

Dementia Rating Scale psychometric study and its applicability in long term care institutions in Brazil

Estudo psicométrico da Escala de Avaliação de Demência e sua aplicabilidade em instituições de longa permanência no Brasil

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ABSTRACT

Objective: To evaluate the diagnostic sensitivity, specificity, and agreement of the Dementia Rating Scale with clinical diagnosis of cognitive impairment and to compare its psychometric measures with those from Mini Mental State Examination. **Methods:** Eighty-six elders from a long-term care institution were invited to participate in a study, and fifty-eight agreed to participate. The global health assessment protocol applied to these elders contained Mini Mental State Examination and Dementia Rating Scale. Clinical diagnosis of cognitive impairment was performed by experts using the DSM-IV criteria. Dementia Rating Scale score was correlated to the Mini Mental State Examination. Sensitivity and specificity of the Dementia Rating Scale and the Mini Mental State Examination were calculated. **Results:** Twenty-two (37.9%) elders had cognitive impairment (8.6% presented with mental cognitive impairment and 29.3% dementia). The Mini Mental State Examination and the Dementia Rating Scale classified 31% and 55.2% as presenting with cognitively impaired. Dementia Rating Scale and the Mini Mental State Examination scores presented a strong correlation. Dementia Rating Scale had a higher sensitivity than Mini Mental State Examination (86.4% *versus* 61.9%). Dementia Rating Scale presented lower diagnostic specificity than Mini Mental State Examination (63.9% *versus* 86.5%). Considering Dementia Rating Scale and Mini Mental State Examination, the diagnostic agreement between them and the clinical diagnosis was similar. **Conclusions:** Dementia Rating Scale showed a high sensitivity to detect cognitive impairment in this population, and it could be a useful tool in these settings.

Keywords: Cognition; Delirium, dementia, amnesic, cognitive disorders; Neuropsychological tests; Homes for the aged; Aged; Sensitivity and specificity; Scales

RESUMO

Objetivo: Avaliar a sensibilidade e a especificidade diagnósticas, e a concordância da Escala de Avaliação de Demência, com diagnóstico clínico de comprometimento cognitivo, e compará-las com as do Miniexame do Estado Mental. **Métodos:** Oitenta e seis idosos de uma instituição de longa permanência foram convidados a participar do estudo e, destes, 58 concordaram em fazê-lo. A avaliação continha Miniexame do Estado Mental e Escala de Avaliação de Demência. O diagnóstico clínico de comprometimento cognitivo foi realizado por especialistas que utilizaram os critérios do DSM-IV. Escores da Escala de Avaliação de Demência e do Miniexame do Estado Mental foram correlacionados e suas sensibilidade e especificidade, obtidas. **Resultados:** Vinte e dois (37,9%) idosos tinham comprometimento cognitivo (8,6% apresentaram comprometimento cognitivo leve e 29,3% demência). O Miniexame do Estado Mental e a Escala de Avaliação de Demência classificaram 31% e 55,2% como apresentando comprometimento cognitivo. Os escores da Escala de Avaliação de Demência e do Miniexame do Estado Mental tiveram uma forte correlação. A Escala de Avaliação de Demência teve uma sensibilidade maior do que o Miniexame do Estado Mental (86,4% *versus* 61,9%) e a especificidade foi menor (63,9% *versus* 86,5%). A concordância diagnóstica da Escala de Avaliação de Demência e do Miniexame do Estado Mental com a o diagnóstico clínico foi similar. **Conclusão:** A Escala de Avaliação de Demência mostrou uma sensibilidade maior na detecção de comprometimento cognitivo na população estudada e poderia ser um instrumento útil para aplicação em instituições de longa permanência.

Descritores: Cognição; Delírium, demência, transtorno amnésico e outros transtornos cognitivos; Testes neuropsicológicos; Instituição de longa permanência para idosos; Idoso; Sensibilidade e especificidade; Escalas

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INTRODUCTION

As population ages^(1,2), long term care institutions (LTCI) play a crucial role in the elderly care. Although LTCIs are historically characterized as places where care-demanding people live, more frequently healthy elderly have decided to live in these facilities for many different reasons (more intense social contact or even enjoying what is offered at LTCIs such as balanced and proper food, recreational and physical activity and specialized medical care). LTCI are often divided into areas based on residents' dependency on daily living activities. In general, more dependent residents are those who required more expenses with their care plans⁽³⁾.

Cognitive impairment (CI) is one of the main reasons for elders' institutionalization and often contributes for increased dependency in LTCI. Once detected, CI should be followed-up⁽⁴⁾. Most of dementias are not curable diseases, however, there are potentially reversible cases⁽⁵⁾. Regarding those considered incurable dementias, multidisciplinary assessment and planning of the patient's future are important issues that make early CI worthwhile in LTCI⁽⁴⁾.

Early detection of CI in elderly living in LTCI allows an efficient treatment to be offered; therefore independency can be maintained longer and less money would be demanded⁽⁶⁾.

There are brief instruments that can be used in the cognitive screening of different population sets including those living at LTCI. The Mini Mental State Examination (MMSE)⁽⁷⁾ has been widely studied in different populations, including in Brazil. Its performance is closely related to schooling and cutoff scores for the Brazilian population have been well-established^(8,9). Although highly sensitive, its specificity can be lower since it is influenced by other than dementia CI such as delirium and psychosis.

The Mattis Dementia Rating Scale (DRS) is an instrument that unable to assess easily the cognitive status⁽¹⁰⁾. It takes 30 to 40 minutes to be applied. The 36 tasks are divided into 5 subscales, each one evaluating different cognitive areas: attention, initiation/perseveration, construction, conceptualization and memory. DRS has some advantages over MMSE since it provides more detailed information about the cognitive functions that are impaired or preserved, because it allows appliers to get a more detailed evaluation of a greater number of cognitive areas⁽¹¹⁾. Also, the DRS has shown to be efficient in detecting mild CI and different stages of dementia. There are Brazilian studies in which schooling was taken into consideration and cutoff scores have been published⁽¹²⁾.

OBJECTIVE

The aim of this study was to evaluate the diagnostic sensitivity, specificity, and agreement of the DRS with clinical diagnosis of CI (dementia or mild CI), and to compare these psychometric measures with the MMSE scores.

METHODS

This study was carried out at the Albert Einstein LTCI, a Brazilian facility for elderly that includes a nursing home service, an assisted living facility, and an outpatient geriatric clinic. Residents dependency status were classified by a team consensus using the Functional Independence Measure (FIM)⁽¹³⁾.

It was a cross-sectional study with 86 elders being invited to participate; they were independent and semi-dependent residents living in the LTCI. Fifty-eight of them agreed to participate in the study; the remaining 28 who refused had no statistical difference in relation to gender, age and dependency level ($p > 0.05$) when compared to the included ones. The participants had 60 or more years and mean educational level of 10 years.

The global health assessment protocol applied to these elders contained tests for cognitive status evaluation including the MMSE and DRS. Clinical diagnosis was performed by experts using the DSM-IV diagnostic criteria for dementia⁽¹⁴⁾ to classify the individuals as demented or non-demented, and the Petersen's diagnostic algorithm for amnesic or non amnesic mild CI⁽¹⁵⁾. The three measurements of CI were dichotomized into "presence" and "absence" of CI according to cutoff scores of Brazilian previous studies^(8,12). Clinical diagnosis was comprised "absence" (no impairment) and "presence" (dementia or mild CI).

DRS score was correlated to MMSE score using the Spearman Coefficient Correlation test. Taking clinical criteria as the gold standard for CI diagnosis, the diagnostic agreement between clinical criteria and DRS, and clinical criteria and MMSE were examined using kappa measurement. Sensitivity and specificity of the DRS and the MMSE were calculated.

The study was performed in the metropolitan area of the city of São Paulo (SP), Brazil, from December of 2008 to December of 2010. The Ethics and Research Committee of the *Instituto Israelita de Ensino e Pesquisa do Hospital Israelita Albert Einstein* approved this study. All the participants signed a consent form before taking part in the study.

RESULTS

Thirty-six subjects (62.1%) had no CI regarding the clinical diagnosis criteria and 22 (37.9%) had CI (8.6% CI and 29.3% dementia). According to MMSE, 31% were classified as cognitively impaired whilst for DRS, 55.2% (Table 1).

Table 1. Distribution of "presence" or "absence" of cognitive impairment

Cognitive impairment by	Absence n (%)	Presence n (%)
Mini Mental State Examination	40 (69.0)	18 (31.0)
Dementia Rating Scale	26 (44.8)	32 (55.2)
Clinical diagnosis	36 (62.1)	22 (37.9)

DRS and MMSE scores presented a strong correlation ($r=0.59$; $p<0,001$). DRS had a higher sensitivity than MMSE to identify CI (86.4% versus 61.9%). To identify the absence of cognitive deficits, DRS presented lower diagnostic specificity than MMSE (63.9% versus 86.5%). Considering DRS and MMSE, the diagnostic agreement between both and clinical diagnosis was similar (Table 2).

The table 3 shows descriptively the results of table 2. Once "no impairment" was diagnosed, MMSE correctly detected the absence of CI in 86.1% (52.8% \pm 33.3%) whilst DRS in 63.9% (52.8% \pm 11.1%). For mild CI, MMSE detected correctly the presence of CI in 40% whilst DRS in 60% (40% \pm 20%). For dementia, MMSE detected correctly the presence of CI in 64.7% whilst DRS in 94.1% (64.7% \pm 29.4%).

Table 2. Diagnosis agreement, sensitivity and specificity of the Mini Mental Status Examination and Dementia Rating Scale

Cognitive impairment by		Clinical diagnosis of cognitive impairment		Kappa	p-value
		Absence n (%)	Presence n (%)		
Mini Mental State Examination	Absence	32 (86.5)*	8 (38.1)	0.499	<0.001
	Presence	5 (13.5)	13 (61.9)**		
Dementia Rating Scale	Absence	23 (63.9)*	3 (13.6)	0.462	<0.001
	Presence	13 (36.1)	19 (86.4)**		

*Specificity; **sensitivity.

Table 3. Distribution of possible combinations among clinical diagnostic (gold standard) and Mini Mental State Examination and Dementia Rating Scale classification

Clinical diagnosis	Mini Mental State Examination	Dementia Rating Scale	Subjects considering clinical diagnosis n (%)
No impairment	No impairment	No impairment	19 (52.8)
	Impairment present	No impairment	4 (11.1)
	No impairment	Impairment present	12 (33.3)
	Impairment present	Impairment present	1 (2.8)
Mild cognitive deficiency	Impairment present	No impairment	0 (0)
	No impairment	Impairment present	1 (20.0)
	No impairment	No impairment	2 (40.0)
Dementia	Impairment present	Impairment present	11 (64.7)
	Impairment present	No impairment	0 (0)
	No impairment	Impairment present	5 (29.4)
	No impairment	No impairment	1 (5.9)

DISCUSSION

The medical literature on LTCI issues, including discussions about useful instruments to assess CI in the institutionalized elderly, is scarce. Our study showed

that DRS had a higher sensitivity than MMSE to detect CI. Although MMSE presented the same diagnostic agreement and higher specificity than DRS, the latter one may be more suitable for CI screening in a LTCI

since this condition is more prevalent in these facilities than in the community⁽¹⁶⁾. The prevalence of CI in previous Brazilian community studies ranged from 4.3% to 29.7%⁽¹⁷⁻¹⁹⁾. As expected in a LTCI, the prevalence of this study was higher. Considering specific diagnosis, CI prevalence found in the present study was higher than that found in a Brazilian community report on this issue (1.6%)⁽²⁰⁾. Dementia prevalence was much higher than in other Brazilian studies (range from 7.1% to 7.2%), being this finding already expected⁽²¹⁻²³⁾.

It is known that MCI diagnosis is the basis for early detection of CI, although there is no consensus about this diagnostic process improvement. According to previous studies⁽²⁴⁾, the MMSE is not adequate to recognize CI, being necessary to use a neuropsychological battery in order to complete the evaluation. The DRS itself is not a neuropsychological battery though it is able to give more details on cognitive status than MMSE. Besides, it can be applied by any trained health professional, but not exclusively to psychologists⁽²⁵⁾. Along with clinical criteria it would be a useful instrument in LTCIs⁽²⁶⁾. In these settings, DRS can be incorporated to the geriatric global assessment facilitating residents follow-up.

There are some limitations to be considered. This study was developed at only one LTCI with no randomized sample. To increase the accuracy of CI diagnosis it would be appropriate to have a larger sample, with an estimation of at least 20 CI patients to facilitate the statistical approach.

However, this study brings a contribution showing CI data in a Brazilian LTCI and a clinical implication to be considered, that is routine use of DRS in LTCI assessments, that allows early detection of CI in elderly people and consequently enables an efficient treatment to be offered.

CONCLUSION

DRS is a useful instrument for cognitive assessment in LTCIs. In this study, it was more sensitive than MMSE.

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