

Cultural validity of cognitive markers for Alzheimer's disease (AD): evidence for global strategies

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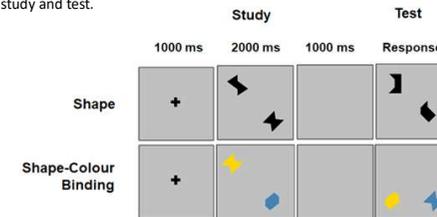
Background

Availability of culture-free cognitive tests with marker properties for Alzheimer's Disease (AD) has proved a barrier to global harmonization strategies. The European Neurodegenerative Diseases Working Group suggested that the Short-Term Memory Binding Test (STMBT) and the Free and Cued Selective Reminding Test (FCSRT) are useful tests for the early detection of AD (Costa et al., 2017). Yassuda et al. (2019) showed that STMB is insensitive to age and education among healthy Brazilian adults. Parra et al. (2019) suggested that these tests should enter global strategies to aid the early detection of AD. Evidence is still needed to ascertain that such a validity translates to the assessment of affected individuals from underrepresented populations. The current study aimed to shed new light on such an outstanding question.

Methods

We recruited 64 healthy controls (HC), 60 patients with Mild Cognitive Impairment (MCI), and 63 patients with mild AD from [Lima at the regional area health clinics of the "Dirección Regional de Salud (DIRESA)" of the "Gobierno Regional del Callao" between June 2018 and May 2019]. They were all illiterate. We considered illiterate individuals who (1) attended no school or were enrolled for less than one year and (2) could not read or write (a booklet was given which showed a simple sentence). We assessed them with the STMBT, the visual FCSRT, and a brief clinical-neuropsychological protocol.

Short-Term Memory Binding (STMB) Test: assesses the ability to temporarily retain features such as shapes and colours integrated within object representations or individually. The ability is assessed by detecting changes between two consecutive displays, study and test.



Results

The assessment confirmed the healthy (CDR=0.0, pFAQ=2.2, BDI=5.9), MCI (CDR=0.5, pFAQ=3.7, BDI=6.2), and dementia (CDR=1.3, pFAQ=16.5, BDI=7.2) status of our groups.

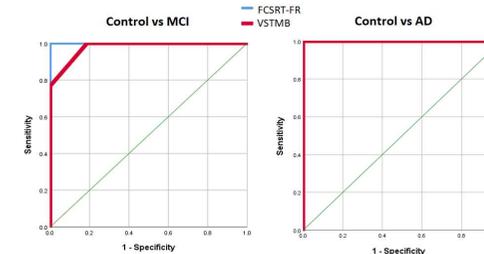
ROC analysis with STMB revealed AUC=0.98 for HC vs. MCI, AUC=1.00 for HC vs. AD, and AUC=0.97 for MCI vs. AD. For the visual FCSRT, an AUC=1.00 was found for HC vs (MCI & AD), and AUC=0.99 for MCI vs AD.

ROC analysis revealed that for a cut-off value of 59.4%, the STMB test (Shape-colour condition) achieved 100% sensitivity and 81% specificity to discriminate between MCI and Controls. A cut-off value of 21 achieved 100% sensitivity and specificity for the FCSRT. To discriminate between AD and Controls both tasks achieved 100% sensitivity and specificity.

	Control	MCI	AD	F(p)	Post-Hoc		
					Crt vs MCI	Crt vs AD	MCI vs AD
N	64	60	63				
CDR	0.02 (0.09)	0.50 (0.00)	1.30 (0.46)	357.6 (0.000)	***	***	***
PFAQ	2.23 (1.32)	3.73 (2.10)	16.56 (4.84)	394.1 (0.000)	*	***	***
BDI_II	5.94 (2.82)	6.20 (2.94)	7.24 (3.06)	3.4 (0.034)	ns	*	ns

CDR: Clinical Dementia Rating Scale; PFAQ: Pfeffer Functional Activities Questionnaire; BDI_II: Beck Depression Inventory.

Significant between-group differences were found with both the STMBT ($F(2,184)=590.1$, $p<0.001$) and Free Recall during the visual FCSRT ($F(2,184)=3936.2$, $p<0.001$), with $HC \gg MCI \gg AD$.



Discussion

The two cognitive markers recently recommended for harmonisation of neuropsychological assessment in neurodegenerative dementias in Europe seem suitable to support such practices in illiterate populations. Parra et al. (2019) recently suggested that only global strategies will help meet global challenges. Here we provide evidence of cognitive markers for AD that can reliably enter such strategies.

- Costa et al. (2017). The need for harmonisation and innovation of neuropsychological assessment in neurodegenerative dementias in Europe: consensus document of the Joint Program for Neurodegenerative Diseases Working Group. *Alzheimers Res Ther*, 9(1), 27.
- Parra et al. (2019). Globalising strategies to meet global challenges: the case of ageing and dementia. *J Glob Health*, 9(2), 020310.
- Yassuda et al. (2019). Free Recall of Bound Information Held in Short-Term Memory is Unimpaired by Age and Education. *Archives of Clinical Neuropsychology*, 35(2):165-175