

LETTERS TO THE EDITOR

Applicability of the single-case methodology in a patient with dementia with Lewy bodies

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When dealing with patients with peculiarities (such as unusual sociodemographic characteristics) that can hinder comparison with existing standards for neuropsychological tests, the single-case methodology can be an interesting option to ascertain whether actual deficits exist. The single-case methodology proposed by Crawford & Howell¹ is one such alternative. This methodology uses a modified *t*-test to verify if the performance of the patient is significantly below the expected mean estimated by a small comparator group. Toward this end, the *t*-test formula was modified to consider the patient as a group of $n=1$, which does not

contribute variance to the test. Besides enabling objective assessment and requiring only a small control group, this methodology generates a significance test (expressed as a *p*-value) and estimates effect sizes. We present a case report as an example of use of this statistical tool.

A 71-year-old woman with no formal education, was referred to our service for neuropsychological examination and comprehensive cognitive assessment with a presumptive diagnosis of dementia with Lewy bodies (DLB), which had been suggested by a geriatrician on the basis of clinical history and examination. Her caregiver provided written consent for participation in the CAAE project no. 0240.0.203.000-11, approved by the Research Ethics Committee of Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil. DLB is a senile degeneration characterized by deficits of attention, executive function, and visuospatial ability. Other notable symptoms are fluctuating cognition, visual hallucinations, and spontaneous motor features of parkinsonism.²

According to her caregivers, the patient had been experiencing nighttime hallucinations, unexplained falls, motor rigidity, and fluctuations in her cognitive status. She also reports episodic memory complaints, but memory appeared to be relatively less impaired considering the

Table 1 Comparison between the patient and the control group and covariate analysis for the MMSE and GDS

	Control group (n=7), mean ± SD	Patient	Significance test* (t)	p-value	Effect size estimate	Estimated percentage of control group that would underperform the patient	Covariate analysis for MMSE and GDS		
							p-value	Effect size	%
Age	70.29±5.12	71	0.13	0.450	0.14	54.94			
Education	1.57±1.72	0	-0.85	0.212	-0.91	21.27			
ADL basics (Katz)	0.20±0.45	2	3.77	0.004	4.03	99.53	0.020	9.23	97.96
ADL instrumentals (Lawton)	1.25±1.26	13	8.74	0.000	9.34	99.99	0.012	10.77	98.72
Depressive symptoms (GDS)	3.00±1.87	9	3.00	0.012	3.21	98.79			
Global cognition (MMSE)	23.43±3.15	10	-3.98	0.003	-4.26	0.33			
Executive functions									
FAB	9.43±1.90	2	-3.654	0.005	-3.91	0.53	0.383	0.87	61.60
PVF-FAS	14.17±9.64	0	-1.37	0.109	-1.47	10.91			
Tower of London	23.14±9.42	2	-2.10	0.040	-2.24	4.03	0.487	-0.10	48.72
Forward digit	21.29±9.93	12	-0.87	0.207	-0.94	20.75			
Backward digit	7.71±6.55	2	-0.81	0.222	-0.87	22.29			
Forward Corsi	22.71±16.10	2	-1.20	0.137	-1.29	13.71			
Backward Corsi	10.86±10.32	4	-0.62	0.278	-1.00	27.84			
Episodic memory									
RAVLT Total	42.14±3.34	13	-8.17	0.000	-8.73	0.00	0.040	-6.12	4.07
RAVLT A6	8.57±2.44	2	-2.52	0.022	-2.69	2.26	0.063	-5.15	6.32
RAVLT A7	9.43±1.99	0	-4.44	0.002	-4.74	0.21	0.010	-9.48	1.00
RAVLT Rec	6.86±5.87	-20	-4.28	0.002	-3.12	0.26	0.085	-4.49	8.54
Semantic memory									
TN-LIN	57.29±4.15	40	-3.89	0.004	-4.57	0.40	0.094	-4.28	9.46
CVF - Animals	12.00±3.37	6	-1.67	0.073	-1.78	7.32			
Language (Token Test)	28.43±4.50	20	-1.75	0.065	-1.87	6.52			
Visuoconstructional praxis									
Pentagons	5.14±1.07	1	-3.62	0.005	-3.87	0.55	0.281	-1.74	28.19
Stick Design Test	11.29±0.76	6	-6.54	0.000	-7.00	0.03	0.008	-9.83	0.87
F-LIN	12.43±8.14	3	-1.08	0.160	-1.16	16.01			

ADL = activities of daily living; CVF - Animals = Category Verbal Fluency, Animals; FAB = Frontal Assessment Battery; F-LIN = Simplified Figure of the Laboratory of Neuropsychological Investigations; GDS = Geriatric Depression Scale; MMSE = Mini Mental State Examination; PVF-FAS = Phonologic Verbal Fluency – F, A, S letters; RAVLT = Rey Auditory Verbal Learning Test – A6 (immediate recall), A7 (late recall), Rec (recognition); SD = standard deviation; TN-LIN = Naming Test of the Laboratory of Neuropsychological Investigations.

* One-tailed test.

whole of her clinical condition. The patient was also impaired in her instrumental activities of daily living (IADLs) and had depressive symptoms.

A comprehensive neuropsychological evaluation was performed, including assessment of global cognition, episodic and semantic memory, executive functions, language, constructional praxis, functionality, and depressive symptoms. A comparison group, composed by seven women matched by age and education, performed the same protocol. The tests and results are presented in Table 1.

The patient scored poorer than the control group in functionality, depression, and all cognitive functions, except language. However, as the patient differed significantly in global cognition and depressive symptoms, we chose to covariate our findings with these variables.³ The results of the covariate comparison between the patient and the control group are shown in Table 1.

The absence of differences between the patient and the control group in paper-and-pencil tests that measure complex visuoconstructional ability demonstrates that the influence of formal education on these cognitive processes should be taken into account. The impairment in late recall of episodic memory was beyond the global cognitive status and depressive symptoms. Testing of executive functions and semantic memory did not indicate a patient deficit to any further extent.

Nevertheless, these results suggest that the patient has a significant impairment of visuoconstructional ability, as tested by a simple task, regardless of her general cognition and depressive symptoms. These results also indicate that some instruments used to evaluate cognitive functions, such as the complex line drawing task⁴ and the Mini Mental State Examination pentagons,⁵ can be influenced by educational attainment. Clinicians should be aware of this phenomenon.

The single case study methodology has broad applicability in the clinical setting for patients with particular characteristics, and can enhance characterization of possible dementia in older adults with low educational attainment.

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Disclosure

The authors report no conflicts of interest.

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