RESEARCH ARTICLE

Reliability and Validity of the Swiss Spinal Stenosis Questionnaire for Iranian Patients with Lumbar Spinal Stenosis

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Abstract

Background: The purpose of this study was validation of the Persian translation of the Swiss Spinal Stenosis Questionnaire in order to be used by Iranian researchers.

Methods: A total of 104 patients with spinal stenosis diagnosis, who were candidates for operative treatment were entered into the study. The patients completed the translated questionnaire in the 1st and the 7th days of admission and 6 months after surgery. Visual analogue scale was used to determine the severity of the pain in the1st day and the 6th month. Discriminant validity, convergent validity, test-retest reliability, internal consistency, ability to detect changes and sensitivity to clinical changes were assessed for the statistical purposes.

Results: Cronbach's α was more than 0.9 for all the items. ICC was about 0.9 for all the items. For symptoms, physical and total items, Cronbach's α was 0.942, 0.957, 0.926 and Intraclass correlation were 0.891, 0.918, 0.862, respectively. Paired t-test was significantly different between the 1st day and the 6th month questionnaire. There was a positive correlation either between the first VAS and the 1st day questionnaire (1st day Q) (r=0.892, *P=0.000*) or between the 6th month VAS and 6th month Q (r=0.940, *P=0.000*). The Pearson's correlation between the difference of the total scores of the 1st day and the 6th month and satisfaction score after surgery showed negative correlation (r= -0.746, *P=0.000*). The effect size was 2.55.

Conclusion: The Iranian version of the Swiss Spinal Stenosis has excellent internal consistency, excellent reliability, good ability to alter with changes, especially parallel with clinical improvement, excellent ability to detect changes, and well either convergent or discriminant validity.

Level of evidence: II

Keywords: Questionnaire, Reliability, Spinal stenosis, Validity

Introduction

Spinal stenosis is one of the most common disorders that conducts patients to orthopedics and spine clinics. Degenerative spinal stenosis is the most common form of spinal stenosis and usually affects elderly population. The most common symptoms of the disease are low back pain, sciatica and intermittent neurogenic claudication (1, 2). Diagnosis of the disease is clinical but radiography, CT scan and specially MRI are useful in confirming the diagnosis and rolling-out other differential diagnosis and are helpful in planning treatment of the disease (1, 3).

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For making standard documentation and communication between publics, we need a uniform language and various questionnaires are our tools for this purpose. So these questionnaires must be standard and reliable in each nation. One of the most useful ones is Swiss Spinal Stenosis that was introduced by Stucki in 1996 and its reliability and validity have been challenged in many studies(4-6). Accordingly, we decided to translate and validate it in order to provide a standard questionnaire for Iranian researchers.

Swiss questionnaire has 18 questions. The first 7 questions are related to patient's symptoms. The first three questions are related to pain (severity, frequency and back pain) and the last four questions are related to neuroischemic symptoms (numbness or tingling, weakness and balance disturbance). Each question is scored from 1 to 5. Thus the maximum score, which can be achieved from this domain, is 35. The next 5 questions are related to physical activity of patients, and each question is scored from 1 to 4 (maximum 20 scores). Higher score means more severity of the disease. The last 6 questions are about satisfaction of patients after surgical treatment, and each is scored from 1 to 4. Higher score means less satisfaction from the surgery.

Materials and Methods

All patients with lumbar spinal stenosis who were candidates for surgical treatment were included in the study. Patients completed the translated forms of the Swiss Spinal Stenosis Questionnairein the first day of admission (1st day Q). These forms were completed again after one week but before surgery (7th day Q). And finally, the patients completed the questionnaires and satisfactory questions 6 months after surgery (6th month Q). Visual analogue scale (VAS) was used for detecting the severity of the pain on the first day and the 6th month after surgery. All the analyses were performed using SPSS 22.

Translation process

For face and content validity of the Iranian translated questionnaire, it was presented to our spine surgeons and neurosurgeons co-workers to ensure used terminologies in the questionnaire are the same as the usual idioms employed by patients in clinics and were consistent with terminologies written in textbooks. Then this questionnaire was back-translated to English by an English master in our university, familiar with medical terminologies but un-aware of the original Swiss Questionnaire. Subsequently, the back-translated copy was compared with the original copy in order to resolve differences, so the final translated copy was prepared for validation.

Validity

To evaluate discriminant validity, paired t-test was used between the 1st day Q and the 6th month Q (7). 0.05 was used as the significance level. For convergent validity, the 1st day Q and the 6th month Q were compared with the corresponding VAS using Pearson correlation (8).

Reliability

Test-retest reliability was detected by the intraclass correlation coefficients (ICCs) and 95% confidence interval using the two pre-operative questionnaires (1st day Q and 7th day Q). Internal consistency was assessed by Cronbach's α using the 1st day Q.

Ability to detect changes

Effect size was used to detect the ability of the questionnaire to determine clinical changes as it is one of the most common methods for this purpose (9). The 1st day Q and the 6th month Q were used to calculate it. The value of 0.2 or less represents low, and value of 0.8 or more represents high ability to detect changes (10).

Sensitivity to clinical changes

Pearson's correlation was used in order to determine the ability of the questionnaire to change after treatment. For this purpose, the difference between the total scores of the 1st day Q and the 6th month Q was calculated, and its correlation and score of satisfaction from surgery were determined. Negative correlation represented the sensitivity to clinical changes because the higher score of satisfaction questions means the less satisfaction from surgery.

Results

A total of 104 patients (68 women and 36 men) with mean age 58.96 ± 1.07 years (39 – 85) with lumbar spinal stenosis diagnosis were entered into the study. All the patients have been performed conservative treatment with no satisfactory results. Thus, they stood as candidates for surgical treatment. Standing radiography and MRI were requested for all the patients and other para-clinic evaluation such as CT scan, bone densitometry and electrodiagnostic studies were requested if indicated for confirming the diagnosis and rolling-out other differential diagnosis and performing operative plane.

The mean scores of the questionnaires are summarized in Table 1. The mean score of VAS of the 1st day Q and the 6th month Q were 7.33 ± 0.65 (6 – 9) and 4.92 ± 7.33 (4 – 6), respectively.

The Cronbach's α of the symptom and physical scales were above 0.9 and the details are listed in Table 2.

The results of the test-retest and intraclass correlation coefficient between the 1st day Q and the 7th day Q are summarized in Table 3.

The results of the paired t-test between the 1st day Q and the 6th month Q in order to determine discriminant validity showed significant difference in all the items as shown in Table 4. About convergent validity, there was a positive correlation either between the first VAS and the 1st day Q (r=0.892, *P=0.000*) or between the 6th month VAS and the 6th month Q (r=0.940, *P=0.000*).

The mean total score of the 1st day Q and the 6th month Q was 40.23 and 24.38, respectively. And the standard deviation of the total score of the 1st day Q was 6.22.

Table 1. The Mean Scores of the Questionnaire on the 1st and 7th Days before Surgery and 6th Months after Surgery and the Mean Score of Satisfaction after Surgery

Questionnaire items	1st day Q ± SD	7th day Q ± SD	6th month Q ± SD
symptoms	23.31 ± 4.70 (14 – 34)	23.04 ± 4.13 (16 – 34)	14.02 ± 4.86 (7 - 28)
Physical	15.27 ± 2.69 (9 – 20)	15.48 ± 2.99 (8 – 20)	10.37 ± 3.62 (5 - 17)
Total	38.56 ± 6.09 (28 – 52)	38.52 ± 5.73 (30 – 52)	24.38 ± 7.42 (13 - 40)
Satisfaction after surgery	-	-	10.65 ± 4.50 (6 – 24)

Table 2. The Cronbach's α of queationnaire items on 1st day of admission

Questionnaire items	Cronbach's α
Symptoms	0.942
physical	0.957
total	0.926

Table 3. The results of test-retest between 1st day Q and 7th day Q

Questionnaire items	ICC	CI 95%	*P value*
symptoms	0.891	0.843 – 0.925	0.000
physical	0.918	0.881 – 0.943	0.000
total	0.862	0.803 – 0.904	0.000

Table 4. The results of paired t test between 1st day Q and 6th month Q in order to determine discriminant validity

Questionnaire items	1st day Q ± SD	6th month Q ± SD	*P value*
symptoms	25.04 ± 4.91	14.02 ± 4.86	0.000
physical	15.19 ± 3.41	10.37 ± 3.62	0.000
total	40.23 ± 6.22	24.38 ± 7.42	0.000

Thus, 2.55 is the calculated effect size in order to determine the ability to detect changes.

Pearson's correlation between the difference of the total scores of the 1st day Q and the 6th month Q and satisfaction score after surgery was used in order to determine the sensitivity of the questionnaire to clinical changes. The result was negative in correlation with a significant difference (r= -0.746, *P=0.000*).

Discussion

Degeneration of the intervertebral disc is the most common cause of low back pain and the final sequence of it, is degenerative lumbar spinal stenosis (11). Low back pain, sciatica and intermittent neurogenic claudication are the most common complaints of patients (12). Treatment may be nonsurgical but according to the degenerative nature of the disease, it is usually progressive and surgical intervention may be required finally as spinal stenosis is one of the most common reason of spinal surgery among older population in the United State (13). In order to communicate between researchers, we need a standard language. Thus, classifications and outcome questionnaires become important. Swiss Spinal Stenosis Questionnaire, also named Zurich claudication questionnaire and Brigham spinal stenosis questionnaire is one of the most common tools for this purpose. As a result, we tried to test its reliability and validity when translated in Persian language.

We used Cronbach's α for internal consistency of our translated questionnaire (14). It looks the questionnaire for homogeneity of the questions. 0.7 or higher values mean satisfactory reliability for comparing the two groups, however, for clinical purposes, the value of 0.9 or above is usually needed (15). This is the result obtained from our study in all domains of the questionnaire.

Repeated reliability means that the questionnaire must lead approximately the same results over a period of time, when completed by the same patient. It is tested with test-retest and intraclass correlation coefficient and the result is a number between 0 and 1. Bigger number, gives the greater reliability. Generally, the value between 0.6 to 0.8 means good and the value greater than 0.8 means excellent reliability (16). Portney and Watkins believed that ICC must reach 0.9 for clinical purposes (17). Our translation is very near to this

criterion. Thus, Iranian version of the questionnaire has excellent reliability.

Surgical treatment of lumbar stenosis usually is successful and satisfactory for patients. The 6th month Q was different significantly from the 1st day Q and this means Iranian version has good ability to alter with changes and to clarify if these changes are parallel to improvement of symptoms of patients, we used satisfactory questions of the questionnaire. There was a negative correlation between the difference of 1st day and 6th month questionnaire and satisfaction of the patients. Increase in the score of satisfaction after surgery means less satisfaction of patients from treatment. Therefore, the larger the difference between 1st day Q and 6th month Q results, more improvements, and less score of satisfactory questions.

The effect size is a tool to clarify the ability to detect changes. The value of 0.2 or less means low ability, but value of 0.8 or more means high ability to detect changes (7). The effect size in our study was 2.55, and this means excellent ability to detect changes.

We used VAS for detecting convergent validity, but it was better to use other questionnaires related to spinal stenosis such as Shuttle Walking Test, Oxford spinal stenosis score, and the Oswestry disability index, but unfortunately none of them have been validated in Iranian version. The results from our analyses shown well either convergent or discriminant validity of the Iranian version of the questionnaire.

The Iranian version of the Swiss Spinal Stenosis Questionnaire has excellent internal consistency, excellent reliability, good ability to alter with changes, especially parallel with clinical improvement, excellent ability to detect changes and well either convergent or discriminant validity.

Our informed consent was obtained from the study participants.

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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