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Spanish validation of the Boston Carpal Tunnel Questionnaire☆

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ABSTRACT

Introduction and objective: To describe the process of cultural adaptation and validation of the Boston Carpal Tunnel Questionnaire (BCTQ) measuring symptom intensity, functional status and quality of life in carpal tunnel syndrome patients and to report the psychometric properties of this version.
Material and methods: A 3 expert panel supervised the adaptation process. After translation, review and back-translation of the original instrument, a new Spanish version was obtained, which was administered to 2 patient samples: a pilot sample of 20 patients for assessing comprehension, and a 90 patient sample for assessing structural validity (factor analysis and reliability), construct validity and sensitivity to change. A re-test measurement was carried out in 21 patients. Follow-up was accomplished in 40 patients.
Results: The questionnaire was well accepted by all participants. Celling effect was observed for 3 items. Reliability was very good, internal consistency: $\alpha_S = 0.91$ and $\alpha_F = 0.87$; test–retest stability: $r_S = 0.939$ and $r_F = 0.986$. Both subscales fitted to a general dimension. Subscales correlated with dynamometer measurements ($r_S = 0.77$ and $r_F = 0.75$) and showed to be related to abnormal 2-point discrimination, muscle atrophy and electromyography deterioration level. Scores properly correlated with other validated instruments: *Douleur Neuropatique 4 questions* and Brief Pain Inventory. BCTQ demonstrated to be sensitive to clinical changes, with large effect sizes ($d_S = -3.3$ and $d_F = -1.9$).
Conclusions: The Spanish version of the BCTQ shows good psychometric properties warranting its use in clinical settings.

Validación al castellano de la escala *Boston Carpal Tunnel Questionnaire*

Palabras clave:
Síndrome del túnel carpiano
Estudios de validación
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RESUMEN

Introducción y objetivo: Describir el proceso de adaptación cultural y validación al español del cuestionario *Boston Carpal Tunnel Questionnaire* (BCTQ) de intensidad de los síntomas, capacidad funcional y calidad de vida en pacientes con síndrome del túnel carpiano, e informar de sus propiedades psicométricas.
Material y métodos: Un panel de 3 expertos supervisó el proceso de adaptación. Tras la traducción, revisión y retrotraducción del instrumento se obtuvo un cuestionario en español que fue administrado a 2 muestras de pacientes: una muestra piloto de 20 pacientes para valorar la comprensibilidad y una de 90 pacientes para comprobar la validez estructural (análisis factorial y fiabilidad), la validez de constructo y la sensibilidad al cambio. Se realizó medición retest a 21 pacientes. Se realizó seguimiento a 40 pacientes.
Resultados: El cuestionario fue bien entendido por todos los participantes. Tres ítems presentaron efecto suelo. La fiabilidad fue muy buena, consistencia interna: $\alpha_S = 0{,}91$ y $\alpha_F = 0{,}87$; estabilidad temporal test-retest: $r_S = 0{,}939$ y $r_F = 0{,}986$. Se comprobó que ambas subescalas del cuestionario se ajustaban a una dimensión general. Las subescalas correlacionaron con las medidas del dinamómetro ($r_S = 0{,}77$ y $r_F = 0{,}75$) y mostraron relación con la discriminación anormal entre 2 puntos, la atrofia muscular y el nivel de afectación según electromiografía. Las puntuaciones correlacionaron adecuadamente con cuestionarios ya validados: *Douleur Neuropatique 4 questions* y Cuestionario Breve de Dolor. El BCTQ demostró ser sensible a los cambio clínicos, con tamaños del efecto grandes ($d_S = -3{,}3$ y $d_F = -1{,}9$).
Conclusiones: La versión en castellano del BCTQ ha demostrado tener buenas propiedades psicométricas, lo que garantiza su uso en el ámbito clínico.

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Introduction

Carpal tunnel syndrome (CTS) is a malady defined as the clinical condition resulting from the compression of the median nerve as it passes beneath the transverse carpal ligament, which causes pain, paresthesia, numbness and weakness in the area of that nerve.[1] It is the direct cause of neuropathic pain[2] and is a highly prevalent condition, observed in 0.1% of the general population. It is also one of the most common causes of work disability, affecting 5% of workers who work in certain professional activities. It is the most common hand peripheral neuropathy cause by entrapment, affecting up to 3% of the general population, with a higher incidence in women between the fourth and sixth decades of life.[3]

A large number of patients with pain in the hand and wrist are evaluated daily by electrophysiological studies and these symptoms are often due to CTS. Its social and economic implications are important because of its high incidence in developed countries,[4] resulting in costs of approximately $30,000 per affected worker in the USA.[5] Our days are getting longer, and although the most common cause is idiopathic,[5] there is a certain suspicion that it is work related,[3] but to date no epidemiological evidence[6] has been established for this theory.

Although the surgical release of the median nerve results in a high rate of satisfaction,[7] some patients report dissatisfaction with results obtained.[8] Given that electromyographic (EMG) studies after the release of the median nerve show no relationship with patient satisfaction,[9] tools such as the Boston Carpal Tunnel Questionnaire (BCTQ; Levine et al., 1993)[10] are needed for a proper evaluation of different treatment methods.

To date, this questionnaire has been translated and validated into Italian[11] and Portuguese.[12] On March 27, 2012 approval from Dr. Jeffrey N. Katz was received to translate and validate the questionnaire into Spanish. The purpose of this study is to validate the BCTQ scale into Spanish, in addition to confirming the psychometric properties of the instrument in the Spanish population.

Materials and methods

Study design

The general recommendations for cultural adaptation and validation of quality of life instruments[13] were followed for the adaptation process. First, a panel of experts was created to oversee the adaptation process. This panel was formed by three experts: one in Orthopedics And Traumatology; Another, In Family And Community Medicine (both compressive neuropathy experts); and an epidemiologist expert in methodology. The original questionnaire was translated by two independent translators from English into Spanish (Spain). The expert panel reviewed the translations and produced a standardized version.

The standardized version was piloted in a sample of 20 patients to assess the comprehensibility of the terms used and the wording of questions. Not having found any difficulty in its comprehension or any significant response bias, the version was considered linguistically acceptable and returned for a back translation into English to identify any possible discrepancies (Annex I).

The research was designed as an observational, cross-sectional, multi-center study under routine clinical practice conditions. A random sample of 90 patients selected by two researchers was chosen according to demand for treatment (see below).

The selected patients complied with the following inclusion criteria: patients of both sexes, over 18-years-old, with the presence of hand and wrist pain, and paresthesia, able to read and understand Spanish, who had given their informed consent. Patients who were unable to read or understand the questionnaire were excluded.

Under no circumstances was the researcher's decision on the most appropriate medical care or treatment for the patient interfered with and all participants gave their informed consent to freely to participate in the study and allow their data to be used. The study was conducted in the field of primary care and clinical specialties hospital in Spain. The study was approved by the European Foundation for Health Research and Education (CEI-EFHRE-EU-201302) Research Ethics Committee. The information was collected from 27/06/2013 to 27/05/2014.

Variables

Patients' social and demographic information and clinical variables of interest were collected in addition to the designation of the painful area on a map of the hand in order to determine whether that area included the median nerve. The BCTQ questionnaire was included as well as the measures necessary for validation, which are detailed below.

Concurrent measurements

Grip force: affected hand's maximum strength and difference between both hands (three grips with an interval of 2 min between each grip starting with the dominant hand). When the hand being assessed was not the dominant hand, the result was offset by adding 10%. The grip was evaluated by a manual dynamometer (Jamar® Hydraulic Hand Dynamometer).

Differentiation between 2 points: sensory ability to differentiate between 2 adjacent points. An open clip with a distance between both ends of 5 mm was used, placing both ends at the same time on the skin of the fingertip (distal phalanx) and lightly pressing 10 times. A differentiation of >5 mm on the fingertip in seven out of the 10 times is considered abnormal.

Muscle atrophy assessment: Atrophy assessment of the thenar area of the hand by the clinician in a 3-point scale (mild, moderate and severe).

Electromyography study: measurement of the orthodromic sensory nerve conduction velocity from fingers 2, 3 and 4, and when they decreased, the fifth finger (ulnar nerve) as a comparator. In normal situations there should be no division of the fourth finger (innervated by the median and ulnar nerve). The distal motor latency and differential latency were evaluated, using surface electrodes, setting three degrees: mild, moderate and significant/extreme (Table 1).

Brief Pain Inventory (BPI)[14]: a self-administered questionnaire consisting of 11 items. The BPI consists of two sections: 'Pain intensity' (4 items) and 'interference in every-day activities'

Table 1
Criteria for evaluating the severity used in the electromyographic study.

Degree	SCV	Division	Distal motor latency	Differential latency
Mild	Normal or >40 m/s	Yes	Normal	Normal
Moderate	<40 m/s	Yes	Normal	Normal or extended
Significant	<40 m/s	Yes	Extended	Extended
Extreme	Absence of sensory and motor conduction			

NCV: sensory nerve conduction velocity.
Normal values: normal distal latency <4 ms; normal differential latency <1 ms.