SHORT REPORT

Usefulness of the Rowland Universal Dementia Assessment Scale in South India

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Background: The number of older people with cognitive impairment being seen in out patient settings is increasing. A brief screening test, which is culturally and educationally fair, would be very useful for clinicians for identifying dementia in these settings.

Objectives: To examine the new cognitive screening test, the Rowland Universal Dementia Assessment Scale (RUDAS), and to compare it with the Mini-Mental State Examination (MMSE).

Method: We administered MMSE and RUDAS to 116 subjects, consisting of 58 patients with mild to moderate dementia and 58 age and sex matched controls. The two screening tests were compared with regard to sensitivity and specificity. We looked at the correlation of both tests with years of formal education among the controls.

Result: RUDAS had a similar sensitivity but better specificity than MMSE, but did have an educational bias.

Conclusions: RUDAS is a useful brief screening test in clinical settings.

Cognitive and behavioural impairment is common in old age. The number of older people presenting with such disorders to general hospitals is increasing due to demographic aging. Many of these patients have dementia. A simple screening instrument to assist the clinician detect cases of dementia is useful, especially in busy out patient settings. The Mini-Mental State Examination (MMSE) is one such scale which can detect cognitive impairment. However, such instruments, developed in the western world, have serious limitations due to cultural and educational bias.^{1,2} Mathuranath *et al* found that education affected the scores of the Malayalam version of MMSE³ (Malayalam is the language spoken in Kerala, India). Another drawback of MMSE is that it does not adequately assess the frontal executive functions; it has no timed element, and thus may be insensitive to slowed mental activity and psychomotor speed, typical of frontal subcortical dementias.⁴

Culturally and educationally fair assessment of cognitive function remains a challenge for the developing world. Educational and cultural bias is being increasingly recognised as a problem even in the developed world because of the presence of less educated and ethnic minorities.⁵

The Rowland Universal Dementia Assessment Scale (RUDAS) is a new screening test developed in a multicultural setting in Australia.⁶ It is a brief six item screening test which is short and easy to administer. It is portable and is claimed to be culturally and educationally fair. It assesses body orientation, praxis, drawing, judgement, memory, and language. It has the additional advantage of being capable of assessing impairment in executive function. The test items in RUDAS, such as “crossing the road”, “animal generation”, and “cube copying”, evaluate executive functioning, both directly and indirectly. It has a reported sensitivity of 89%

and a specificity of 98% when tested in a multicultural setting in Australia.

It is important to determine whether RUDAS retains these advantages when used in entirely different socio-cultural settings. We also wished to determine how RUDAS performs when compared with the Malayalam version of MMSE. We designed the present study to answer these questions.

METHODS

We undertook this prospective study at the Medical College, Thrissur, Kerala, India, from October 2003 to November 2004. RUDAS was translated and back translated by investigators who were fluent in both English and Malayalam. We identified cases of dementia using DSM-IV criteria.⁷ We used separate criteria to diagnose dementia with Lewy bodies and frontotemporal dementia.^{8,9} We included only subjects with mild to moderate dementia on the Clinical Dementia Rating (CDR) scale¹⁰ and recruited them from the weekly dementia clinic, a new service established in collaboration with the 10/66 Dementia Research Group at Thrissur. We selected age and sex matched controls in the ratio 1:1 from caregivers of patients receiving treatment at the same hospital. A clinician blind to the diagnosis administered MMSE and RUDAS.

Cases and controls were classified as screened positive or screened negative based on the recommended cut-off points. We computed the sensitivity and specificity using the original cut off of 24 for MMSE and 23 for RUDAS.

McNemar's test was used to examine whether the sensitivities and specificities of the two screening tests differed significantly. Student's *t* test was used to see if there was any significant difference between cases and controls in educational status. Pearson's correlation was used to determine whether there was any correlation between years of formal education and RUDAS and MMSE scores among the controls. The level of significance was set at 0.05.

RESULTS

The screening tests were administered to 58 patients with dementia and 58 controls. Mean ages were 65.07 (standard deviation (SD) 11.3) years and 65.1 (SD 10.9) years for subjects with dementia and controls, respectively. The mean length of formal education was 5.59 (SD 4.07) years for subjects with dementia and 5.36 (SD 3.66) years for controls. Student's *t* test did not show any significant difference between the two groups as regards educational status ($p = 0.756$). Twenty two controls (37.93%) and 20 patients (34.48%) with dementia had more than 6 years of formal education each. There were 23 (39.6%) patients with Alzheimer's disease (AD), 17 (29.3%) with vascular dementia (VD), and 18 (31.1%) with non-Alzheimer's disease non-vascular dementia (non-AD non-VD). In the non-AD non-VD group, four subjects had frontotemporal dementia,

Abbreviations: AD, Alzheimer's disease; CDR, Clinical Dementia Rating; MMSE, Mini-Mental State Examination; RUDAS, Rowland Universal Dementia Assessment Scale; VD, vascular dementia

Table 1 Mean scores and standard deviation among the subtypes of dementia and their corresponding controls

	AD patients (n = 23)	AD controls (n = 23)	VD patients (n = 17)	VD controls (n = 17)	Non-AD non-VD patients (n = 18)	Non-AD non-VD controls (n = 18)
RUDAS, mean (SD)	12.04 (5.84)	24.30 (2.67)	15.94 (7.45)	24.94 (3.17)	15.17 (7.33)	24.83 (3.00)
MMSE, mean (SD)	11.35 (5.66)	21.74 (5.24)	16.00 (6.89)	22.65 (5.68)	14.5 (7.27)	24.06 (3.83)

AD, Alzheimer's disease; mean, mean score; MMSE, Mini-Mental State Examination; n, number; RUDAS, Rowland Universal Dementia Assessment Scale; SD, standard deviation; VD, vascular dementia.

Table 2 Sensitivity and specificity of RUDAS and MMSE

Test	Subtypes of dementia							
	Dementia				Non-AD non-VD			
	Sn	Sp	Sn	Sp	Sn	Sp	Sn	Sp
RUDAS	0.88	0.76	1.0	0.74	0.82	0.88	0.77	0.72
MMSE	0.9	0.48*	0.96	0.39*	0.88	0.47*	0.83	0.61

AD subtype: 23 patients, 23 controls; dementia: 58 patients, 58 controls; non-AD non-VD subtype: 18 patients, 18 controls; VD subtype: 17 patients, 17 controls.

AD, Alzheimer's disease; MMSE, Mini-Mental State Examination; n, number; RUDAS, Rowland Universal Dementia Assessment Scale; Sn, sensitivity; Sp, specificity; VD, vascular dementia.

*Significant difference when compared with RUDAS.

three had AD plus cerebrovascular disease, three had meningioma, two had dementia with Lewy bodies, two had Parkinson's disease with dementia, one had Huntington's disease, one had glioma, one had post-traumatic dementia, and one had spinocerebellar ataxia.

We did not encounter any particular problem in translating RUDAS into Malayalam and it was done without changing the content. The mean RUDAS score of patients with dementia was 14.16 (SD 6.92) and that of controls was 24.66 (SD 2.89). The mean MMSE score of patients with dementia was 13.69 (SD 6.74) and that of controls was 22.72 (SD 5). The mean scores for the dementia subtypes are given in table 1.

The sensitivity and specificity of RUDAS and MMSE are given in table 2. We did not find any significant difference between RUDAS and MMSE as regards their sensitivity. However, there was a significant difference in specificity ($p < 0.001$). Among the dementia subtypes, there was significant difference in specificity for the AD ($p = 0.021$) and VD ($p = 0.016$) patients but not for the non-AD non-VD patients.

The mean scores among controls for RUDAS and MMSE were 24.66 (SD 2.89) and 22.72 (SD 5), respectively. There were positive correlations with years of formal education of 0.452 for RUDAS scores ($p < 0.001$) and 0.639 ($p < 0.001$) for MMSE scores.

DISCUSSION

Our study supports the view that RUDAS is a useful screening test for detecting cognitive impairment in clinical settings. We found it to be a user friendly, easy to administer scale. Screening tests should be able to detect cognitive impairment and discriminate between subjects with and without disease. We found RUDAS better than MMSE in this respect. RUDAS has a similar sensitivity but better specificity than MMSE. RUDAS has an acceptable level of specificity while screening for dementia and its subtypes. This may be because RUDAS was developed specifically to screen for dementia unlike MMSE. Most of the items in RUDAS are capable of identifying cognitive impairment seen in patients with mild to moderate dementia. It is quite possible that the inclusion of frontal executive function test items in RUDAS has given it this advantage. This needs further exploration.

Unlike the initial report,⁶ we found that RUDAS scores were significantly correlated with years of formal education. In our study, RUDAS showed a similar sensitivity but lower specificity than found by Storey *et al.*⁶ Half (51.1%) of their normal controls and 35% of their patients with dementia had more than 6 years of formal education.⁶ The lower specificity in our study may be partly explained by the fact that only 37.93% of the controls in our study had more than 6 years of formal education.

There are problems with instruments used to screen for dementia in developing countries. People without dementia but with less education, illiterate, and innumerate may be screened positive for dementia. We need to look at ways to reduce this possibility to an acceptable level. Development of RUDAS seems to be a step in the correct direction although the usefulness of RUDAS has to be proved in other cultures and languages.

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