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Pain-related disability measurement: the cultural adaptation and validation of "pain disability index (PDI)" and "pain disability questionnaire (PDQ)" among Iranian low back pain patients

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Abstract

Background: Low Back Pain (LBP) is still a medical problem in 21st century. Having back pain and being disabled by it are not the same thing. It is common to come across with patients who have simple back pain but surprisingly totally disabled and vice versa. In clinical practice, it is important to have a proper evaluation of disability and making a clear distinction between pain and disability. During the past two decades several self-report measures and questionnaires have been developed to evaluate disability in LBP patients, however most of these questionnaire were designed in English language and based on European or American studies. The aim of this study was to develop and validate a translated and culturally adapt "Pain Disability Index (PDI)" and "Pain Disability Questionnaire (PDQ)" among Iranian patients with low back pain.

Methods: The Persian versions of the PDI, PDQ were created through systematic translation and cross-cultural adaptation of the original questionnaires. The Oswestry Disability Index and Visual Analogue Scale were used for validation studies. Patients were asked to complete these questionnaires initially and also at 7 days later as retest.

Results: A total of 304 patients with acute and chronic LBP completed the Persian versions of PDI, PDQ, "Oswestry Disability Index" (ODI) and "Visual Analogue Scale" (VAS). Among patients 111 patients participated for retest after seven days. The Cronbach's alpha (coefficient of reliability) for the PDI and PDQ was satisfactory. The PDI and PDQ showed high and very high test-retest reliability (ICC=0.8 and 0.92 respectively). The Pearson correlation coefficient among PDI, PDQ with ODI was 0.64 and 0.72, and for PDI, PDQ, ODI with VAS was 0.36, 0.47 and 0.57, respectively ($P<0.001$).

Conclusion: The Persian version of the PDI and PDQ questionnaires are reliable and valid instruments to evaluate generic perceived disability in Persian-speaking patients with LBP. It is shown that PDI and PDQ are capable of measuring the disability in LBP patients. They could be used in clinical and research encounters with acceptable confidence.

Keywords: Low back pain, disability, pain disability index, pain disability questionnaire

Introduction

Low Back Pain (LBP) is one of the most common illnesses among individuals. More than 80% of people will experience LBP at some point during their lives. It is an important clinical, social, economic and public health problem occurring in different groups of the population. However, a definite pathology can be diagnosed in about 15% of patients with LBP and the rest remains still non-specific. LBP is a problem for patients, health professionals and society [1-4]. It also is the primary cause for work absence and

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disability. LBP disability is often explained as pain affecting activities such as mobility, dressing, sitting and standing, and accounts for up to 75% to 90% of the total cost due to repeated treatments, long-term work absence, and early retirement [2,3,5]. Beside the pain, the disability caused by pain makes significant problems for patients. Making a clear distinction between pain and disability is of great importance in clinical practice [4]. Hildebrandt et al demonstrated that the most important variable in determining a successful treatment of chronic LBP is the reduction of subjective feeling of disability in patients [6].

It is proven that the pain is only one of the multiple factors that determine disability [7, 8]. There are valid evidences to support the role of psychosocial risk factors beside physiologic factors in the development of LBP disability in recent years. Hence it is necessary to include patients' perspective in judging the results of the LBP treatment.

During the last two decades, a number of questionnaires have been developed to measure the functional status and the pain related disability. By using these measures one can evaluate patients' perspective and experience from pain and the effects of LBP on daily living [9]. Therefore measuring disability caused by pain is an important element of subjective assessment of patients [10, 11]. Based on the best of the knowledge of authors neither a pain-related disability measuring instrument nor a culturally adapted questionnaire has been developed for Persian speaking patients. Pain Disability Index (PDI) and Pain Disability Questionnaire (PDQ) are two developed measures that have widely been used in several studies [12-16]. We have selected these two questionnaires for cultural modification of Persian-speaking patients who undergo evaluation for disability secondary to low back pain. Among the patients who suffer from pain, those with low back pain were recruited for the present study. Specific scales for measuring disability in LBP is available in Persian versions [17], but the generic-type features of the PDI and PDQ are distinct in the present study. General health surveys measure overall health with a broad range of questions covering different aspects of health. General measures allow comparisons among patients with the same condition as well as between patients with different conditions. Moreover, general measures may be able to identify unsuspected side effects from a new treatment [11]. The PDI and PDQ have been extensively tested, own good psychometric properties, and are applicable in a wide variety of settings [12,15, 18,19]

Many researchers believe using the available instruments is much better than developing new ones. The cross-cultural adaptation of a self-administered questionnaire for use in a new country, culture, or language necessitates the use of a unique method to reach equivalence between the original source and target versions of the questionnaire. Inferences regarding the effect of treatment variables are meaningful only if the translation fidelity of the scale itself has been demonstrated [20, 21].

This article presents the first attempt on translation and validation of the PDI and PDQ in the Middle East. The purposes of present study were to translate the PDI and PDQ to Persian language, perform a cross-cultural adaptation of them, evaluate psychometric properties and validate the Persian versions of the questionnaires. Moreover, this study demonstrated the rate of disability generated by the pain in the low back impaired Iranian patients' sample.

Methods

*Measures***:** The PDI, PDQ, Oswestry Disability Index Persian Version (ODI-PV) and Visual Analogue Scale (VAS) as a measure of pain intensity were administered in the current study.

The PDI originally developed by Pollard in 1984 [16]. Many studies tested this measure and have shown strong psychometric properties for it, including validity [18], reliability [16,18] and sensitivity to change [16,22]. The PDI is brief, yet comprehensive in the domains of life that assesses the extent that

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pain affects the performance of routine daily activities with seven numerical scales from 0 to 10. A response choice of 0 indicates normal performance, whereas 10 indicate complete inability to carry out a particular activity. The possible range is between 0-70. Seven daily activities are: family/home responsibilities, recreation, social activity, occupation, sexual behavior, self-care and life-support activity [15,18,23]. To our knowledge this scale has been translated into four other languages: Finish [22], Swedish [24], Dutch [25] and French [15].

The PDQ is one of the three commonly used and well-validated multidimensional measures of pain[26]. The PDQ was developed in 2004, as a self-report measure that incorporates a disability-related psychosocial component in addition to a physical functioning component related to pain. The focus of this measure is primarily on disability and activities of daily living. Psychosocial variables which play an integral role in the development and maintenance of chronic pain disability form an important core of the PDQ. It yields a total functional disability score ranging from 0 (optimal function) to 150 (total disability), using 11 points Likert scale [12,14]. The PDQ consistently demonstrated stronger correlation coefficients to a wide variety of physical and psychosocial measures of human function, such as the SF-36, Beck Depression Inventory, Hamilton-D, VAS, ODI and MVAS [12,14,19]. To our knowledge the PDQ has been translated into Spanish language [14].

The ODI was developed by Fairbank et al. and consists of 10 items assessing the level of pain and its interference with several physical activities, sleeping, self-care, sex life, social life, and traveling for LBP patients. The scale is one of the most widely used outcome measures for patients with LBP [27]. The Persian version of ODI provided by Mousavi et al in 2006 and its psychometric properties has been reported [17].

The VAS was used to measure pain intensity. The VAS measure of pain is a horizontal line, 100 mm in length, anchored by word descriptions at each end (no pain and worst pain possible). The patient selects the point on the line that best represent his/her perception of pain level [28]. Patients completed the VAS once at the time of participation in the study and once during the time of maximum pain within the past thirty days.

Translation and Cross-Cultural Adaptation: One of the most highly recommended and common procedures for translation verification today are the forward-backward translation method. This method was introduced by Brislin et al in 1973 [20,21,29]. In this study we created a procedure based on Brislin's adapted model to cross culturally adapt the translations of the PDI and PDQ to Persian. In the first stage of the translation process, known as forward translation, the PDI and PDQ translated from the source language (English) to the target language (Persian) by two bilingual translators whose native language was Persian. They produced two independent translations. One of the translators was aware of the concepts being examined in the questionnaire being translated. Translators neither were aware nor informed of the concepts being quantified. In stage two the translators and researchers prepared the results of the translations and reached for an agreement regarding all items and response choice labels. This is called Preliminary Common Forward Translation. In stage three the Preliminary Common Forward Translation of the PDI and the PDQ were back translated to the source language again by a translator who was totally unaware of the original version. The back translator was an English-Persian bilingual. In stage four back translation version along with the other reports checked by the expert committee to check for any discrepancy during translations. From this stage pre-final versions of the PDI and PDQ were provided. In the fifth stage the pre-final versions of both scales were used for the pre-test on 50 LBP patients. They were interviewed, and asked about what they understood from each item, especially those which had difficulty with them. The results were reported to the rest of researchers and translators for con-

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Table 1. Demographic and clinical characteristics of the population (n=304)

	Mean ± SD	%
Age	40.47 ± 13.46	
Pain intensity		
In time of complete questionnaire	47.22 ± 26.9	
Maximum pain in last month	70.04 ± 24.27	
Pain duration	91.37 ± 112.25	
Gender (Female)		60.07%
Education		
Less than high school diploma		16.1%
High school diploma		32.1%
Associate degree		8.2%
BSc		32.5%
MSc		8.2%
PhD, Doctorate degree		0.3%
Type of LBP		
Acute		11.1%
Chronic		88.9%
PDI		
Female	26.12 ± 15.57	
Male	22.41 ± 13.26	
PDQ		
Female	60.12 ± 35.76	
Male	58.67 ± 29.87	

PDI: Pain Disability Index, PDQ: Pain Disability Questionnaire

sideration and necessary changes to reach the final version.

Participants: A total of 304 Persian-speaking patients with acute, sub-acute and chronic LBP with or without radicular pain participated in this study. They consecutively enrolled in the study over a period of 5 months, in selected clinics and hospitals in Tehran, Iran. Patients' information sheet and pain drawing were completed after informed consents obtained from them.

Inclusion criteria were age over 18 years, ability to comprehend and answer the questionnaire, and proven low back pain. Exclusion criteria of study were literacy level under 14 years of age, active illness and pain in other body regions, addiction to any drugs or alcoholic drinks, receiving medication or any therapy before the last occurrence of the pain, recent surgical operation, fracture in lumbar and pelvic area and pregnancy. To collect patients' information each subject must completed background data sheet, Persian Versions (PV) of the PDI, PDQ, ODI and VAS in a random way.

Statistical Analysis: SPSS software version 17.0 was used for data analysis. The internal consistency for each scale was estimated using the Cronbach' alpha coefficient, with $\alpha \geq 0.85$ was considered satisfactory [30]. Intra-class correlation coefficient (ICC) was used to evaluate test-retest reliability of the PDI-PV and the PDQ-PV. One hundred and eleven of patients completed these scales one week later for the second time. (Values of 0.70 or above were acceptable, between 0.70-0.80 were considered high and above 0.86 were considered very high [30].)

Pearson correlation coefficient analyses were used to evaluate the convergence validity scores of the PDI-PV and the PDQ-PV with the ODI-PV. (Values between 0-0.25 considered little, 0.26-0.49 considered low, 0.50-0.69 considered moderate, 0.70-0.89 considered high and 0.9-1 considered as very high correlation [31].)

To find out the association between pain and disability the PDI-PV and PDQ-PV were analyzed with VAS using Pearson correlation.

Results

Table 1 summarizes the demographic and clinical characteristics of the studied population. The mean age of the participants was 40.47±13.46 years and 60.07% of patients

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Table 2. The chrobnach' alpha and the ICC of PDI-PV and PDQ-PV

	N	Chronbach' alpha	ICC
7-item PDI	233	0.86	0.80
6-item PDI	304	0.85	0.85
15-item PDQ	202	0.93	0.92
14-item PDQ	304	0.93	0.93

were women. The mean pain duration was 91.37±112.25 months.

Of 304 patients, 71 patients did not answer the "sex life" question of the PDI-PV and ODI-PV. Also 103 patients did not answer the "decline income since pain begun." question of the PDQ-PV. These missed of data on specific items could not be due to lack of understanding by the patients, and authors believed that could rather be due to a cultural difference or restriction. Hence, the unanswered items were not considered as missed data. This problem was resolved by analyzing each of the scales in two separate forms: "PDI-PV with 7 items" and "PDI -PV with 6 items" that the "sex life" item was eliminated in the "PDI-PV with 6 items", "PDQ-PV with 15 items" and "PDQ-PV with 14 items" that the "decline income since pain begun" item was eliminated from "PDQ-PV with 14 items". Regarding the other items, one patient did not complete the "recreational activity" of the PDI-PV and another one did not complete the "take pain medication" of the PDQ-PV, which considered as minor missing values.

The mean total scores of PDI-PV and PDQ-PV in women were more than men. Also mean total scores of both questionnaires in patients with previous surgery on lower back and radicular pain were greater than LBP patients who were not suffered from radicular pain or the consequent surgery.

The Chronbach' alpha for 7-item PDI-PV (n=233) and 6-item PDI-PV (n=304) was respectively 0.86 and 0.85, and for both the 15-item PDQ-PV (n=202) and the 14-item PDQ (n=304) was 0.93 (table 2).

Test-retest reliability for PDI-PV and PDQ-PV was high and very high respectively. The ICC values for the7-item PDI-PV, 6-item PDI-PV, 15-item PDQ-PV and the 14-item PDQ-PV were 0.80, 0.85, 0.92 and 0.93 respectively (Table 2). Standard Error of Measurement (SEM) for the PDI-PV and the PDQ-PV were 6.29 and 9.56 respectively, which considered acceptable values for both scales.

The Pearson correlation coefficients estimated convergence validity of Persian versions, using the ODI-PV, for the 7-item PDI-PV and the 6-item PDI-PV were 0.64 and 0.62 respectively, for the 15-item PDQ-PV and the 14-item PDQ-PV were 0.72 and 0.73 respectively. The Pearson correlation coefficient among the PDI-PV and PDQ-PV was high (0.78) ($P < 0.001$).

The correlation among the 7-item PDI-PV, 6-item PDI-PV, 15-item PDQ-PV, 14-item PDQ-PV, ODI-PV and pain intensity (VAS) using the Pearson correlation coefficient were 0.36, 0.35, 0.47, 0.48 and 0.57, respectively ($P < 0.001$) (Table 3).

Table 3. Pearson correlation coefficient of PDI-PV and PDQ-PV with pain intensity and ODI-PV [All estimates are stated as r (P-value)].

	N	Pain intensity	10-item ODI-PV	9-item ODI-PV
7-item PDI-PV	233	0.361 (0.01)	0.644 (0.01)	0.616 (0.01)
6-item PDI-PV	304	0.359 (0.01)	0.623 (0.01)	0.641 (0.01)
15-item PDQ-PV	202	0.479 (0.01)	0.725 (0.01)	0.743 (0.01)
14-item PDQ-PV	304	0.483 (0.01)	0.734 (0.01)	0.741 (0.01)

Discussion

The results of current study shows the Persian versions of the PDI and PDQ are valid and reliable instruments for evaluation of generic pain-related disability among Iranian population with low back pain and based on our search, these two instruments are the only generic outcome measures for evaluation of perceived disability due to pain in Iran.

We tried to provide comprehensible Persian adapted instruments, without any ambiguously. To reach this goal and because of special cultural circumstances, some modifications were performed in translations:

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Because of religious, cultural and traditional values, some patients in this study opted not to answer the "sex life" item in the questionnaire. Also many patients were housewives with no income. For these patients the item "decline income since pain begun" was not applied. This issue was adjusted by eliminating these two items from the questionnaires and analyzing them in two separate forms.

For the PDI-PV, the terms "no disability" and "worst disability" were translated as "I don't have disability" and "I have total disability". Also items two and three included "recreation" and "social activity" translated in plural forms.

For the PDQ-PV, "lift overhead" and "reach for things" of item 5 were respectively translated as "grasp something and lift it overhead" and "extend arm to get something". All responses (except item 15) translated in a way to directly refer to each patient. For example "work normally" and "unable to work at all" were translated as "I do my work normally" and "I can't work at all". In items 2, 3, 4, 5, 6, 7 and item 15 "your pain" was just translated to "pain". The strict equivalent of the word "travel" in Persian is used for longer journeys, and it did not included short journeys, thus it was changed to "traffic". In item 10 "to see doctor" was translated as "visit doctor". In item 15 "no problem" and "sever problem" were translated to "no interference" and "total interference" to accommodate the response within the question.

The Chronbach' alpha of the PDI-PV was 0.86, similar to the coefficients previously reported by Tait and Pollard (0.86) [32], Tait et al (0.86) [18] and in French version of PDI (0.83) [15]. The Chronbach' alpha of the PDQ-PV was similar to Anagnostis (0.93 and 0.96 respectively) [12]. These results suggested that the Persian versions of these questionnaires have satisfactory internal consistency.

The PDI-PV and PDQ-PV showed high and very high reliability respectively. These results are consistent with the previous studies [12,15,16,18].

Convergence validity for the PDI-PV and PDQ-PV with the use of the ODI-PV showed moderate and high correlation. In Gronblad et al study the association between the PDI and ODI was reported high with correlation equal to 0.83 [16]. Anagnostis et al showed the PDQ has stronger correlation with many self-report measures like SF-36 and "Beck Depression Questionnaire" than the ODI [12,19,26]. Overall it can be concluded that these scales can measure pain related disability with an acceptable reliability and validity although the focus of this study was LBP patients.

There was significant correlation between the PDI-PV, PDQ-PV and VAS. The Pearson correlations were low (0.36 and 0.47 respectively) and similar to those of Gronblad [23], and Kovacs [33], [16]. The pain and disability did not showed a high correlation, that was corresponded to Waddell study [34]. Low to moderate correlations between pain intensity and disability in LBP patients are due to a multitude of other factors that determine disability, in addition to pain intensity [7, 8, 16]. Among risk factors for LBP disability are work-related factors and, importantly, psychosocial factors [16]. In addition, it has shown clinically that relevant improvements in pain may lead to almost unnoticeable changes in disability and quality of life[33]. In fact, low back disability is considered as a human illness rather than low back pain, as a spinal disease, and hence it is necessary to make a clear distinction between pain and disability and assess each separately[4]. Accordingly to previous thoughts we believe that pain-related disability and pain itself are two separate contents that have to be measured separately and interpret in different contexts. This also could be a proof for the clinicians that just measuring pain is not enough, and assessing the outcome of disability caused by a painful condition is as valuable. The results of this study not only offered the PDI-PV and PDQ-PV as suitable measures for routine clinical use, but provided substantial information for research. The outcome data gained by these two scales are consistent, reliable and can

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add more output to patients' interviews by therapists and physicians.

The correlation between the PDI-PV and PDQ-PV was high using the Pearson correlation coefficient. Both the PDI-PV and PDQ-PV had high reliability and moderate and high association with ODI-PV. The results of this study showed that both the PDI-PV and the PDQ-PV had comparable psychometric properties.

Conclusion

The Persian versions of the PDI and PDQ were developed in a systematic procedure, which are valid and reliable instruments to measure disability caused by pain in patients with low back pain. The use of these questionnaires is recommended in clinical settings as assessment tools and also to compare the effect of the treatment interventions, and the future outcome studies.

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