

## Original Article

# Reliability and Validity of the Turkish Short-Form McGill Pain Questionnaire-2 (TR-SF-MPQ-2) in patients with chronic low back pain

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## ABSTRACT

**Objectives:** The aim of this study was to assess validity and reliability of the Turkish version of the expanded and revised version of the Short-Form McGill Pain Questionnaire (TR-SF-MPQ-2) in patients with chronic low back pain (CLBP) and to investigate the relationship between TR-SF-MPQ-2 and etiology, pain scales, and disability index.

**Patients and methods:** Between October 2014 and December 2014, a total of 194 patients with CLBP (66 males, 128 females; mean age 50±14.3 years; range, 35 to 65 years) attending to our outpatient clinic were included. To assess reliability, Cronbach alpha ( $\alpha$ ) and intraclass correlation coefficient (ICC) were estimated for participants who completed the questionnaire in the morning and afternoon. The validity of the questionnaire was evaluated by analyzing the confirmatory factor analysis. The Visual Analog Scale and Oswestry Disability Index were also used to test concurrent validity of the questionnaire.

**Results:** For total score, Cronbach  $\alpha$  was 0.912 and ICC was 0.973, ranging from 0.72 to 0.84 for Cronbach  $\alpha$  and from 0.960 to 0.989 for ICC in subgroups. The confirmatory factor analysis showed a good model fit for each subgroup ( $\chi^2/Df < 3$ , GFI  $> 0.95$ , CFI  $> 0.90$ , NFI  $> 0.90$ , and RMSEA  $< 0.10$ ). The correlation coefficient between the mean VAS and the mean total score was 0.648.

**Conclusion:** Our study results indicate that the Turkish version of the SF-MPQ-2 is a reliable and valid tool to assess pain in the Turkish patients with CLBP.

**Keywords:** Chronic low back pain, reliability, Short-Form McGill Pain Questionnaire-2, Turkish, validity.

Low back pain is the most frequently observed pain type and it has a tremendous effect on the quality of life.<sup>[1]</sup> More than three months of low back pain is defined as chronic low back pain (CLBP).<sup>[2]</sup> About 17 to 54% of patients with CLBP describes neuropathic pain.<sup>[3]</sup> In the literature CLBP is classified as predominantly neuropathic pain.<sup>[4]</sup> The main reason of the mixture of different pain types is the psychosocial factors, which are the cause and consequence of chronicity, and play a key role in the prognosis and treatment of the CLBP.<sup>[5]</sup>

Due to the complex structure of CLBP, multidimensional pain scales urge to describe pain types and guide the treatment and prognosis. One of the most popular scale to describe the multidimensional nature of CLBP is the McGill Pain Questionnaire.<sup>[6]</sup> Although the McGill Pain Questionnaire is a well-defined multidimensional pain scale, the major limitation of this scale is the length of the questionnaire and, therefore, it is not applicable in daily routine outpatient clinics. To overcome drawback of the questionnaire, Melzack<sup>[7]</sup> developed the short

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form of the McGill Pain Questionnaire (SF-MPQ) which does not contain neuropathic pain scale. Over the past two decades, neuropathic pain has received increasing attention. As a result, Dworkin et al.<sup>[8]</sup> added neuropathic pain questions to SF-MPQ, and SF-MPQ-2 was developed.

The SF-MPQ-2 is a well-known pain scale worldwide and translated to many languages including Japanese, Thai, and Persian and its reliability and validity studies were performed. In addition, its validity for some specific patients groups such as cancer, acute low back pain, osteoarthritis, and diabetic polyneuropathy was studied.<sup>[8-14]</sup>

In the present study, we aimed to assess the validity and reliability of the Turkish version of the SF-MPQ-2 (TR-SF-MPQ-2) in patients with CLBP and to investigate the relationship between TR-SF-MPQ-2 and etiology, pain scales, and disability index.

## PATIENTS AND METHODS

### Instrument

Twenty-two pain descriptors are included in the SF-MPQ-2. The instrument is rated on 0-10 numerical scale to describe the severity of the pain. The SF-MPQ-2 consists four subclasses: affective, continuous, intermittent and neuropathic. The affective descriptors are “tiring exhausting,” “sickening,” “fearful,” and “punishing-cruel”. The continuous pain descriptors are “throbbing pain”, “cramping pain”, “gnawing pain”, “aching pain”, “heavy pain” and “tender”. The intermittent pain descriptors are “shooting pain”, “stabbing pain”, “sharp pain”, “splitting pain”, “electric-shock pain”, and “piercing”. The neuropathic pain descriptors are “hot burning pain”, “cold-freezing pain”, “pain caused by light touch”, “itching”, “tingling or pins and needles”, and “numbness”. The scoring of the questionnaire is determined by calculating the average score of each subgroup and the total, as well.<sup>[8]</sup>

### Translation and face validity

A written permission was obtained from the author who developed the original questionnaire to translate the questionnaire and use it in our study. The translation and the linguistic conformity were performed by using the Linguistic Validation Manual for Patient-Reported Outcomes (PRO) Instruments Guide as the basis.<sup>[15]</sup> The questionnaire was translated into Turkish by three different professional

medical translators. Three different questionnaire forms were made into one single questionnaire form by two different physicians who are fluent in English. This questionnaire form was translated into English by two different professional medical translators. The translated questionnaire form in English was compared with the original English SF-MPQ-2 and checked for the differences. After the last round of translation, the preliminary version of the TR-SF-MPQ-2 was tested in 10 CLBP patients in a pilot study to check its understandability. The results from the pilot study showed that the TR-SF-MPQ-2 was easily understandable (see Appendix 1).

### Participants and method of validation

A written informed consent was obtained from each patient. The study protocol was approved by Ankara Physical Therapy and Rehabilitation Training and Research Hospital Ethics Committee (No. B.10.1.T.KH.5.06.0.02.Z.F1.08-3245). The study was conducted in accordance with the principles of the Declaration of Helsinki.

The sample size was measured at 10:1 ratio according to Hair et al.<sup>[16]</sup> After 10 to 15% data loss, a total of 194 voluntary patients (66 males, 128 females; mean age 50±14.3 years; range, 35 to 65 years) from outpatient clinics were included in the study. The data were collected from Ankara Physical Medicine Rehabilitation Training and Research Hospital between October and December 2014 using the convenience sampling method. Inclusion criteria were as follows: having low back pain more than three months, aged between 18 and 90 years, knowing how to read and write in Turkish, and being oriented and cooperated. Exclusion criteria were as follows: having any neurological diseases requiring rehabilitation or rheumatic disorders affecting the axial skeleton. The questionnaire was applied to each patient twice within the same day: i.e., in the morning and afternoon. Demographic data of the patients were recorded. To validate the TR-SF-MPQ-2, Oswestry Disability Index (ODI), Visual Analog Scale (VAS), and Douleur Neuropathique en 4 Questions (DN4) were administered to all patients at their first visit. The ODI was used to determine the disability levels of the patients.<sup>[17]</sup> To determine the pain, neuropathic pain and its severity, VAS was used.<sup>[18]</sup> The DN4 was used to evaluate the neuropathic origin of the symptoms.<sup>[19]</sup>

### Statistical analysis

Statistical analysis was performed using the IBM SPSS for Windows version 20.0 software (IBM Corp.,

Armonk, NY, USA). The IBM SPSS Amos™ version 24 for Windows (IBM Corp., Armonk, NY, USA) was used for confirmatory factor analysis (CFA) for the validity of the study. Descriptive data were expressed in mean  $\pm$  standard deviation (SD), median (min-max) or number and frequency, where applicable. The normality of the parameters was assessed using the Kolmogorov-Smirnov test. If there were two independent groups, the Student t-test or Mann-Whitney U test was used based on normality of distribution. For more than two dependent groups, the Friedman test was used, while the Bonferroni test was used to identify significant differences. A multiple linear regression was used to predict DN4 based on subgroup of TR-SF-MPQ-2 scores. To examine the relation of quantitative data to each other, the Pearson and Spearman correlation tests were used. A *p* value of 0.05 was considered statistically significant with 95% confidence interval (CI).

### Reliability analysis

A Cronbach alpha ( $\alpha$ ) coefficient was used to assess the internal consistency of each subgroup. A Cronbach  $\alpha$  coefficient  $>0.7$  was considered acceptable.<sup>[20]</sup> The test-retest reliability was determined by intra-class correlation (ICC), and an ICC  $>0.90$  was considered highly reliable.<sup>[21]</sup>

### Validity analysis

The chi-square/degrees of freedom ( $\chi^2/Df$ ), goodness of fit index (GFI), comparative compliance index (CFI), normed compliance index (NFI), and mean square root of approximate errors (RMSEA) were used for the CFA. A  $\chi^2/Df$  ratio less than 3 indicated very good fit for the model. Likewise, GFI, CFI, and NFI  $>0.90$  were considered acceptable. A RMSEA of  $<0.10$  indicated valid adaptability.<sup>[8]</sup>

Since no other valid test has the same features of TR-SF-MPQ-2, VAS and ODI were used to test

Demographical data	n	%	Mean $\pm$ SD
Age (year)	194		50 $\pm$ 14.3
Sex			
Female	128	66	
Male	66	34	
Clinical characteristics			
Etiology			
Spinal degeneration	37	19.1	
Disc herniation	74	38.1	
Spinal stenosis	20	10.3	
Discopathy	28	14.4	
Myofascial pain	35	18	
Duration			
3-6 months	34	17.5	
7-12 months	38	19.6	
13-36 months	34	17.5	
>36 months	88	45.4	
SD: Standard deviation.			

concurrent validity. The relationship between the TR-SF-MPQ-2, VAS and ODI were assessed using the Pearson correlation test. A correlation with an absolute value of  $>0.50$  was considered acceptable.<sup>[22]</sup>

## RESULTS

Of the patients, 38.1% had a disc herniation and 45.4% reported back pain for more than three years. Baseline demographic and clinical data of the patients are summarized in Table 1.

### Reliability

The internal consistency analysis of TR-SF-MPQ-2 was evaluated using Cronbach  $\alpha$  coefficient and a total score of 0.912 was obtained. Since no deletion of any item increased the value of Cronbach  $\alpha$  in its own subgroup, no item deletion was needed.

	Number of items	T1 (Mean $\pm$ SD)	T2 (Mean $\pm$ SD)	Cronbach's $\alpha$ coefficient	ICC (95% CI)
Continuous	6	3.87 $\pm$ 2.38	3.82 $\pm$ 2.417	0.718	0.962 (0.943-0.974)
Intermittent	6	3.88 $\pm$ 2.731	3.73 $\pm$ 2.869	0.809	0.963 (0.944-0.975)
Neuropathic	6	2.65 $\pm$ 2.441	2.66 $\pm$ 2.443	0.761	0.984 (0.976-0.989)
Affective	4	4.90 $\pm$ 3.272	4.67 $\pm$ 3.397	0.843	0.960 (0.940-0.973)
Total	22	3.73 $\pm$ 2.231	3.63 $\pm$ 2.334	0.912	0.973 (0.960-0.982)
TR: Turkish; SF: Short form; MPQ: McGill Pain Questionnaire; T1: First attempt to complete questionnaire; SD: Standard deviation; T2: Second attempt to complete questionnaire; ICC: Intraclass correlation; CI: Confidence interval.					

TABLE 3 Intercorrelations between TR-SF-MPQ-2 scores and VAS, DN4, and ODI					
	Continuous	Intermittent	Neuropathic	Affective	Total
VAS	0.629	0.602	0.377	0.571	0.648
ODI	0.551	0.573	0.541	0.595	0.672
DN4	0.374	0.526	0.713	0.391	0.601

TR: Turkish; SF: Short form; MPQ: McGill Pain Questionnaire; VAS: Visual Analog Scale; DN4: Douleur Neuropathique en 4 Questions; ODI: Oswestry Disability Index.

TABLE 4 Fit indices values for confirmatory factor analysis of TR-SF-MPQ-2					
	$\chi^2/Df$	GFI	CFI	NFI	RMSEA
Continuous	2.228	0.967	0.942	0.903	0.080
Intermittent	1.910	0.971	0.975	0.950	0.069
Neuropathic	2.172	0.975	0.973	0.952	0.078
Affective	0.965	0.995	1.000	0.994	0.000

TR: Turkish; SF: Short form; MPQ: McGill Pain Questionnaire;  $\chi^2$ : Chi-square; Df: Degree of freedom; GFI: Goodness fit index; CFI: Comparative fit index; NFI: Normative fit index; RMSEA: Root mean square error of approximation.

TABLE 5 Standardized factor loadings of confirmatory factor analysis					
	Continuous	Intermittent	Neuropathic	Affective	
1 Throbbing pain	0.56				
2 Shooting pain		0.73			
3 Stabbing pain		0.65			
4 Sharp pain		0.78			
5 Cramping pain	0.40				
6 Gnawing pain	0.50				
7 Hot-burning pain			0.42		
8 Aching pain	0.71				
8 Heavy pain	0.70				
10 Tender	0.39				
11 Splitting pain		0.69			
12 Tiring-exhausting				0.70	
13 Sickening				0.89	
14 Fearful				0.64	
15 Punishing-cruel				0.81	
16 Electric-shock pain		0.50			
17 Cold-freezing pain			0.41		
18 Piercing		0.49			
19 Pain caused by light touch			0.52		
20 Itching			0.46		
21 Tingling or 'pins and needles'			0.96		
22 Numbness			0.71		

**TABLE 6**  
Comparison of etiology with subgroups of TR-SF-MPQ-2

	Etiology				
	Spinal degeneration (n=37)	Disc herniation (n=74)	Spinal stenosis (n=20)	Discopathy (n=28)	Myofacial pain (n=35)
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Continuous	3.5±2.5	4.1±2.3	3.5±1.7	4.9±2.5	3.1±2.4
Intermittent	3.1±3.0	4.6±2.4	3.9±2.6	4.7±2.8	2.6±2.6
Neuropathic	1.9±2.6	2.7±2.3	3.7±2.7	3.9±2.2	1.7±2.0
Affective	3.4±3.5	5.3±3.0	6.1±3.0	6.4±2.5	3.8±3.2
<i>p</i>	0.00	0.000	0.00	0.00	0.00
<i>Total</i>	2.9±2.5	4.1±2	4.2±2.0	4.8±2.1	2.7±2.1

TR: Turkish; SF: Short form; MPQ: McGill Pain Questionnaire; SD: Standard deviation.

The test-retest reliability coefficients (ICC) were also considered highly reliable and ranged from 0.960 to 0.984. There was no statistically significant difference between the mean scores of TR-SF-MPQ-2 in the first and second attempt to complete the questionnaire (T1 and T2) ( $p>0.05$ ) (Table 2).

### Validity

Total and subgroup scores of the TR-SF-MPQ-2 were significantly correlated with VAS and ODI ( $p<0.001$ ), supporting concurrent validity (Table 3). The standardized factor loadings are summarized in Table 4. The CFA fit showed a good construct validity for the original four-factor model and hypothesized model was modified by adding error covariance between hot-burning pain and itching (0.39), also between pain caused by light touch and tingling or pins and needles (-0.93) (Table 5).

### Relation with neuropathic pain and disability

Total and subgroup scores of TR-SF-MPQ-2 were positively correlated with DN4 and ODI ( $p<0.001$ ). The correlation between neuropathic pain scores of TR-SF-MPQ-2 and DN4 was the highest among subgroup scores (Table 3). A multiple linear regression was performed to predict DN4 scores based on subgroup scores of TR-SF-MPQ-2. A significant regression equation was found ( $F=198.326$   $p<0.001$ ) with an  $R^2$  of 0.508. The DN4 scores increased 0.640 times for each neuropathic pain scores of TR-SF-MPQ-2. Only neuropathic pain group of TR-SF-MPQ-2 was found to be the predictor of DN4 ( $p<0.001$ ).

The patients with either spinal degeneration or disc herniation, the lowest score was the neuropathic pain group among subgroups of TR-SF-

MPQ-2 ( $p<0.001$ ). Affective descriptive had the highest scores among subgroups of TR-SF-MPQ-2 in patients with discopathy ( $p<0.005$ ). Affective descriptive scores were higher than continuous and intermittent pain scores in the patients with spinal stenosis ( $p<0.05$ ). In the patients with myofascial pain, neuropathic pain scores were lower than continuous pain and affective descriptive scores ( $p<0.01$ ) (Table 6).

## DISCUSSION

To the best of our knowledge, this study is the first to attempt to translate, validate and evaluate reliability of the TR-SF-MPQ-2 in the Turkish population. The validity and reliability of the TR-SF-MPQ-2 were substantiated according to the internal consistency, test-retest, and CFA analyses. The Cronbach  $\alpha$  coefficients, indicator of internal consistency, of the total score (0.912) and subgroup scores (0.718-0.843) of the TR-SF-MPQ-2 (0.912) were found to be high, consistent with the literature even with the original English version of the questionnaire.<sup>[9,11,13,14]</sup>

Furthermore, the ICC, a test-retest method, indicated highly reliable results with total and subgroups of TR-SF-MPQ-2 ( $>0.90$ ), consistent with the literature.<sup>[9,10,13,14]</sup> The ICC values of subgroups of the current study ( $>0.90$ ) were higher, compared to the study of Kachooei et al.<sup>[13]</sup> (range, 0.73 to 0.90) and Maruo et al.<sup>[14]</sup> (range, 0.75 to 0.85), in which retest was applied it after three days and three months respectively. For test-retest purposes, it has been recommended the gap between second time and first time should be long enough for subjects to forget the answers.<sup>[23]</sup> However, in low back pain, a short interval should be administered between test and retest to

minimize the changes in pain. Roach et al.<sup>[24]</sup> showed that the correlation was the highest in 24 h in low back pain and correlation was decreased, when the time interval was longer.<sup>[25]</sup> In the validity and reliability study of the Turkish version of SF-MPQ, Yakut et al.<sup>[26]</sup> also reported that short term test-retest was considered important, since clinicians might be willing to start the analgesic treatment and the treatment might affect the pain intensity. Adelmanesh et al.<sup>[9]</sup> also emphasized the importance of 7-h interval due to the fact of reduced chance of spontaneous change in pain characteristics. Due to the need of immediate start of analgesics and chance of spontaneous change in pain characteristics, short term (within a day) was chosen for test-retest method in our study.

The CFA is used for testing expected factor structure of a given scale which verifies the validity of factor structure established a previous model alternately than searching a new factor structure and it differs from exploratory factor analysis.<sup>[14]</sup> To evaluate construct validity of TR-SF-MPQ-2, a CFA was performed within suggesting subgroups for SF-MPQ-2. The CFA model showed a good-fitting four-factor model, which is consistent with the study of Buphha et al.<sup>[10]</sup> and the two studies of Dworkin et al.<sup>[8,11]</sup> (i.e., the original study of SF-MPQ-2 and study with acute back pain).

The VAS is a valid and reliable pain scale and is used to measure of the severity of the pain.<sup>[27]</sup> The concurrent validity was verified by the correlation between VAS and the total scores of the TR-SF-MPQ-2 ( $r=0.648$ ), confirming the results obtained from the previous study ( $r=0.637$ ).<sup>[26]</sup>

In our study, the change of pain types over different etiology was seen. The patients with either discopathy or spinal stenosis had higher affective scores and, in literature, it has been known for patients with spinal stenosis with psychological impact.<sup>[28]</sup> It is important that the TR-SF-MPQ-2 can discrete between different etiology using subgroup of the scale. This would guide the physicians to make an individual treatment plan for every individual patient.

The limitations of this study include that the patients were recruited from a single healthcare center and no treatment or follow-up design was added. Planning a treatment step and follow-up in a multi-center, large-scale study would increase the chance of usefulness of questionnaire.

In conclusion, our study results indicate that the Turkish SF-MPQ-2 is a reliable, valid, and sensitive

pain questionnaire for CLBP which is helpful for distinguishing different pain types, including neuropathic pain, and interrelating the etiology of the CLBP.

#### Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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## APPENDIX 1

## Turkish version of the Short-Form McGill Pain Questionnaire 2 (TR-SF-MPQ-2)

Bu anket formu size farklı ağrı niteliklerinden bazılarını ve ilgili semptomları tarif eden bir kelime listesi vermektedir. Geçen hafta içinde hissettiğiniz ağrıların her birinin ve ilgili semptomların yoğunluğunu en iyi tarif eden numaraya lütfen X koyun. Kelime ağrınızı veya ilgili semptomu tarif etmiyorsa 0 kullanın.

1	Zonklayan ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
2	Yayılan ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
3	Saplanan ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
4	Keskin ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
5	Kramp ağrısı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
6	Kemiren ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
7	Sıcak hissi veren- yakan ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
8	Sızlayan ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
9	Şiddetli ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
10	Hassasiyet	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
11	Çok şiddetli ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
12	Yorucu-tüketici ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
13	Bıktırıcı ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
14	Korku veren ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
15	Eziyet edici ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
16	Elektrik çarpar gibi ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
17	Soğuk-donduran ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
18	Delip geçici ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
19	Hafif dokunuş ile ortaya çıkan ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
20	Kaşındıran ağrı	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
21	Karınçalanma veya iğnelenme	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü
22	Uyuşma	Yok	0	1	2	3	4	5	6	7	8	9	10	En kötüsü