CT images. There were no restrictions on patient selection with regard to level(s) of LCCS, age, or other characteristics. We excluded all patients with prior lumbar spine surgery and spinal anomalies. We also excluded other types of LBP disease.

Translation

The cross-cultural adaptation went through seven stages according to guidelines:

1. Contact with SBST developers
2. Initial translations (forward translation from English into Persian)
3. Synthesis
4. Backward translations
5. Expert committee review
6. Test of the penultimate version
7. Final version.

Two general practitioners forward translated the questionnaire into Persian. One was aware of the project, and the other was not. Both were instructed to aim for conceptual rather than literal translation. They compared translations and produced a single provisional version of the questionnaire. Then, two other professional translators performed the backward translation of the provisional Persian questionnaire back into English. Finally, an expert committee consisting of translators, researchers, and one outcome methodologist reviewed the translation and cultural adaptation processes. After careful review, few changes were necessary, and the penultimate Persian version was produced. Testing this version was performed in the following way: Five patients with LBP completed the penultimate Persian version to establish that it could be understood and that the questions measured what they were intended to measure. For each item, patients were asked to respond to the following questions: Do you understand what this means? What does this mean to you in your own words? Most patients understood the questionnaire and the concept of each item. However, their general comments on difficulty in completing the questionnaire or understanding the texts were examined, and after a consensus by authors, the final version was developed and used in this study [12–14] (Supplementary Material, Fig. 2).

Patients and data collection

The final draft of the Iranian version was administered to a sample of newly diagnosed LBP patients attending the neurosurgery clinic of a large teaching hospital in Tehran, Iran. There were no restrictions on patient selection with regard to severe, moderate, and mild LBP and age. As there were some illiterate patients ($n = 52$), data for them was collected by face-to-face interviews; the remaining patients ($n = 217$) completed the questionnaire by themselves. To avoid intrarater bias, only one of us (PA, a trained neurosurgery resident) interviewed the patients. There was no significant difference between mean scores between groups, indicating that both methods are

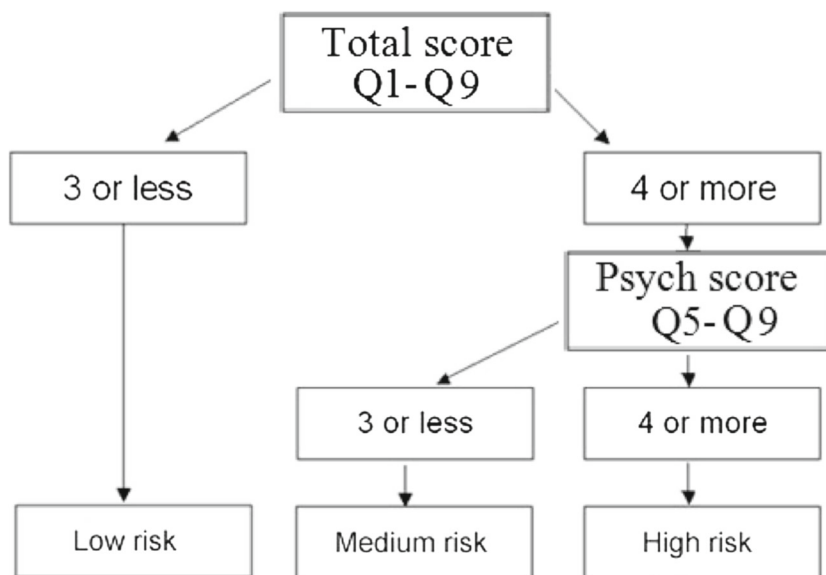| The Keele STarT Back Screening Tool		
Patient name: _____Date: _____		
Thinking about the last 2 weeks tick your response to the following questions:		
	Disagree	Agree
	0	1
1. My back pain has spread down my leg(s) at some time in the last 2 weeks		
2. I have had pain in the shoulder or neck at some time in the last 2 weeks		
3. I have only walked short distances because of my back pain		
4. In the last 2 weeks, I have dressed more slowly than usual because of back pain		
5. It's not really safe for a person with a condition like mine to be physically active		
6. Worrying thoughts have been going through my mind a lot of the time		
7. I feel that my back pain is terrible and it's never going to get any better		
8. In general I have not enjoyed all the things I used to enjoy		
9. Overall, how bothersome has your back pain been in the last 2 weeks?		
Not at all Slightly Moderately Very much Extremely		
0 0 0 1 1		
Total score (all 9): _____ Sub Score (Q5-9):_____		

Fig. 1 Original English version of the nine-item STarT Back screening tool

acceptable [face-to-face interview group, 4.3, standard deviation (SD) = 2.5 versus self-administered group, 4.1 (SD = 2.3), $P = 0.846$]. Patients were assessed at one point in time.

Additional measure

The Iranian version of the ODI is a measure of functionality and contains ten items, with a possible score ranging from 0 to 50 and higher scores indicating worst conditions. The psychometric properties of the questionnaire are well documented [15], and the questionnaire was used to examine criterion validity.

Statistical analysis

Several statistical tests were used to establish the psychometric properties of the SBST.

1. Reliability: Reliability was assessed by internal consistency using Cronbach's alpha coefficient; alpha ≥0.7 was considered satisfactory [16].
2. Validity: To test validity, the following procedures were used.
(i) Criterion validity (convergent validity): correlation between the SBST and the ODI was assessed using Pearson's correlation coefficient; values ≥0.40 were considered satisfactory ($r \geq 0.81$–1.0 excellent, 0.61–0.80 very good, 0.41–0.60 good, 0.21–0.40 fair, 0.0–0.20 poor) [16, 17].
(ii) Responsive to change: This was performed to examine how well the questionnaire could indicate changes after surgery. As 97 patients underwent surgery, we compared baseline data and postsurgery information for them using the paired samples t test. Of these, 68 patients were from the high risk group and 29 patients from the median-risk group.

All statistical analyses were performed using the PASW Statistics 18 Version 18 (SPSS, Inc., 2009, Chicago, IL, USA).

Results

Characteristics of LBP patients and their scores on the SBST are shown in Table 1. Mean patient age was 58.6 (SD = 10.9) years; most were married (76.9 %) and had completed primary or secondary education (65.1 %). All items of the questionnaire had a 100 % response rate, and no patient experienced difficulty completing it. Overall mean SBST score (Q1–9) and psychosocial subscale score (Q5–9) were 4.1 (SD = 2.4) and 2.1 (SD = 1.5), respectively.

Reliability as examined by Cronbach's alpha coefficient was satisfactory: 0.82 for the overall scale (Q1–9), and 0.79 for psychosocial subscale. SBST validity was examined using convergent validity: overall score (Q1–Q9) correlated strongly with the ODI, lending support to its good convergent validity ($r = 0.81$; $P < 0.001$). Finally, responsiveness to change was evaluated by paired t test. In all instances the SBST was able to detect changes after intervention (surgery), indicating improvement in all subscales, as expected. Results are shown in Table 2.

Discussion

The results obtained in this study show that the Persian version of the SBST is a reliable and valid instrument for screening LCCS patients. The SBST is one of the internationally renowned tools for screening LBP patients and is

Table 1 Characteristics of the study sample ($n = 269$)

	Number	Percentage
Age groups (year)		
29–54	78	28.9
55–64	101	37.5
≥65	90	33.6
Mean (SD)	58.6 (10.9)	
Range	29–84	
Gender		
Male	117	43.5
Female	152	56.5
Educational status		
Illiterate	52	19.3
Primary	127	47.2
Secondary	48	17.9
College/university	42	15.6
Marital status		
Single	25	9.3
Married	207	76.9
Divorced/widowed	37	13.8
ODI*		
Mean (SD)	31.8 (12.8)	
SBST score**		
Overall (Q1–Q9)		
Mean (SD)	4.1 (2.4)	
Psychosocial subscale (Q5–Q9)		
Mean (SD)	2.1 (1.5)	
Subgroups as classified on the SBST		
High risk	72	26.8
Median risk	114	42.4
Low risk	83	30.8

SD standard deviation, ODI Oswestry Disability Index, SBST STarT Back Screening Tool

* Higher scores on the ODI indicate worse conditions

** Higher scores on the SBST indicate worse conditions

Table 2 Responsiveness to change for the STarT Back Screening Tool (SBST) as indicated for patient subgroups ($n = 97$)

Risk group	Preoperative Mean (SD)	Postoperative Mean (SD)	P value*
High ($n = 61$)	6.3 (1.9)	1.7 (1.4)	<0.0001
Median ($n = 28$)	4.8 (1.5)	1.6 (1.3)	<0.0001
Low ($n = 8$)	1.9 (1.5)	0.8 (1.2)	0.03
Overall	4.4 (1.6)	1.6 (1.3)	<0.0001

* Derived from paired samples t test

valued for its ease of administration, reliability, validity, development in different cultures, and applicability in analysis of economics [6–10]. It is a potentially useful tool for

use in primary care settings. The French and Spanish versions were reported to be comprehensible [7, 8]. The Danish version tested the discriminative validity. It also has sufficient patient acceptability and discriminant validity to be used in Denmark [9]. Our study performed convergent validity, which is a major contribution toward the psychometric evaluation of the instrument. To the best of our knowledge, the Persian version is the only condition-specific outcome measure that has undergone psychometric evaluation in Iran for screening LCCS patients. As our study results proved that the SBST is responsive to treatment (surgery), we believe it could also be used in clinical settings.

We carried out only a limited number of tests for this validation study. In future, it might be necessary to perform other tests to establish stronger psychometric indexes for the SBST. As the test recognized clinical measures for known groups, comparing items such as walking distance is recommended. Perhaps performing factor analysis might also help establish further psychometric evidence for the questionnaire. As the ODI is a disease (LBP)-specific quality of life measurement and the SBST evaluates physical condition as well as psychological indicators using the ODI alone seems to be insufficient. For validation, comparison with a psychological instrument is recommended. Finally, we were unable to include other types of LBP disease in this study for psychometric assessment due to a variety of disease- and treatment-related variables in LBP patients.

The SBST questionnaire is a sensitive measure for screening LCCS patients. The use of this simple measure is recommended in order to increase the diagnostic success of LCCS patients, especially in teaching hospitals.

Conclusion

In general, the Iranian version of the SBST performed well, and findings suggest it is a reliable and valid measure for screening LBP in patients with LCCS in primary care settings.

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