The Journal of Physical Therapy Science

SPTS

Original Article

Cross-cultural adaptation and validation of the Turkish version of the pain catastrophizing scale among patients with ankylosing spondylitis

Nursen İlçin, PhD, PT[1])*, Barış Gürpinar, MSc, PT[1]), Deniz Bayraktar, MSc, PT[1]),
Sema Savci, PhD, PT[1]), Pinar Çetin, MD[2]), İsmail Sari, MD[2]), Nurullah Akkoç, MD[2])

[1)] School of Physical Therapy and Rehabilitation, Dokuz Eylul University: İzmir, Turkey
[2)] Department of Internal Medicine, Division of Rheumatology, Dokuz Eylul University School of
    Medicine, Turkey

Abstract. [Purpose] This study describes the cultural adaptation, validation, and reliability of the Turkish version of the Pain Catastrophizing Scale in patients with ankylosing spondylitis. [Methods] The validity of the Turkish version of the Pain Catastrophizing Scale was assessed by evaluating data quality (missing data and floor and ceiling effects), principal components analysis, internal consistency (Cronbach's alpha), and construct validity (Spearman's rho). Reproducibility analyses included standard measurement error, minimum detectable change, limits of agreement, and intraclass correlation coefficients. [Results] Sixty-four adult patients with ankylosing spondylitis with a mean age of 42.2 years completed the study. Factor analysis revealed that all questionnaire items could be grouped into two factors. Excellent internal consistency was found, with a Chronbach's alpha value of 0.95. Reliability analyses showed an intraclass correlation coefficient (95% confidence interval) of 0.96 for the total score. There was a low correlation coefficient between the Turkish version of the Pain Catastrophizing Scale and body mass index, pain levels at rest and during activity, health-related quality of life, and fear and avoidance behaviors. [Conclusion] The results of this study indicate that the Turkish version of the Pain Catastrophizing Scale is a valid and reliable clinical and research tool for patients with ankylosing spondylitis.
Key words: Ankylosing spondylitis, Pain, Catastrophizing

(This article was submitted Sep. 14, 2015, and was accepted Oct. 21, 2015)

INTRODUCTION

Chronic back pain is the one of the most prevalent symptoms of ankylosing spondylitis, along with stiffness and disability[1]. Pain generally starts in the lower back or hip and persists for more than three months. Inflammatory back pain is associated with prolonged morning stiffness lasting 30 minutes or longer, and 70–80% of patients have a good response to non-steroidal anti-inflammatory drugs (NSAIDs)[1–3]. The quality of life of patients with ankylosing spondylitis is negatively affected by chronic pain and functional changes[3, 4]. Worsening symptoms result in activity limitations and may lead to long-term restriction of physical activity, with negative physical and psychological consequences. Therefore, it is important to assess all aspects of pain. The catastrophizing effect of pain in people with chronic pain has recently attracted increased attention[5–10].

"Catastrophizing" describes a maladaptive response to pain; it is characterized by heightened pain intensity and difficulty in disengaging from pain[11]. It is an exaggerated focus point of pain and pain-related factors, such as psychological distress and pain severity, in people with chronic pain[12–14].

Sullivan et al. developed the Pain Catastrophizing Scale (PCS) to screen patients with catastrophizing thoughts and

improve treatment planning, implementation, and outcome assessment; it has also been widely used to research pain and chronic pain[15]. Validated versions of the PCS have been published in numerous languages; however, none have included patients with ankylosing spondylitis[16–23]. Therefore, the aim of this study was to describe the cultural adaptation, validation, and reliability of the Turkish version of the PCS (PCS-Turk) in patients with ankylosing spondylitis.

SUBJECTS AND METHODS

The present study was performed in two-steps; the PCS was first translated to Turkish (PCS-Turk) and adapted cross-culturally; second, the PCS-Turk was tested for psychometric properties with a 3–10 day follow-up for test-retest analysis, as recommended by the literature. Recommendations from by Beaton et al.[24] were followed during the translation and cultural adaptation process. First, two physiotherapists whose mother language was Turkish independently translated the original PCS into Turkish; these two versions were combined into a single version. This combined version was translated back to English by a clinician and a non-clinician blinded to the original PCS. The expert committee examined all translations and determined the pre-final form. Twenty physiotherapy research assistants and lecturers tested this pre-final form to determine if the Turkish PCS was easily understood. After this testing, the final form was composed and administered to patients with ankylosing spondylitis.

This study included 64 patients with ankylosing spondylitis, including 45 men, diagnosed according to the modified New York criteria[25] and followed up at the Department of Rheumatology of Dokuz Eylul University Hospital between September 2014 and March 2015. Patients diagnosed with ankylosing spondylitis who were more than 18 years of age, able to under-stand Turkish, and were willing to participate in the study were enrolled. Eligible patients were selected by a rheumatologist and sent to a physical therapist who performed the measurements. The baseline characteristics of the whole sample group are shown in Table 1. Signed informed consent was obtained from all patients. This study was approved by Ethics Committee of Dokuz Eylul University. The study was conducted according to the Declaration of Helsinki (Ethical Principles for Medical Research Involving Human Subjects).

Patients included in this study completed the PCS-Turk and provided sociodemographic information and concurrent measurements during the initial assessment. Body mass index was calculated as the patient weight divided by the square of the height. A self-reported measure, the PCS-Turk comprises the same 13 items as the original PCS, which focus on thoughts and feelings encountered while experiencing pain. Respondents were asked to rate the frequency of their thoughts and beliefs related to past painful experiences on a five-point Likert scale ranging from 0 (not at all) to 4 (all the time). Higher scores indicate higher levels of pain catastrophizing. To assess the construct validity of the PCS-Turk, patients with ankylosing spondylitis were asked to mark their perceived pain level at rest and during physical activity on the visual analogue scale (VAS) in addition to completing the Ankylosing Spondylitis Quality of Life Questionnaire (ASQoL)[26, 27] and Fear Avoid-ance Beliefs Questionnaire Activity(FABQ-A) and Work Subscale (FABQ-W)[26, 28].

Descriptive statistics of the demographic data and psychometric properties were analyzed using SPSS 20.0. Floor and ceiling effects were explored by calculating the percentage of subjects with the highest and lowest possible scores[29].

The reliability of the questionnaire was assessed by test-retest, concurrent measurements, and internal consistency. Cron-bach's alpha was used to examine the internal consistency of both the entire questionnaire and each factor. A subset of patients was asked to complete the questionnaire 10 days after the initial assessment to analyze test-retest consistency, and intraclass coefficient correlation (ICC) was used to test the agreement between baseline and retest scores and to evaluate the agreement for item[29, 30]. ICC values of 0.6 to 0.8 were considered evidence of good reliability, while values above 0.8 were considered evidence of excellent test reliability[20].

The construct validity measured to show the correlation between PCS and other related scales. Pearson correlations were used to test the correlation between PCS and ASQoL, and VAS scores during activity and at rest. Confirmatory factor analysis was performed with varimax rotation[31, 32].

RESULTS

A total of 64 patients with ankylosing spondylitis participated in the study; none required assistance to complete the PCS questionnaire, and 65.5% of the patients participated in the test-retest. Forty-five (70.3%) patients were men and 19 were women. Their mean age and disease duration were 42.2 ± 11.2 and 12.5 ± 9.3 years, respectively. The patients rated their pain intensity at 3.2 ± 2.4 at rest and 4.0 ± 2.6 during activity, out of possible VAS scores ranging from 0 to10.

There were no missing data in the PCS scores. The distributions of the scores are shown in Table 2. Celling and floor effects were calculated by of individuals obtained the respectively highest and the lowest scores. The mean total PCS score was 23.5 points and no ceiling effects were found, although the floor effect for the lowest score possible was 4.75.

The internal consistency was excellent, with a Chronbach's alpha value of 95.5. The anti-image correlation was above 85%; no items were removed as the variation and covariation were consistent. Ten days after the initial assessment, a subset of patients with ankylosing spondylitis (65.5%) was asked to complete the questionnaire again. The mean total PCS scores were 23.56 ± 14.28 and 22.07 ± 14.07 at test and retest, respectively, resulting in an ICC (95% CI) of 96.3.

The 64 patients in this study were recruited from the Department of Rheumatology of Dokuz Eylul University Hospital;

Table 1. Demographic characteristics of subjects

	(n=64)		
	Min	Max	X ± SD
Age (years)	19.0	64.0	42.2 ± 11.2
BMI*(kg/m^2)	18.5	36.7	26.5 ± 4.1

*BMI: body mass index

Table 2. Distribution of results

Pain Catastrophizing Scale	Range	Mean (SD)	Lowest N (%)	Highest N (%)	Cronbach's Alpha if item deleted
Total Score	0-52	23.5 (14.2)	3 (4.7)	0	
I worry all the time about whether the pain will end	0-4	2.0 (1.3)	13 (20.3)	9 (14.1)	0.955
I feel I can't go on	0-4	1.6 (1.2)	14 (21.9)	6 (9.4)	0.958
It's terrible and I think it's never going to get any better	0-4	1.7 (1.3)	15 (23.4)	10 (15.6)	0.954
It's awful and I feel that it overwhelms me	0-4	2.0 (1.4)	11 (17.2)	13 (20.3)	0.954
I feel I can't stand it anymore	0-4	1.5 (1.3)	19 (29.7)	6 (9.4)	0.956
I become afraid that the pain will get worse	0-4	2.1 (1.3)	8 (12.5)	14 (21.9)	0.955
I keep thinking of other painful events	0-4	1.3 (1.2)	20 (31.3)	6 (9.4)	0.958
I anxiously want the pain to go away	0-4	1.8 (1.4)	15 (23.4)	11 (17.2)	0.955
I can't seem to keep it out of my mind	0-4	1.5 (1.3)	18 (28.1)	8 (12.5)	0.955
I keep thinking about how much it hurts	0-4	1.5 (1.2)	17 (26.6)	7 (10.9)	0.956
I keep thinking about how badly I want the pain to stop	0-4	2.3 (1.3)	10 (15.6)	16 (25.0)	0.957
There's nothing I can do to reduce the intensity of the pain	0-4	1.5 (1.3)	18 (28.1)	7 (10.0)	0.955
I wonder whether something serious may happen	0-4	2.0 (1.3)	10 (15.6)	13 (20.3)	0.955

SD: standard deviation

Kaiser-Meyer-Olkin (KMO) testing showed sampling a adequacy of 92%, and that Bartlett's test of sphericity factor analysis could be performed with these items (p < 0.001).

Factor analysis revealed that all the items were gathered under one factor when eigenvalue was accounted for 1 unlike in the study by Sullivan et al.[14], and a two-factor structure emerged when the eigenvalue decreased to 75–60% (Table 3). This two-factor structure was different from previously reported two-factor structures[4, 16]. This factor structure represented 69.9% of the total variance.

The factor for the seventh item was similar under the two-factor structure; therefore, this item was removed from factor analysis. The total variance of the 12 remaining items was 68.7%, even under a one-factor structure.

The total PCS score showed low correlation coefficients with body mass index, pain level at rest and during activity, health-related quality of life, and fear and avoidance behaviors. Body mass index had low and negative correlations with total PCS score (Table 4).

DISCUSSION

The results of this study indicate that the PCS-Turk is a valid and reliable tool for Turkish patients with ankylosing spondilitis. The process of translating and back-translating the English PCS was performed in strict accordance with established guidelines[23]. The sample size was calculated by using the ratio of five individuals for each item to be included in the factor analysis[32] and 64 patients were recruited for the study. Other studies on cultural adaptation and language validation have used a variety of sample sizes. Although our study had the smallest sample size among these studies, the KMO ratio was 92%, indicating that the sample size was adequate for this study.

The results of this study suggest that the PCS-Turk is a valid and reliable measure in patients with ankylosing spondylitis, with excellent internal consistency and test re-test reliability.

The PCS-Turk presented good concurrent validity with other pain-related measures, including quality of life and avoidance behaviors. ICC and Chronbach's alpha efficiency were calculated 0.96 and 0.5 where in previous studies that validated the PCS ICC from 0.79 to 0.93 and Chronbach's alpha from 0.93 to 0.53 . Our study had the highest ICC score among related studies. Therefore, the PCS-Turk is valid to use in clinical settings, as the ICC score is higher than 0.90.

Patients were re-tested 10 days after their initial assessments, a time span consistent with other reports in the literature.

Table 3. PCS factor structure according to principle components

	Factor	
	1	2
PCS8	0.784	0.351
PCS13	0.753	0.346
PCS9	0.750	0.372
PCS12	0.749	0.365
PCS11	0.747	0.244
PCS3	0.736	0.487
PCS1	0.713	0.410
PCS4	0.655	0.565
PCS10	0.650	0.438
PCS6	0.640	0.535
PCS2	0.273	0.886
PCS5	0.434	0.753
PCS7	0.489	0.495

Table 4. Spearman's rho coefficients for PCS total scores and concurrent measures

	Correlation coefficient (rho)
BMI	−0.257*
VAS-rest	0.365**
VAS-Activity	0.312**
ASQL	0.529**
FABQ-A	0.490**
FABQ-W	0.467**

BMI: body mass index, VAS: Visual Analoque Scale, ASQL: Ankylosing Spondylitis Quality of Life Questionnaire, FABQ-A: Fear Avoidance Beliefs Questionnaire Activity Subscale, FABQ-W: Fear Avoidance Beliefs Questionnaire Work Subscale
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed)

Pain perception may depend on many factors and is very malleable, even though the test-retest repeatability was excellent (ICC 96.3). Meyer et al. and Fernandes et al. reported ICC values of 0.80 and 0.85 for the German and Norwegian versions, respectively[16, 19].

To our knowledge, there is no other reliable and valid Turkish-language scale or questionnaire related to pain catastrophizing behavior and belief. We therefore evaluated its validity by assessing the correlation between VAS for pain level, the ASQL for the impact of pain on quality of life, and the FABQ-A for pain-related beliefs and behaviors. The PCS-Turk showed a moderate correlation coefficient for quality of life (r = 0.529).

Yep et al. found mild correlation between health-related quality of life (SF-36) and pain catastrophizing behavior[17]. Ankylosing spondylitis is a chronic condition in which patients experience unbearable pain when they exhaust themselves or remain still for extended periods. It is evident that pain and health related quality of life have a strong relation.[26]. Our results support this statement. The FABQ has also been used in previous studies on PCS validation. Meyer et al.[16] reported correlation coefficients of rho= 0.51 for FABQ-A and 0.61 for FABQ-W for the German version; similarly, the coefficients were 0.34 and 0.25 for the Norwegian version of the questionnaire[19]. In our study, the FAB-A and FAB-W correlation coefficients were 0.49 and 0.47, respectively. Although the correlation rates were different, the results of these three studies showed statistically significant relationships between pain catastrophe and PCS scores.

The original PCS questionnaire consists of three subscales: helplessness, magnification, and rumination. This structure explains 87% of the total variance[15]. The construct validity was tested by factor analyses and the items were gathered under two factors that reflected 69% of the total variance. Even though the reflected ratio is considered a good value, the items gathered under these two factors were different than those reported by previous studies. Therefore, the items gathered under each subgroup were likely to be related. For example, items from the helplessness subscale, including, "I feel I can't go on like this much longer" and "I can't stand it anymore" as well as "I keep thinking of other painful events" from the magnification subscale grouped together as one factor. The first two items concerned patient feedback that they felt they had no choice but to bear the pain, unlike the other helplessness items.

Furthermore, the analysis revealed that item 7, regarding thoughts of other painful events, was equally distributed between two factors. This finding indicates that the patients could not discriminate between other painful situations that they had experienced and the experiences of others. We believed that this confusion affected the results, so repeated and factor analysis after deleting item 7. The variance results remained high, with a minimum reduction compared to the previous results with all 13 items.

As a result, the PCS-Turk can be considered to have a two-factor structure. It showed good internal consistency and reproducibility. Additionally, the PCS-Turk had good concurrent validity with related measurements. We believe that the PCS-Turk is a valuable tool for patients with ankylosing spondylitis. Furthermore, the results of this study showed that PCS is a useful tool to understand the catastrophizing dimension of pain in this patient population. Evaluating pain catastrophization in patients with ankylosing spondylitis may enable clinicians and researchers to identify pain-related beliefs and behaviors.

ACKNOWLEDGEMENT

REFERENCES

1) Golder V, Schachna L: Ankylosing spondylitis: an update. Aust Fam Physician, 2013, 42: 780–784. [Medline]

2) Sari İ, Öztürk MA, Akkoç N: Treatment of ankylosing spondylitis. Turk J Med Sci, 2015, 45: 416–430. [Medline] [CrossRef]

3) Sharma J, Senjyu H, Williams L: Comparison of chest expansion measurement in clients with ankylosing spondylitis and healthy individuals. J Phys Ther Sci, 2003, 15: 47–51. [CrossRef]

4) Ward MM: Health-related quality of life in ankylosing spondylitis: a survey of 175 patients. Arthritis Care Res, 1999, 12: 247–255. [Medline] [CrossRef]

5) Osman A, Barrios FX, Gutierrez PM, et al.: The pain catastrophizing scale: further psychometric evaluation with adult samples. J Behav Med, 2000, 23: 351–365. [Medline] [CrossRef]

6) Sullivan MJ, Lynch ME, Clark AJ: Dimensions of catastrophic thinking associated with pain experience and disability in patients with neuropathic pain conditions. Pain, 2005, 113: 310–315. [Medline] [CrossRef]

7) Khan RS, Ahmed K, Blakeway E, et al.: Catastrophizing: a predictive factor for postoperative pain. Am J Surg, 2011, 201: 122–131. [Medline] [CrossRef]

8) Mankovsky T, Lynch M, Clark A, et al.: Pain catastrophizing predicts poor response to topical analgesics in patients with neuropathic pain. Pain Res Manag, 2012, 17: 10–14. [Medline]

9) Hayashi K, Arai YC, Ikemoto T, et al.: Predictive factors for the outcome of multidisciplinary treatments in chronic low back pain at the first multidisciplinary pain center of Japan. J Phys Ther Sci, 2015, 27: 2901–2905. [Medline] [CrossRef]

10) Yağci N, Duymaz T, Cavlak U: How does pain localization affect physical functioning, emotional status and independency in older adults with chronic musculoskeletal pain? J Phys Ther Sci, 2014, 26: 1189–1192. [Medline] [CrossRef]

11) Sullivan MJ, Thorn B, Haythornthwaite JA, et al.: Theoretical perspectives on the relation between catastrophizing and pain. Clin J Pain, 2001, 17: 52–64. [Medline] [CrossRef]

12) Turner JA, Jensen MP, Romano JM: Do beliefs, coping, and catastrophizing independently predict functioning in patients with chronic pain? Pain, 2000, 85: 115–125. [Medline] [CrossRef]

13) Turner JA, Mancl L, Aaron LA: Pain-related catastrophizing: a daily process study. Pain, 2004, 110: 103–111. [Medline] [CrossRef]

14) Cano A: Pain catastrophizing and social support in married individuals with chronic pain: the moderating role of pain duration. Pain, 2004, 110: 656–664. [Medline] [CrossRef]

15) Sullivan MJ, Bishop SR, Pivik J: The Pain Catastrophizing Scale: development and validation. Psychol Assess, 1995, 7: 524–532. [CrossRef]

16) Meyer K, Sprott H, Mannion AF: Cross-cultural adaptation, reliability, and validity of the German version of the Pain Catastrophizing Scale. J Psychosom Res, 2008, 64: 469–478. [Medline] [CrossRef]

17) Yap JC, Lau J, Chen PP, et al.: Validation of the Chinese Pain Catastrophizing Scale (HK-PCS) in patients with chronic pain. Pain Med, 2008, 9: 186–195. [Medline] [CrossRef]

18) García Campayo J, Rodero B, Alda M, et al.: [Validation of the Spanish version of the Pain Catastrophizing Scale in fibromyalgia]. Med Clin (Barc), 2008, 131: 487–492. [Medline]

19) Fernandes L, Storheim K, Lochting I, et al.: Cross-cultural adaptation and validation of the Norwegian pain catastrophizing scale in patients with low back pain. BMC Musculoskelet Disord, 2012, 13: 111. [Medline] [CrossRef]

20) Morris LD, Grimmer-Somers KA, Louw QA, et al.: Cross-cultural adaptation and validation of the South African Pain Catastrophizing Scale (SA-PCS) among patients with fibromyalgia. Health Qual Life Outcomes, 2012, 10: 137. [Medline] [CrossRef]

21) Sehn F, Chachamovich E, Vidor LP, et al.: Cross-cultural adaptation and validation of the Brazilian Portuguese version

of the pain catastrophizing scale. Pain Med, 2012, 13: 1425–1435. [Medline] [CrossRef]

22) Cho S, Kim HY, Lee JH: Validation of the Korean version of the Pain Catastrophizing Scale in patients with chronic non-cancer pain. Qual Life Res, 2013, 22: 1767–1772. [Medline] [CrossRef]

23) Lopes RA, Dias RC, Queiroz BZ, et al.: Psychometric properties of the Brazilian version of the Pain Catastrophizing Scale for acute low back pain. Arq Neuropsiquiatr, 2015, 73: 436–444. [Medline] [CrossRef]

24) Beaton DE, Bombardier C, Guillemin F, et al.: Guidelines for the process of cross-cultural adaptation of self-report measures. Spine, 2000, 25: 3186–3191. [Medline] [CrossRef]

25) van der Linden S, Valkenburg HA, Cats A: Evaluation of diagnostic criteria for ankylosing spondylitis. A proposal for modification of the New York criteria. Arthritis Rheum, 1984, 27: 361–368. [Medline] [CrossRef]

26) Zochling J: Measures of symptoms and disease status in ankylosing spondylitis: Ankylosing Spondylitis Disease Activity Score (ASDAS), Ankylosing Spondylitis Quality of Life Scale (ASQoL), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), Bath Ankylosing Spondylitis Global Score (BAS-G), Bath Ankylosing Spondylitis Metrology Index (BASMI), Dougados Functional Index (DFI), and Health Assessment Questionnaire for the Spondylarthropathies (HAQ-S). Arthritis Care Res (Hoboken), 2011, 63: S47–S58. [Medline] [CrossRef]

27) Yılmaz O, Tutoğlu A, Garip Y, et al.: Health-related quality of life in Turkish patients with ankylosing spondylitis: impact of peripheral involvement on quality of life in terms of disease activity, functional status, severity of pain, and social and emotional functioning. Rheumatol Int, 2013, 33: 1159–1163. [Medline] [CrossRef]

28) Korkmaz N, Akinci A, Yörükan S, et al.: Validation and reliability of the Turkish version of the fear avoidance beliefs questionnaire in patients with low back pain. Eur J Phys Rehabil Med, 2009, 45: 527–535. [Medline]

29) Osburn HG: Coefficient alpha and related internal consistency reliability coefficients. Psychol Methods, 2000, 5: 343–355. [Medline] [CrossRef]

30) Kim SG, Kim MK: The intra- and inter-rater reliabilities of the Short Form Berg Balance Scale in institutionalized elderly people. J Phys Ther Sci, 2015, 27: 2733–2734. [Medline] [CrossRef]

31) Aksakoglu G: Korelasyon ve Regresyon. In: Saglikta Arastirma Teknikleri ve Analiz Yontemleri. Izmir: DEÜ Rektörlük Matbaasi, 2001, pp 228–236.

32) Terwee CB, Bot SD, de Boer MR, et al.: Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol, 2007, 60: 34–42. [Medline] [CrossRef]