



# Evaluation of cognitive impairment in elderly population with hypertension from a low-resource setting: Agreement and bias between screening tools



María Lazo-Porras<sup>a,b</sup>, María A. Pesantes<sup>a</sup>, J. Jaime Miranda<sup>a,c,\*</sup>, Antonio Bernabe-Ortiz<sup>a,d</sup>

<sup>a</sup> CRONICAS Center of Excellence in Chronic Diseases, Universidad Peruana Cayetano Heredia, Lima, Peru

<sup>b</sup> CONEVID Unidad de Conocimiento y Evidencia, Universidad Peruana Cayetano Heredia, Lima, Peru

<sup>c</sup> School of Medicine, Universidad Peruana Cayetano Heredia, Lima, Peru

<sup>d</sup> Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, United Kingdom

## ARTICLE INFO

### Article history:

Received 26 April 2016

Received in revised form 6 September 2016

Accepted 28 November 2016

Available online 1 December 2016

### Keywords:

Cognitive impairment

Hypertension

Minimental state examination

Montreal cognitive assessment

Leganés cognitive test

## ABSTRACT

**Introduction:** The evaluation of cognitive impairment in adulthood merits attention in societies in transition and especially in people with chronic diseases. Screening tools available for clinical practice and epidemiological studies have been designed in high-income but not in resource-constrained settings. The aim of this study was to assess the agreement and bias of three common tools used for screening of cognitive impairment in people with hypertension: the modified Mini-Mental State Examination (MMSE), the Montreal Cognitive Assessment (MoCA), and the Leganés Cognitive Test (LCT).

**Methods:** A cross-sectional study enrolling participants with hypertension from a semi-urban area in Peru was performed. The three screening tools for cognitive impairment were applied on three consecutive days. The prevalence of cognitive impairment was calculated for each test. Pearson's correlation coefficients, Bland-Altman plots, and Kappa statistics were used to assess agreement and bias between screening tools.

**Results:** We evaluated 139 participants, mean age 76.5 years (SD ± 6.9), 56.1% females. Cognitive impairment was found in 28.1% of individuals using LCT, 63.3% using MMSE, and 100% using MoCA. Correlation coefficients ranged from 0.501 between LCT and MoCA, to 0.698 between MMSE and MoCA. Bland-Altman plots confirmed bias between screening tests. The agreement between MMSE and LCT was 60.4%, between MMSE and MoCA was 63.3%, and between MoCA and LCT was 28.1%.

**Conclusions:** Three of the most commonly used screening tests to evaluate cognitive impairment showed major discrepancies in a resource-constrained setting, signaling towards a sorely need to develop and validate appropriate tools.

© 2016 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Cognitive impairment is a growing public health concern [1–3]. Aging, lifestyles and chronic diseases, mainly hypertension and type 2 diabetes mellitus, are the most important contributing factors for the development of and progression towards cognitive impairment [4]. Previous studies in Latin America have reported a prevalence of cognitive impairment between 1% to 28% in the general population [5,6], whereas dementia was present in 3.4% to 7.1% [6,7]. The wide range reported for these estimates depend on the method used, i.e. screening tools or specialized clinical assessment. Within the arsenal of screening tools,

several tests including the modified Minimental State Examination (MMSE), Leganés Cognitive Test (LCT), Montreal Cognitive Assessment (MoCA), and others have been validated against international guidelines or clinical plus an assessment battery for cognitive impairment diagnosis.

Even when international guidelines [8,9] recommend older adults (i.e. those aged ≥65 years) should be assessed for cognitive impairment, yet a definite diagnosis of cognitive impairment is cumbersome and must be performed by a neurologist [10,11]. However, other guidelines and researchers concluded that the evidence is insufficient to assess the balance of harms and benefits of the screening [12,13]. Therefore, utility of cognitive screening is still controversial. Moreover, there are reported different strategies for screening i.e. use of one test, two test in combination and nowadays there is not agreement in the best method of evaluation [14]. Another issue is that several older adults, especially in low- and middle-income countries, live in remote rural regions or urban

\* Corresponding author at: CRONICAS Center of Excellence in Chronic Diseases, Universidad Peruana Cayetano Heredia, Armendariz 497, Miraflores, Lima, Peru.  
E-mail address: [jaime.miranda@upch.pe](mailto:jaime.miranda@upch.pe) (J.J. Miranda).

areas without access to specialized services that could offer routine screenings; hence, the need to have simple and rapid screening tools to assess cognitive impairment.

Most of the epidemiological studies using different tests for cognitive impairment and dementia have been developed and validated in high-income countries where language, socioeconomic status, education level, and access to healthcare are different from Latin America. The literature on the topic arising from Latin America is scant, coming mainly from Brazil. For example, there are studies adapting and validating the MMSE in Brazil, but also studying the effect of age and education on results, as well as assessed different cut-offs [15–17]. Moreover, a previous study used the MMSE in a rural population with low education [18]. In addition, MoCA has been also validated in Brazil [19]. In Ecuador some studies have used LCT and MoCA [20,21]. Despite of this, there is limited data available evaluating the performance of these screening tools to diagnose or suggest cognitive impairment in Latin American and its rural areas [22].

The aim of this study was to determine the bias and agreement between the MMSE, MoCA and LCT for screening of cognitive impairment among participants with hypertension in a semi-urban area in Peru, and to provide evidence about the need to have more appropriate tools given current changes in the population trends and recent efforts by the Peruvian government to improve the quality of life among poor older adults [23].

## 2. Methods

### 2.1. Ethics

The Institutional Review Board of the Universidad Peruana Cayetano Heredia, Lima, Peru, approved this protocol. Oral informed consent was obtained from all participants due to high rates of illiteracy.

### 2.2. Study design, setting and participants

This study was performed in the semi-urban area of Tumbes, located in the northern coast of Peru, near the border with Ecuador, where the traditional agricultural landscape has become intermixed with rapidly growing urban sections. As people with hypertension are at higher risk of cognitive impairment, participants were a subsample of those originally enrolled in the Tumbes site of the CRONICAS Cohort Study [24], specifically those aged  $\geq 65$  years and classified as having a diagnosis of hypertension at baseline in 2010–2011. Hypertension was defined according to international guidelines: systolic blood pressure  $\geq 140$  mm Hg or diastolic blood pressure  $\geq 90$  mm Hg using the mean of the last two of three blood pressure (BP) measures, or self-report of physician diagnosis and currently receiving antihypertensive medication [25]. All participants who met the inclusion criteria were re-contacted during October and November of 2014 to be assessed with the screening tools for cognitive impairment.

### 2.3. Cognitive evaluation

Three different screening tools were used; each has been previously translated into Spanish and used in different Spanish-speaking countries. Our evaluation was conducted during three consecutive days. Every day, a trained staff performed one of the tests in the following order: MMSE was applied on the first day, followed by the Leganés on the second day, and the MoCA on the last day. This method was used to avoid fatigue given the similarity of questions across tools as well as to ensure a standardized procedure for the evaluation of the participants.

The modified Minimal State Examination (MMSE) was validated in Spanish in Chile, contains six questions with a maximum score of 19 points. A cutoff of 13 points or lower suggests cognitive impairment [26,

27]. Items assessed in the tool are registration, orientation, delayed recall, attention/concentration, visual-spatial ability and verbal comprehension.

The Montreal Cognitive Assessment (MoCA), validated in Colombia [28], is a 30-point assessment tool comprising 11 questions. According to the manual we added one point for an individual who has 12 years or fewer of formal education. A cutoff  $\leq 25$  points indicates cognitive impairment [29]. Items evaluated in this tool are attention and concentration, executive functions, memory, language, conceptual thinking, calculation, visuoconstructional skills, and orientation.

The Leganés Cognitive Test (LCT) was validated in Spanish in Spain [30]. The tool contains 12 questions with a maximum score of 32 points, and a cutoff point of 22 is used for determining cognitive impairment [31]. Items included in this tool are temporal orientation, spatial orientation, personal information, naming test, immediate memory, late memory and logical memory.

### 2.4. Other variables

We collected demographic information: age, sex, education level (none/initial, primary, secondary or higher), marital status (single, with partner, divorce/widowed), currently working, socioeconomic status based on possessions weighted asset index, and split in tertiles. With regards to hypertension status, we collected time of disease in years, anti-hypertensive treatment, and control of blood pressure defined as systolic blood pressure  $< 140$  mg/dL and diastolic blood pressure  $< 90$  mm Hg.

Lifestyles variables included smoking status (never, former, current smoker), hazardous drinking, evaluated using the Alcohol Use Disorder Identification Test [32], physical activity using the leisure time and transport-related domain of the International Physical Activity Questionnaire (IPAQ) [33,34], and access to healthcare (yes/no).

Other important clinical variables such as the presence of depressive symptoms using the Center for Epidemiological Studies Depression (CES-D) with a cutoff of 16 points; type 2 diabetes mellitus, defined as fasting glucose  $\geq 126$  mg/dL [ $\geq 7$  mmol/L] or self-report of physician diagnosis and currently receiving anti-diabetic medication [35]; current self-reported history of stroke, body mass index (BMI) categories (normal if BMI  $\geq 18.5$  and  $< 25$  kg/m<sup>2</sup>, overweight  $\geq 25$  and  $< 30$  kg/m<sup>2</sup>, and obese  $\geq 30$  kg/m<sup>2</sup>) [36], were also evaluated.

### 2.5. Statistical analysis

STATA 12 for Windows (Stata Corp, College Station, TX) was used for analysis. Prevalence of cognitive impairment using MMSE, MoCA and LCT and their respective 95% confidence intervals (95% CI) were estimated. Mean and standard deviation (SD) or median and interquartile range (IQR) were utilized to describe the distribution of quantitative variables. To allow for comparisons between tests, we used non-standardized (raw scores) and standardized (z-score) values of MMSE, MoCA and LCT. This standardization technique rescaled raw scores into a new variable with a mean of 0 and a standard deviation of 1. Pearson correlation coefficients ( $r$ ) were calculated to measure the strength of the linear relationship between two tests. As previous studies comparing two quantitative methods using correlation have been criticized, Bland-Altman plots, calculated using the difference between the methods ( $X - Y$ ) against the average of them ( $(X + Y) / 2$ ) [37], were used. This simple parametric approach allows us to assess error and bias, spot outliers and detect trends.

Finally, using each of the score's cutoff values for cognitive impairment, Kappa statistics ( $\kappa$ ) were calculated.

## 3. Results

### 3.1. Description of participants

From the 1160 participants recruited in the CRONICAS Cohort Study, a total of 146 had the diagnosis of hypertension and were aged  $\geq 65$  years

Download English Version:

<https://daneshyari.com/en/article/8683461>

Download Persian Version:

<https://daneshyari.com/article/8683461>

[Daneshyari.com](https://daneshyari.com)