Psychometric characteristics of the full and short versions of the IQCODE-BR among low income elderly persons with a low educational level

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Abstract

Objective: To study the psychometric characteristics of the Brazilian Portuguese version of the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE-BR) using a sample of low income elderly persons with a low educational level, and compare the full and short versions of the questionnaire. *Method:* A cross-sectional study of a convenience sample of a population with a low educational level was performed. The IQCODE-BR was applied to the informants of 87 elderly persons (60-90 years old), who were triaged by psychiatrists and neurologists for the diagnosis of depression, mild cognitive impairment (MCI), and dementia. *Results:* The median age of the sample was 72 and the majority were women (72.4%). A total of 31 (35.6%) were illiterate, 30 (34.5%) had dementia, 21 (24.1%) suffered from depression, 20 (23.0%) had MCI, and 16 (18.4%) were diagnosed with none of these conditions. The median IQCODE-BR was higher in the groups with depression and MCI than the normal group, and was highest of all in the group with dementia. The full and reduced versions of the IQCODE-BR had similar levels of accuracy. *Conclusion:* In this sample the IQCODE-BR was shown to be an effective tool for tracking MCI and dementia. The use of the short version with cut-off points of 3.22 for MCI excluding a diagnosis of depression, and 3.48 for dementia irrespective of the presence of symptoms of depression, is suggested.

Key words: Mild Cognitive Impairment; Dementia; Aging.

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INTRODUCTION

Vulnerability to disease increases during the aging process, resulting in a higher frequency of chronic-degenerative diseases that can affect systemic health.[1-3]

Dementia is one of the most significant causes of morbidity and mortality among the elderly. It is a chronic syndrome whose main characteristics are the decline of memory and other intellectual functions, such as language, praxis, the ability to recognize and identify objects, abstraction, organization, planning and sequencing, as well as changes in behavior or personality, impairing the psychosocial development of the individual.[4]

The vast majority of cases of dementia cases are degenerative, and the syndrome is the main cause of Alzheimer's disease. There is still no satisfactory treatment. The few drugs that can slightly modify the progression of the disease are more effective in the early stages.[5] Mild Cognitive Impairment (MCI) is manifested by a change in cognition compared to the previous level of the patient, with impaired performance in one or more of the cognitive domains that are expected for the individual's age and education, but with the retention of independence in functional skills.[6,7]

In this context, validation tools that can identify the disease in its early stages are extremely important. Around the world, one of the most widely-employed screening tools is the *Informant Questionnaire on Cognitive Decline in the Elderly* (IQCODE),[8] a questionnaire developed in Australia and used in many countries.[9-11] It consists of 26 questions and is applied to a family member or caregiver who has had contact with an elderly individual for over ten years. This instrument was translated and validated for Brazilian use (IQCODE-BR)[12] and a reduced version was created, composed of 16 questions taken from the full version.

Studies have indicated the importance of informant reporting as a fundamental part of the criteria for the diagnosis of dementia.[13,14] It is essential to evaluate the history of cognitive decline through the observations of a relative, especially when assessing an individual with a low education level, whose performance in neuropsychological tests may be compromised. Functional tests should be combined with cognitive assessment to improve diagnostic accuracy.[15]

The aim of the present study was to evaluate the psychometric characteristics of IQCODE-BR in a sample of low income elderly individuals with a low educational level, comparing the full and reduced versions.

METHOD

This study is a part of the Programa de Envelhecimento Cerebral ("Brain Aging Program") (PENCE) of the Estratégia Saúde da Família ("Family Health Strategy") (ESF) of Porto Alegre in collaboration with the Instituto de Geriatria e Gerontologia ("Institute of Geriatrics and Gerontology") of the Pontifícia Universidade Católica do Rio Grande do Sul (IGG-PUCRS). PENCE was developed from an EMI-SUS cross-sectional study of the population registered with the Porto Alegre ESF.[16] The participants of the present study are part of this sample, which is characterized by low income individuals. Of these, 7.0% have no income, 54.7% earn less than the minimum wage, 25.0% earn the equivalent of one to two monthly minimum wages, 5.0% earn the equivalent of two to four times the monthly minimum wage and approximately 2.0% earn the equivalent of four to six monthly minimum wages, as described in other studies using the same population group.[17,18]

A total of 87 elderly individuals aged 60 to 90 years treated at the Ambulatório de Envelhecimento Cerebral ("Brain Aging Clinic") (AMBEC) in the period from March to December 2013, who were accompanied by an informant they had known for at least ten years, were included in the study. The AMBEC was created specifically at the Neurology

Service of the Hospital São Lucas of PUCRS to care for the mental health of elderly individuals registered with PENCE.

Patients diagnosed with central nervous system diseases other than MCI or dementia or with psychiatric axis I disorders other than depressive disorder or anxiety were excluded from the study.

All patients underwent at least one neurological consultation and one psychiatric consultation. In the neurological consultation, the patients were cognitively evaluated using Addenbrooke's Cognitive Examination Revised (ACE-R). Where required, the patients were referred for neuropsychological assessment using the *Consortium to Establish a Registry for Alzheimer's Disease* (CERAD) battery of evaluations. In psychiatric consultation, patients were evaluated with the reduced 15 item Portuguese version of the Geriatric Depression Scale (GDS) and the Portuguese mini-version 5.0 of the Mini-International Neuropsychiatric Interview (MINI), a screening tool for Axis I psychiatric disorders.

The diagnosis of MCI and dementia followed the recommendations of the *National Institute on Aging – Alzheimer's Association* (NIA-AA) published in 2011.[19] Diagnoses of more severe depression were made in consultation with a psychiatrist, based on the DSM-IV-TR criteria.[20] Both the psychiatrist and the neurologist had no knowledge of the IQCODE-BR result. The nurse who applied the IQCODE-BR in relation to neurological and psychiatric diagnosis was also unaware of the result.

The IQCODE-BR is a questionnaire for the detection of cognitive decline based on the reports of informants. The full version consists of 26 questions, of which 16 are included in the reduced version. The questions are answered based on the Likert scale, with five options (1 much improved; 2 a bit improved; 3 not much change; 4 a bit worse, 5 much worse). The end result is obtained by the weighted sum of the items, which is then divided by the total range of items. The final score of the two versions ranges from 1 to 5. The questionnaire was applied by the same researcher and took approximately 15 minutes. The full version was applied to all participants, and analysis of the full and reduced versions was performed at a later date.

The data was entered into a database specially developed for the project using the *File Maker Pro* 11 program. Statistical analysis was performed using the SPSS 17 program. Frequencies, means and standard deviations were used for descriptive statistics. Pearson's chi-squared test was used to compare the categorical variables (demographic data) of the groups. When more than 25% of households had an expected value below 5, Fisher's exact test was used. To compare the means between groups, variance analysis (one-way ANOVA) with the Bonferroni post-hoc test was used. To control the confounding effect, the comparison of the IQCODE-BR mean values between the groups was adjusted for age and education through multiple linear regression probability *(logit)*. The Pearson correlation coefficient was used to analyze the association between the IQCODE-BR and the MMSE and ACE-R values, and the Spearman correlation coefficient was used to analyze the association between the IQCODE-BR and GDS values. Exploratory factor analysis was used for analysis of construct validity, with the application of varimax rotation, and internal consistency was assessed with Cronbach's alpha. To study the accuracy of IQCODE-BR and the best cut-off points for the diagnosis of MCI and dementia, ROC curves were constructed and sensitivity and specificity were calculated.

Accompanying persons/informants who participated in the study signed a Free and Informed Consent Form and responded to the full version of IQCODE-US, with 26 questions.

The researchers followed the recommendations of Resolution nº 466/2012 of the National Health Council of the Ministry of Health. The project was approved by the Ethics Research Committee

of the Pontifícia Universidade Católica do Rio Grande do Sul, registered under n° 228.937, dated 13 March 2013.

RESULTS

The mean age of the 87 elderly respondents was 72.1 (SD = 7.5) years. The data presented in Table 1 is related to sociodemographic characteristics. It is noteworthy that most of the elderly individuals were female (72.4%) and that 35.6% were illiterate. The elderly were divided into four groups: 30 with dementia, 20 with MCI, 21 with depression and 16 with no such diagnoses. It was observed that there was an association between MCI and dementia and advanced age and low education. There was no significant difference in the results based on gender.

Table 1. Distribution of sociodemographic data, according to diagnosis. Porto Alegre, RS, 2013.

Variable	Group				*p*	Total
	Normal	Depression	MCI	Dementia		
Age						
m±sd	68.7(±6.9)	69.3(±6.4)	74.2(±7.9)	74.3(±7.3)	0.015*	72.1(±7.5)
age group	61-82	60-82	62-90	61-86		60-90
Gender - n (%)						
male	4 (25.0)	4 (19.0)	8 (40.0)	8 (26.7)	0.498§	24 (27.6)
female	12 (75.0)	17 (81.0)	12 (60.0)	22 (73.3)		63 (72.4)
Age group - n (%)						
60-69	11 (68.8)	11 (52.4)	5 (25.0)	8 (26.7)		35 (40.2)
70-79	3 (18.8)	9 (42.9)	10 (50.0)	14 (46.7)	0.038#	36 (41.4)
80 or +	2 (12.5)	1 (4.8)	5 (25.0)	8 (26.7)		16 (18.4)
Educ. level - n (%)						
illiterate	4 (25.0)	4 (19.0)	11 (55.0)	12 (40.0)		31 (35.6)
Did not complete primary school	6 (37.5)	15 (71.4)	8 (40.0)	14 (46.7)	0.043#	43 (49.4)
Completed primary school	6 (37.5)	2 (9.5)	1 (5.0)	4 (13.3)		13 (14.9)
Total – n	16	21	20	30		87

CCL= mild cognitive impairment; m= mean; sd= standard deviation; *ANOVA; § Pearson chi-squared test; #t Fisher's Exact test.

The distribution of the final results of the full and reduced versions of IQCODE-BR for each diagnostic group is shown in Table 2. Full and reduced mean IQCODE-BR results were, respectively, 3.18 and 3.15 for elderly persons without cognitive impairment and depression; 3.38 and 3.39 for elderly persons with depression; 3.48 and 3.48 for elderly persons with MCI; and 3.78 and 3.83 for elderly persons diagnosed with dementia. A statistically significant difference was observed between the groups ($p < 0.001$). *Post hoc* analysis revealed there was no significant difference between the groups with depression and MCI, but found that these groups differed significantly from normal individuals and elderly individuals with dementia.

Table 2. Mean, standard deviation, median and ranges of final results of complete and reduced versions of IQCODE-BR, in accordance with diagnosis. Porto Alegre, RS, 2013.

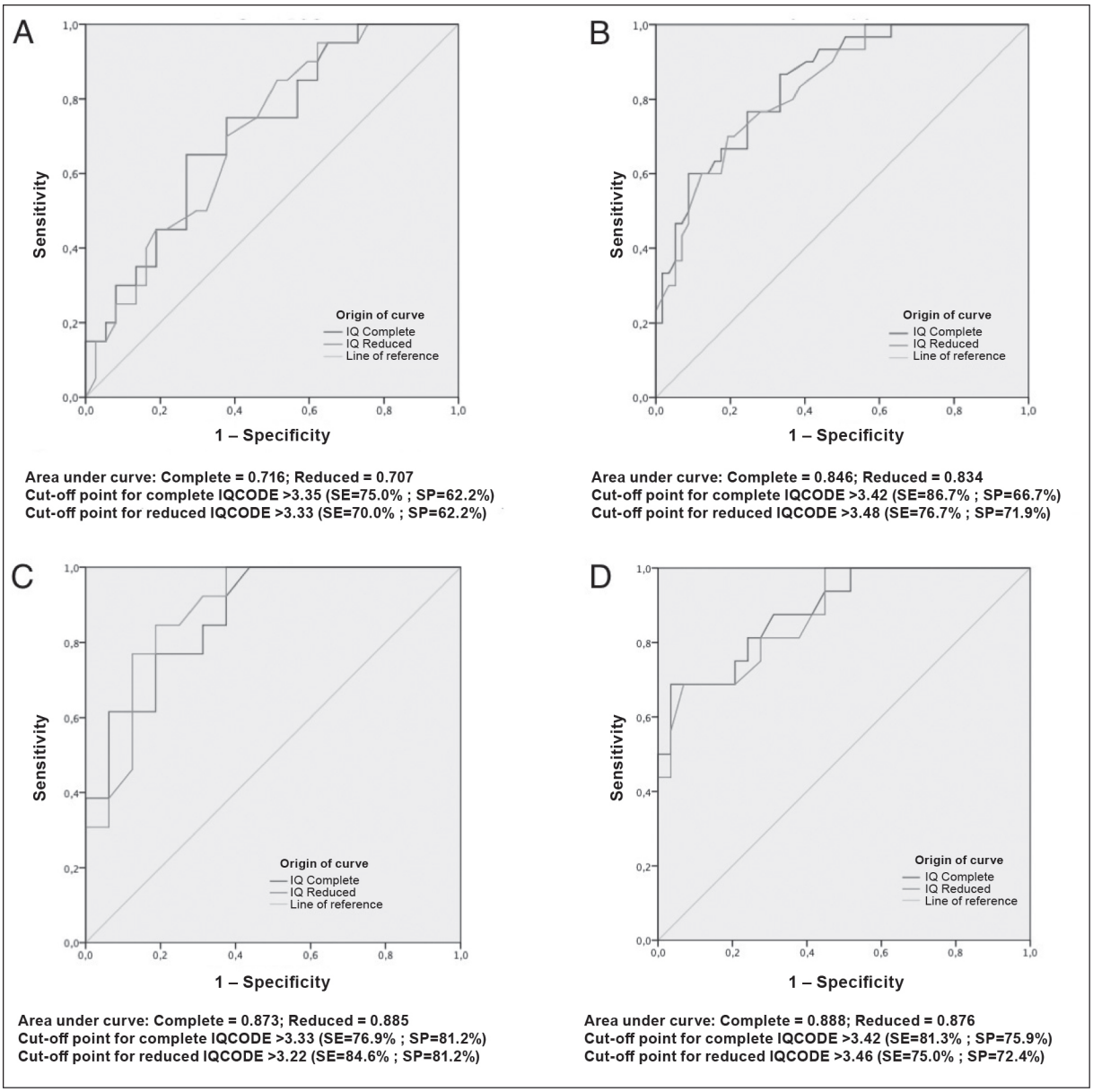
IQCODE-BR	Group				*p**	*p*%
	Normal (n=16)	Depression (n=21)	MCI (n=20)	Dementia (n=30)		
Complete						
m±sd	3.18(±0.16)	3.38(±0.22)	3.48(±0.24)	3.78±(0.35)		
Med	3.18	3.39	3.41	3.74	<0.001	<0.001
range	2.96-3.54	3.00-3.76	3.13-4.00	3.24-4.50		
Reduced						
m±sd	3.15±(0.18)	3.39±(0.28)	3.48±(0.27)	3.83(±0.41)		
Med	3.13	3.38	3.41	3.78	<0.001	<0.001
range	2.94-3.57	3.00-4.00	3.07-4.00	3.27-4.69		

CCL= mild cognitive impairment; m= mean; sd= standard-deviation; med= median; *p value calculated by variance analysis (one way ANOVA); %value of p corrected for age and educational level.

The full and reduced versions of the IQCODE-BR had Cronbach's alpha values of 0.906 and 0.908 respectively. Individually, all the questions had values greater than 0.90, except for question 25 of the reduced version, which had a Cronbach's alpha value of 0.898. Exploratory factor analysis resulted in an overall variance percentage of 57.8 for the full version and 65.3 for the reduced version, with the identification of five and four possible domains, respectively. When analyzing the questions to which each domain was linked with most affinity, it was observed that many questions belong simultaneously to more than one domain. There are not, therefore, clearly defined individual domains.

The correlation between IQCODE-BR (complete and reduced version) and the instruments assessing cognition, ACE-R and MMSE, was moderate and statistically significant, with a correlation coefficient of -0.492 and -0.483 for ACE-R and -0.527 and -0.512 for MMSE respectively.

Figure 1 shows the ROC curves generated for the diagnosis of MCI and dementia among all the elderly persons (A and B), and excluding elderly persons with depression (C and D). A cut-off point of 3.22 was identified for diagnosis of MCI with the reduced version when patients with depression were excluded, with sensitivity of 84.6% and specificity of 81.2%. For the diagnosis of dementia in the total population, a cut-off point of 3.48 for the reduced version of IQCODE-BR was identified, with sensitivity of 76.7% and specificity of 71.9%, respectively.



A- diagnosis of MCI (n=87); B- diagnosis of dementia (n=87); C- diagnosis of MCI in elderly individuals without depression (n=66); D- diagnosis of dementia in elderly individuals without depression (n=66);

S= sensitivity; E= specificity.

Figure 1. ROC curve showing relationship between sensitivity and specificity of scores of complete and reduced versions of IQCODE-BR for the diagnosis of mild cognitive impairment (MCI) and dementia. Porto Alegre, RS, 2013.

DISCUSSION

Several studies have shown that age and educational level act as risk factors for cognitive decline and the development of dementia, and that a higher educational level acts as a protective factor against the same.[21,22] The study population, despite being a convenience sample, included elderly people with and without mental health problems registered with the Porto Alegre ESF. In the present study there was an association between age and the educational level of the elderly persons studied. The frequency of older patients with lower educational levels was higher among patients with MCI and dementia.

There was a strong association between the IQCODE-BR results and the diagnosis of dementia, given that similar results were obtained for MCI and depression. There was no significant difference between the means of the MCI and the depression groups, which indicates that depression can interfere with the tracking of dementias. Studies have shown that depression is related to the detection of MCI[23,24] and is often a confounding factor for its diagnosis.

The internal consistency of the present study, both when using the full and the reduced version of the questionnaire, was also strong, with a score of greater than 0.90 for the sample surveyed here, and in wider literature.[25,26]

With respect to exploratory factor analysis, it was not possible to group the questions into appropriate separate domains, as most fell into more than one domain. As such, exploratory factor analysis could not be fully completed as the questions cannot be classified into the correct domains, suggesting that the affinity between the questions is directly interconnected. This finding was even more significant in the reduced version.

No IQCODE-BR domains were identified as the questionnaire was not based on such divisions, and is an instrument for investigating activities of daily living compared with cognitive performance over the previous ten years. Most issues correlate with more than one domain. It is inferred that because of their direct affinity, there is no way to separate them into domains.

The correlation coefficient with the MMSE and ACER was moderate, with values below $r = -0.630$. According to literature these values are higher than those described in some other studies.[27-29]

The full and reduced versions had similar psychometric characteristics, meaning the reduced version can be used without a significant loss of quality of the instrument among this population, although other instruments should be used for diagnostic purposes.[30]

In assessing accuracy, a larger ROC curve area was obtained when the elderly diagnosed with depression were replaced with those with MCI. Although different cut-off points were established for the full and reduced versions, both versions proved effective at tracking MCI and dementia. The present study suggests that the IQCODE-BR is able to detect dementia in individuals with a low educational level at an early stage, but that its findings can be influenced by a diagnosis of depression. Therefore, for the reduced version cut-off points of 3.22 to identify CCL (when depressive symptoms are excluded) and 3.48 to identify dementia (regardless of the presence of depression) are suggested.

While there are several suggestions of cut-off points in existing literature, it should be noted that most of the populations studied are different.[31-34] The aim of the present study was to study data from a population with a low educational level.

Because it is a convenience sample, with data from an ESF outpatient referral clinic, the results of this study refer to a low income population with a low educational level. The findings of the present study show that this easy to apply, accurate instrument can be used as a diagnostic tool to detect dementia at an early stage by ESF nurses and technicians in a primary care environment.

CONCLUSION

The IQCODE-BR proved to be an effective instrument for dementia screening in the study population, which is characterized by a low educational level. Cronbach's coefficient was similar to those found in other studies. While the relationship between the IQCODE-BR and other instruments was very positive, a combination of symptoms suggestive of depression can have a significant effect on IQCODE-BR evaluation. In such cases a detailed diagnostic evaluation of this mood disorder is required. It is recommended that the smaller version of IQCODE-BR is used, as, in addition to being quicker to apply, it can be used without reducing the accuracy of the results. The cut-off point suggested for the reduced version of IQCODE-BR in the identification of dementia is 3.48, regardless of the possible presence of depressive symptoms. When used to track MCI the suggested cut-off point is 3.22, when no symptoms of a depressive disorder are present.

REFERENCES

1. Laka HM, Laaksonen DE, Lakka TA, Niskanem LK, Kumpusalo E, Tuomilehto J, et al. The metabolic syndrome and total and cardiovascular disease mortality in middle-aged men. JAMA 2002;288(21):2709-16.
2. Girman CJ, Rhodes T, Mercuri M, Pyörälä K, Kjekshus J, Pedersen TR, et al. The metabolic syndrome and risk of major coronary events in the Scandinavian Simvastatin Survival Study (4S) and the Air Force/Texas Coronary Atherosclerosis Prevention Study (AFCAPS/TexCAPS). Am J Cardiol 2004;93(2):136-41.
3. Whitmer RA, Gunderson EP, Barret-Connor E, Quesenberry CP Jr, Yaffe K. Obesity in middle age and future risk of dementia: a 27year longitudinal population based study. BMJ 2005;330:1-5.
4. Macedo MBM, Ramos LR. Validade da versão em português da Clinical Dementia Rating. Rev Saúde Pública 2005;39(6):912-17.
5. Mancuso C, Siciliano R, Barone E, Butterfield DA, Preziosi P. Pharmacologists and Alzheimer disease therapy: to boldly go where no scientist has gone before. Expert Opin Investig Drugs 2011;20(9):1243-61.
6. Albert MS, DeKosky ST, Dickson D, Dubois B, Feldman HH, Fox NC, et al. The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement 2011;7(3):270-9.
7. Costa MJ, Ribeiro RCL, Cotta RMM, Leal PFG. Declínio cognitivo de idosos e sua associação com fatores epidemiológicos em viçosa , minas gerais. Rev Bras Geriatr Gerontol [Internet] 2011 [acesso em 01 Jun 2012];14(1):109-22. Disponível em: http://revista.unati.uerj.br/scielo.php?script=sci_arttext&pid=S1809-98232011000100012&lng=pt
8. Fuh JL, Teng EL, Lin KN, Larson EB, Wang SJ, Liu CY, et al. The Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) as a screening tool for dementia for a predominantly illiterate Chinese population. Neurology 1995;45(1):92-6.
9. Tang WK, Chan SSM, Chiu HFK, Wong KS, Kwok TCY, Mok V, et al. Can IQCODE detect postroke dementia? Int J Geriatr Psychiatry 2003;18(8):706-10.
10. Petersen RC, Stevens JC, Ganguli M, Tangalos EG, Cummings JL, Dekosky ST. Practice parameter: early detection of dementia: mild cognitive impairment (an evidence-based review). Neurology 2001;56(9):1133-42. Report of the Quality Standards Subcommittee of the American Academy of Neurology.
11. Morales JM, Bermejo F, Romero M, De-Ser T. Screening of dementia in community-dwelling elderly through informant report. Int J Geriatr Psychiatry 1997;12(8):808-16.
12. Sanchez MAS, Lourenço RA. Informant Questionnaireon Cognitive Decline in the Elderly (IQCODE): adaptação transcultural para uso no Brasil. Cad Saúde Pública [Internet] 2009 [acesso em 26 jun 2014];25(7):1455-65. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2009000700003&lng=en

13. McKhann GM, Knopman DS, Chertkow H, Hyman BT, Jack CR Jr, Kawas CH, et al. The diagnosis of dementia due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement 2011;7(3):263-9.

14. Bustamante SEZ, Bottino CM, Lopes MA, Azevedo D, Hototian SR, Litvoc J, et al. Instrumentos combinados na avaliação da demência em idosos: resultados preliminaries. Arq Neuropsiquiatr 2003;61(3A):601-6.

15. Bruki SMD. Illiteracy and dementia. Dement Neuropsychol 2010;4(3):153-7.

16. Gomes I, Nogueira EL, Engroff P, Ely LS, Schwanke CHA, De Carli GA. The multidimensional study of the elderly in the family healthy strategy in Porto Alegre, Brazil (EMI-SUS). PAJAR 2013;1(1):20-4.

17. Ely L, Valle GM, Engroff P, Gomes I, Moresco R, Tatsch E, et al. The Association Between the Chronic Use of Non-Steroidal Anti- Inflammatory Drugs and Oxidative and Inflammatory Markers in the elderly. Inflamm Allergy Drug Targets 2015;13(5):323-9.

18. Engroff P, Ely LS, Guiselli SR, Goularte FH, Gomes I, Viegas K, et al. Soroepidemiologia de Toxoplasma gondii em idosos atendidos pela Estratégia Saúde da Família, Porto Alegre, Rio Grande do Sul, Brasil. Ciênc Saúde Coletiva 2014;19(8):3385-93.

19. DeKosky ST, Carrillo MC, Phelps C, Knopman D, Petersen RC, Frank R, et all. Revision of the criteria for Alzheimer's disease: a symposium. Alzheimer's Dement 2011;7(1):1-2.

20. Associação Psiquiátrica Americana. DSM-IV TR: Manual Diagnóstico e Estatístico dos Transtornos Mentais. 4ª ed. rev. Porto Alegre: Artmed, 2000.

21. Brucki SMD, Nitrini R, Caramelli P, Bertolucci PHF, Okamoto IH. Sugestões para o uso do Mini- Exame do Estado Mental no Brasil. Arq Neuropsiquiatr 2003;61(3B):777-81.

22. Almeida OP. Mini exame do estado mental e o diagnóstico de demência no Brasil. Arq Neuropsiquiatr 1998;56(3b):605-12.

23. Nitrini R. Epidemiologia da doença de Alzheimer no Brasil. Rev Psiquiatr Clín 1999;26(5):1-10.

24. Potter GG, Steffens DC. Contribution of depression to cognitive impairment and dementia in older adults. Neurologist 2007;13(3):105-17.

25. Moraes EM, organizador. Princípios básicos de geriatria e gerontologia. Belo Horizonte: Coopmed; 2008.

26. Jorm AF, Korten AE. Assessment of cognitive decline in the elderly by informant interview. BR J Psychiatr 1988;152:209-13.

27. Jorm AF, Jacomb PA. The Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE): socio-demographic correlates, reliability and some norms. Psychol Med 1989;19(4):1015-22.

28. Ehrensperger MM, Berres M, Taylor KI, Monsch AU. Screening properties of the German IQCODE with a two-year time frama in MCI and early Alzheimer's disease. Int Psychogeriatr 2010;22(1):91-100.

29. Gomes JS. Contribuição para a Validação do IQCODE – Informant Questionnaire on Cognitive Decline in the Elderly [dissertação]. Coimbra: Escola Superior de Altos Estudos; 2011.

30. Winblad B, Palmer K, Kivipelto M, Jelic V, Fratiglioni I, Wahlund LO, et al. Mild cognitive impairment-beyond controversies, towards a consensus: report of International Working Group on Mild Cognitive Impairment. J Intern Med 2004;256(3):240-56.

31. Jorm AF. A short form of the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE): development and cross-validation. Psychol Med 1994;24(1):145-53.

32. Law S, Wolfson C. Validation of a French version of an informant-based questionnaire as a screening test for Alzheimer's disease. Br J Psychiatr 1995;167(4):541-4.

33. Lim HJ, Lim JPP, Anthony P, Yeo DHH, Sahadevan S. Prevalence of cognitive impairment amongst Singapore's elderly Chinese: a community-based study using the ECAQ and the IQCODE. Int J Geriatr Psychiatry 2003;18(2):142-8.

34. Ozel-Kizil ET, Turan ED, Yilmaz E, Cangoz B, Uluc S. Discriminant validity and reliability of the Turkish Version of Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE-T). Arch Clin Neuropsychol 2010;25(2):139-45.

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