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ORIGINAL RESEARCH

Cultural Adaptation, Reliability and Validation of the Arabic Örebro Musculoskeletal Pain Questionnaire in Patients with Low Back Pain

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Background: The Örebro Musculoskeletal Pain Questionnaire (ÖMPQ) assesses the psychosocial factors in people with complaints of musculoskeletal disorders and predicts those likely to develop persistent symptoms.

Objective: To culturally-adapt and assess the validity of the ÖMPQ in an Arabic population with low back pain (LBP).

Methods: This was a prospective cohort validation study of the ÖMPQ. The Arabic-ÖMPQ was created by forward translation, translation synthesis and backward translation in an Arabic population. Participants were included if they were 18 years or older, had acute or chronic LBP and were fluent in Arabic. Eighty-four patients completed the questionnaires at baseline, 2 days later and 3 months follow-up. We assessed specific agreement and test–retest reliability using the interclass correlation coefficient (ICC). We assessed predictive validity using linear regression and relative risk. We assessed content validity by investigating the ceiling and floor effects.

Results: To construct validity, the Arabic-ÖMPQ had a moderate ($r \geq 0.3$, <0.5) to high ($r \geq 0.5$) correlation with pain, disability, fear-avoidance and catastrophizing questionnaires. The test-rest reliability was high $ICC_{2,1}$=0.92 (95% CI: 0.83–0.96). The Arabic-ÖMPQ score at baseline can significantly predict disability at 3 months $F(1,82)=33.87$, $p<0.01$; R^2=0.29.

Conclusion: The translation of the Arabic-ÖMPQ into Arabic was successful. The Arabic-ÖMPQ showed very good reliability and proper validity and thus can be used to predict the risk of developing persistent disability amongst patients with LBP in an Arabic population.

Keywords: low back pain, Örebro Musculoskeletal Pain Questionnaire, Arabic, cultural adaptation, validation

Introduction

Low back pain (LBP) is a common worldwide health problem. It affects 40% of individuals at some point in their life,[1] and is a leading cause of disability and health-care financial burden.[2] In the Arab region (22 countries), LBP-related disability has reached levels similar to those of the Western world.[3] Among high-income Arab countries (six countries), LBP is ranked the fourth reason for years lost due to disability.[3] In Saudi Arabia, LBP may be affecting 53% to 79% of people,[4] and it is also considered the third leading cause of disability after motor vehicle accidents and diabetes.[2] Due to the rapid rise of such conditions, the Ministry of Health in Saudi Arabia through the World Health Organization Regional Office has called for programs and policies to reduce the burden of chronic diseases in all countries in the Eastern Mediterranean.[3]

Given the huge burden of LBP in Saudi Arabia, it is important that primary care clinicians are able to identify patients at risk of developing persistent symptoms and make early referrals to physical therapy. In Saudi Arabia, patients with spinal disorders represent 28.1% of referrals to physical therapy clinics, of which 53.1% are due to LBP.[5] From the time of referral, it seems that patients who took 16 days or more till their first physical therapy session were less likely to adhere to the treatment plan and more likely to develop persistent symptoms.[6] In a Saudi community, development of persistent LBP symptoms has been associated with physical factors such as pain intensity, physical activity and body

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mass index, as well as psychosocial factors (ie yellow flags) such as fear-avoidance, unhelpful beliefs, poor expectation about recovery, anxiety and depression.[7] These factors, despite cultural differences, are similar to those reported in the Western world.[8] It is recognized that early assessment of these factors will help clinicians identify patients at risk of persistent disability and direct them to the optimal path of care early.[9]

One tool that to assist in the early identification of yellow flags and patients risking the development of persistent disability due to pain is the Örebro Musculoskeletal Pain Questionnaire (ÖMPQ).[10] The ÖMPQ uses multiple domains to predict disability including physical factors such as pain intensity and location and psychological factors such as fear-avoidance, unhelpful beliefs, poor recovery expectations, catastrophizing, anxiety and depression. The ÖMPQ consists of 25 items of which 21 are scored. Each scored item can take a value from 1 to 10, for a total score of 210. A score of 105 or less indicates a low risk of developing persistent disability (accuracy of 95%), a score of more than 105 and less than 130 indicates a moderate risk of developing persistent disability and a score of 130 or more indicates a high risk of persistent disability (accuracy of 86%) at 6 months.[10,11] In the original study, an ÖMPQ score of 90 points had a sensitivity of 89% and a specificity of 65% for absenteeism due to sickness, and a sensitivity of 74% and a specificity of 79% for functional ability.[10] The ÖMPQ has been shown to have satisfactory reliability and predictive validity.[10]

The ÖMPQ can benefit clinicians, researchers, and patients. It can aid primary care providers in evaluating the risk of developing persistent disability upon first contact with the patient. This can help researchers design studies that account for baseline variables that predict disability or explain variability in response to intervention. It helps patients receive proper treatment that addresses the reasons for their persistent disability. Additionally, primary health-care clinics are often not equipped with trained personnel to screen for psychosocial factors associated with LBP. Furthermore, many psychosocial variables have been identified in the literature, which makes their assessment overwhelming and time-consuming. Therefore, using the ÖMPQ can offer multiple stakeholders better allocation of resources and utilization of time.

Since its release in 1998, the ÖMPQ English version has been translated, culturally adapted and validated into several languages and populations.[12–15] However, there is no translation, cultural adaptation or validation in an Arabic population thus far. Arabic is one of the most commonly used languages in the world and considered one of the six official languages by the United Nations.[16] Therefore, the aim of this study is to culturally-adapt and evaluate the ability of the ÖMPQ to predict disability in a primary care clinic in Saudi Arabia.

Materials and Methods

Translation of the Arabic ÖMPQ

Based on Beaton et al guidelines,[17] we conducted a multistep translation of the ÖMPQ. The first step was a forward translation where two translators whose native language was Arabic and proficient in English translated the ÖMPQ into Arabic. The two Arabic translations were synthesized into a single form. The second step was backward translation, where two translators whose native language was English and proficient in Arabic translated the synthesized Arabic ÖMPQ back into English. In the third step, an expert committee was formed to examine all the translations from the forward, backward and synthesized versions, and create a prefinal version of the Arabic ÖMPQ. The expert committee consisted of two researchers and three clinicians familiar with Saudi culture who worked to resolve any discrepancy in the translation process and ensure that the prefinal version is appropriate for use in Saudi culture. The prefinal version was distributed on 23 consecutive patients at a primary care outpatient facility to examine the comprehension of each item and resolve any misinterpretation. Since there were no issues with the prefinal version, the expert committee decided to use it as the final version.

Validation of the Arabic ÖMPQ

Design

The final version of the Arabic ÖMPQ was used to test the psychometric properties in a primary care outpatient clinic in a hospital in Saudi Arabia. Participants were asked to complete questionnaires at baseline, 2 days later and then 3 months follow-up. The study was supported, for reliability and validity, by using the minimum required number of participants of 50.[18] To account for dropout, we aimed to increase the number of participants to 80. This study was approved by the Office of Research Integrity and Compliance in the authors' hospital.

Participants

The inclusion period was between March 2018 and February 2019. Participants were included if they were 18 years or older, had acute or chronic LBP and were fluent in Arabic. Participants were excluded if they had fracture, cancer, inflammatory conditions, infections, severe neurological deficits, post-surgical, psychiatric disorder or pregnant. Participants who consented to participate were asked to complete the questionnaires and then received the usual care.

The purpose of the study was explained, and informed consents were signed by all participants. The study planned to include at least 50 participants, the minimum required to measure the reliability and validity of a questionnaire adequately, according to Terwee et al.

Measurements

Session One (at Baseline)

Participants completed a demographics form, the Arabic versions of the ÖMPQ, Oswestry Disability Index (ODI),[19] Numeric Pain Rating Scale (NPRS), Fear-Avoidance Behavior Questionnaire-Physical Activity and Work scales (FABQ-PA; FABQ-W),[20] and the Pain Catastrophizing Scale (PCS).[21]

Session Two (Two Days Later)

Each participant was asked if their symptoms changed from last session? Participants were also asked to complete the Arabic NPRS and ÖMPQ again to investigate the retest reliability.

Session Three (Three Months Later)

Participants were asked to complete the Arabic versions of ODI and NPRS. They were also asked if their symptoms changed from last sessions.

Statistical Analysis

All statistical analysis was conducted using SPSS 25 (Armonk, NY: IBM Corp.). We used descriptive statistics to describe participants' characteristics and the prevalence of the three risk profiles: low, medium, and high on the Arabic ÖMPQ.

For Construct Validity

We analyzed the characteristics of pain, disability, fear-avoidance behavior and catastrophizing across the ÖMPQ risk profile to determine the discriminant validity. We also calculated Pearson's correlation coefficient between specific ÖMPQ items and their respective questionnaires according to each item domain. We used Bier et al,[22] a priori expectations that there would be moderate ($r \geq 0.3$, <0.5) to high ($r \geq 0.5$) correlation between pain items 9, 10 and 11 with the NPRS; catastrophizing items 12, 13, 14 and 15 with PCS; fear-avoidance of physical activity items 18 and 19 with FABQ-PA scale; and fear-avoidance of work item 20 with FABQ-W scale; disability items 6, 20, 21, 22, 23, 24 and 25 with ODI. We expected a low correlation $r<0.3$ between items 8 (perception of work demands), 16 (expectation to return to work) and 17 (work satisfaction) with FABQ-W scale.

For Reliability

We assessed the agreement between two measurements in a group of participants whose conditions remained stable between sessions 1 and 2. We considered a stable condition when the participant responded "yes" to the question "Have your symptoms changed from the last session?" and the NPRS score did not change more than ± 1 point. We calculated the interclass coefficient ($ICC_{2,1}$) and the specific agreement. The $ICC_{2,1}$ was interpreted as follows: ≤0 = poor; 0.01–0.02 = slight; 0.21–0.4 = fair; 0.41–0.60 = moderate; 0.61–0.80 = substantial; and 0.81–1 = perfect. We also calculated specific agreement using a 3×3 table similar to that reported Bier et al.[22]

For Predictive Validity

We calculated a simple linear regression to determine whether ÖMPQ at baseline can predict ODI at 3 months. We also calculated the relative risk ratio (RR) for the medium-risk group and high-risk group relative to the low-risk group. For RR, we considered persistent disability when the ODI score at 3 months remained above the median of the baseline score.

For Content Validity

We investigated floor and ceiling effects by calculating the percentage of participants scoring 0 (floor) or 210 (ceiling). If the percentage was >15%, then floor or ceiling effect was present.

Results

We recruited 84 participants whose demographics are listed in Table 1. At baseline, 53.6% of participants were in the low-risk group, 38.1% were in the medium-risk group and 8.3% were in the high-risk group.

Table 1 Demographics and Clinical Characteristics at Baseline

Variable	Frequency	Percent (%)
Age, y, mean (SD)	33.1 (10.6)	
Sex		
Male	54	64.3
Female	30	35.7
Education		
Secondary school	24	28.6
College degree	54	64.3
Higher education	6	7.1
Employment		
Student	8	9.5
Employed	51	60.7
Unemployed	18	21.4
Retired	7	8.3
Clinical characteristics		
Symptoms duration, mean± (SD)	58.2 (66.4)	66.4
NPRS mean (SD)	5.3	2.3
ODI mean (SD)	29.6	19.5
FABQ-PA mean (SD)	12.1	5.7
FABQ-W mean (SD)	16.4	9.9
PCS mean (SD)	21.6	11.5
Arabic-ÖMPQ mean (SD)	98.3	25.9
Risk profile		
Low	45	53.6
Medium	32	38.1
High	7	8.3

Note: Data are reported as numbers and percentages unless stated otherwise.
Abbreviations: SD, standard deviation; NPRS, Numeric Pain Rating Scale; ODI, Oswestry Disability Index; FABQ-PA, Fear-avoidance behavior questionnaire Physical Activity; FABQ-W, Fear-avoidance behavior questionnaire Work; PCS, Pain catastrophizing Scale; Arabic-ÖMPQ, Arabic Örebro Musculoskeletal Pain Questionnaire.

For Construct Validity

It appeared that for each increase in risk profile on the ÖMPQ, there was an increase in clinical characteristics of pain, disability, fear-avoidance and catastrophizing (Table 2). Also, the Pearson's [*r*] correlation between each ÖMPQ item and its corresponding clinical outcome is reported in Table 3. There was moderate to high correlation between the pain items 9, 10 and 11 with the NPRS. There was a low correlation between the catastrophizing item 12 with PCS; however, moderate to high correlation between the catastrophizing items 13, 14 and 15 with PCS. There was a high correlation between the fear-avoidance (physical activity) items 18 and 19 with FABQ-PA scale. There was a high correlation between the perception of work demands item 8 with FABQ-W scale; however, there was a low correlation between the fear-avoidance (work) item 20, expectation to return to work item 16 and work satisfaction item 17 with FABQ-W scale. There was a moderate to high correlation between the disability items 6, 21, 22, 23, 24 and 25 with ODI.

For Reliability

There was 45 participants whose status was determined to be stable, so they were included in the assessment of reliability. The $ICC_{2,1}$ for the ÖMPQ was 0.92 (95% CI: 0.83–0.96). The specific agreement for the low-risk group was 78.26%, medium-risk group was 71.79% and high-risk group was 40% (Table 4).

For the Predictive Validity

A simple linear regression shows that the ÖMPQ at baseline can significantly predict the ODI at 3 months $F\ (1,82) = 33.87,\ p<0.01$; with R^2 of 0.29. To calculate the RR, persistent disability at 3 months was set at or above the ODI baseline median score of 26. The RR for the medium-risk group compared with the low-risk group was 1.9 (95% CI: 1.2–3.3). The RR for the high-risk group compared with the low-risk group was 2.3 (95% CI: 0.7–7.7).

For Content Validity

We investigated the floor and ceiling and there was no participant scoring 0 (floor effect) or 210 (ceiling effect).

Discussion

This study translated the ÖMPQ into Arabic and tested its reliability and validity. The translation of the ÖMPQ was appropriate as the expert committee ensured that the items are reader-friendly and close to Saudi Arabian culture and dialect. The Arabic ÖMPQ was understood well by patients in primary care clinics, and we did not have any issues with items comprehension.

Face validity refers to whether an instrument appears to measure what it is intended to measure at face value. Since the instrument of Arabic ÖMPQ is intended to measure risk of developing persistent disability in people with LBP, its face validity can be determined by checking the domains that constitutes LBP disability. LBP disability can stem from pain, physical, and psychosocial factors; all of which appear to be included in the Arabic ÖMPQ.

Table 2 Clinical Characteristic Across Risk Profiles of Arabic-ÖMPQ

	Low (≤ 105)	Medium (>105 and <130)	High (≥130)
Arabic-ÖMPQ, N (%)	45 (53.6)	32 (38.1)	7 (8.3)
Pain (NPRS)	4.5 (2.2)	5.7 (1.8)	8.6 (1.9)
Disability (ODI)	20.7 (14.4)	37.1 (17.8)	53.4 (23.0)
Fear-avoidance (FABQ)	24.0 (13.1)	32.0 (10.0)	41.9 (11.7)
Catastrophizing (PCS)	15.3 (9.8)	27.3 (8.5)	35.6 (8.3)

Abbreviations: SD, Standard Deviation; NPRS, Numeric Pain Rating Scale; ODI, Oswestry Disability Index; FABQ, Fear-avoidance behavior questionnaire; PCS, Pain catastrophizing Scale; Arabic-ÖMPQ, Arabic Örebro Musculoskeletal Pain Questionnaire.

Table 3 Pearson's Correlation Between Each Arabic-ÖMPQ Item and Outcome Measures

Arabic-ÖMPQ Item	Outcome Measure	Pearson's *r*		Expected a Priori
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	ODI	0.38	Moderate	Yes
7	-	-	-	-
8	FABQ - W	0.51	High	No
9	NPRS	0.47	Moderate	Yes
10	NPRS	0.30	Moderate	Yes
11	NPRS	0.36	Moderate	Yes
12	PCS	0.11	Low	No
13	PCS	0.39	Moderate	Yes
14	PCS	0.39	Moderate	Yes
15	PCS	0.59	High	Yes
16	FABQ - W	0.16	Low	Yes
17	FABQ - W	−0.09	Low	Yes
18	FABQ - PA	0.52	High	Yes
19	FABQ - PA	0.53	High	Yes
20	FABQ - W	0.23	Low	No
21	ODI	0.26	Low	No
22	ODI	0.39	Moderate	Yes
23	ODI	0.54	High	Yes
24	ODI	0.44	Moderate	Yes
25	ODI	0.45	Moderate	Yes

Abbreviations: (-), Item not applicable for analysis; NPRS, Numeric Pain Rating Scale; ODI, Oswestry Disability Index; FABQ-PA, Fear-avoidance behavior questionnaire Physical Activity; FABQ-W, Fear-avoidance behavior questionnaire Work; PCS, Pain catastrophizing Scale; A-ÖMPQ, Arabic Örebro Musculoskeletal Pain Questionnaire.

Content validity refers to how well an instrument covers the aspects or spectrum of a construct. Limited content validity is indicated by the presence of more than 15% of the patients reaching either the floor (0/210 points) or ceiling effects (210/210 points) on the Arabic ÖMPQ. Since there was no participant scoring 0 (floor effect) or 210 (ceiling effect), we determined that the Arabic ÖMPQ showed good content validity.

For the construct validation, it was important that the Arabic ÖMPQ can distinguish between patients with LBP who have low, medium, or high psychosocial status. We did not use receiver operating curve because we did not want to dichotomize the scores. To that end, this study shows that for each increase in psychosocial risk status on the Arabic

Table 4 Specific Agreement Between Session 1 (Baseline) and Session 2 (48 Hours Later)

		Session 2 (2 Days Later)		
		Low	**Medium**	**High**
Session 1 (Baseline)	Low	18 (A)	3 (B)	0 (C)
	Medium	6 (D)	14 (E)	0 (F)
	High	1(G)	2 (H)	1 (I)

Notes: Calculations: Low risk: A/(A+(B+C+D+G)/2) = 18/23 = 78.26%. Medium risk: E/(E+(B+H+D+F)/2) = 14/19.5 = 71.79%. High risk: I/(I+(C+F+G+H)/2) = 1/2.5 = 40%/.

ÖMPQ, there was an associated increase in the outcome measures of pain, disability, fear-avoidance and catastrophizing. This suggested that the Arabic ÖMPQ had good discriminant validity between low-, medium- and high-risk groups.

Since the ÖMPQ had multiple constructs such as pain, disability, fear-avoidance and catastrophizing, we investigated if these constructs are correlated with their respective outcome measures. Similar to correlations found in other studies,[12–15] the constructs within the Arabic ÖMPQ show significant moderate to high correlations with their respective outcome measures. The correlations were as expected a priori and suggest that the Arabic ÖMPQ is capable of capturing various levels of psychological factors.

There were three items in the Arabic ÖMPQ that correlated differently than what was set a priori: item 8 (perception of work demands), item 12 (pain control), and item 20 (fear-avoidance of work). Item 8 was expected to have a low correlation ($r < 0.3$) with FAB-W, but it was found to have a high correlation ($r \geq 0.5$), suggesting a better than expected correlation between perception of work demands and fear-avoidance of work. Item 12 was expected to have at least a moderate correlation with pain catastrophizing but the correlation was low, suggesting that item 12 should be considered in light of other pain catastrophizing items 13, 14 and 15. Item 20 was expected to have at least moderate correlation with the FABQ-W but had low correlation, suggesting that items 8 and 20 should be evaluated together when assessing work demands or fear avoidance of work.

The reliability of the Arabic ÖMPQ was tested between session 1 (baseline) and session 2 (2 days later). Since LBP could change rapidly, the 2-day time interval was considered long enough to reduce recall bias and short enough to prevent substantial change in status. The reliability was tested with $ICC_{2,1}$ showed perfect reliability, which was similar to the levels reported in the Norwegian and Brazilian translated versions.[12,15] We also investigated specific agreements for each risk status between session 1 and 2. It appeared that for low and medium risk status, there was very good agreement. However, for the high-risk status, there was a fair agreement likely due to smaller number of participants in this category.

We investigated the predictive validity of the Arabic ÖMPQ in two ways. One, we used simple linear regression to investigate if the ÖMPQ score at baseline is predictive of the disability score on ODI at 3 months. The simple regression showed that the ÖMPQ at baseline can predict disability at 3 months and can explain 29% of the variability in disability at 3 months. Two, we used RR to determine if being in one risk category increases the chances of developing persistent disability. Participants in the medium-risk profile have 1.9 higher chance of developing persistent disability compared to the low-risk group. Also, participants in the high-risk group have 2.3 higher chances of developing disability compared to the low-risk group. The confidence interval of medium-risk and high-risk groups were overlapped, and also the confidence interval of high-risk group crossed 1. This could be due to patient receiving treatment "usual care", or due to smaller number of participants in the high-risk group.

We recognized that the original ÖMPQ had been modified to address several limitations such as inconsistent wording, reduced practicality, and lack of independent validation.[23] So, just like in Gabel et al,[23] we carefully selected wording of the questions that are related to symptom duration, activity, function variables, and psychosocial constructs. Also, we attempted to divide the Arabic ÖMPQ into themed sections for ease of response and grading. However, unlike Gabel

et al,[23] we did not renumber the questions nor did we modify the construct "pain" to "pain/problem" or reduce the number of body regions. We did so because we were hoping that the Arabic ÖMPQ would be used for conditions other than LBP.

There were several reasons to choose the ÖMPQ for cultural adaptation and validation in Arabic population. At the time of the study, there were not validated psychosocial screening tools for Arabic people with musculoskeletal pain. Also, the ÖMPQ may be more useful clinically as the responses to its items are scaled from 0 to 10 as opposed to dichotomized with "yes" and "no", which can help clinicians' probe on constructs that need further assessment.[24] Finally, the ÖMPQ is commonly recommended by clinical practice guidelines of LBP.[25,26]

Several limitations of this study can be identified. We only validated the Arabic ÖMPQ patients with LBP, and we do not know if it generalizes to other musculoskeletal cases. We only used the level disability as a predicted variable of poor outcome, and we do not know if other clinical outcomes can be predicted with Arabic ÖMPQ. Future research should investigate whether the Arabic ÖMPQ improves the delivery of healthcare and reduces its cost.

Conclusion

The Arabic ÖMPQ should be used in primary care and physical therapy clinics to assist in early screening of patients with LBP with elevated psychosocial profile and determine patients with LBP at risk of developing persistent disability. The Arabic ÖMPQ has been translated and validated for patients with LBP in primary care clinics in a Saudi Arabian population. The translation was appropriate, and the Arabic ÖMPQ showed satisfactory reproducibility, construct, content and predictive validity.

Abbreviations

FABQ-PA, Fear-Avoidance Behavior Questionnaire-Physical Activity; FABQ-W, Fear-Avoidance Behavior Questionnaire-Work; ICC, Interclass Correlation Coefficient; LBP, low back pain; NPRS, Numeric Pain Rating Scale; ODI, Oswestry Disability Index; ÖMPQ, Örebro Musculoskeletal Pain Questionnaire; PCS, Pain Catastrophizing Scale; RR, Risk Ratio.

Data Sharing Statement

The datasets used during the current study are available from the corresponding author upon request.

Ethical Approval and Consent of Participants

This study was approved by the Office of Research Integrity and Compliance at both the Qurayyat General Hospital in Saudi Arabia and the West Virginian University School of Medicine # 1710818925. Our study complies with the Declaration of Helsinki.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no competing interests.

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