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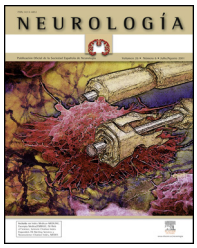

ORIGINAL ARTICLE

Validation of the Spanish version of Addenbrooke's Cognitive Examination III for diagnosing dementia☆

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Abstract
Introduction: Addenbrooke's Cognitive Examination is a screening test used to diagnose dementia. The third edition of this test (ACE-III) was recently developed. The aim of this study was to translate and validate the ACE-III in Spanish.
Methods: The ACE-III was translated and adapted to Spanish. It was then administered to a group of healthy subjects as well as a group of patients with different types of mild dementia treated in 2 hospitals in Spain.
Results: Internal reliability (Cronbach's alpha = 0.927), inter-rater reliability (intraclass correlation coefficient = 0.976) and test—retest reliability (kappa 0.995) were excellent. Age ($r = -0.512$) and education ($r = 0.659$) showed a significant correlation with total test scores. The diagnostic accuracy of ACE-III was higher than that of the Mini-Mental State Examination, particularly for the group with the highest educational level. Researchers obtained normative data and cut-off points for the diagnosis of dementia.
Conclusions: The Spanish version of the ACE-III is a reliable and valid test for diagnosing dementia. Its diagnostic accuracy is high, especially in patients with a higher level of education.

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PALABRAS CLAVE
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Validación de la versión española del test Addenbrooke's Cognitive Examination III para el diagnóstico de demencia

Resumen
Introducción: El Addenbrooke's Cognitive Examination (ACE) es un test de cribado para el diagnóstico de demencia. Recientemente, se ha desarrollado la tercera versión del test (ACE-III). El objetivo del estudio fue la traducción y adaptación del ACE-III al español y su validación.
Material y métodos: El ACE-III fue traducido y adaptado al español. Se administró a un grupo de sujetos cognitivamente sanos y a pacientes con demencia leve de diferentes tipos en 2 centros españoles.
Resultados: La consistencia interna del test (alfa de Cronbach = 0,927), la fiabilidad intereval-uador (coeficiente de correlación intraclase = 0,976) y la fiabilidad test-retest (kappa = 0,995) fueron elevadas. Edad (r = −0,512) y escolaridad (r = 0,659) se correlacionaron significativamente con la puntuación total del test. La capacidad diagnóstica del ACE-III fue superior al Mini-Mental State Examination, especialmente en el grupo con mayor escolaridad. Se obtuvieron datos normativos por edad, y puntos de corte para la detección de demencia.
Conclusiones: La versión española del test ACE-III es un instrumento válido para el diagnóstico de demencia, con una alta capacidad discriminatoria especialmente en pacientes con un mayor nivel educativo.

Introduction

Both the incidence and the prevalence of dementia have risen in recent years, and it is believed that the frequency of dementia will continue rising due to the ageing population. As a result, screening for and diagnosing dementia are immensely important tasks because they provide the gateway to proper treatment.[1]

The high numbers of patients seen in general and neurology clinics for cognitive symptoms point to a need for sensitive and specific instruments enabling doctors to distinguish between physiological and pathological states.[2,3] Screening tests constitute the first step in the neuropsychological evaluation; they allow us to identify subjects that may have a disease, but not deliver a diagnosis.[4] The most frequently employed screening test is the Mini Mental State Examination (MMSE), although it does present a number of limitations.[5] Several other neuropsychological tests have been developed in order to reduce those limitations. One of the best-known is Addenbrooke's Cognitive Examination (ACE), which was initially developed as a modified form of the MMSE and which has proved its utility for diagnosing and monitoring different types of cognitive decline.[6–12] In addition to serving as a screening tool, the ACE may also permit differential diagnosis of different types of dementia, and as such, it can be used for both screening and diagnostic ends. The ACE test and its revised version (ACE-R) have both been adapted and validated in Spanish.[13–15]

The third English-language version of this test (ACE-III) has recently been developed and validated with a view to increasing the diagnostic utility of earlier versions.[16] The goal of this study was to produce a translated, adapted version of the ACE-III in Spanish and validate it for diagnosing dementia.

Material and methods

Study design

Prospective, observational, comparative, cross-sectional study intended to validate the ACE-III test in a population of healthy controls and subjects with various types of dementia.

Study population

The test was validated in 217 subjects recruited from the neurology departments at Hospital Clínico San Carlos in Madrid and Hospital de la Santa Creu i Sant Pau in Barcelona. Subjects were recruited between January and April 2014.

Inclusion criteria were being at least 50 years old and having sufficient hearing, sight, and physical ability to complete the evaluation.

Healthy controls were selected among patients' family members who accompanied them to appointments, or among healthy volunteers. Exclusion criteria were neurological or systemic diseases potentially able to affect cognitive function, current psychiatric disease, and history of abusing alcohol or other substances.

Pathological cases were included consecutively from among patients attending appointments in the listed neurology departments if they met inclusion criteria. We included patients diagnosed with dementia according to NINCDS-ADRDA criteria[17] and rated as 'mild' according to the Clinical Dementia Rating scale.[18] Patients with different types of dementia were recruited in proportion to the prevalence of each dementia type[19,20] according to the latest diagnostic criteria. The sample therefore included patients with Alzheimer disease,[17] vascular dementia,[21] degenerative