



Contents lists available at ScienceDirect

## Journal of Orthopaedic Science

journal homepage: <http://www.elsevier.com/locate/jos>

## Original article

# Cross-cultural adaptation, reliability and validity of the Turkish version of the Japanese Orthopaedic Association Back Pain Evaluation Questionnaire

Gurkan Gunaydin <sup>a,\*</sup>, Zeynep Hazar Kanik <sup>a</sup>, Gul Oznur Karabicak <sup>b</sup>, Ugur Sozlu <sup>a</sup>, Omer Osman Pala <sup>a</sup>, Zeynep Beyza Alkan <sup>a</sup>, Selda Basar <sup>a</sup>, Seyit Citaker <sup>a</sup>

<sup>a</sup> Department of Physiotherapy and Rehabilitation, Health Science Faculty, Gazi University, Ankara, Turkey

<sup>b</sup> Department of Physiotherapy and Rehabilitation, Health Science Faculty, Baskent University, Ankara, Turkey

## ARTICLE INFO

## Article history:

Received 6 October 2015  
Received in revised form  
12 January 2016  
Accepted 16 January 2016  
Available online xxx

## ABSTRACT

**Background:** Low back pain is among the most common musculoskeletal system disorders. Outcome measures are needed for the measurement of function, to establish a treatment program, and for monitoring the improvement in low back pain. There exist several questionnaires enquiring about function in low back pain. One of these is Japanese Orthopaedic Association Back Pain Evaluation Questionnaire, whose reliability and validity were previously established. Other than the original version of the questionnaire, only its Persian version exists. The present study aims to investigate the cross-cultural adaptation, reliability and validity of the Turkish version of the Japanese Orthopaedic Association Back Pain Evaluation Questionnaire.

**Methods:** The study included 103 patients with low back pain. For reliability assessment of the questionnaire, test–retest and internal consistency analyses were performed. The results of test–retest analysis were assessed by Intraclass Correlation Coefficient method. For internal consistency, Cronbach Alpha value was used. Validity analyses of the questionnaire were performed by construct validity. For construct validity, convergent validity was tested. Convergent validity of the questionnaire was calculated via its correlation with suitable subscales of the Short Form-36 and the total score of the Oswestry Disability Index by using Pearson's correlation coefficient.

**Results:** Intraclass Correlation Coefficient values for test–retest reliability were found to be in the range of 0.765–0.924, which indicate a sufficient level of test–retest reliability. Cronbach's Alpha value was found to be 0.804 indicating a high internal consistency. Pearson's correlation coefficient between Japanese Orthopaedic Association Back Pain Evaluation Questionnaire to Short Form-36 and Oswestry Disability Index values were ranged between 0.424 and –0.810, indicating a good correlation.

**Conclusions:** Considering all these data, it was concluded that the Turkish version of the Japanese Orthopaedic Association Back Pain Evaluation Questionnaire is valid and reliable.

© 2016 The Japanese Orthopaedic Association. Published by Elsevier B.V. All rights reserved.

## 1. Introduction

Low back pain is amongst the most common musculoskeletal disorders [1] and it is quite cumbersome for both individuals and the healthcare system [2,3]. Low back pain, which is a serious health problem in both developed and developing countries [4,5], is observed more frequently in women and in an age range of 40–80.

Monthly prevalence of low back pain was estimated to be about 23% [6].

The primary aim of physical therapy in low back pain problems is the restoration of normal functions. Therefore, measurement tools are needed to assess function and to monitor the changes [7]. In low back pain, while the losses in movement, such as decreased range of motion or straight leg raise can be measured objectively [8–11], an objective evaluation of activity limitation may not always be possible [12]. Outcome measurements fill in this gap by providing objective answers regarding the current status and function to clinicians, surgeons, and researchers [7,13]. In this

\* Corresponding author.

E-mail address: [gurkangunaydin@gazi.edu.tr](mailto:gurkangunaydin@gazi.edu.tr) (G. Gunaydin).

regard, outcome measurements are a crucial part of evaluation and treatment [14,15].

Recommended parameters that may be used in scales for the comprehensive assessment of low back pain are listed as follows: pain, low-back function, general health condition, work disability, and patient satisfaction [16]. However, no questionnaires inquiring about low back pain has been defined as the gold standard. Therefore, increasing the number of questionnaires focussing on low back pain would increase the parameters in both low back pain assessment and patient monitoring, thereby provides a larger perspective for clinicians and researchers. Japanese Orthopaedic Association (JOA) Score was developed in 1986 by a few members of the JOA to assess low back pain [17]. In 2008, JOA revised the JOA Score and created the Japanese Orthopaedic Association Back Pain Evaluation Questionnaire (JOABPEQ) [18–20]. JOABPEQ comprises 25 items in 5 subscales, namely social function, mental health, walking ability, lumbar function, and low back pain. Each subscale score ranges from 0 to 100, where low score indicates worse condition [20]. Most components of JOABPEQ (90.5%) were found to be correlated with the International Classification of Functioning, Disability and Health (ICFDH). JOABPEQ allows a comprehensive evaluation in patients with low back pain and has been in use in many countries [21]. The questionnaire was found to be valid and reliable in patients with low back pain [19,20], and there exists only the Persian version of the questionnaire, other than the original version [22]. The JOABPEQ with its parameters is a comprehensive questionnaire, but it does not have a Turkish version. The aim of the present study was to investigate the reliability and validity of the Turkish version of the JOABPEQ.

## 2. Materials and methods

The permission to conduct the reliability and validity studies of the Turkish version of the JOABPEQ was obtained from the JOA before the study was commenced. For translation and cultural adaptation, the procedure set out by Beaton et al. was followed [23]. First, the questionnaire was translated from English to Turkish by two Turkish speakers with a very good command of English. Later, both versions of the Turkish translations were combined and the Turkish version was translated back to English by 2 English speakers with a very good command of Turkish. The research team evaluated the translated version in terms of linguistic compatibility and cultural adaptation. The face validity of the questionnaire was tested in a group of 30 patients, and then the Turkish version of the JOABPEQ was finalized.

### 2.1. Patient population

The study included 103 patients seeking treatment at the Physiotherapy and Rehabilitation Clinic (Faculty of Health Sciences, Gazi University, Turkey), who were diagnosed with low back pain by a specialist and volunteered to be included in the study. Thirty of 103 patients were included in the test–retest reliability study and 2 days' time interval was selected for this analyses. Also no treatment was administered for these 30 patients for 2 days. The study was approved by Gazi University Ethics Committee on May 22, 2015 (#77082166-604.01.02).

### 2.2. Japanese Orthopaedic Association Back Pain Evaluation Questionnaire

JOABPEQ is a self-assessment, disease-specific questionnaire for back pain. It contains 25 items (social function: 4, mental health: 7, lumbar function: 6, walking ability: 5 and low back pain: 4) with five subscales. Each subscale score ranges from 0 to 100. Higher

scores indicate better conditions [20]. JOABPEQ was found valid and reliable in low back pain patients [19,20].

### 2.3. Short Form-36 (SF-36)

SF-36 is a self-assessment questionnaire consists of 36 items with 8 subscales (physical functioning, social functioning, role limitations due to physical problems, bodily pain, general health perception, vitality, role limitations due to emotional problems and mental health). Each subscale score ranges from 0 to 100 and higher scores indicates better condition. Turkish version of SF-36 was found valid and reliable [24].

### 2.4. Oswestry Disability Index (ODI)

ODI consists of 10 items addressing different aspects of function. Each item scored from 0 to 5. In the ODI, higher scores indicate a worse condition [25]. Turkish version of ODI was found valid and reliable by Yakut et al. [12].

### 2.5. Statistical analyses

All statistical analyses were performed using SPSS version 22. For the assessment of the reliability of the JOABPEQ, test–retest and internal consistency analyses, and for the validity assessment of the questionnaire, construct validity analysis were performed. For the test–retest reliability and internal consistency analyses, Intraclass Correlation Coefficient (ICC) and Cronbach's Alpha value were used, respectively. Pearson's correlation coefficient was used for convergent validity analysis, which was performed for construct validity assessment. In present study SF-36 and ODI were preferred for convergent validity analyses of JOABPEQ. In this analysis the correlation between the 'social function', 'mental health', 'low back pain', 'lumbar function' and 'walking ability' subscales of JOABPEQ were analysed with 'social function', 'mental health', 'bodily pain', 'physical function' and 'physical function' subscales of the SF-36 respectively. Also correlation between the total scores of JOABPEQ and ODI were examined. For ICC analysis 0.75 and over [26] and Cronbach Alpha value 0.80 and over [27,28] were assumed to be sufficient, respectively. For the Pearson's correlation coefficient, 0.81–1.00, 0.61–0.80, 0.41–0.60, 0.21–0.40, and 0–0.20 were assumed to be indicating excellent, very good, good, fair, and poor, respectively [29].

## 3. Results

Of the 103 patients, 53 were female (51.46%) and 50 were male (48.54%). The patients' demographic data are presented in Table 1. Based on the internal consistency analysis of the questionnaire, Cronbach's Alpha was found to be 0.804 (Table 2). This value indicates that the questionnaire has a high internal consistency. The ICC score was found to be 0.779, 0.765, 0.780, 0.848, and 0.924 for 'low back pain', 'lumbar function', 'walking ability', 'social life function', and 'mental health' subscales, respectively (Table 3). As a result of these ICC values JOABPEQ has sufficient test–retest results.

Pearson's correlation coefficient values of JOABPEQ subscales with SF-36 subscales as shown in the following. 'Social function' subscale of JOABPEQ observed a good correlation (0.424) with 'social function' subscale of SF-36. 'Mental health' subscale of JOABPEQ showed good correlation (0.466) with 'mental health' subscale of SF-36. 'Low back pain' subscale of JOABPEQ indicated good correlation (0.440) with 'bodily pain' subscale of SF-36. 'Lumbar function' subscale of JOABPEQ found good correlation (0.594) with 'physical function' subscale of SF-36. 'Walking ability' subscale of JOABPEQ showed very good correlation (0.786) with

**Table 1**  
Demographic characteristics of patients.

	Female (n = 53) X ± SD	Male (n = 50) X ± SD	Total (n = 103) X ± SD	p
Age (year)	44.34 ± 14.47	41.94 ± 16.72	42.77 ± 15.97	0.438
Height (cm)	160.87 ± 7.45	174.98 ± 7.19	167.72 ± 10.17	<b>p &lt; 0.001</b>
Weight (kg)	69.58 ± 12.59	83.78 ± 18.32	76.48 ± 17.11	<b>p &lt; 0.001</b>
BMI (kg/m <sup>2</sup> )	26.99 ± 5.18	27.42 ± 5.97	27.20 ± 5.55	0.702

All values as mean ± SD.

**Table 2**  
Internal consistency of JOABPEQ.

Cronbach alpha
0.804

**Table 3**  
Test–retest analysis of JOABPEQ.

Subscales of JOABPEQ	ICC
Low back pain	0.779
Lumbar function	0.765
Walking ability	0.780
Social function	0.848
Mental health	0.924

JOABPEQ: Japanese Orthopaedic Association Back Pain Evaluation Questionnaire.

**Table 4**  
Convergent validity.

JOABPEQ	SF-36	r
Social function	Social function	0.424
Mental health	Mental health	0.466
Low back pain	Bodily pain	0.440
Lumbar function	Physical function	0.594
Walking ability	Physical function	0.786
JOABPEQ total	ODI total	−0.810

JOABPEQ: Japanese Orthopaedic Association Back Pain Evaluation Questionnaire, SF-36: Short-Form 36, ODI: Oswestry Disability Index.

'physical function' subscale of SF-36. Besides correlation between the total score of the JOABPEQ and ODI was found excellent (−0.810) (Table 4).

#### 4. Discussion

In the present study, the Turkish version of the JOABPEQ was found to be valid and reliable in a Turkish population.

The internal consistency of the Persian version of the JOABPEQ was reported to be in the range of 0.71–0.81 [22]. In the present study, the internal consistency coefficient of the Turkish version of the JOABPEQ was recorded as 0.804, which indicates that the internal consistency of the Turkish version of the JOABPEQ is high similar to Persian version.

In version studies, for test–retest analyses, various time lags between test–retest have been selected. In the original version of the JOABPEQ, the time lag between test–retest was 2 weeks [19]. Marx et al. reported no statistically significant difference between 2 days and 2 weeks of test–retest time lags [30]. In the present study, the time lag between test–retest was selected as 2 days based on the report of Marx et al. It was reported that, in the original version of the JOABPEQ, except for 1 parameter, Kappa coefficient was over 0.50 for all parameters [19]. No test–retest analysis was performed

for the Persian version of the JOABPEQ [22]. For the Turkish version of the questionnaire, test–retest ICC score was found to be 0.779, 0.765, 0.780, 0.848, and 0.924 for low back pain, lumbar function, walking ability, social life function, and mental health subscales, respectively. It was observed that the Turkish version of the JOABPEQ has sufficient test–retest reliability, which is similar to the original version.

The validity of the original version of the JOABPEQ was assessed by factor analysis, and the questionnaire was reported to have 5 factors [20]. In the Persian version, the validity of the questionnaire was assessed by item-scale correlation matrix, and the Pearson's correlation coefficient was reported in the range of 0.48–0.78 [22]. The Pearson's correlation between sub-parameters of the Turkish version of the JOABPEQ and those of the SF-36 were found to be in the range of 0.424–0.786 (good–very good). The Pearson's correlation between the total score of the Turkish version of the JOABPEQ and that of the ODI was found to be −0.810 (negative excellent correlation). Based on these findings, the Turkish version of the questionnaire appears to have high validity.

#### 5. Conclusion

The Turkish version of the JOABPEQ has high internal consistency, sufficient test–retest reliability, and high convergent validity. The Turkish version of the JOABPEQ is reliable and valid in patients with low back pain. As a future study, responsibility of JOABPEQ for back pain patients in Turkish population should be investigated.

#### Conflict of interest

The authors declare that they have no conflict of interest.

#### Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jos.2016.01.006>.

#### References

- Becker A, Held H, Redaelli M, Strauch K, Chenot JF, Leonhardt C, Keller S, Baum E, Pflingsten M, Hildebrandt J, Basler HD, Kochen MM, Donner-Banzhoff N. Low back pain in primary care: costs of care and prediction of future health care utilization. *Spine (Phila Pa 1976)* 2010 Aug 15;35(18):1714–20.
- Fritz JM, Childs JD, Wainner RS, Flynn TW. Primary care referral of patients with low back pain to physical therapy: impact on future health care utilization and costs. *Spine (Phila Pa 1976)* 2012 Dec 1;37(25):2114–21.
- Martin BI, Gerkovich MM, Deyo RA, Sherman KJ, Cherkin DC, Lind BK, Goertz CM, Lafferty WE. The association of complementary and alternative medicine use and health care expenditures for back and neck problems. *Med Care* 2012 Dec;50(12):1029–36.
- Koes BW, van Tulder MW, Ostelo R, Kim Burton A, Waddell G. Clinical guidelines for the management of low back pain in primary care: an international comparison. *Spine (Phila Pa 1976)* 2001 Nov 15;26(22):2504–13 [discussion 13–4].
- Genet F, Autret K, Roche N, Lapeyre E, Schnitzler A, Mandjui B, Manou B, Dziri C, Helleuch H, Rejeb N, Oudghiri N, Revel M, Poiraudreau S. Comparison of the repercussions of cLBP in four French-speaking countries. *Ann Phys Rehabil Med* 2009 Dec;52(10):717–28.

- [6] Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, Woolf A, Vos T, Buchbinder R. A systematic review of the global prevalence of low back pain. *Arthritis Rheum* 2012 Jun;64(6):2028–37.
- [7] Davidson M, Keating JL. A comparison of five low back disability questionnaires: reliability and responsiveness. *Phys Ther* 2002 Jan;82(1):8–24.
- [8] Deyo RA, Diehl AK. Measuring physical and psychosocial function in patients with low-back pain. *Spine (Phila Pa 1976)* 1983 Sep;8(6):635–42.
- [9] Fritz JM, Erhard RE, Vignovic M. A nonsurgical treatment approach for patients with lumbar spinal stenosis. *Phys Ther* 1997 Sep;77(9):962–73.
- [10] Kerssens JJ, Sluijs EM, Verhaak PF, Knibbe HJ, Hermans IM. Back care instructions in physical therapy: a trend analysis of individualized back care programs. *Phys Ther* 1999 Mar;79(3):286–95.
- [11] Mielenz TJ, Carey TS, Dyrek DA, Harris BA, Garrett JM, Darter JD. Physical therapy utilization by patients with acute low back pain. *Phys Ther* 1997 Oct;77(10):1040–51.
- [12] Yakut E, Duger T, Oksuz C, Yorukan S, Uretan K, Turan D, Frat T, Kiraz S, Krd N, Kayhan H, Yakut Y, Guler C. Validation of the Turkish version of the Oswestry Disability Index for patients with low back pain. *Spine (Phila Pa 1976)* 2004 Mar 1;29(5):581–5 [discussion 5].
- [13] Schoppink LE, van Tulder MW, Koes BW, Beurskens SA, de Bie RA. Reliability and validity of the Dutch adaptation of the Quebec back pain disability scale. *Phys Ther* 1996 Mar;76(3):268–75.
- [14] Garratt A. Patient reported outcome measures in trials. *BMJ* 2009;338:a2597.
- [15] Cella D, Yount S, Rothrock N, Gershon R, Cook K, Reeve B, Ader D, Fries JF, Bruce B, Rose M. The Patient-Reported Outcomes Measurement Information System (PROMIS): progress of an NIH roadmap cooperative group during its first two years. *Med Care* 2007 May;45(5 Suppl 1):S3–11.
- [16] Bombardier C. Outcome assessments in the evaluation of treatment of spinal disorders: summary and general recommendations. *Spine (Phila Pa 1976)* 2000 Dec 15;25(24):3100–3.
- [17] Izumida S, Inoue S. Assessment of treatment for low back pain. *J Jpn Orthop Assoc* 1986;60(3):391–4.
- [18] Fukui M, Chiba K, Kawakami M, Kikuchi S, Konno S, Miyamoto M, Seichi A, Shimamura T, Shirado O, Taguchi T, Takahashi K, Takeshita K, Tani T, Toyama Y, Wada E, Yonenobu K, Tanaka T, Hirota Y. JOA back pain evaluation questionnaire: initial report. *J Orthop Sci* 2007 Sep;12(5):443–50.
- [19] Fukui M, Chiba K, Kawakami M, Kikuchi S, Konno S, Miyamoto M, Seichi A, Shimamura T, Shirado O, Taguchi T, Takahashi K, Takeshita K, Tani T, Toyama Y, Yonenobu K, Wada E, Tanaka T, Hirota Y. Japanese Orthopaedic Association Back Pain Evaluation Questionnaire. Part 2. Verification of its reliability: the subcommittee on low back pain and cervical myelopathy evaluation of the clinical outcome committee of the Japanese Orthopaedic Association. *J Orthop Sci* 2007 Nov;12(6):526–32.
- [20] Fukui M, Chiba K, Kawakami M, Kikuchi S, Konno S, Miyamoto M, Seichi A, Shimamura T, Shirado O, Taguchi T, Takahashi K, Takeshita K, Tani T, Toyama Y, Wada E, Yonenobu K, Tanaka T, Hirota Y. Japanese Orthopaedic Association Back Pain Evaluation Questionnaire. Part 3. Validity study and establishment of the measurement scale: subcommittee on low back pain and cervical myelopathy evaluation of the clinical outcome committee of the Japanese Orthopaedic Association. *Jpn J Orthop Sci* 2008 May;13(3):173–9.
- [21] Wang P, Zhang J, Liao W, Zhao L, Guo Y, Qiu Z, Yue G. Content comparison of questionnaires and scales used in low back pain based on the international classification of functioning, disability and health: a systematic review. *Disabil Rehabil* 2012;34(14):1167–77.
- [22] Azimi P, Shahzadi S, Montazeri A. The Japanese Orthopedic Association Back Pain Evaluation Questionnaire (JOABPEQ) for low back disorders: a validation study from Iran. *J Orthop Sci* 2012 Sep;17(5):521–5.
- [23] Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine (Phila Pa 1976)* 2000 Dec 15;25(24):3186–91.
- [24] Pinar R. Reliability and construct validity of the SF-36 in Turkish cancer patients. *Qual Life Res* 2005 Feb;14(1):259–64.
- [25] Fritz JM, Irrgang JJ. A comparison of a modified Oswestry low back pain disability questionnaire and the Quebec back pain disability scale. *Phys Ther* 2001 Feb;81(2):776–88.
- [26] Andresen EM. Criteria for assessing the tools of disability outcomes research. *Arch Phys Med Rehabil* 2000 Dec;81(12 Suppl 2):S15–20.
- [27] Zinbarg RE, Revelle W, Yovel I, Li W. Cronbach's  $\alpha$ , Revelle's  $\beta$ , and McDonald's  $\omega_H$ : their relations with each other and two alternative conceptualizations of reliability. *Psychometrika* 2005;70(1):123–33.
- [28] Zinbarg RE, Yovel I, Revelle W, McDonald RP. Estimating generalizability to a latent variable common to all of a scale's indicators: a comparison of estimators for  $\omega_H$ . *Appl Psychol Meas* 2006;30(2):121–44.
- [29] Feise RJ, Michael Menke J. Functional rating index: a new valid and reliable instrument to measure the magnitude of clinical change in spinal conditions. *Spine (Phila Pa 1976)* 2001 Jan 1;26(1):78–86 [discussion 7].
- [30] Marx RG, Menezes A, Horovitz L, Jones EC, Warren RF. A comparison of two time intervals for test–retest reliability of health status instruments. *J Clin Epidemiol* 2003 Aug;56(8):730–5.