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# Validation and reliability of the Persian version of the Zurich Claudication Questionnaire in patients with lumbar spinal stenosis

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ABSTRACT

*Background:* One of the applicable tools introduced as a specific tool for assessing claudication in patients with lumbar spinal stenosis is the Zurich Claudication Questionnaire (ZCQ). This questionnaire has been validated in different populations of patients. The present study aimed to determine the validation status of the Persian version of ZCQ.

*Methods:* After professional translation of the ZCQ by native English translators, it was executed twice before surgery with 1 day interval on 45 Iranian patients with spinal stenosis. The reliability was assessed by determining the Chronbach's Alpha coefficient as well as intraclass correlation coefficient (ICC). To assess the concurrent validity, the correlation across the 3 domains of the questionnaire was calculated by the Pearson's correlation test and the content validity was determined using a panel of experts.

*Results:* To assess test-retest reliability, the ICC for ZCQ for symptom severity, functional disability, and satisfaction domains were 0.80, 0.82, and 0.78, indicating acceptable reliability. Regarding internal consistency, Cronbach's alpha coefficients for the Persian version of ZCQ for the 3 above domains were shown to be 0.96, 0.92, and 0.90 respectively. On the subject of content validity, the 3 questionnaire's domains were marked as relevant with the content validity indices of 0.88, 0.82, and 0.80 respectively. Concerning concurrent validity, all 3 domains of the Persian ZCQ correlated strongly with 1 another.

*Conclusions:* The ZCQ questionnaire with the same original structure is completely functional and reliable in the Iranian patient community.

## Introduction

One of the major differential diagnoses of appearing pain and numbness along with gait disturbance is lumbar spinal stenosis. spinal stenosis is mainly characterized by a narrowing spinal canal mostly in the lumbar section due to progressive degenerative processes that may lead to intraspinal vascular and neural compression [1].

Due to the deterioration of clinical symptoms in affected patients, impaired quality of life is significantly expected in such people if this condition left untreated [2].

In most patients with mild symptoms, conservative therapy can be accompanied by the proper therapeutic response, however in some cases; invasive approaches such as surgical decompression may be indicated [3,4].

The first diagnostic step in such patients, as well as the selection of an appropriate treatment approach, is a detailed and comprehensive clinical evaluation of its complications and severity. Various tools have been developed to assess the degree of lumbar spinal stenosis as well as claudication caused by its progressions such as the Oswestry Disabil-

FDA device/drug status: Not applicable.

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**Table 1**
The reliability analysis of ZCQ questionnaire.

| Item | No. question | Scale mean if the item deleted | Cronbach's alpha item deleted |
|---|---|---|---|
| Severity of symptoms | Q1 | 15.85 | 0.945 |
| | Q2 | 16.60 | 0.976 |
| | Q3 | 16.10 | 0.923 |
| | Q4 | 15.80 | 0.944 |
| | Q5 | 15.80 | 0.938 |
| | Q6 | 15.80 | 0.940 |
| | Q7 | 16.85 | 0.951 |
| Functional disability | Q8 | 7.90 | 0.986 |
| | Q9 | 8.25 | 0.941 |
| | Q10 | 8.15 | 0.945 |
| | Q11 | 8.55 | 0.950 |
| | Q12 | 8.75 | 0.932 |
| Treatment satisfaction | Q13 | 9.70 | 0.877 |
| | Q14 | 9.45 | 0.847 |
| | Q15 | 9.60 | 0.874 |
| | Q16 | 9.15 | 0.802 |
| | Q17 | 9.40 | 0.875 |
| | Q18 | 9.20 | 0.846 |

ity Index and visual analogue scale [5,6]; however, these tools are not specific for assessing such orthopedics defects.

One of the applicable tools that have been introduced as a specific tool for assessing claudication is the Zurich Claudication Questionnaire (ZCQ) which is now accepted as a valid tool for the assessment of spinal stenosis and its intensity [7].

This questionnaire has been structured into 3 main domains including the domain for assessing symptom severity, the domain for assessing the degree of functional disability, and the domain for assessing patients' level of satisfaction with the treatment approach. In this questionnaire, a higher score in each domain indicates more defect severity.

Due to the comprehensiveness of the questions and especially the patients' easy understanding of the content of the questions, while the concepts of the questions are specialized, the use of this tool has been highly welcomed in many specialized treatment centers [8]. In addition, this tool has been translated and validated linguistically in different countries [9–11]; however, its Persian version has not been assessed structurally or contently.

Hence, the present study aimed to assess the psychometric properties of the Persian version of ZCQ in patients with lumbar spinal stenosis.

## Materials and methods

### *Description of questionnaire structure*

The ZCQ questionnaire consists of 3 main components (domains). The first domain has 7 items scored 1 to 5 for assessment of the severity of symptoms, the second domain with 5 items scored 1 to 4 for assessment of functional disability and the third domain with 6 items scored 1 to 4 for assessment of treatment satisfaction.

The higher score in each domain indicates more severe symptoms condition and the total score can be obtained by adding the final scores for 3 domains.

Translation of the ZCQ questionnaire

WHO practice guideline was employed to translate the original version of the ZCQ questionnaire [12]. Briefly, a forward translation of the primary version was first considered into the targeted language (the Persian version).

The forward translation was done by 2 blinded expert translators independently. This phase was followed by a backward translation into the original language (English). Any variances in translating were resolved aided by a third party that was also fluent in both languages.

In the final phase, the consensus back-translation was compared to the original version, and the ultimate version agreed upon by all 3 translators was finalized.

The assessment of ZCQ reliability and validity

To examine the reliability and validation states of ZCQ, the measurement of reliability and content validity of the questionnaire were considered.

First, the reliability of the tool was assessed by determining test-retest reliability and internal consistency.

For assessing test-retest reliability, the power of agreement between 2-time points of questionnaire fulfillment (2 times before surgery with 24 line hour interval on 45 patients suffering lumbar spinal stenosis) was tested by measuring the intraclass correlation coefficient (ICC). In this regard, the coefficient > 0.7 indicated an acceptable reliability state.

For the assessment of internal consistency, Cronbach's alpha coefficients related to preoperative responses were calculated with the goal of determining the homogeneity of the items within each domain and also the overall questionnaire. A Cronbach's alpha of 0.7 or higher was considered acceptable for internal consistency.

To assess the content validity, the content validity index (CVI) was determined based on the viewpoints of 4 specialists on the contents of the items in each domain concerning 1) the relevance of each item in the questionnaire, 2) the clarity of each item, and 3) the essentiality of each item. The relevant scale was categorized into a 4-point scale as "not relevant," "somewhat relevant," "quite relevant" and "very relevant." Therefore, CVI was calculated as the number of responses as "very relevant" for each item divided by the total number of responses that values higher than 0.79 indicated relevant (content valid) status.

To assess the concurrent validity, the correlation across the 3 domains of the questionnaire was also calculated by Pearson's correlation test.

For the statistical analysis, the statistical software SPSS version 23.0 for windows was used.

## Results

Overall, 45 patients were recruited for the present study that fulfilled the ZCQ questionnaire 2 times before surgery with 24 line hour interval.

To assess test-retest reliability, the ICCs for the Persian version of ZCQ for symptom severity, functional disability, and satisfaction domains were 0.80, 0.82, and 0.78 respectively indicating acceptable reliability.

Regarding internal consistency, Cronbach's alpha coefficients for the Persian version of ZCQ for the 3 above domains were shown to be 0.96, 0.92, and 0.90 respectively indicating high internal consistency. In this regard, deleting each item led to a significant lowering of total consistency indicating acceptable integrity of the questionnaire (Table 1).

With regard to content validity, the 3 questionnaire items were marked as relevant with the CVIs of 0.88, 0.82, and 0.80 respectively.

Regarding concurrent validity, we could show that all 3 domains of the Persian ZCQ correlated strongly with one another with a correlation coefficient of 0.81 between the domains of symptom severity and functional disability domains, a coefficient of 0.76 between symptom severity and satisfaction domains, and a coefficient of 0.76 between functional disability and satisfaction domains.

## Discussion

Patients with spinal canal stenosis, basically face 2 major limitations, including pain and paresthesia, as well as lower limb dysfunction, and this issue, if more severe, can affect various physical and psychological aspects of the patients' quality of life.

In fact, the desired treatments, including conservative or surgical methods, are considered mainly with the aim of improving the patients' disabilities and ultimately improving their quality of life. What plays an important role in choosing the most favorable treatment approach includes the accurate and comprehensive initial assessment of the patients' primary disabilities and the details of the spread of the complications of this disorder.

However, various examinations and imaging methods play a fundamental role in determining and diagnosing abnormalities related to this condition, but the first step in evaluating patients is to gather comprehensive information on the initial symptoms of the disease, especially the occurrence of claudication in patients, and the best tool in such an evaluation is comprehensive and reliable questionnaires.

Various questionnaires have been designed and presented to evaluate the symptoms and severity of disability of such patients, but almost none of these questionnaires have been specific to investigate various aspects of involvement and disability in patients with spinal canal stenosis.

In recent years, the use of the ZCQ questionnaire has received special attention and it has been shown that it has been very successful in evaluating 3 important aspects related to the complications of the disease, including the severity of symptoms, the level of functional disability, and the level of satisfaction of patients with the treatments performed.

Based on this, in various societies of the world, the mentioned questionnaire has been evaluated in terms of reliability and validity in that society and finally, it has been used as the most applicable tool in examining the severity of disability and limitations in such patients.

What was clearly identified in our study was the reliability and validity of this questionnaire in the Iranian patient community, which made unnecessary the need for restructuring this questionnaire, the factor analysis of the questionnaire, and its complete localization in this community.

In general, in the validation of an international questionnaire, several issues should be considered.

First, the questionnaire should have acceptable reliability, which means that in the repeated use of these questionnaires, an almost similar understanding of the questionnaire questions will be obtained (repeatability). Reliability is actually a symbol of homogenous continuity and alignment of the questions of a questionnaire.

In the second step, the questionnaire must also have high accuracy or validity so that the answers given to the questions of the respondents are consistent with what the questioner expects and in fact, the answers to the questions have the necessary accuracy. This issue will reflect both the content of the questionnaire questions (content validity) and the focus of the questions on the ultimate goal of research (concurrent validity).

Obviously, in evaluating the goals of a study, establishing both aspects including the reliability and validity of the tool will be absolutely necessary.

In cases where at least one of these components is not achieved, an in-depth examination of both the structure and content of the questionnaire is based on the characteristics.

Therefore, what was determined in the present study was that the ZCQ questionnaire with the same original structure was also completely functional and reliable in the Iranian patient community, and it was an acceptable evaluation of the disease state, the disability related to it, and also the level of satisfaction of the patients with the treatments performed.

## Declarations of Competing Interest

The authors declare that there is no conflict of interest.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.xnsj.2023.100237.

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