SPINE Volume 29, Number 5, pp 581–585

Validation of the Turkish Version of the Oswestry Disability Index for Patients With Low Back Pain

Edibe Yakut, PT, PhD,* Tülin Düger, PT, PhD,* Çiğdem Öksüz, PT,* Selma Yörükan, MD,† Kemal Üreten, MD,‡ Deran Turan, PT,* Tüzün Fırat, PT, MSc,* Sedat Kiraz, MD,‡ Nuray Kırdı, PT, PhD,* Hülya Kayıhan, PT, PhD,* Yavuz Yakut, PT, PhD,* and Çağatay Güler, MD§

Study Design. Validation of a translated, culturally adapted questionnaire.

Objectives. To translate and culturally adapt the Turkish version of the Oswestry Disability Index (ODI) (2.0), and to validate its use for assessing disability in Turkish patients with low back pain.

Summary of Background Data. The ODI is a reliable evaluation instrument for disability, but no validated Turkish version is available.

Methods. A total of 95 outpatients with low back pain were assessed by the ODI. Sixty-five of these patients were observed on a second occasion. Translation/retranslation of the English version of the ODI was done blindly and independently by four different individuals, and adapted by a team. Individuals were given the ODI and other scales (Visual Analog Scale, Schober Test, and the Roland-Morris Disability Questionnaire) on their first visit and a week later.

Results. Scores of the two ODIs were 27.10 (SD 16.22) on day 1 and 22.88 (SD 13.94) on day 7, with an intraclass correlation coefficient of r = 0.938 ($P < 0.001$). Cronbach's alpha was 0.918 (day 1) and 0.895 (day 7) in the validation. Concurrent validity, measured by comparing ODI responses with the results of Visual Analog Scale and Schober test, was r = 0.367 ($P < 0.01$), r = −0.068 ($P = 0.591$) for day 1, and r = 0.392 ($P < 0.01$), r = −0.041 ($P = 0.745$) for day 7, respectively. Construct validity, tested by determining the correlation between the Turkish ODI and the Turkish adaptation of the Roland-Morris Disability Questionnaire, yielded r = 0.815 ($P < 0.001$) on day 1 and r = 0.708 ($P < 0.001$) on day 7.

Conclusion. The Turkish version of ODI has good comprehensibility, internal consistency, and validity and is an adequate and useful instrument for the assessment of disability in patients with low back pain. [Key words: low back pain, disability, Oswestry disability index, Turkish version] **Spine 2004;29:581–585**

The restoration of normal function is considered a key outcome of physical therapy for low back problems. Physiotherapists therefore need measurement tools that accurately assess function and monitor change over time.[1]

Impairments, such as decreased range of movement and reduced straight leg raising, can be observed by therapists.[2–7] However, direct observation of activity limitation is impractical, and physiotherapists often rely on their clients' self-report to assess the impact of low back pain (LBP) on daily activities. Standardized self-report questionnaires provide a convenient method of collecting and synthesizing a large amount of information on activity limitation.[1,8,9] Several self-reported disability questionnaires have been developed for people with LBP, and their importance as measures of treatment outcome in clinical trials has been emphasized.[8,10–19]

Two of the most commonly used disability scales for people with LBP are the Roland-Morris Disability Questionnaire (RMQ) and the Oswestry Disability Index (ODI). The measurement properties of both of these scales have been studied extensively, and a recent report of the International Forum of Primary Care Research in Low Back Pain contended that both scales are acceptable for measuring disability related to LBP.[8]

Most of these standard questionnaires have been developed to study English-speaking patients. There is nevertheless a need for measures specifically designed to be used in non-English-speaking countries because cultural groups vary in disease expression and in their use of various health care systems. This need has become more acute with the growing number of large multicenter multicountry trials. It is clear that a scale can not be transferred directly from one culture to another without being revalidated for the new conditions.[20] Therefore, a simple direct translation of a questionnaire from one language to another does not permit its use in clinical trials. The translation must be validated to achieve an equivalent questionnaire and to allow comparability of data.

The importance of measuring outcome has also been recognized among the rehabilitation specialists in Turkey over the last decade. Consequently, internationally accepted instruments for functional assessment have been adapted and used, especially in clinical research.[20–23] One recent adaptation was for the RMQ, which was subsequently used in a study to investigate the validation of its use among Turkish patients with LBP.[24]

Another of the widely used and validated scales for measuring disability is the ODI. The ODI was originally

From the *School of Physical Therapy and Rehabilitation, †Department of Physiology, Faculty of Medicine, ‡Department of Rheumatology, Faculty of Medicine, and §Department of Public Health, Faculty of Medicine, Hacettepe University, Ankara, Turkey.
Acknowledgment date: July 24, 2002. First revision date: February 5, 2003. Acceptance date: June 2, 2003.
The manuscript submitted does not contain information about medical device(s)/drug(s).
No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.
Address correspondence to Edibe Yakut, PT, PhD, Hacettepe University, School of Physical Therapy and Rehabilitation, 06100 Samanpazari Ankara, Turkey; E-mail: yyakut@hacettepe.edu.tr

described in 1980.[25] The questionnaire consists of 10 items addressing different aspects of function. Each item scored from 0 to 5, with higher values representing greater disability. The total score is multiplied by 2 and expressed as a percentage.[8,22]

To date, no Turkish version of the ODI has been validated. Therefore, the objectives of this study were to translate into Turkish, culturally adapt, and validate the use of the ODI among Turkish patients with LBP.

■ Materials and Methods

Patients and Setting. Ninety-five consecutive outpatients with chronic LBP of at least 3 months duration who were receiving one or more therapeutic interventions (nonsteroid antiinflammatory drug medication and/or physical therapy) were included in the study. All patients had been previously investigated by physical and neurologic examination, spine radiographs, and laboratory tests (complete blood count, erythrocyte sedimentation rate, blood biochemistry, urinary analysis) to identify causes of LBP. Patients having neurologic deficits were not included in the study.

Translation. For the translation process, we used the recent guidelines for cross-cultural adaptation.[26] Two translations from English to Turkish were performed by two different and independent translators whose mother tongue was Turkish, allowing detection of errors and divergent interpretations of items with ambiguous meaning in the original instrument. One of the translators was aware of the process purpose and the concepts involved in the instrument to obtain a better idiomatic and conceptual rather than literal equivalence between the two versions of the questionnaire, and to render the intended measurement more reliable. The other translator was unaware of the translation objective, and this was useful in eliciting unexpected meanings from the original tool. Both Turkish translations were then compared for inconsistencies. The two translations were then retranslated, also blindly and independently, into English by two native English speakers. Each English translation was then compared with the original English ODI version 2.0 and checked for inconsistencies.

The Turkish version was then jointly reviewed by a bilingual team, including the four translators, one public health physician, and three physiotherapists, to assess the necessity of performing a cultural adaptation and to fine-tune it for use among Turkish patients. They again compared the Turkish version with the original English version to detect errors of interpretation and nuances that might have been missed. The final stage of the adaptation process is the test of the prefinal version. Thirty persons were tested in the study. This ensures that the adapted version still retains its equivalence in an applied situation. The only missing data in this stage of the adaptation process referred to the 10th section in the first sentence where "travel" was translated loosely. Twenty patients skipped this question. The word "travel" was translated as "gezip tozmak" (trip, outing excursion) rather than "seyahat etmek" (journey, expedition). Patients understood this expression more easily. Since the test of the prefinal version did not include validity and reliability, the patients were not recalled 7 days later. This version was finalized after slight changes were made by consensus.

Reliability. Two common forms of reliability are test-retest reliability and internal consistency. Test-retest reliability measures stability over time, by administering the same test to the same subjects at two points in time. The appropriate length of the interval depends on the stability of the variables that causally determine that which is measured. In this investigation, a time interval of 7 days was used. We used intraclass correlation coefficient (ICC) to evaluate test-retest reliability. ICCs can vary from 0.00 to 1.00, where values of 0.60 to 0.80 are regarded as evidence of good reliability and with those above 0.80 indicating excellent reliability.[27] Portney and Watkins claim that, for most clinical measurements, reliability should exceed 0.90 to ensure reasonable validity.[28] Reliability below the acceptable level indicates that the measure has too high a level of random measurement error.[29]

The internal consistency of a scale relates to its homogeneity. The coefficient of internal consistency is mainly assessed with Cronbach's alpha.[30] It is suggested that the value of alpha should be above 0.80 for acceptance as high internal consistency.[31]

Validity. Concurrent validity was measured by comparing the ODI responses with other measurements performed at approximately the same time. Internal criteria included a Visual Analog Scale (VAS) (0 cm = no pain, 10 cm = unbearable), assessing pain as used in the original paper by Fairbank and Pynsent.[22] The external criteria were mobility measurements of the spine. The Schober test is a commonly used method for this measurement. The spinal intersection of a line, joining the dimples of Venus and two points, 5 cm below and 10 cm above this level, was marked with the patient standing. Forward bending with the knees and arms extended has been examined by measuring the increased distance of these points. These methods have been proved to be accurate, reproducible, and easy and quick to use.

Convergent and discriminant validity are two forms of construct validity. In convergent validity, scores on similar measures are expected to coverage, *i.e.*, correlate significantly with each other.[31] This correlation may be significantly different from zero. By contrast, discriminant validity is demonstrated when items or scales that measure dissimilar constructs are found to be unrelated.[32]

In this study, construct validity was assessed by comparing the responses to the ODI with results of the RMQ. Construct validity coefficients were accepted as follows: $r \geq 0.81$–1.0 as excellent, 0.61–0.80 very good, 0.41–0.60 good, 0.21–0.40 fair, and 0–0.20 poor.[33] Concurrent and construct validity were measured by the Pearson's correlation coefficient.

All assessments were repeated 7 days later by the rheumatologist. The means and standard deviations were determined to describe the demographic data of the patients. All statistical analyses were done with SPSS 10.0 for Windows. A probability value of $P < 0.05$ was considered to indicate a significant effect.

■ Results

Patient Characteristics

A total of 65 patients with a mean (SD) age of 65.26 (11.63) years, attended of follow-up assessment after 7 days. Mean spinal movement (Schober) was 4.34 (1.11) cm at baseline and 4.66 (1.11) cm at follow-up. All patients reported some pain at baseline, which decreased by an average of 6% at follow-up (Table 1).

Table 1. Demographic Data and Mean Scores

	Mean	(SD)	r (*P*)
Age (yr)	39.24	(10.62)	
Gender [n (%)]			
Female	49	(75)	
Male	16	(25)	
Schober (cm)			
Day 1	4.34	(1.11)	0.95 (<0.001)
Day 7	4.66	(1.11)	
VAS (cm)			
Day 1	5.25	(1.64)	0.89 (<0.001)
Day 7	4.95	(1.60)	
ODI (%)			
Day 1	27.10	(16.22)	0.91 (<0.001)
Day 7	22.88	(13.94)	
RMQ (0–24)			
Day 1	10.14	(6.44)	0.93 (<0.001)
Day 7	8.82	(5.57)	

r = Pearson correlation coefficient between day 1 and day 7.

Reliability

Internal consistency was found adequate at both assessments with Cronbach's alpha at 0.918 and 0.895 day 1 and day 7, respectively. Test-retest reliability was also adequate for the ODI (ICC = 0.938; $P < 0.001$).

Validity

Concurrent validity was measured by comparing the responses to the ODI with the results of VAS and mobility of the spine by using the Pearson's correlation coefficient. The ODI/VAS showed a positive correlation for day 1 ($r = 0.367$; $P < 0.01$), and for day 7 ($r = 0.392$; $P < 0.01$). Pearson's correlation coefficients were not statistically significant for comparison of the ODI sum scores with Schober testing for day 1 ($r = -0.068$ $P = 0.591$) and day 7 ($r = -0.041$ $P = 0.745$) (Table 2).

Construct validity was tested by determining the correlation between the Turkish version of the ODI and the Turkish adaptation of RMQ. The resulting correlation was excellent ($r = 0.815$; $P < 0.001$) for day 1 and very good ($r = 0.708$; $P < 0.001$) for day 7.

■ Discussion

The results of this study indicate that the Turkish version of the ODI is a reliable and valid instrument for the measurement of disability in Turkish-speaking patients with LBP.

The adaptation of the ODI to the Turkish language has produced an instrument that is reliable and demonstrates both internal and external validity. Levels of reliability were slightly higher than those found elsewhere. For example, Cronbach's alpha was found to be 0.76 by Fisher and Johnson[34] and 0.87 by Kopec *et al.*[35]

Table 2. Relationship of Schober-VAS and Questionnaires

		Day 1	Day 7
ODI	Schober	−0.068 (0.591)	−0.041 (0.745)
	VAS	0.367 (0.003)	0.392 (0.001)
	RMQ	0.815 (0.000)	0.708 (0.000)
RMQ	Schober	−0.054 (0.659)	−0.091 (0.467)
	VAS	0.382 (0.002)	0.382 (0.002)

Values are r (*P* value).

In the analysis for concurrent validity, there was a positive correlation between the ODI and VAS, and no correlation between ODI and mobility of the spine, in line with previous findings of Gronblad *et al.*[36,37] The association between physical measurements (*e.g.*, strength, range of motion, flexibility) and functional status, or disability, is often weak.[38–40] It can be explained by discriminant validity. It is demonstrated when items or scales that measure dissimilar constructs are found to be unrelated. Therefore, the increase in disability with decreased or unchanged mobility is an expected finding.

In the determination of construct validity, there was an adequate correlation between the Turkish ODI and the Turkish validated version of the RMQ. The disability scales correlated well with each other, which is consistent with the observed results in other studies.[2,23,41,42] The ODI is a simple and rapid scale that is quite easy to score. In this respect, the ICC of 0.94 is an excellent measure of reliability of the Turkish version of the ODI.

As Fairbank and Pynsent mentioned, in the original report, completing the questionnaire required approximately 5 minutes.[22] In our study, the patients were able to complete the questionnaire in the same time interval. At the end of the prefinal version, the Turkish version did not require any changes except one word. Hence, it was concluded that the questionnaire was easily comprehensible to the Turkish population. In addition, the ease of developing translated and culturally adapted versions that are as reliable as the original scale is a factor to be taken into account for considering a scale as an international standard. In their article, Roland and Fairbank[16] describe RMQ and ODI and provide evidence of their validity and reliability and some comparative results obtained with the use of the two questionnaires. The RMQ may be better suited to settings in which patients have mild to moderate disability and the ODI to situations in which patients have persistent severe disability.[16] The Turkish version of ODI, in addition to the Turkish validated version of RMQ, will permit comparison between numerous studies on a wide range of low back problems in the Turkish population. The full-adapted version is published in the Appendix. This version, including details of the translation process, has been sent to Dr. Fairbank for inclusion in his web site.

According to proposed guidelines, the current authors decided to translate a measure previously developed in the English language. If the transposition of a questionnaire from its original cultural context is performed by simple translation, it is not likely to be successful because of language and cultural differences. Furthermore, quality of life perceptions and the ways in which health problems are expressed vary from culture to culture.[20] There is a need for measures specifically designed to be used in non–English-speaking countries because cultural groups

vary in disease expression and in their use of various health care systems. Therefore, in further studies, the validation of the Turkish version ODI should be tested in different spinal conditions.

We regard the small number of patients as a limitation in our study. However, the Turkish version of the RMQ study has included 64 subjects. In our study also, since there was a decrease in attendance of patients with LBP to the rheumatology department, we ended our investigation with a total of 65 patients in order to preserve the topicality of the study. We think that a study based on the Turkish population with a larger number of patients and using different back pain questionnaires would increase the value of our present study.

■ Conclusion

The results suggest that the Turkish version of the ODI validated in this study is an easy to understand, reliable, and valid instrument for the measurement of the limitation of functional ability caused by LBP in the Turkish-speaking population.

■ Key Points

- The ODI is valid for the Turkish population.
- The questionnaire was translated into Turkish and retranslated into English by four different individuals and transculturally adapted by a team.
- Patients who visited the rheumatology department with low back pain were given the ODI, RMQ, VAS, and spinal movement, and assessed on their first visit and 7 days later.
- The Turkish version of the ODI has good comprehensibility, internal consistency, and reliability and is an adequate and useful instrument for the assessment of disability caused by low back pain in the Turkish population.

Acknowledgment

The authors thank Dr. Jeremy Fairbank, for his permission to translate the ODI into Turkish, and the members of the committee (John Kırvar, English teacher and Cesur Öztürk, English teacher) for their cooperation.

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Point of View

Jeremy Fairbank, MD, FRCS

This paper is a "text-book" exercise in translating an outcome instrument. This process is important so that patients and outcomes can be compared in different cultures and settings. It facilitates the international publication of local research. It is also part of the validation process of commonly used instruments.

The Oswestry Disability Index has been presented in a number of modifications in English. It has been translated into many languages.[1,2] This process has not always been as scrupulously performed as Dr. Yakut and his colleagues have done it. It is also more difficult in languages with distinct dialects, such as German (Anne Mannion, personal communication). We are collecting as many of these translations as can be found on a website, as well as the English version number that was translated. We have asked authors to give references to any validation process that may have been done. It is essential for the viability of an outcome instrument that it remain under critical scrutiny. It has been 25 years since the Oswestry Disability Index was first used in version 1.0. It remains valid, easy to complete and to score, and can be used in a wide variety of settings.

We would like to keep an up-to-date citation index on the website and would be happy to include papers published in journals or other media missed by conventional citation searches.

The Oswestry website is *www.merc.wlv.ac.uk/ODI/index.htm*.

From the Nuffield Orthopaedic Centre, Oxford, United Kingdom.
The manuscript submitted does not contain information about medical device(s)/drug(s).
No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.
Address correspondence to Jeremy Fairbank, MD, FRCS, Nuffield Orthopaedic Centre, Oxford OX3 7LD, UK; E-mail: jeremy.fairbank@ndos.ox.ac.uk

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