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Cross-cultural adaptation and validation of the Turkish version of Centrality of Pain Scale in patients with fibromyalgia syndrome

Tugba Ozsoy-Unubol[1] | Cagri Unal-Ulutatar[2]

[1]Physical Medicine and Rehabilitation, Sultan Abdulhamid Han Training and Research Hospital, İstanbul, Turkey

[2]Physical Medicine and Rehabilitation, Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital, İstanbul, Turkey

Correspondence
Tugba Ozsoy-Unubol, SBÜ İstanbul Sultan Abdülhamid Han Eğitim ve Araştırma Hastanesi, Selimiye Mahallesi, Tıbbiye Cd, 34668 Üsküdar/İstanbul.
Email: tugbaozsoyy@gmail.com

Abstract

Aim: The purpose of this study was to perform a cross-cultural adaptation of the Turkish version of the Centrality of Pain Scale (COPS) and to evaluate its psychometric properties in patients with fibromyalgia syndrome (FMS).

Methods: Centrality of Pain Scale was translated and culturally adapted according to guidelines. Clinical and demographic data of the patients were recorded. In addition to the Turkish version of the COPS (COPS-TR), fibromyalgia impact questionnaire (FIQ), Pain Catastrophizing Scale (PCS), Brief Pain Inventory-Short Form (BPI-SF), Beck Depression Inventory (BDI), Generalized Anxiety Disorder 7-item (GAD-7) scale and Short Form-36 were applied. Internal consistency and test–retest methods were used for reliability analysis. Convergent validity was assessed by analyzing the correlations between COP-TR and functional parameters. Divergent validity and responsiveness were also evaluated.

Results: One hundred and four patients (90 female and 14 male) were included. The mean age was 44 years. Good internal consistency (α = .84) and high test–retest reliability (intraclass correlation coefficient = 0.95) were determined. Highest correlations were detected between COPS-TR and BPI-SF pain interference score (r = .64), COPS-TR and PCS (r = .61). There was no significant correlation with non-functional parameters (body mass index, disease duration). It showed high responsiveness (effect size and standardized response mean were 1.66 and 1.94, respectively). The patients filled out COPS-TR in 2 minutes.

Conclusions: COPS-TR is a reliable and valid instrument that shows good psychometric properties. It can be used in clinical practice and scientific research.

KEYWORDS

Centrality of Pain Scale, cross-cultural adaptation, fibromyalgia, validation

1 | INTRODUCTION

Fibromyalgia syndrome (FMS), with prevalence of 2%-8%, is characterized by widespread pain and several symptoms including fatigue, sleep disturbances, and cognitive problems.[1,2] It is diagnosed with a set of criteria; according to the American College of Rheumatology (ACR) 2016 revision criteria, patients should have generalized pain which is defined as pain in at least 4 of 5 regions (left upper, left lower, right upper, right lower, and axial regions). Jaw, chest, and abdominal pain are not included in this definition.[3]

Pain is the core symptom of FMS which has a complex pathogenesis. Central sensitization, hypothalamic–pituitary–adrenal axis abnormalities, increased levels of substance P, neurotrophins, and psychological factors including depression and anxiety, are responsible for the pathogenesis.[4,5] Since chronic pain is the major symptom of FMS, it is important to evaluate how patients perceive pain and how their life is affected by pain. The term "centrality" is a distinct concept from pain mechanisms (central sensitization). It refers to what extent pain dominates or takes over the patients' lives. The Centrality of Pain Scale (COPS) is a 10-item self-report questionnaire which assesses how individuals with chronic pain perceive pain in their lives. It has been developed and validated in patients with chronic non-malignant pain and mixed chronic pain diagnoses.[6,7]

The aim of is this study is to investigate the psychometric properties of a Turkish version of COPS (COPS-TR) in patients with FMS.

2 | METHODS

The study protocol was approved by the Hamidiye local ethics committee of the University of Health Sciences. Written informed consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki.

2.1 | Patients

Patients with the diagnosis of FMS according to ACR 2016 revision criteria who were older than 18 years were included in the study.[3] Exclusion criteria were the diagnosis of psychiatric disorders or severe systemic diseases, such as heart or renal failure, and the inability to read and write in Turkish. The sample size was determined according to Nunnally who recommended a 10:1 respondent-to-item ratio.[8] COPS has 10 items and 100 (10 × 10) participants should therefore be included.

2.2 | Measures

2.2.1 | Fibromyalgia impact questionnaire

This is an instrument which assesses the health status of patients with FMS. Physical function, work status, morning tiredness, stiffness, fatigue, and depression are some measures evaluated by the FIQ. The lowest score is zero and the maximum possible score is 100.[9] Higher scores reflect a worse health status. It has been translated and validated for the Turkish population.[10]

2.2.2 | Centrality of Pain Scale

This is a 10-item questionnaire in which each item is rated on a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, 5: strongly agree). Items 2, 4 and 9 are reversely scored. The total score is the sum of all item scores. Higher scores reflect more "centralized" pain. The maximum possible score is 50 and the minimum score is 10.[6,7]

2.2.3 | The Pain Catastrophizing Scale

This is a 13-item self-reported questionnaire with 3 dimensions including rumination, magnification, and helplessness. Each item is rated on a 5-point Likert scale (0: not at all, 4: all the time) and its score ranges from 0 to 52.[11] It has been validated for the Turkish population.[12]

2.2.4 | Brief Pain Inventory-Short Form

This is a 9-item self-administered questionnaire which evaluates the severity of pain and the impact of the pain on an individuals' daily life. Patients were asked to rate their least, worst, average, and current pain, and by calculating the mean of these 4 items we get the pain severity score. Patients were also asked to rate the degree to which pain interferes with general activity, mood, walking ability, normal work, relations with other persons, sleep, and enjoyment of life on a 10-point scale. The pain interference score is the mean of these 7 items and is a valid and reliable tool for the evaluation of musculoskeletal pain.[13]

2.2.5 | Beck Depression Inventory

This is a 21-item self-administered questionnaire in which each item is rated 0 to 3. The total score ranges from 0 to 63. It has been validated for the Turkish population.[14]

2.2.6 | Generalized Anxiety Disorder 7-item scale

This is a 7-item instrument that assesses the severity of anxiety. Each item is scored 0 to 3 (0: not at all, 1: several days, 2: over half the days, and 3: nearly every day). The total score is the sum of all item scores.[15] Its reliability and validity has been studied in the Turkish population.[16]

2.2.7 | Short Form-36

This evaluates health-related quality of life. It has 8 domains including physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health. The validity and reliability of the instrument has been studied and normative data is available for the Turkish population.[17,18]

TABLE 1 Demographic and clinical features of the participants (N = 104)

	n (%)	
Gender		
Female	90 (86.5%)	
Male	14 (13.5%)	
Education		
Primary-secondary school	63 (60.6%)	
High school	25 (24%)	
University	16 (15.4%)	
Work status		
Employed	30 (28.9%)	
Unemployed	72 (69.2%)	
Retired	2 (1.9%)	
	Mean ± SD	**Min-Max**
Age	44 ± 9.5	19-66
BMI	28.7 ± 5.4	15.4-45.4
Symptom duration (mo)	41 ± 39.6	3-240
Disease duration (mo)	5.6 ± 7.6	0-36
Widespread pain index	12 ± 2.3	7-19
Symptom severity index	10.1 ± 1.7	5-12

Abbreviations: BMI, body mass index; Min-Max, minimum-maximum; SD, standard deviation.

2.3 | Translation process

The COPS scale was translated and adapted to Turkish according to standard guidelines.[19-21] Forward translation was performed by 2 independent bilingual translators whose native language is Turkish. A consensus was derived after discussion between the translators and the researchers. Backward translation was performed by 2 other bilingual translators who had not seen the original version of COPS and who were native English speakers, fluent in Turkish. An expert committee, composed of 2 physiatrists, 4 translators, a physiotherapist, and a psychiatrist, compared all versions and discussed the problems and discrepancies. The committee approved a pre-final version of COPS-TR and a pilot test was then performed on a lay group (n = 20) to test its clarity. Finally the committee assessed all the findings and approved the final version of COPS-TR.

2.4 | Statistical analysis

The IBM SPSS Statistics 22 (IBM Corp) was used for statistical analysis. The results were evaluated at a significance level of $P < .05$.

2.5 | Reliability

Test–retest reliability and internal consistency analysis were performed. COPS-TR was applied to the participants twice, with a 2-week interval between each undertaking. Intraclass correlation coefficients (ICCs) were used for the determination of test–retest reliability. ICC values between 0.75 and 0.9 represent good reliability and values greater than 0.90 indicate excellent reliability.[22] Cronbach's alpha was calculated for the assessment of internal consistency, with values >0.70 indicating good internal consistency.[8]

2.6 | Validity

The face validity of the COPS-TR was assessed via cognitive debriefing interviews with 20 lay participants. They were asked if there was any ambiguity or difficulty in understanding questions.

Correlation analysis was performed between COPS-TR and PCS, FIQ, BPI-SF, BDI, GAD-7, and SF-36 for convergent validity. The correlation between COPS-TR, body mass index (BMI) and disease duration was assessed for divergent validity. Spearman's correlation coefficient (ρ) was used to assess convergent and discriminative validity.

2.7 | Responsiveness

Patients who were treated for the first time were evaluated with the COPS-TR and PCS for responsiveness 12 weeks after treatment. The standardized response mean (SRM) and effect size (ES) were calculated. The values between 0.2 and 0.4 indicate a small effect, between 0.5 and 0.7 express a medium effect and values >0.8 point out a greater effect.[23]

3 | RESULTS

A total of 104 FMS patients (90 female and 14 male) were recruited into this study. The demographic and clinical characteristics of the patients are given in Table 1. The mean age of the patients was 44 ± 9.5 years, and the mean duration of the disease was 5.6 ± 7.6 months. The pre-final version of COPS was tested in FMS patients with cognitive interviews. Each subject completed the questionnaire and was interviewed to learn what the patient thought was meant by each questionnaire item and the chosen response. All of the questions were well understood by the patients. There were no unclear questions or missing data. According to the expert committee, no further cultural adaptations were needed. The final version of COPS was tested in 104 FMS patients. The COPS-TR took an average of 2 minutes (±30 seconds) to complete. The mean COPS-TR score was 33.1 and PCS was 28.7 in FMS patients (Table 2).

3.1 | Reliability

The internal consistency (Cronbach's alpha) of COPS-TR was found to be 0.84. Fifty-two FMS patients completed the questionnaire twice. The test–retest reliability of COPS-TR was 0.95 ($P < .005$) indicating low random measurement error for scale.

TABLE 2 Descriptive analyses of functional parameters (N = 104)

	Mean ± SD	Min-Max
FIQ	64.5 ± 14.1	30-92.1
BPI-pain severity	5.7 ± 2	1-10
BPI-pain interference	5.2 ± 2	0.1-10
PCS	28.7 ± 10.5	4-52
COPS-TR	33.1 ± 7.8	10-49
BDI	15.7 ± 8.2	0-41
GAD-7	13.4 ± 5.1	0-21
SF36 physical function	45.5 ± 25.2	0-95
SF36 physical role limitations	17.7 ± 30.5	0-100
SF36 bodily pain	41 ± 20.6	0-90
SF36 general health	40.1 ± 16.1	0-75
SF36 vitality	31.3 ± 15	5-75
SF36 social functioning	57.7 ± 24.3	0-100
SF36 emotional role limitations	33.7 ± 41.8	0-100
SF36 mental health	49.7 ± 18.9	6-96

Abbreviations: BDI, Beck Depression Inventory; BPI, Brief Pain Inventory; COPS-TR, Turkish version of Centrality of Pain Scale; FIQ, Fibromyalgia Impact Questionnaire; GAD-7, Generalized Anxiety Disorder 7-item; Min-Max, minimum-maximum; PCS, Pain Catastrophizing Scale; SD, standard deviation; F36, Short Form-36.

TABLE 3 Relation of the COPS-TR scores with demographic, clinical and functional parameters (N = 104)

	Spearman's correlation coefficient (rho)	*P* value
Age	.21	.03*
BMI	.07	.47
Disease duration (mo)	.11	.25
FIQ	.54	<.0005*
BPI-pain severity	.41	<.0005*
BPI-pain interference	.64	<.0005*
PCS	.61	<.0005*
BDI	.36	<.0005*
GAD-7	.27	.006*
SF36 physical function	−.49	<.0005*
SF36 physical role limitations	−.27	.006*
SF36 bodily pain	−.32	.001*
SF36 general health	−.55	<.0005*
SF36 vitality	−.42	<.0005*
SF36 social functioning	−.45	<.0005*
SF36 emotional role limitations	−.32	.001*
SF36 mental health	−.57	<.0005*

Note: Abbreviations: BDI, Beck Depression Inventory; BPI, Brief Pain Inventory; COPS-TR, Turkish Version of Centrality of Pain Scale; FIQ, Fibromyalgia Impact Questionnaire; GAD-7, Generalized Anxiety Disorder 7-item; Min-Max: minimum-maximum; PCS, Pain Catastrophizing Scale; SD, standard deviation; SF36: Short Form-36.
*$P < .05$ accepted as significant.

3.2 | Validity

For the face validity analysis, cognitive debriefing interviews were performed with 20 lay participants. The patients understood all of the questions easily and no further changes were needed. The COPS-TR had moderate-strong correlation with most of the functional and clinical parameters (convergent) and an insignificant correlation with non-clinical parameters (divergent validity; Table 3). The COPS-TR had the strongest correlation with BPI-pain interference scores (rho = 0.64, $P < .0005$) and PCS scores (rho = 0.61, $P < .0005$). The mean COPS-TR scores of female patients was significantly higher than male patients (33.8 ± 7.6 and 28 ± 7.6, respectively, $P = .012$).

Both the floor and ceiling effects were calculated at 1.9% which means that the floor or ceiling effect were not present.

3.3 | Responsiveness

The responsiveness of the COPS-TR was analyzed in 37 patients. The ES and the SRM of the COPS-TR were 1.66 and 1.94, respectively. The ES and the SRM of the PCS were 1.60 and 1.68, respectively (Table 4).

4 | DISCUSSION

The current study shows that the Turkish version of COPS is a valid and reliable instrument to evaluate how pain dominates patients' lives. The items are clear and the scale was filled out in 2 minutes.

Pain beliefs, cognitions, and behaviors are important for the diagnosis and treatment of chronic pain. Better functional outcome and treatment adherence can be ensured by adjusting these concepts.[24] Fibromyalgia patients feel more affected by their illness in their daily lives and have maladaptive coping strategies compared to patients with other rheumatic diseases. Among the coping strategies, catastrophizing is used more, and distancing from pain and ignoring pain sensations are used less by patients with FMS.[25] Taking all of this into account, in FMS it is very important to assess how "central" the pain is and how the patients' lives are affected by pain. The COPS scale aims to evaluate how pain takes over the patients' lives. The overall effect of multiple physical, psychological, and social factors on patients' perceptions of how much pain is dominating their lives is measured by COPS.

The mean score of COPS-TR was 33.1 (range: 10-49) in our study compared with 31.8 (range: 13-49) in the original study, which was performed on patients with chronic non-malignant pain.[6] In another study, conducted on patients with the hepatitis C virus who had

TABLE 4 Responsiveness of COPS-TR and PCS in FMS patients (N = 37)

	Mean change ± SD	ES	SRM
COPS-TR	12.21 ± 6.28	−1.66	−1.94
PCS	13.94 ± 8.29	−1.60	−1.68

Abbreviations: COPS-TR, Turkish Version of Centrality of Pain Scale; ES, effect size;PCS, Pain Catastrophizing Scale; SD, standard deviation; SRM, standardized response mean.

chronic pain, the mean score was 28.8.[7] In this study, the most common pain-related diagnoses were neck or joint pain (77.0%), low back pain (64.2%), and arthritis (59.7%).

COPS-TR has a good reliability with a Cronbach's alpha coefficient of 0.84, which refers to a sufficient internal homogeneity. The Cronbach's alpha value was 0.9 in the original study and 0.943 in a study where psychometric properties were studied in a Chinese population.[6,26] Test–retest reliability was performed with 2-week intervals in our study and was found to be very good (ICC: 0.95), indicating a low random measurement error for scale. Consistent with our findings, the ICC was found to be 0.929 in the Chinese version of COPS.[26]

The COPS-TR has a significant correlation with PCS, FIQ, BPI-SF pain severity and interference scores, BDI, GAD-7 and SF-36, which indicates a good convergent validity. On the other hand, it has no significant correlations with BMI and disease duration, which refers to a divergent validity. Taking these into consideration, COPS-TR has adequate construct validity among patients with FMS. Wang et al studied convergent validity with PCS and a Pain Self-Efficacy Questionnaire (PSEQ); they found moderate correlation with the PCS (r = .57) and the PSEQ (r = −.42).[26] In the original study, COPS was negatively correlated with physical health function (r = −.48), mental health function (r = −.38), quality of life (r = −.35), and provider assessment of pain control.[6] In another study, where psychometric properties were studied, COPS total scores were highly and positively correlated with measures of pain severity (r = .61), pain interference (r = .68), pain catastrophizing (r = .69), depressive symptoms (r = .47), and anxiety symptoms (r = .37).[7] Consistent with these findings, in our study the strongest correlation was with pain interference (r = .64) and pain catastrophizing (r = .61) scores. In addition, we found significant moderate correlation with SF-36 mental health (r = −.57), general health (r = −0.55), physical function (r = −.49), social function (r = −.45), vitality domain scores (r = −.42), pain severity scores (r = .41), and depressive symptoms (r = .36). A strong correlation was also observed with FIQ (r = .54). The FIQ measures the health status of patients with FMS and the COPS assesses how patients were affected by their pain. The strong correlation detected shows that it is a good outcome measure for FMS. Since it has good convergent validity and it has no floor or ceiling effect, it is a valid instrument. Responsiveness is evaluated to define the capacity of the scale to detect the change over time. In our study, the patients who were treated for the first time were evaluated 12 weeks after the treatment in order to assess the responsiveness of COPS-TR. The ES and SRM of the COPS-TR were 1.66 and 1.94, respectively, which suggests high responsiveness. There are a limited number of studies evaluating the psychometric properties of COPS and neither of these studies evaluated the responsiveness of COPS.

To the best of our knowledge, this is the first study in which psychometric properties were studied in fibromyalgia patients and cross-culturally adapted to the Turkish population. The strengths of this study include the use of standardized methods for both translation processes and the evaluation of the psychometric properties of the COPS-TR. We also performed a comprehensive analysis, including pain severity, interference, depressive and anxiety symptoms, quality of life, and how the patients perceived their pain. Furthermore, in addition to reliability and validity, we also evaluated the responsiveness of the COPS-TR. The study has some limitations, the most important being that there were only 14 men, because FMS is more frequent in the female gender.

In conclusion, COPS-TR is a valid and reliable instrument in patients with FMS in the Turkish population. It can be used to evaluate how the lives of patients with FMS are affected by their pain. It may have influence on treatment decisions and follow-up.

CONFLICT OF INTEREST

Both authors declare no conflict of interest to declare.

ETHICAL STANDARDS

All procedures were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by local Hamidiye ethics committee of University of Health Sciences. The manuscript has 2 authors and each author is responsible for the content and writing of the paper.

INFORMED CONSENT

Informed consent was obtained from all individual participants included in the study.

ORCID

Tugba Ozsoy-Unubol https://orcid.org/0000-0001-9538-9191
Cagri Unal-Ulutatar https://orcid.org/0000-0002-4571-8521

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