



ORIGINAL ARTICLE

Validity and reliability of Turkish version of the Brief Pain Inventory-Short Form for patients with chronic nonmalignant pain

Kronik nonmaling ağrısı olan hastalarda Brief Ağrı Envanteri Kısa Formu'nun Türkçe formunun geçerliliği ve güvenilirliği

Yasemin YILDIRIM,¹ Serap PARLAR KILIÇ,² Sibel EYİĞÖR,³ Can EYİĞÖR,⁴ Yusuf YILDIRIM,⁵
Emine KARAMAN,¹ Gülay OYUR ÇELİK,⁶ Meltem UYAR⁴

Summary

Objectives: The aim of this study was to evaluate the validity and reliability of the Turkish version of the Brief Pain Inventory-Short Form for patients with chronic nonmalignant pain.

Methods: An analytical design was used. A total of 192 patients were included in the study. A demographic questionnaire and the Brief Pain Inventory-Short Form were used to collect data. Content validity was assessed by experts and construct validity was tested using exploratory factor analysis. Reliability analyses estimated the internal consistency and test-retest reliability. Cronbach's alpha and the item-total correlations were calculated for the subscales to examine internal consistency.

Results: Exploratory factor analysis yielded 2 factors: pain severity and pain interference, which accounted for 68.81% of the total variance. The coefficient alpha of both subscales demonstrated good internal consistency. The item-total correlations of the scale ranged between 0.56 and 0.87. The test-retest reliability was $r=0.774$ for pain severity and $r=0.808$ for pain interference ($p=0.001$).

Conclusion: The Turkish version of the Brief Pain Inventory-Short Form is a valid and reliable instrument to assess chronic nonmalignant pain.

Keywords: Brief pain inventory short form; chronic nonmalignant pain; pain assessment; validity; reliability.

Özet

Amaç: Bu çalışmanın amacı, kronik nonmaling ağrısı olan hastalarda Brief Ağrı Envanteri Kısa Formu'nun Türkçe versiyonunun geçerliliğini ve güvenilirliğini değerlendirmektir.

Gereç ve Yöntem: Analitik çalışma deseni kullanıldı. Çalışmaya 192 hasta dahil edildi. Veri toplamada sosyodemografik soru formu ve Brief Ağrı Envanteri Kısa Formu kullanıldı. Envanterin geçerliliğini değerlendirmek için içerik ve yapı geçerliliği kullanılmıştır. İçerik geçerliliği uzman görüşü ile değerlendirildi. Yapı geçerliliği için açımlayıcı faktör analizi kullanılmıştır. Güvenirlik analizi için iç tutarlılık ve test tekrar test güvenilirlik analizleri yapılmıştır. İç tutarlılık için alt boyutların Cronbach alfa ve madde-toplam korelasyonları hesaplandı.

Bulgular: Açımlayıcı faktör analizi 2 faktör göstermiştir, ağrı şiddeti ve ağrı girişimi. İki faktör toplam varyansın %68.81'ini açıklamıştır. Her iki alt boyutun alfa katsayısı iyi iç tutarlılık göstermiştir. Ölçeğin madde toplam korelasyonları 0.56 ile 0.87 arasındadır. Test–retest güvenilirliği ağrı şiddeti için $r=0.774$ ve ağrı girişimi için $r=0.808$ 'dir ($p=0.001$).

Sonuç: Brief Ağrı Envanteri Kısa Formu'nun Türkçe versiyonu, kronik nonmaling ağrıyı değerlendirmek için güvenilir ve geçerli bir araçtır.

Anahtar sözcükler: Brief ağrı envanteri kısa formu; nonmaling ağrı; ağrı değerlendirilmesi; geçerlik; güvenilirlik.

¹Department of Internal Medicine Nursing, Ege University Faculty of Nursing, İzmir, Turkey

²Department of Internal Medicine Nursing, İnönü University Faculty of Health Sciences, Malatya, Turkey

³Department of Physical Therapy and Rehabilitation, Ege University Faculty of Medicine, İzmir, Turkey

⁴Department of Anesthesiology, Pain Clinic, Ege University Faculty of Medicine, İzmir, Turkey

⁵Department of Gynecological Oncology, İzmir, Turkey

⁶Department of Surgical Nursing, İzmir Katip Çelebi University Faculty of Health Sciences, İzmir, Turkey

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Correspondence: Dr. Yasemin Yıldırım. Ege Üniversitesi Hemşirelik Fakültesi, Bornova 35100, İzmir, Turkey.

Phone: +90 - 232 - 311 55 38 **e-mail:** yasemin.kyildirim@ege.edu.tr

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Introduction

Chronic pain and its treatment are an important economic burden on healthcare systems. All over the world, it is the most common symptom that requires professional support.^[1] Affecting millions of people every year, chronic pain has a negative effect on the quality of life and causes physical, functional, and psychological problems.^[2, 3] Patient assessment is the most important step in the management of chronic pain, which has both material and spiritual importance.^[4] Pain assessment is a major step in the diagnosis and treatment of the patients suffering from pain.^[5]

Not only the severity of the pain, but also its duration, localisation, somatosensorial characteristics, and accompanying emotional symptoms should be taken into consideration. Nevertheless, pain control may be a problematic process due to the inadequacy of objective evaluation methods.^[6, 7] Reliable and valid instruments can provide guidance for healthcare professionals in clinical practice in terms of pain assessment. The Brief Pain Inventory (BPI) was developed in 1994 by Cleeland and Ryan for two reasons; the subjective severity of pain and the interference caused by pain. The BPI is a valid, reliable, and commonly used scale which evaluates the localisation and severity of pain during the past 24 hours as well as its effect on activity in individuals with pain.^[8]

It is a quick and useful scale with validity and reliability performed in different populations and different languages.^[9-16] Although the BPI has been primarily used to assess cancer-related pain, it is validated for non-malignant pain, as well.^[16, 17] Since chronic pain affects functional activity and psychology, these aspects of pain should also be assessed with regard to multidisciplinary treatment. The BPI allows to assess these aspects, as well. The BPI is comprised of two parts. The first part includes eight items which question pain location, pain severity, analgesic use, and pain relief. The second part evaluates the effect of pain on daily life activities.^[8, 18] In Turkey, there have been no multi-dimensional scales except for the McGill Pain Questionnaire used to assess all aspects of pain. Although the BPI has been validated in several languages and tested in surgical patients in Turkey, a validated Turkish version of the inventory for patients with chronic nonmalignant pain has not been

available until now. For this reason, the purpose of this study is to determine validity and reliability of the BPI-SF in patients with chronic nonmalignant pain, and to provide with a multi-dimensional scale to be used in chronic pain assessment in Turkey.

Material and Method

Study Design

This was a descriptive and psychometric study.

Participant and Data Collection

This study was conducted on both inpatients and outpatients in the clinic of physical therapy and rehabilitation, rheumatology, and algology at two university hospitals in Izmir and Gaziantep, Turkey. Inclusion criteria of patients were as follows; 1) being diagnosed with chronic pain by a specialist, 2) having a pain duration of at least three months, 3) being over the age of 18, 4) being able to communicate verbally, and 5) giving informed consent. Patients who had a history of previous surgery in the last two weeks were excluded from the study due to the different nature of nonmalignant pain and surgical pain. Also, patients who were newly diagnosed with cancer were not included in the study. The sample group of the study consisted of 192 patients. The number of items in the BPI-SF (n=9) was taken into consideration in determining the appropriate sample size for the study. At least 3 or more patients are recommended for each scale item in the scale study.^[19] The number of patients included in this study was twenty times of the number of BPI-SF items. In the study of the test-retest reliability of the scale, 30 patients were administered the same scale again after two weeks.

Data Collection

The pilot study was conducted among 10 patients with chronic pain in order to assess the comprehensibility and ease of use for the Turkish Brief Pain Inventory (BPI-SF-Tr). For application to larger study populations, the final version of the scale was formed. Patients who participated in the pilot study were not included in this study. All study data were collected by using face-to-face interview methods. The questions were read to the participants and then their answers were marked on the questionnaires.

Translation procedure for the Brief Pain Inventory

(SF): Language validity of the scale was performed in the first step of the study. The original form of the BPI-SF was translated from English to Turkish by the research team (three nursing lecturers and four doctor lecturers) and also two native Turkish speakers who spoke English fluently (one was a nursing lecturer and the other one was an English lecturer who is also native English speaker). Then, two bilingual translators translated the Turkish items back into English. None of experts had seen the original English text of the scale.^[11] After we compared with the back-translated version and the original version, we found them to be nearly the same. No changes were made in them. Finally, the Turkish version of the BPI-SF was produced for final use upon consensus of the translation committee.

Validity of the Brief Pain Inventory (SF): Content validity and construct validity were performed to assess the validity of the BPI-SF. Content validity is conducted according to expert opinion and is related to whether questions on the assessment tool are in accordance with the measurement objective and represent the area intended to be measured or not. Content validity of the BPI-SF-Tr was assessed by four experts. These professionals comprised of two algologists and two algology nurses. These experts were asked to evaluate the each item of the BPI-SF over a 100% agreement level.^[20] And then, its final form was composed. Construct validity of the BPI-SF-Tr was tested using exploratory factor analysis.

Firstly, permission for use of the BPI-SF was obtained from the author who developed the tool. Institutional approval was received from the Ethics Committee of Faculty of Nursing. Furthermore, written consent from the institutions and informed consent from each participant were taken.

Measures: Two instruments were used to collecting the data of the study. The demographic questionnaire was developed upon a literature review. The questionnaire included socio-demographic characteristics (gender, age, marital status, educational status, social security, employment, and economic condition) and medical characteristics (diagnosis of the disease, duration of disease, treatment, duration of pain, and intensity of the pain) of the patients. The BPI-SF is a patient-rated and easy-to-understand in-

strument. Developed by Cleeland and Ryan (1994), the inventory allows patients to rate the severity of their pain and the degree to which their pain interferes with common dimensions of feeling and function. The BPI-SF measures their current, worst, least, and average pain during the past 24 hours. These four items are assessed by using a numeric scale, with 0= no pain and 10= pain as bad as you can imagine. The other seven items evaluates how much pain interfered with various daily activities, including general activity, walking, work, mood, enjoyment of life, relations with others, and sleep. Again, a 0 to 10 scale, with 0= no interference and 10= interferes completely, is used.^[8, 21] The BPI-SF also retains the body diagram from the initial questionnaire and questions about effectiveness of pain treatment.^[21] The Cronbach's alpha reliability of the original version of the BPI ranges from 0.77 to 0.91.^[8]

Statistical Analysis

The Statistical Package for The Social Sciences 13.0 for Windows was used to conduct statistical analysis. P values of less than 0.05 were accepted as statistically significant. Firstly, descriptive statistics were performed to assess characteristics of participants. Also, means and standard deviations were calculated for each item of the subscales. Secondly, reliability and validity analysis of the BPI-SF-Tr was carried out. Content validity and construct validity were calculated for assessing the validity of the BPI-SF-Tr. In order to examine construct validity, exploratory factor analysis was used. Principal component analysis for extraction method and varimax with Kaiser Normalization for rotation method were assessed. Cronbach's alpha coefficient and item total correlation were calculated to establish internal consistency reliability of the subscales.^[20, 22] For the purpose of assessing the test-retest reliability for the scale, the Pearson correlation coefficient was performed.

Results

A total of seven patients were excluded from the sample group due to their refusal to participate in the study. Finally, 192 patients were included in this study. Table 1 illustrates socio-demographic and medical characteristics of the patients. As shown in Table, 64.6% were female, 78.6% were married, and 45.9% were primary school graduates. The mean age was 49.35 ± 15.49 (range 17 to 84) years.

Table 1. Characteristics of the sample

	Frequency	Percentage
Gender		
Female	124	64.6
Male	68	35.4
Marital status		
Married	151	78.6
Single	41	21.4
Level of education		
Literate	24	12.5
Primary school (age 7 to 12)	88	45.9
Secondary school (age 13 to 17)	43	22.4
University	37	19.3
Occupation		
Employee	58	30.2
Selfemployed	11	5.7
Retired	41	21.4
Housewife	82	42.7
Total	192	100.0
	Mean	SD
Age (years)	49.35	15.49
Duration of disease (years)	4.34	4.74
Duration of pain (years)	3.52	3.94

SD: Standard deviation.

All patients had health insurance and 64.1% were not currently working (retired or a housewife). The mean time from the diagnosis was 4.34 ± 4.74 (range one to 25) years. The mean duration of pain was 3.52 ± 3.94 years.

Descriptive results of the Turkish Brief Pain Inventory (SF)

Table 2 illustrates descriptive statistics for each item of the subscales. The mean worst pain score was 6.99 ± 2.11 and the mean least pain was 3.22 ± 2.17 . Patients reported that the highest score was obtained in pain's interference with general activity, which was followed by normal work, mood, enjoyment of life, sleep, walking ability, and relationship with other.

Validity of the Turkish Brief Pain Inventory (SF)

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value was 0.88 with a statistically signifi-

Table 2. Descriptive results of the BPI-Tr

BPI item	Mean	SD
Pain Severity (0–10)		
Pain worst	6.99	2.11
Pain least	3.23	2.18
Pain on average	5.19	1.95
Pain now	5.11	2.52
Pain interference (0–10)		
General activity	6.02	2.42
Mood	5.29	2.81
Walking ability	4.54	3.05
Normal work	5.98	2.54
Relationships with others	3.84	2.92
Sleep	4.81	3.11
Enjoyment of life	5.19	3.09

BPI: Brief Pain Inventory; SD: Standard deviation.

Table 3. The 2 factors and factor loadings of the BPI-Tr items

BPI item	Factor I (PI)	Factor II (PS)
Pain severity		
Pain worst	0.53	0.65
Pain least	0.08	0.93
Pain on average	0.34	0.86
Pain now	0.22	0.84
Pain interference		
General activity	0.63	0.57
Mood	0.81	0.20
Walking ability	0.71	0.10
Normal work	0.66	0.42
Relationships with others	0.79	0.18
Sleep	0.60	0.36
Enjoyment of life	0.82	0.23

BPI: Brief Pain Inventory; SD: Standard deviation; PI: Pain interference; PS: Pain severity. The bold figures represent factor 1 and factor 2.

cant Barlett sphericity (BS) ($p=0.001$). After exploratory factor analysis; it was loaded on two factors as pain intensity and pain interference in this study by using principal component extraction method with varimax rotation. Table 3 illustrates the two factors and factor loadings of the BPI items. The first factor consisted of all seven interference items and accounted for 55.5% of the variance. The second factor consisted of the four pain intensity scales and

Table 4. Item analysis and internal consistency of the BPI-Tr

BPI item	Item-total correlation	If Item deleted alpha	Cronbach alpha
Pain severity (0–10)			
Pain worst	0.70	0.89	0.89
Pain least	0.79	0.86	
Pain on average	0.87	0.83	
Pain now	0.75	0.88	
Pain interference (0–10)			
General activity	0.72	0.87	0.89
Mood	0.73	0.86	
Walking ability	0.56	0.89	
Normal work	0.71	0.87	
Relationships with others	0.70	0.87	
Sleep	0.60	0.88	
Enjoyment of life	0.77	0.86	
Total BPI-Tr			

BPI: Brief Pain Inventory.

accounted for another 13.3% of the variance. Both factors accounted for 68.8% of the total variance. Factor loads of these two factors ranged from 0.60 to 0.93. The eigenvalues of the two factors were 6.10 and 1.46.

Reliability of the Turkish Brief Pain Inventory (SF)

Internal consistency and test-retest reliability were performed in order to assess the reliability of the BPI. For the internal consistency, Cronbach's alphas and the item-total correlations were calculated for the pain interference and pain severity scales. The alpha coefficient was 0.89 for the pain severity scale, and 0.89 for the pain interferences scale. The total Cronbach's alpha coefficient was high as 0.91 for all items (BPI-SF-Tr) of the scale. All alpha values indicated good internal consistency.^[23–25] The item-total correlations of the scale ranged between 0.56 and 0.87 (Table 4). The item-total correlations for all items of the scale were adequate criteria.^[20, 26] Table 4 illustrates the alpha values when items are deleted.

The test-retest reliability measurement was performed to assess the stability of the BPI-SF-Tr over time. After patients completed the BPI-SF-Tr, 30 patients were administered the same scale again two weeks later. Pearson correlations for test-retest reliability were $r=0.77$, $p=0.001$ for the pain severity, and $r=0.81$, $p=0.001$ for the pain interference.

Discussion

The this study has revealed that the BPI-SF-Tr is a valid and reliable instrument to assess pain severity and interference in patients with chronic nonmalignant pain. Validity refers whether an assessment instrument accurately measures what is supposed to measure or not. When an instrument is valid, it truly reflects the concept it is supposed to measure.^[20] Three types of validity are content validity, criterion-related validity, and construct validity.^[24] The content validity and construct validity were performed for validity of this study. Construct validity was confirmed by using the factor analysis. The KMO and BS are used to assess the adequacy for factor analysis of data. For factorability, KMO should be greater than 0.4.^[27] KMO and BS values obtained in this study showed that the sample size and correlation matrix of the scale items were suitable for factor analyses.^[22, 27] After factor analysis, a total of 11 items were loaded on two factors as pain severity and pain interference. This result is consistent with numerous other factor analysis results in many different countries.^[8–12, 14, 15] Only two studies reported three factors: pain severity, pain activity, and mood interference.^[13, 28]

Reliability is consistency among independent measurements of the same variable.^[24, 28] The reliability of an assessment tool refers to the tool producing consistent, adequate, homogeneous, repeatable results.

Table 5. Reliability coefficient of the pain severity and pain interference subscales of the various versions of the BPI

Country	PS α	PI α
Brazil	0.91	0.87
China	0.86	0.91
France	0.86	0.90
Germany	0.88	0.92
Greece	0.89	0.85
Italy	0.78	0.78
Japan	0.81	0.81
Lebanon	0.82	0.92
North India	0.89	0.91
Norway	0.87	0.92
Russia	0.93	0.95
Taiwan	0.81	0.89
Turkey	0.89	0.89

BPI: Brief Pain Inventory; PI: Pain interference; PS: Pain severity. Bolded numbers are results of the present study in Turkey.

[29] The reliability of an assessment instrument is the extent to which it yields consistent, reproducible estimates of what is assumed to be an underlying true score.^[30] There is an inverse relationship between reliability and random error. Despite its necessity, reliability alone is not sufficient for validity.^[24, 28] In order to assess the reliability of the BPI, internal consistency and test-retest reliability were performed.

Internal consistency is usually measured with Cronbach's alpha. Cronbach's alpha reliability coefficient is the indicator of the homogeneity of the items included in the scale.^[23, 24] Internal consistency ranges between 0 and one^[23, 25, 28] and literature suggests that a reliability of 0.70 is considered as acceptable.^[33–36] An alpha within the range of 0.80 and 0.90 was accepted as good internal consistency.^[23–25] In this study, both coefficient alphas of the subscales and the total scale were above 0.80. The Cronbach's alpha coefficient values indicated that items correlated with each other and the BPI-SF-Tr were reliable.^[23] When Cronbach's alpha coefficient values obtained in this study were compared to other BPI validation studies, it was found in some cases higher than those reported in other studies (Table 5).^[9, 10] The acceptable item-total correlation for each item should be 0.30 and items with a correlation coefficient lower

than 0.30 generally are recommended to be omitted from the scale.^[20, 26] Because the item total correlations for each item were above 0.30, any item from these two subscales was not eliminated.^[28]

Test-retest reliability measures the stability over time. For test-retest analyses, the group should consist of at least 30 people, and the duration between two tests should be short enough to remember the answers given in the first application, and long enough to allow a considerable change in responders in terms of the features measured by the scale.^[28] A typical interval is several weeks.^[24] The results of test-retest study showed an acceptable correlation coefficient for the BPI-SF-Tr.

Conclusion

The study confirmed that the BPI-SF in patients with chronic nonmalignant pain was determined to be a valid and reliable instrument for Turkish populations. It can be used as a tool for comprehensive pain assessment in patients suffering from chronic nonmalignant pain. It is recommended that this scale should be further evaluated both in different regions of Turkey with larger samples and in diverse populations.

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