

Comparison of cognitive performance between elderly people of different scholarities with and without depressive symptoms

Comparação do desempenho cognitivo entre idosos de diferentes escolaridades com e sem sintomas depressivos

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ABSTRACT

Introduction: The presence of depressive symptoms and cognitive impairment are highly correlated with aging. In addition to this, there are other variables that also influence the presence and severity of existing cognitive disorders, such as schooling level. **Objective:** compare the cognitive performance among the elderly of different educational levels with and without depressive symptoms through the Rivermead Behavioural Memory Test (RBMT). **Methods:** a cross-sectional study with elderly people of different scholarities, with and without depressive symptoms. To evaluate the depressive symptoms, the Geriatric Depression Scale (GDS) was used and the Rivermead Behavioral Memory Test (RBMT) and the Mental State Mini Examination (MMSE) were applied for the evaluation of cognition. **Results:** the study included 69 elderly people with a mean age of 68.4 years (SD \pm 5.9) and a mean educational level of 7.9 years (SD \pm 3.7), the mean GDS score was 3.3 points (SD \pm 3.8) and the mean RBMT score was 16.19 points (SD \pm 3.8). **Conclusion:** in the studied sample, there is a significant difference in the performance of the elderly with and without depressive symptoms in the RBMT test when stratified by schooling.

Keywords: cognition; aging; depression; educational status.

RESUMO

Introdução: A presença de sintomas depressivos e comprometimento cognitivo estão altamente correlacionados com o envelhecimento. Além disso, existem outras variáveis que também influenciam a presença e a gravidade dos distúrbios cognitivos existentes, como o nível de escolaridade. **Objetivo:** comparar o desempenho cognitivo entre idosos de diferentes níveis educacionais, com e sem sintomas depressivos, por meio do Teste de Memória Comportamental de Rivermead (RBMT). **Métodos:** estudo transversal com idosos de diferentes bolsistas, com e sem sintomas depressivos. Para avaliar os sintomas depressivos, foi utilizada a Escala de Depressão Geriátrica (GDS) e o Teste de Memória Comportamental de Rivermead (RBMT) e o Mini Exame do Estado Mental (MEEM) foram aplicados para avaliação da cognição. **Resultados:** o estudo incluiu 69 idosos com idade média de 68,4 anos (DP \pm 5,9) e escolaridade média de 7,9 anos (DP \pm 3,7), o escore médio da GDS foi de 3,3 pontos (DP \pm 3,8) e o RBMT médio pontuação foi de 16,19 pontos (DP \pm 3,8). **Conclusão:** na amostra estudada, há uma diferença significativa no desempenho de idosos com e sem sintomas depressivos no teste RBMT, quando estratificados pela escolaridade.

Palavras-chave: cognição; envelhecimento; depressão; Status educacional.

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INTRODUCTION

Depression is one of the most prevalent psychiatric disorders in the elderly population. This disorder may cause great damage to the quality of life of this population¹. Depressive symptoms are often associated with cognitive decline in aging^{2,3}. It is estimated that approximately 40-60% of depressed patients, without dementia, present cognitive deficits^{4,5}.

Although the association between depression and cognitive decline is well established in the literature, some research aim at understanding this association and the existing variability in relation to the affected cognitive domains^{6,7}. Studies about depressed patients evidenced that these subjects present damage in different cognitive domains, such as: attention; processing speed functions; episodic memory; executive functions; semantic memory and daily problems solving^{8,9}.

Another association not yet consensual in the literature is that cognitive decline and associated factors that interfere in the analyzed results, because besides the impact of depression on cognitive decline in individuals, it is known that there are other variables that contribute to this damage, such as aging itself, which causes a gradual decline of memory. Other variables of great relevance are, mainly, educational and socioeconomic level, lifestyle, visual and auditory accuracy, social relations and genetic composition, which are important factors to be investigated and also influence the presence and severity of existing cognitive alterations^{10,11}.

Among the evidences that analyze the education level, there is divergence in the literature; because some researchers consider that schooling has an important effect on cognitive performance and may be a confusion bias in the interpretation of objective test results used for the evaluation of cognition^{12, 13, 14}. Because of this, it was created the Rivermead Behavioural Memory Test (RBMT), which is a widely used test for memory evaluation in aging and it is different of other tests, because it presents functional and ecological tasks, where educational level would have a lower impact^{15, 16, 17}.

In the literature, studies demonstrate the importance of RBMT for the differentiation of mild cognitive impairment (MCI) and Alzheimer's disease¹⁸, as well as being an appropriate test for early detection of these¹⁷. The literature presents several controversies regarding the tests to be used aiming at an accurate clinical result. In his study, Efklides¹⁹ compared different formal memory tests in a

sample of healthy individuals and found a positive correlation between education and cognitive performance, which is an important consideration in formal memory tests. This study demonstrated that the Wechsler Memory Scale and the Everyday Memory Questionnaire they are not so widely used scale that presents some weaknesses, since the correlation found was higher with the formal memory tests than with the RBMT¹⁹. This is possibly why that the RBMT has been the most used in studies.

The adequacy of norms considering age and education is considered important for proper interpretation of results. The RBMT is distinguished among several memory batteries for being presumably an ecologically valid memory test, as it replicates memory demands frequently faced in everyday life. It has been widely used for memory assessment in aging and can be very useful for the diagnosis of neurocognitive disorders alone and also as part of formal cognitive batteries¹⁹. In Brazil, previous studies with the RBMT indicate a low effect of education on the memory of healthy individuals, contrary to the findings of the present study. A study investigating the effect of education on the performance of healthy elderly people in several cognitive tests revealed that education did not interfere in the performance of the elderly in the RBMT test¹⁵.

The objective of this study is to compare the cognitive performance among the elderly of different educational levels with and without depressive symptoms through the Rivermead Behavioural Memory Test (RBMT).

METHODS

It is a cross-sectional study. The study included individuals over 60 years old (minimum: 60 - maximum: 83), with and without depressive symptoms. The group of subjects without depressive symptoms was selected from two administrations of Family Health Strategy, in Porto Alegre, Brazil (ESF – POA) and the group with depressive symptoms was selected from the Cerebral Aging Clinic from a reference hospital, in the state of Rio Grande do Sul, Brazil. The excluded subjects presented a history of neurological diseases, medical diagnosis of dementia, they were illiterate and they presented language and/or hearing alterations, which could impair the performance and/or understanding of the tests. Education was collected in years of study and this was categorized as: low educational level (from 1 to 7 years of education) and high educational level (≤ 8 years of education).

In order to identify the subjects' depressive symp-

toms, they responded the Geriatric Depression Scale (GDS)²⁰. The scale consists of 15 questions. The responses were 'yes' (0 points) and 'no' (1 point), a maximum of 15 points. The cut-off point to consider depressive symptoms is 5 points. To be more reliable in relation to the score of depressive symptoms, this study used the cut-off point higher than or equal to 6 points.

The cognitive evaluation of the elderly subjects was performed through the RBMT (Rivermead Behavioural Memory Test)²¹. The test is divided into 12 subtests which evaluate orientation, planning, immediate memory (verbal and visual), recent memory (verbal and visual) and recognition. In each task, the score could vary from 0 to 2 points. Thus, two points indicate normal performance; one point indicates intermediate performance; zero indicates total performance fault in the task. The test weighted score varies from 0 to 24 points. The RBMT presents four equivalent versions. In this study, it was used the A test version. It was also used the Mini Mental State Examination test (MMSE)²², a screening test of cognitive alterations, widely used in research, easy to apply, and evaluating general cognitive aspects such as: orientation, memory, language, planning and praxis.

The data collection was performed by a single professional trained for the study, aiming at the maximum standardization of the data found. This study was approved by the institutional Ethics Committee and all participants signed the free and clarified consent term, to participate in

this study.

The data were analyzed in SPSS software v.21 (Chicago: SPSS Inc). A descriptive analysis was performed through absolute and relative frequency measurements and calculation of the distribution of variables through medians and interquartile ranges and means and standard deviations. To confirm the normality of the data, it was used the Shapiro Wilks test. In order to analyze the difference between the medians and interquartile ranges of the variables studied, it was used the Mann-Whitney test, considering a statistical significance of 5%.

RESULTS

This study included 69 elderly people who live in southern Brazil, have low incomes and access the public health service, with an average age of 68.4 years (SD±5.9) and with an average education of 7.9 years (SD ± 3.7). The average GDS score was 3.3 points (SD ± 3.8) and the average RBMT score was 16.19 points (SD ± 3.8). They are independent individuals from the community.

Table 1 shows the difference between the medians and the interquartile range between the groups and the results of the GDS, RBMT and MEEM tests, and the differences in medians and interquartile ranges were observed when stratified by schooling in all.

Table 2 presents the descriptive results stratified by education and depressive symptoms for the results analyzed by means of standard and standard deviation. It

Table 1 - Comparison of groups stratified by schooling regarding age variables, depressive symptoms and performance in cognitive assessment.

	Low Educational Level (n=30)	High Educational Level (n=39)	p-value
	Md (IQ25-75%)	Md (IQ25-75%)	
Age	67,0 (62,0-72,0)	69,0 (66,5-72,0)	0,092
GDS	3,0 (1,0-7,0)	1,0 (0,0-3,0)	0,001
RBMT	15,0 (10,0-18,0)	20 (16,7-21,2)	<0,001
MEEM	24,0 (22,0-27,5)	27,0 (24,7-30,0)	0,015

*Values expressed through median and the respective interquartile interval 25-75%.

**Mann-Whitney's test.

Table 2- Comparison of groups stratified by schooling and depressive symptoms regarding age variables and performance in cognitive assessment.

	Low Educational Level Mean (standard deviation)		High Educational Level Mean (standard deviation)	
	Depressive symptoms	No Depressive symptoms	Depressive symptoms	No Depressive symptoms
Age	68,05(±5,93)	65,54(±5,93)	70,08(±5,61)	66,00(±2,83)
RBMT	14,80(±4,76)	13,62(±4,63)	19,08(±3,59)	19,00(±2,83)
MEEM	26,00(±2,88)	21,58(±4,12)	26,71(±2,69)	29,50(±0,71)

can be observed that the greatest results are for individuals with higher education and depressive symptoms. As for education, this seems to be the biggest factor influencing the difference between the results.

DISCUSSION

The results of this study demonstrate that there is a significant difference in the performance of the elderly with and without depressive symptoms in the RBMT test when stratified by educational level. Even the RBMT test being different from the others, because it is a test with functional and ecological tasks, where the education would have a smaller impact, in this study it is observed that the results are significantly different.

A possible explanation for the significant difference between groups through the RBMT test is the effect of depression plus the education level of the elderly. It was verified that in the elderly with low educational level and with depressive symptoms there is no difference in the cognitive performance in relation to the elderly with low education and without depressive symptoms²³. Studies indicate that the association between depressive symptoms and cognitive alterations varies according to the level of cognitive reserve, thus, older people with higher education presented worsening in their cognitive performance in the presence of depressive symptoms while the elderly with low level of education maintained the same cognitive performance in the presence of depressive symptoms^{24, 25}.

It was evidenced that in patients diagnosed with higher levels of depression there is a greater impairment in cognitive abilities, among them, psychomotricity, memory, reading comprehension, verbal fluency and executive functions^{26,27,28}. Thus, possibly, the variable depression interferes with the performance of cognitive assessments and the investigation of the individual's educational level may not be sufficient to minimize these effects. Therefore, the importance of assessing depression concomitantly to the RBMT test is emphasized, since its effect is not the same in different educational levels, even from the investigation of functional and ecological tasks.

In addition, considering the education as a proxy for the socioeconomic level, it can be inferred, as demonstrated in this study, that the elderly with lower educational attainment have a higher median and interquartile range in the GDS. Thus, it is expected that there is greater depression in more vulnerable individuals, as reported in the literature^{29,30}.

The MMSE has been used worldwide, mainly for epidemiological tracing; however, despite the fact that it presents different scores for the different degrees of education, since it is already expected differentiation between the results, not all studies and clinicians take into account the different expected performances^{31,32,33,34}. Therefore, it is important to understand the differences caused by education in individuals.

This study presents some limitations, among them, the cross-sectional design does not allow conclusions about the causality and direction of these relations, besides that population studies and with stratified sampling could better compare these results. However, it is worth to emphasize the importance of this study, since there is still no consensus in the literature and the difficulty of developed countries to find older people with low educational level.

CONCLUSION

It was concluded that, in this sample, there is a significant difference in the performance of the elderly with and without depressive symptoms in the RBMT test when stratified by educational level.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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