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Analysis of the reliability and validity of the Turkish version of the intermittent and constant osteoarthritis pain questionnaire

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Objective: The aim of this study was to analyze the validity and reliability of the Turkish version (ICOAP-TR) of the intermittent and constant osteoarthritis pain (ICOAP) questionnaire in patients with knee osteoarthritis (OA).

Methods: Thirty-eight volunteer patients diagnosed with knee OA answered the questionnaire twice with an interval of 2–4 days. The reliability of the measurement was assessed using Cronbach's alpha coefficient and intraclass correlation (ICC) for test-retest reliability. Criterion validity was tested against the Western Ontario and McMaster Universities Arthritis Index (WOMAC) pain score and visual analog scale (VAS) designed to assess the perceived discomfort rated by the patient.

Results: Test-retest reliability was found to be ICC=0.942 for total score, 0.902 for constant pain subscale, and 0.945 for intermittent pain subscale. Internal consistency was tested using Cronbach's alpha and was found to be 0.970 for total score, 0.948 for constant pain subscale, and 0.972 for intermittent pain subscale. For criterion validity, the correlation between the total score of ICOAP-TR and WOMAC pain subscale was r=0.779 ($p<0.05$), and correlation between total score of ICOAP-TR and VAS was r=0.570 ($p<0.05$).

Conclusion: The ICOAP-TR is a reliable and valid instrument to be used with patients with knee OA.

Keywords: Knee; osteoarthritis; pain; intermittent and constant osteoarthritis pain.

Level of Evidence: Level III Diagnostic Study

Pain is the most commonly reported symptom in osteoarthritis (OA).[1] In clinical studies, it is often shown as the singular outcome; however, the pain experience of OA is variable and complex.[2] Pain may begin in the early stages of the disease in relation to activities of daily living and may alleviate with rest, yet it may become constant as the disease progresses. In addition, severe pain attacks may become episodic.[3,4] The pain questionnaires used in OA studies evaluate the entirety of the pain experience, though, in order to understand the pain of OA, a more detailed and thorough assessment tool is required. In this respect, with the collaboration of Outcome Measures in Rheumatology Clinical Trials (OMERACT) and Osteoarthritis Research Society

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International (OARSI), the intermittent and constant osteoarthritis pain (ICOAP) questionnaire was developed.[4,5]

The ICOAP questionnaire was primarily developed to assess 2 types of pain in OA: constant pain, characterized by the condition of feeling perpetual pain, and intermittent pain, defined as severe but temporary. This questionnaire is the first that is capable of evaluating these 2 types of pain in OA. In addition to assessing pain intensity and frequency, the questionnaire evaluates the effects of pain on mood, sleep, quality of life, and physical functions.[4,6]

The questionnaire consists of 11 items and 2 subsections. Five items are related to constant pain, and the remaining items are designed for intermittent pain. Items are evaluated using a 5-point Likert scale. Ten of the 11 items assess the severity of pain. Likert scale scores are defined as 0 (not at all), 1 (mildly), 2 (moderately), 3 (severely), and 4 (extremely). Only the seventh item questions the frequency of pain. This item may be answered as 0 (never), 1 (rarely), 2 (sometimes), 3 (often), and 4 (very often).[7]

The items in the questionnaire investigate the patient's condition from the week previous to completing the questionnaire. The questionnaire may be self-response, it may be filled out by face-to-face interview, or the questions may be asked by phone.[4,6]

The ICOAP questionnaire is a multidimensional OA-specific tool designed to comprehensively evaluate the pain experience in people with hip or knee OA. Both a hip and knee joint version of the ICOAP are available.[4,5]

Other instruments for assessing pain in individuals with OA have been previously adapted to the Turkish language, including the Western Ontario and McMaster Universities Arthritis Index (WOMAC), the short-form McGill pain questionnaire (SF-MPQ), the Turkish version of the knee injury and osteoarthritis outcome score—physical function short-form (KOOS-PS), and the arthritis impact measurement scales.[8–11] All of these evaluation tools consider the pain in OA as the singular result. ICOAP, by design, measures the pain in 2 different forms (intermittent and constant pain), allowing for a more-detailed and tailored approach to data collection.

The questionnaire has been adapted to different languages[5,12,13] and used as an outcome measurement in medical intervention studies,[3,13,14] but it had not yet been adapted to Turkish. Thus, the aim of this study was to analyze the validity and reliability of the Turkish version of ICOAP (ICOAP-TR) in patients with knee OA.

Patients and methods

This study was composed of 2 stages. Stage 1 consistsed of the translation procedures and the pilot study, including cultural adaptation. The second was related to the analysis of validity and reliability. In the cultural adaptation process, the guidelines advocated by Guillemin et al. and Beaton et al. were used.[15,16] Two forward translations were conducted by 2 independent translators (native Turkish speakers) from the original language (English) to the target language (Turkish). The 2 translators along with 2 physiotherapists with clinical experience in knee OA then held a meeting in order to develop a prototype of the ICOAP-TR, which was back translated into the original language by 2 native English speakers who were unaware of the original version. The back translated version and the original version were compared in a second meeting attended by the 4 translators and the physiotherapists in order to decide on the version of ICOAP-TR to be used in pilot testing. For pilot testing, 15 individuals were asked to complete the questionnaire and report any difficulty in comprehension for each item. The pilot testing volunteers reported no difficulty in comprehension of the items.

Informed consent was obtained from all subjects and ethical approval was obtained from the Gülhane Military Medical Academy Ethical Review Committee (1491-1082-10/1539). The study included individuals diagnosed with knee OA in the orthopedics department who were receiving physiotherapy. Volunteers who were diagnosed with unilateral or bilateral OA according to the radiological and clinical criteria of the American College of Rheumatology, which had OA classified as 2 (minimal) according to the Kellgren-Lawrence grading scale,[17] and who were between 50–80 years old were included in the study. Volunteers with another disease/disorder in their lower extremity joints other than OA, a history of neurological disease, a history of back problems, active rheumatologic diseases potentially responsible for secondary OA, or a history of widespread pain were excluded from the study.

The participants were asked to answer the questionnaire for a second time after an interval of 2–4 days. The demographic data are provided in Table 1.

There were no missing values for the test-retest of the items of ICOAP. The questionnaire took <10 minutes to complete.

Cronbach's alpha was used to assess the internal consistency of ICOAP. Subscales to total and inter-subscale correlations were used to assess internal consistency with Pearson correlation analysis.

Table 1. Characteristics of the subjects.

	n	%	Mean±SD
Age			50.44±7.30
Height			163.00±6.37
Weight			78.07±6.98
Body mass index			30.93±4.37
Kellgren-Lawrence grading system			
Grade 2	38	100	
Gender			
Female	38	100	
Involved knee			
Right knee	10	26.3	
Left knee	17	44.7	
Bilateral knee	11	28.9	

SD: Standard deviation.

Test-retest values of subscales and total scores were compared with the Wilcoxon signed-rank test. Test-retest reliability was calculated by using intraclass correlation coefficient (ICC).

The criterion validity was tested against the Western Ontario and McMasters Universities Osteoarthritis (WOMAC) pain score for several reasons: testing similar concepts in OA, having been previously used in the original studies of ICOAP, and having a validated version translated into Turkish language. Visual analog scale (VAS) was designed to assess the perceived discomfort rated by the volunteer (0: no discomfort, 100: maximum discomfort).[6] WOMAC was designed to assess physical function, stiffness, and pain in individuals with hip and knee OA. The questionnaire includes 24 items (5 for pain, 2 for stiffness, and 17 for physical function). The reliability and validity of the Turkish version has been previously demonstrated.[8]

All statistical analysis was conducted using SPSS 16.0 for Windows (SPSS Inc., Chicago, IL, USA). The probability value was taken as $p<0.05$.

Results

The means and standard deviations of the 2 dimensions of ICOAP, WOMAC pain subscale, and VAS are shown in Table 2.

Table 2. Reliability and validity of Intermittent and constant osteoarthritis pain scale.

Reliability				
	Test Mean±SD (n=38)	**Retest Mean±SD (n=38)**	**ICC (95% confidence interval)**	**Alpha coefficient**
Total score	21.65±8.49	20.84±8.57	0.942 (0.892–0.970)	0.970
Constant pain subscale	9.68±4.76	9.42±4.78	0.902 (0.820–0.948)	0.948
Intermittent pain subscale	11.97±4.80	11.42±4.71	0.945 (0.898–0.971)	0.972
WOMAC pain subscale	8.84±3.13			
Visual analog scale	69.84±22.87			

Validity						
	Constant pain subscale		**Intermittent pain subscale**		**Total score**	
	r	**p**	**r**	**p**	**r**	**p**
WOMAC pain subscale	0.741	0.000	0.643	0.000	0.779	0.000
Visual analog scale	0.532	0.001	0.580	0.000	0.570	0.000

SD: Standard deviation; ICC: Intraclass correlation coefficient; WOMAC: Western Ontario and McMasters Universities Osteoarthritis.

According to Wilcoxon signed-rank test, there was no difference between test-retest values of the total score, constant pain subscale, and intermittent pain subscale ($p>0.05$).

Inter-subscale correlation was found to be $r=0.593$ ($p<0.05$). The correlations between subscales and total score were $r=0.890$ for constant pain subscale and $r=0.883$ for intermittent pain subscale ($p<0.05$).

For internal consistency reliability analysis, Cronbach's alpha was calculated to be 0.970 for total score, 0.948 for constant pain subscale, and 0.972 for intermittent pain subscale (Table 2).

Test-retest reliability was found to be ICC=0.942 for total score, 0.902 for constant pain subscale, and 0.945 for intermittent pain subscale (Table 2).

Correlations between the total score of ICOAP and WOMAC pain subscale and between the total score of ICOAP and VAS were tested for criterion validity. The resulting correlation was $r=0.741$ ($p<0.05$) for WOMAC pain subscale and 0.532 ($p<0.05$) for VAS. Correlations between ICOAP subscales and both WOMAC pain subscale and VAS showed good criterion validity (Table 2).

Discussion

The results of this study demonstrated that ICOAP-TR is a valid and reliable instrument to be used in patients with knee OA.

No changes were made on the items or answers during the process of developing the Turkish version, nor were there any missing values related to gathered data. We believe that this result indicates the statements in ICOAP-TR were easy to comprehend and the questionnaire is ready for use by the Turkish population.

The second stage of the study was to determine whether the ICOAP-TR was a valid and reliable instrument. The 2 forms of reliability are internal consistency and test-retest reliability.

The Cronbach's Alpha values related to ICOAP-TR provided in Table 2 are similar to the original (0.93), German (0.81–0.90) and Portuguese (0.92) internal consistency values (Table 2).[4,12,13]

Test-retest reliability is based on the results of applying the same instrument to the same individuals twice in a predetermined time interval. The interval in our study was determined to be 2–4 days, similar to that of other studies.[4,12,13] ICC was used to assess reliability between the 2 measurements. The results indicate that the ICOAP-TR has excellent test-retest reliability.[18] These results are similar to the abovementioned original (ICC: 0.93) and cross-cultural adaptation (Portuguese ICC: 0.88–0.92) studies, with the exception of the German version, where ICC ranged from 0.57–0.67. In that version, the authors concluded that the ICC was excellent, with further reference to the obtained alpha coefficients (0.81–0.90). The high alpha coefficients and poor-to-acceptable ICC values may be another point of future study.

The criterion validity of the ICOAP-TR was determined by analyzing the correlation to the WOMAC subscale (pain) and VAS (evaluating the level of discomfort that the individual experiences with his/her knee). Similar to other studies (original: $r=0.81$, German version: $r=0.67$) testing ICOAP validity against WOMAC pain subscale, the ICOAP-TR has good validity.[4,12,13] In addition, we found that both subscales of the ICOAP were correlated with the WOMAC pain subscale.

The relation between VAS, rating discomfort, and ICOAP also proved that the adapted instrument has good validity. The same method for validity was utilized in other similar studies.[4] However, Hawker et al. rated discomfort using a Likert scale with values between 0–4, whereas VAS was used in our study, and the participants were asked to rate their discomfort on a 100 mm long scale.

One of the limitations in our study was that the participants were individuals referred to the orthopedics outpatient clinic and receiving physiotherapy, who may not accurately represent the population of all patients with knee OA in Turkey. Secondly, the participants in this study were not questioned regarding possible analgesic, corticosteroid (injection or otherwise) and nonsteroidal anti-inflammatory drug (NSAID) usage. Although the sole purpose of this study was to investigate the cross-cultural adaptation process, this point should be stated clearly to avoid any misinterpretation.

Our study indicates that for the measurement of pain in patients with knee OA, the ICOAP-TR is a valid and reliable instrument. We believe that the ICOAP-TR is a key instrument to ensure that knee OA pain is assessed in more detail in clinical settings and future studies to be conducted in Turkey.

Conflics of Interest: No conflicts declared.

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