SHORT COMMUNICATION
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Cognitive impairment and metabolic syndrome in a population of Brazilian oldest-old

Vanessa Hashimoto[1], Alessandro Ferrari Jacinto[1]*, Lara Miguel Quirino Araújo[1], Maysa Seabra Cendoroglo[1], Clineu de Mello Almada Filho[1]

INTRODUCTION

The global oldest-old population is projected to increase 351% between 2010 and 2050. In Brazil, approximately 4.3 million people are aged over 80 years, making it the fastest-growing stratum of the country's population. The total number of people with dementia worldwide is set to reach 82 million in 2030 and 152 million in 2050. Approximately 60% of people with dementia live in low- and middle-income countries. The prevalence of dementia doubles for every 5-year increase in age; therefore, dementia is a major health issue among those who aged above 80 years[1,2].

Metabolic syndrome (MS) is a common clinical condition in the older population. It consists of a set of cardiovascular risk factors and is associated with an increased risk of developing diseases, including cerebrovascular disease. Vascular risk factors are associated with cognitive impairment no dementia (CIND) and dementia, particularly vascular dementia[3,4].

Recently, the World Health Organization published a document containing key topics related to dementia prevention including management of weight, hypertension, diabetes, and dyslipidemia, all of which are MS criteria[5].

Cognitive impairment no dementia denotes individuals whose cognitive functioning falls below normal, but who do not meet the criteria for dementia. The follow-up of older people with CIND is important in order to identify those who will progress to dementia[6].

The literature is conflicting regarding the association between MS and CIND or dementia, with some studies confirming this association and others not, particularly in the oldest-old[7].

The aim of this study was to determine the association between MS and CIND in a population of functionally independent oldest-old.

METHODS

A population of functionally independent community-dwelling subjects who aged above 80 years participated in this cross-sectional study. The population was part of a cohort ("Projeto Longevos") routinely followed at an outpatient clinic of a university hospital in São Paulo, Brazil. Data were obtained from the first assessment of the individuals at the clinic and included sociodemographic information, cognitive screening results, and presence of clinical factors related to MS.

The clinical and laboratory data used for MS diagnosis were as follows: waist circumference ≥102 cm (male) and ≥88 cm (female); triglycerides ≥150 mg/dL or use of medication for dyslipidemia, high-density lipoprotein (HDL) cholesterol <40 mg/dL (male) and <50 mg/dL (female) or use of lipid-lowering drugs; systemic arterial hypertension reported by the participant or use of antihypertensive drugs; and fasting glycemia ≥100 mg/dL or use of medication for diabetes. In accordance with the National Cholesterol Education Program-Adult Treatment Panel Guide III (NCEP/ATP III) criteria[8], three out of these five items needed to be present in order to establish an MS diagnosis.

The instruments used for cognitive screening were the Mini-Mental State Exam[9], the Clock Drawing Test[10], and Verbal Fluency[11]. Scores on two of the three instruments had to be below the expected level for this population in order to consider the participant as having CIND.

The study was approved by the Ethics Committee of UNIFESP (1532/09).

Statistical analysis

Categorical variables were expressed as absolute and relative values, whereas continuous variables were expressed as central tendency measures. The association of categorical variables was

[1]Disciplina de Geriatria e Gerontologia, Universidade Federal de São Paulo, São Paulo (SP), Brazil
*Corresponding author: alessandrojacinto@uol.com.br
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assessed using the chi-square test and the comparison of continuous variables between two groups was assessed using the Student's *t* test. Logistic regression was used in the multivariate analysis. The level of statistical significance adopted was 0.05.

RESULTS

The total number of oldest-old in the cohort was 323, of which 68 were excluded due to missing items of information collected for this study. Data from 255 participants were analyzed. There were 171 (67%) women and 84 (33%) men. Overall, 55% had MS in the female group versus 39% in the male group.

The mean age of the total sample was 85.4 (±4.4) years and the mean schooling was 4.8 (±4.5) years. Considering the groups "with and without metabolic syndrome," there was no statistically significant difference for age (p=0.84) and for schooling (p=0.09).

The mean age of the group with CIND was statistically and significantly higher than the group without CIND (p=0.02). No statistically significant difference was observed between the groups with and without CIND considering schooling (p=0.17).

As shown in Table 1, no association was found between CIND and MS (p=0.35).

As shown in Table 2, no association was found between any of the components of MS and CIND.

Simple logistic regression was then performed using independent variables with p<0.25 in the bivariate analysis which in this case were age and schooling. "With CIND" was the dependent variable. Only the difference in age was associated with "having CIND" (odds ratio [OR] 1.07; p=0.02; and 95% confidence interval [CI] 1.008–1.13), which means that for each increased year there is 7.07% more chance to have CIND.

DISCUSSION

The sample population was predominantly women, consistent with the global demographic profile showing feminization of old age. In Brazil, 55.7% of its 20 million older people are women. As expected, there was a statistically significant association between older age and CIND[2].

There was no association between CIND and MS in the cohort of oldest-old studied. This is in line with the literature, where previous studies have failed to find this association among the oldest-old[7]. An analysis of relevant scientific publications revealed that the association between MS and cognitive impairment depends on the age group of the population studied. In younger older adults, most studies suggest an association between MS and cognitive impairment[12-17], whereas in the oldest-old, the results fail to confirm this association[18-22].

Table 1. Association between cognitive impairment no dementia and metabolic syndrome.

CIND	Metabolic syndrome						p
	No		Yes		Total		
	n	%	n	%	n	%	
No	78	67	101	73	179	70	0.35
Yes	38	33	38	27	76	30	
Total	116	45	139	55	255	100	

CIND: cognitive impairment no dementia.

Table 2. Association between each component of metabolic syndrome and CIND.

CIND		No		Yes		Total		p
		n	%	n	%	n	%	
High waist circumference	No	85	47	38	50	123	48	0.71
	Yes	94	53	38	50	132	52	
Low HDL-cholesterol or use of lipid-lowering medication	No	64	36	29	38	93	36	0.72
	Yes	115	64	47	62	162	64	
Hyperglycemia or use of diabetes medication	No	97	54	46	61	143	56	0.35
	Yes	82	46	30	39	112	44	
Reported hypertension or use of medication	No	38	21	15	20	53	21	0.79
	Yes	141	79	61	80	202	79	
Hypertriglyceridemia	No	142	79	57	75	199	78	0.45
	Yes	37	21	19	25	56	22	

CIND: cognitive impairment no dementia.

The existence of this difference raises questions. One explanation may lie in the MS cutoffs — do they apply to the oldest-old as they do to other populations? Another interesting point is the "survival effect," indicating that the oldest-old reach old age despite cardiovascular risks[18]. The antagonistic pleiotropy hypothesis could partially explain the greater deleterious effect of MS in younger ages compared to oldest-old[23].

The main limitation of this study was its cross-sectional design. However, this is the first study conducted in Brazil investigating the association of CIND with MS in the oldest-old.

AUTHORS' CONTRIBUTIONS

VH: Conceptualization, Data Curation, Writing – Review and Editing. AFJ: Formal Analysis, Writing – Original Draft. **LMQA:** Writing – Review and Editing. **MSC:** Writing – Review and Editing. **CMAF:** Conceptualization, Formal Analysis, Writing – Review and Editing.

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