



## The Persian Version of Örebro Musculoskeletal Pain Screening Questionnaire: Translation and Evaluation of its Psychometric Properties

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**How to cite this article:** Sharafi SE, Hafizi S, Shahi MH, Kordi R, Noorbala AA, Arbabi M, et al. The Persian version of Örebro musculoskeletal pain screening questionnaire: Translation and evaluation of its psychometric properties. *Int J Prev Med* 2017;8:14.

### ABSTRACT

**Background:** Screening of psychosocial risk factors for chronic low back pain (LBP) is essential. The Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ) is one of the most recognized and widely used instruments for this purpose. This study aimed to translate the ÖMPSQ into Persian, to adapt it for Iranian culture, and to investigate its psychometric properties.

**Methods:** Using a linguistic methodology, the ÖMPSQ was translated into Persian according to the World Health Organization guideline. A total of 106 patients with LBP participated in the study. Internal consistency and test-retest reliability were evaluated. Concurrent validity was estimated with Pearson's correlation between the ÖMPSQ and short form health survey (SF-12), Hospital Anxiety and Depression Scale (HADS), and visual analog scale (VAS). Factor analysis was used to evaluate dimensionality.

**Results:** The content validity index was 0.80. The instrument had a good test-retest reliability (intraclass correlation coefficient = 0.82) and internal consistency (Cronbach's  $\alpha$  = 0.82). Factor analysis indicates that factorial structure of Persian version was similar to original questionnaire. There was a significant correlation ( $r = 0.252-0.639$ ,  $P < 0.01$ ) between VAS score and all the ÖMPSQ domains. Physical component summary of SF-12 was positively correlated with miscellaneous domain ( $r = 0.384$ ,  $P < 0.05$ ) and negatively correlated with psychology domain of ÖMPSQ ( $r = -0.364$ ,  $P < 0.05$ ). A significant correlation between total score and anxiety component of HADS and psychology domain of ÖMPSQ was found ( $r = 0.49$ ,  $P < 0.01$  and  $r = 0.442$ ,  $P < 0.05$ , respectively). Correlations between the ÖMPSQ and SF-12 and HADS and VAS indicate acceptable concurrent validity.

**Conclusions:** The Persian version of ÖMPSQ was as a valid and reliable instrument and also a good cross-cultural equivalent for original English version.

**Keywords:** Linguistic validation, low back pain, Örebro Musculoskeletal Pain Screening Questionnaire, psychometric properties

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DOI:  
10.4103/2008-7802.201658

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## INTRODUCTION

Musculoskeletal disorders are among the major causes of disability and dysfunction in Iran and worldwide.<sup>[1]</sup> Low back pain (LBP) is the most common musculoskeletal problem and is known as one of the most prevalent causes of morbidity all across the globe<sup>[2,3]</sup> as up to 90% of adults experience LBP at some stages in their lives.<sup>[4]</sup> LBP has been shown to be the second cause of Disability Adjusted Life Years in all age groups of Iranian people.<sup>[5]</sup> Epidemiologic studies in Iran revealed high prevalence of musculoskeletal problems, particularly LBP (acute and chronic) among Iranian population.<sup>[1,5-7]</sup> In a recent national health survey conducted among more than 25,307 Iranians of both rural and urban areas, 29.3% of the subjects reported LBP.<sup>[8]</sup> Moreover, LBP is the source of significant economic burden for societies, due to high level of resulting activity limitation. The majority of these costs arise from the chronicity of the disease.<sup>[9]</sup> Pain subsides within first 2–3 months in about 80%–90% of cases, and for the rest (about 10%–20%), chronic pain syndromes develop.<sup>[10]</sup> The underlying pathology of chronic LBP cannot be still identified in about 85% of cases that is called as nonspecific chronic LBP.<sup>[11]</sup> Despite advances in surgical and pharmaceutical interventions, 32% of patients with LBP report some episodes of limitations in daily activities due to LBP even after receiving of usual treatments.<sup>[12]</sup> These findings more highlight the importance of psychosocial factors in the disability and burden of LBP on the societies. Consistent with this, a cohort study conducted on industrial workers in Iran showed that workers with lower job satisfaction and higher job strains are more likely to report LBP.<sup>[13]</sup> Psychosocial factors or “yellow flags” can increase the risk of development or continuation of chronic pain.<sup>[14]</sup> They are major contributors in the transition of acute LBP to chronic LBP.<sup>[15]</sup> Early identification and treatment of these contributing factors can prevent transition from acute to chronic LBP.<sup>[14,15]</sup>

Application of an appropriate measure is the essential part of screening for psychosocial risk factors of chronic LBP. Several screening tools have been introduced in the literature, which have included psychological and physical prognostic factors.<sup>[2]</sup> The original Örebro Musculoskeletal Pain Screening Questionnaire (original-ÖMPSQ)<sup>[16]</sup> is one of the most widely used and investigated instruments in this field.<sup>[17-22]</sup> In addition, ÖMPSQ was recommended for evaluation of workers who are under the compensation insurance coverage<sup>[14,23]</sup> and also recognized as a useful tool for prediction of absenteeism,<sup>[16,17,22,24-26]</sup> chronicity,<sup>[9,20,24]</sup> pain,<sup>[16,18,27]</sup> and impairment.<sup>[21,23,27]</sup>

Shortened form of this questionnaire (ÖMPSQ-10) is also recently validated by Linton *et al.* and has been shown to be more feasible than the long form of the questionnaire

with acceptable predictive ability<sup>[28,29]</sup> and can be utilized in clinical and research settings.

To the best of our knowledge, very few studies conducted in Iranian population regarding the role of psychosocial factors in LBP. We believe reasons for this gap of literature about the role of psychological factors in LBP may be due to lack of appropriate measures.<sup>[30]</sup> The purpose of the study was to develop Persian version of ÖMPSQ (ÖMPSQ-P) and to assess its validity and reliability.

## METHODS

### Linguistic validation

On the basis of standard guideline of World Health Organization (WHO), the English version of ÖMPSQ was translated into Persian.<sup>[31]</sup> Accordingly, the questionnaire was translated into Persian by translators whose their mother tongue was Persian and had enough expertise in English. After reaching a consensus regarding the translated Persian version, it was back translated by two native English speakers to English. In a meeting, all the translators and researchers and two experts evaluated all versions of the questionnaires and the final Persian version of the questionnaire was developed and its content validity was tested accordingly. In this regards, ten patients filled out the questionnaire and words with unclear meaning were replaced and the final version was provided. An independent bilingual translator back translated the final Persian version to English.

The content validity and equivalence testing was performed by six independent academic psychiatrists and psychologists. They rated the degree that each questionnaire item assesses defined content. A 5-point Likert scale in the ascending trend of “appropriateness” and “relevance” was used.

### Participants

Volunteer patients who participated in this study were recruited consecutively from LBP clinic of sports medicine unit affiliated to Tehran University of Medical Sciences (TUMS), Tehran, Iran. All the patients had chronic nonspecific LBP (at least 3 months in the past 6 months). Patients with age less than 18 or more than 65 years, inability to read and write in Persian, and with red flags who were suspicious that their LBP were due to specific origin such as inflammatory diseases (rheumatologic diseases), infectious diseases, neoplasms, fractures, cauda equina syndrome were excluded by a sports medicine specialist from the study. The protocol of the study was approved by our Institutional Ethics Committee.

### Measures

#### Örebro Musculoskeletal Screening Questionnaire

The original-ÖMPSQ has 25 self-administered questions, of which 21 of them are scored (on a 0–10 point

response scale) giving a total score of 0 to 210. These are designed around five proposed domains: function, pain, psychological, fear-avoidance, and miscellaneous.<sup>[25]</sup> The ÖMPSQ items have been derived from the “Acute LBP Screening Questionnaire” (ALBPSQ)<sup>[32]</sup> by removing the word “back” and adding further body areas to question #1.<sup>[16]</sup> Patients were classified into “low,” “medium,” and “high” risk groups using derived cutoff of  $\geq 112$  for high risk group and a cutoff of 90 to separate low from medium risk group patients.<sup>[16,21,33]</sup>

The ÖMPSQ and ALBPSQ were used in several studies in different countries with various languages.<sup>[19,27,34]</sup> However, there is no validated questionnaire in Persian-language available for screening of psychosocial factors in LBP.

According to the five components of ÖMPSQ, we selected hospital anxiety and depression scale (HADS) and short form health survey (SF-12) and visual analog scale (VAS) for evaluation of psychological component, function and disability, and pain and their correlation with ÖMPSQ.

#### *Short form health survey*

SF-12 as a shorter alternative of the SF-36 was repeatedly used in health outcomes surveys. It includes 12 self-administered questions for measuring eight health concepts: physical functioning (2 items), role limitations due to physical problems (2 items), bodily pain (1 item), general health (1 item), vitality (1 item), social functioning (1 item), role limitations due to emotional problems (2 items), and perceived mental health (2 items). These eight health concepts form two distinct subscales related to physical and mental health known as physical component summary (PCS) and mental component summary.<sup>[35,36]</sup> The SF-12 was a reliable and valid instrument to measure health-related quality of life among the Iranian population.<sup>[37]</sup>

#### *The Hospital Anxiety and Depression Scale*

HADS is a brief and widely used self-administered questionnaire to determine the levels of anxiety and depression in the persons with medical problems. It is a 14-item scale. Seven of the items are pertaining to anxiety and seven to depression.<sup>[38]</sup> It has been translated and validated in many languages, and it is widely used in Persian population for clinical and research purposes.<sup>[39]</sup>

#### *Visual analog scale*

VAS is an instrument that tries to measure a characteristic like pain which is ranging across a continuum of values and cannot easily be directly measured. VAS is a standard and valid measure of pain intensity with high test-retest reliability.<sup>[40]</sup>

## **Psychometric and statistical analysis**

### *Reliability*

The ÖMPSQ-P was tested for internal consistency through calculation of Cronbach's alpha coefficient

for each domain and also the whole questionnaire. All of the participants were tested 2 weeks after initial assessment. Intraclass correlation coefficient (ICC) was utilized for assessing the test-retest reliability of the questionnaire.

### *Concurrent validity*

To examine concurrent validity of the instrument all of the participants completed SF-12, HADS and VAS questionnaires concurrent with ÖMPSQ and the correlation of the scores of all questionnaires were calculated.

### *Construct validity*

Factorial structure and dimensionality of the questionnaire were assessed through factor analysis with a varimax rotation and Kaiser normalization. Although varimax rotation as a type of orthogonal rotation is used when there is not any inter-correlation among different factors as field mentions in his book<sup>[41]</sup> if the correlation between factors was insignificant in oblique rotation, it is logical to use orthogonal rotation.

For determining the degree of agreement between expert panel members in the second step of translation process, a content validity index (CVI) was calculated. Lynn has indicated that a CVI of 0.78 or higher is acceptable.<sup>[42]</sup> To assess reliability of the ÖMPSQ, Chronbach's alpha coefficient assessed for internal consistency. Cronbach's alpha greater than 0.7 was assumed satisfactory.<sup>[43]</sup> For test-retest analysis, intraclass correlation coefficient (ICC) was utilized. Fleiss describes ICC values from 0.40 to 0.75 as “fair to good.”<sup>[44]</sup>

Factor analysis was utilized for analyzing dimensionality of the questionnaire. Concurrent validity of ÖMPSQ was evaluated using correlations between ÖMPSQ-P subscale scores and HADS, SF-12, and VAS scores. A significance level of  $P \leq 0.05$  was assumed satisfactory.

## **RESULTS**

### **Linguistic validation**

The ÖMPSQ-P was developed in complete conformance with the previously mentioned translation process. Each step of process provides further information for the improvement of understandability and acceptability of the questionnaire. The only cultural discrepancy between English and Persian version was that people in Iran usually do not go shopping weekly, but most of them go shopping when they need something to buy. As a result, we delete the term “weekly” in question # 20.

Content validity examined by experts' panel. The CVI for the total and the five subscales instrument (function, pain, psychological, fear-avoidance, and miscellaneous) was 0.80, 0.82, 0.84, 0.80, 0.85, and 0.78, respectively. The paucity of missing data in psychometric evaluation also confirmed the acceptability of the instrument.

### Psychometric evaluation

A total of 106 patients with LBP participated in this study. The demographic characteristics of the subjects are summarized in Table 1. The descriptive statistics of different measures are presented in Table 1.

Internal consistency was found to be acceptable with Cronbach's alpha coefficient between 0.56 and 0.82 [Table 2]. The ICC for test-retest reliability was 0.82 (95% confidence interval 0.142–0.244,  $P < 0.0001$ ).

Concurrent validity of ÖMPSQ is measured by Pearson's correlation coefficient between ÖMPSQ domains and scores of HADS, SF-12, and VAS. As shown in Table 3, the comparable domains of ÖMPSQ and other questionnaires were significantly correlated. There was a significant correlation ( $r = 0.252-0.639$ ,  $P < 0.01$ ) between VAS score and all the ÖMPSQ domains. PCS of SF-12 was positively correlated with miscellaneous domain ( $r = 0.384$ ,  $P < 0.05$ ) and negatively correlated with psychology domain of ÖMPSQ ( $r = -0.364$ ,  $P < 0.05$ ). A significant correlation between total score and anxiety component of HADS and psychology domain of ÖMPSQ was found ( $r = 0.49$ ,  $P < 0.01$  and  $r = 0.442$ ,  $P < 0.05$  respectively).

The solution emerged from factor analysis revealed five factors with eigenvalues of 4.97, 2.30, 1.92, 1.45, and 1.36 which were accounted for 57.20% of variance observed [Table 4]. The factors that were extracted in this study were consistent with most of the domains of original version of ÖMPSQ except for miscellaneous domain. Items of the function domain were correlated with factor 1, items of the pain domain were associated with factor 2, items of the psychology domain were correlated with factor 3, and items of fear-avoidance beliefs were correlated with factor 5.

### DISCUSSION

This study aimed to develop ÖMPSQ-P and to assess reliability and validity of it. The Persian translated version was provided using standard forward-backward guideline. The final version of the questionnaire was prepared after assessment of face and content validity. The ÖMPSQ was clearly understood and easily applicable to the patients. Content validity indices of total and specific domains of questionnaire were robust. As stated by Lynn, in the condition that six or more persons judging an item, the CVI should be at least 0.78 for the item to be acceptable.<sup>[42]</sup> The Cronbach's alpha for the whole questionnaire which provides an estimate of internal reliability was 0.82 which is high and satisfactory. The similar value found by Gabel *et al.* while assessing 143 acute LBP persons.<sup>[45]</sup> In

**Table 1: Demographic and descriptive characteristics of participated patients**

Characteristics	Values
Total number	106
Female (%)	47.2
Age (years), mean±SD	41.74±13.27
Education level (%)	
Under diploma	18.9
Diploma	37.7
Bachelor of science	32.1
Higher education	11.3
Employment status (%)	
Homemaker	32.1
Employed	51.9
Jobless	9.4
Retired	6.6
Score of ÖMPSQ (0-210)	
Total	96.33 (29.80)
Pain domain	29.96 (9.43)
Psychology domain	21.45 (9.73)
Fear-avoidance beliefs domain	17.81 (7.51)
Function domain	16.70 (11.69)
Miscellaneous domain	10.41 (5.56)
Score of VAS for pain (0-10)	55.2 (24.81)
Score of HADS (0-21)	
Total	16.72 (6.54)
Depression	7.23 (3.34)
Anxiety	9.26 (4.36)
Score of SF-12 (0-100)	
MCS	39.16 (10.18)
PCS	37.74 (7.81)

ÖMPSQ=Örebro Musculoskeletal Pain Screening Questionnaire, VAS=Visual analog scale, HADS=Hospital Anxiety and Depression Scale, SF-12=short form health survey, MCS=Mental Component Summary, PCS=Physical Component Summary, SD=Standard deviation

**Table 2: Cronbach's alpha value of total and domain-specific of Örebro Musculoskeletal Pain Screening Questionnaire**

ÖMPSQ items	Number of items	Cronbach's alpha
Total score	21	0.82
ÖMPSQ domains		
Pain	5	0.64
Function	5	0.63
Psychology	5	0.56
Fear-avoidance beliefs	3	0.62
Miscellaneous	3	0.65

ÖMPSQ=Örebro Musculoskeletal Pain Screening Questionnaire

another study conducted by Grotle *et al.*, they evaluated 123 Norwegian patients with acute LBP and 50 patients with chronic LBP. The results show a Cronbach' alpha of 0.95.<sup>[27]</sup> In a validation study of Dutch version of ÖMPSQ, Heneweer *et al.* reported a Cronbach's alpha of 0.81.<sup>[20]</sup> Schmidt *et al.* evaluated 360 German patients

**Table 3: Pearson's correlation coefficient of the Örebro Musculoskeletal Pain Screening Questionnaire subscales and scores of Visual analog scale, Hospital Anxiety and Depression Scale, and Short Form Health Survey**

	Pain	Miscellaneous	Psychology	Fear-avoidance beliefs	Function
VAS	0.639**	0.252**	0.398**	0.309**	0.348**
SF-12-PCS	-0.256	0.384*	-0.364*	-0.172	-0.167
SF-12-MCS	0.037	-0.324	-0.327	-0.242	0.102
HADS-total	-0.298	0.061	0.490**	0.254	0.011
HADS-depression	-0.175	0.092	0.330	0.203	0.158
HADS-anxiety	-0.287	-0.013	0.442*	0.171	-0.091

\*P<0.05, \*\*P<0.01. ÖMPSQ=Örebro Musculoskeletal Pain Screening Questionnaire, VAS=Visual analog scale, HADS=Hospital Anxiety and Depression Scale, SF-12=Short form health survey, MCS=Mental Component Summary, PCS=Physical Component Summary

**Table 4: The Cronbach's alpha value if item deleted of the Örebro Musculoskeletal Pain Screening Questionnaire items and factor loading from factor analysis of it**

ÖMPSQ items	Cronbach's alpha if item deleted	Factor 1 - function	Factor 2 - pain	Factor 3 - psychology	Factor 4	Factor 5 - fear-avoidance beliefs
Q1	0.825	-	0.513	-	-	-
Q2	0.825	-	0.320	-	-	0.320
Q3	0.830	-	0.568	-	-	-
Q4	0.832	-	-	0.571	-	-
Q5	0.820	-	0.509	-	-	-
Q6	0.818	-	0.812	-	-	-
Q7	0.817	-	0.780	-	-	-
Q8	0.819	-	-	-	0.607	-
Q9	0.824	-	-	0.836	-	-
Q10	0.820	-	-	0.825	-	-
Q11	0.816	-	-	-	0.731	-
Q12	0.819	-	-	0.464	-	-
Q13	0.821	-	-	0.556	-	-
Q14	0.818	-	-	-	0.543	0.556
Q15	0.823	-	-	-	-	0.803
Q16	0.815	-	-	-	-	0.758
Q17	0.817	0.661	-	-	-	-
Q18	0.822	0.818	-	-	-	-
Q19	0.807	0.739	-	-	-	-
Q20	0.819	0.790	-	-	-	-
Q21	0.819	-	-	-	0.672	-
Eigenvalues		4.97	2.30	1.92	1.45	1.36
Percent of variance		23.676	10.95	9.17	6.92	6.47

ÖMPSQ=Örebro Musculoskeletal Pain Screening Questionnaire

with acute and subacute LBP and Cronbach' alpha was 0.80.<sup>[46]</sup>

Test-retest reliability over 2 weeks using ICC was 0.82 which is comparable to similar studies<sup>[20,27,45]</sup> and shows high stability of ÖMPSQ over time.

Factor analysis revealed five-factor solution for this questionnaire. This finding is similar to five dimensions of the original questionnaire and Dutch version of ÖMPSQ. Two studies have reported inconsistent number of factors. In the validation study of the Norwegian version ALBPSQ, the authors

reported three factors for the measure.<sup>[27]</sup> In another more recent study, six factors have been reported for this measure.<sup>[45]</sup>

The current study has various limitations that should be considered in interpretation of the results. First, ÖMPSQ is a self-administered questionnaire; therefore, results may be affected by response bias. Second, the sample size of the study may not be an ideal sample size for factor analysis.

We suggest the recent Persian validated Fear-Avoidance Beliefs Questionnaire be used for concurrent validity of the fear-avoidance domain of ÖMPSQ in future.<sup>[47]</sup>

## CONCLUSIONS

The ÖMPSQ-P is a reliable and valid measure that can be used for psychosocial screening of patients with LBP. This instrument could assist the clinicians to have a biopsychosocial and multidimensional approach to chronic non-specific LBP.

## Acknowledgments

The study was supported by a grant from TUMS (Grant No. 90-03-30-15074). We would like to thank Professor Steven Linton, Professor of Clinical Psychology, Centre for Health and Medical Psychology, Örebro University for his permission to use the instrument.

## Financial support and sponsorship

The study was supported by a grant from Tehran University of Medical Sciences.

## Conflicts of interest

There are no conflicts of interest.

Received: 25 Sep 15 Accepted: 27 Nov 16

Published: 07 Mar 17

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