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Original article

Chronic diseases, cognition, functional decline, and the Charlson index in elderly people with dementia☆

Fausto Aloísio Pedrosa Pimenta[a,*], *Maria Aparecida Camargos Bicalho*[b], *Marco Aurélio Romano-Silva*[c], *Edgar Nunes de Moraes*[c], *Nilton Alves de Rezende*[c]

[a]*Medical School, Universidade Federal de Ouro Preto (UFOP), Ouro Preto, MG, Brazil*
[b]*Medical Clinical Department, Medical School, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil*
[c]*Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil*

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A B S T R A C T

Objective: To assess the association between chronic degenerative diseases and functional decline, cognition, and mortality prediction.
Methods: A cross-sectional study was conducted in a geriatrics service in Belo Horizonte, Brazil, involving 424 patients subdivided into two groups: control and dementia. The study analyzed socio-demographic and environmental data, chronic degenerative diseases, the Charlson index, and data on functional and cognitive dementia.
Results: After a univariate analysis, there was a greater frequency of cerebrovascular accident (CVA), urinary incontinence, constipation, and sleep disorder in the dementia group, while the multivariate analysis showed a greater number of environmental factors and sleep disorder. Regarding the Mini Mental State Examination (MMSE), patients with chronic obstructive pulmonary disease (COPD), CVA, and heart failure presented lower scores. There was a greater score in the dementia group with regarding the Charlson index.
Conclusion: These comorbidities were associated with the functional decline in elderly people with dementia.

Doenças crônicas, cognição, declínio funcional e Índice de Charlson em idosos com demência

Palavras-chave:
Demência
Comorbidade
Idoso
Deficiência
Doença crônica

R E S U M O

Objetivo: Este estudo avaliou a associação entre as doenças crônico-degenerativas e o declínio funcional, a cognição e a predição da mortalidade.
Métodos: Um estudo transversal foi realizado em um Serviço de Geriatria em Belo Horizonte, Brasil, envolvendo 424 pacientes subdivididos em dois grupos: controle e com demência. Foram analisados dados sociodemográficos e ambientais, doenças crônicas degenerativas, o Índice de Charlson, dados sobre a demência, funcionais e de cognição.

☆Study conducted at Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil.

**Corresponding author:*
E-mail: fpimenta@medicina.ufop.br

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Resultados: Após análise univariada, houve maior frequência de acidente vascular encefálico (AVE), incontinência urinária, constipação intestinal e distúrbio do sono no grupo demência, enquanto na análise multivariada houve maior número de fatores ambientais e distúrbio do sono. Quanto ao Mini Exame do Estado Mental (MEEM), pacientes com doença pulmonar obstrutiva crônica (DPOC), AVE e insuficiência cardíaca apresentaram escores mais baixos. Em relação ao Índice de Charlson, houve maior pontuação no grupo com demência.
Conclusão: As comorbidades foram associadas ao declínio funcional nos idosos com demência.

Introduction

The aging process causes significant changes in morbimortality patterns. Elderly people face the impact of chronic degenerative diseases, their consequent fragility, and their feared dependence, caused especially by dementia syndromes.[1]

Among the main causes of dementia, Alzheimer's disease (AD), which is responsible for 50 to 60% of the cases, is highlighted. Currently, it is estimated that over 35 million individuals across the world suffer from the disease, and its prevalence has been significantly increasing in different age groups. In the USA, it became the fourth leading cause of death in the age group between 75 and 84 years old, and the third largest single cause of incapacity and mortality.[2,3] In Brazil, it is estimated that approximately 700,000 people suffer from the disease. In this context, AD became an important public health problem around the world, together with vascular dementia (VD), addressed in most epidemiological studies. However, there is no consensus yet on its pathophysiological mechanism.[4-6] Mixed dementia is a condition in which AD and *VD* occur simultaneously, with combined neurodegenerative and cerebrovascular changes, respectively, causing higher functional impairment.[6,7]

Elderly people with dementia present a high prevalence of comorbidities,[8-12] which may impair cognition and increase functional decline, requiring early interventions to improve the quality of life of these patients and their family members, considering the functional improvement and maintenance of their independence for activities of daily living (ADLs).[13-15]

Objective

This work aimed to assess chronic degenerative diseases, such as cardiovascular, respiratory, urological, digestive, endocrine, and metabolic diseases, and to associate them with cognition, functional factors, and the Charlson's comorbidity index (CCI) in elderly patients with dementia.

Methods

This was a cross-sectional study with a comparison group (control), using frequencies, percentages, and measures of central tendency and dispersion, performed in a center specialized in elderly care under the Brazilian Unified Health System (Sistema Único de Saúde – SUS), receiving patients from primary care. The study was performed between 2007 and 2010 and involved 814 elderly patients with complaints of cognitive changes, or changes observed by their caregiver. Of these, 22 patients refused to sign the informed consent, 56 provided insufficient data, 16 showed other types of dementia, and 296 patients with depression were excluded. All criteria for depression and dementia were observed in accordance with the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV). Regarding dementia, the diagnosis of AD (probable or possible) was made pursuant to the criteria established by the National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA), or when showing signals suggestive of VD through evaluation by the Hachinski ischemic scale, original version or as modified by Loeb.[16-18] Elderly patients not presenting dementia syndrome, mood disorder, or mild cognitive impairment were placed in the control group. Therefore, 312 elderly people with dementia (VD, mixed, and AD) and 112 controls were studied. Information about this service is also found in other works.[19,20] Elderly patients were evaluated pursuant to the Multidimensional Assessment Protocol for the Elderly. This procedure is described in the Guide for Health Care of the Elderly (Linha Guia de Atenção a Saúde do Idoso) of the Minas Gerais State Department of Health.[21] This study was approved by the local ethics committee.

The study variables were demographics, valid functional assessment scales,[22,23] Mini Mental State Examination (MMSE), data on dementia (Clinical Dementia Rating [CDR][24] and Behavioral and Psychological Symptoms of Dementia [BPSD]), and CCI.[25]

The instruments used were selected to address the main clinical dimensions potentially associated with the existence of comorbidities. The following conditions were evaluated: osteoarthritis, osteoporosis, malignant neoplasia, systemic arterial hypertension (SAH), congestive heart failure (CHF), atrial fibrillation, chronic coronary artery disease, anemia, diabetes mellitus, chronic obstructive pulmonary disease (COPD), cerebrovascular accident (CVA), dyspepsia, vitamin B12 deficiency, folic acid deficiency, urinary incontinence, constipation, hypothyroidism, liver disease, dyslipidemia, hyperuricemia, chronic renal failure, peripheral arterial and venous insufficiency, immobility syndrome, postural instability, falls, fractures, and sleep disorders.

The following additional examinations were part of the propedeutics in patients attended to at the reference center: complete blood count, thyroid-stimulating hormone (TSH), vitamin B12, folic acid, fasting glucose, urea, creatinine, total cholesterol and fractions, triglycerides, uric acid, sodium, potassium, chloride, calcium, phosphorus, alkaline phosphatase, albumin, globulins, urine test, fecal occult blood test, chest X-ray, and electrocardiogram. The rhythm of glomerular filtration was calculated by the Crockoft-Gault equation. Other additional examinations were requested according to the clinical indication. Computed tomography or magnetic resonance imaging was performed in all patients with VD or mixed dementia.

The CCI was originally designed as a measure of mortality risk within a year attributable to comorbidity in a longitudinal study. It was then validated in a cohort of breast cancer female patients. Its contents and weighting scheme were created based on Cox's proportional hazards model.[25]

Information collected was entered into a database developed using Access® 2007 software. Subsequently, data was analyzed in R, version 2.7.1– a public domain software.

The descriptive results were obtained using frequencies and percentages for the characteristics of the categorical covariates, and by obtaining measures of central tendency (mean and median) and dispersion (standard deviation) for the quantitative variables. The variables (control and dementia) and categorical covariates were compared through contingency tables, and the Yates-corrected chi-squared test was applied to compare proportions when there were two categories in each variable. When the number of categories was higher than two, the Pearson's chi-squared test was used. If at least one expected frequency was lower than five, Fisher's exact test was used. To compare the quantitative variables and covariates, Student's *t*-test was used when the usual assumptions for the model were met. Otherwise, the Mann-Whitney test was used. The assumptions for the Student's *t*-test were verified using the Shapiro-Wilk test and Levene's test.

Results

Family and caregivers reported that the time between the changes observed in the individuals and the diagnosis of dementia averaged 27.6 months, and 33.9 months for the beginning of the specific treatment with anticholinesterase for AD.

The demographics are presented in Table 1, and they demonstrate a similarity between the groups. A higher number of drugs were evidenced in the dementia group, reflecting a higher number of comorbidities.

The result of the univariate analysis is presented in Tables 1 and 2, and demonstrates that both groups had a

Table 1 – Comparison between the socio-demographic characteristics and the use of medication between patients with dementia and the control group in a population of elderly people, Belo Horizonte, Brazil. 2007 to 2009.

Characteristics	Group				p-value	OR	95% CI
	Dementia		Control				
	n	%	n	%			
Gender							
Female	209	71.8	82	28.2	0.271[a]	0.7	0.4 to 1.2
Male	103	77.4	30	22.6		1.0	
Education							
0 to 4 years	265	75.5	86	24.5	0.039[b]	6.2	0.9 to 49.3
5 to 8 years	24	61.5	15	38.5		3.2	0.4 to 29.3
9 to 11 years	18	72.0	7	28.0		5.1	0.6 to 54.1
Over 12 years	2	33.3	4	66.7		1.0	
Age							
Up to 64 years	7	87.5	1	12.5	0.456[b]	2.8	0.1 to 107.3
65 to 74 years	76	67.3	37	32.7		0.8	0.1 to 5.1
75 to 84 years	150	75.4	49	24.6		1.2	0.2 to 7.4
85 to 94 years	74	76.3	23	23.7		1.3	0.2 to 8.3
Over 95 years	5	71.4	2	28.6		1.0	
Marital status							
Married	165	74.7	56	25.3	0.287[b]	1.0	0.6 to 1.7
Divorced	16	84.2	3	15.8		1.8	0.5 to 8.3
Single	21	61.8	13	38.2		0.5	0.2 to 1.3
Widow(er)	95	74.8	32	25.2		1.0	
Medicines (more than 5 classes)							
Yes	126	92.0	11	8.0	< 0.001[a]	6.2	3.1 to 12.7
No	186	65.0	100	35.0		1.0	

95% CI, 95% confidence interval; OR, odds ratio.
[a]Yates-corrected test.
[b]Fisher's exact test.

Table 2 – Comparison of the characteristics related to the main comorbidities between patients diagnosed with dementia and a comparative group in a population of elderly people, Belo Horizonte, Brazil. 2007 to 2009.

Characteristics	Group				p-value	OR	95% CI
	Dementia		Control				
	n	%	n	%			
Sleep disorders							
Yes	187	91.7	17	80.3	< **0.001***	8.4	4.6 to 15.3
No	125	56.8	95	43.2		1.0	
Constipation							
Yes	68	86.1	11	13.9	**0.009***	2.5	1.2 to 5.3
No	244	70.9	100	29.1		1.0	
CVA							
Yes	48	85.7	8	14.3	**0.041***	2.4	1.03 to 5.6
No	264	71.7	104	28.3		1.0	
Urinary incontinence							
Yes	68	90.7	7	90.3	< **0.001***	4.2	1.8 to 10.3
No	243	70	104	30.0		1.0	
SAH							
Yes	225	74.3	78	25.7	< **0.708***	1.1	0.7 to 1.9
No	87	71.9	34	28.1		1.0	
Hyperlipidemia							
Yes	87	74.4	30	24.4	**0.920***	1.1	0.6 to 1.8
No	225	73.3	82	26.7		1.0	
Vitamin B_{12} deficiency							
Yes	80	78.4	22	21.6	**0.252***	1.4	0.8 to 2.5
No	232	72.1	90	27.9		1.0	
Osteoporosis							
Yes	74	71.8	29	28.2	**0.797***	0.9	0.5 to 1.4
No	228	73.8	81	26.2		1.0	
Postural instability							
Yes	104	79.4	27	20.6	**0.100***	1.6	0.9 to 2.6
No	208	71.2	84	28.7		1.0	

95% CI, 95% confidence interval; CVA, cerebrovascular accident; OR, odds ratio; SAH, systemic arterial hypertension.
*Yates-corrected test.

high prevalence of chronic diseases. There was a statistically significant difference for sleep disorders, CVA, constipation, and urinary incontinence, which were most prevalent in the dementia group.

Using a multivariate logistic regression analysis, sleep disorders were more frequent in the dementia group (OR: 4.4; CI: 1.4 to 13.4).

Regarding CCI, there was a difference, with higher score in the dementia group, which averaged 5.5 ($p < 0.001$).

The number of psychosocial factors occurring in the last five years was found to be correlated, in this study, to the diagnosis of dementia. The main psychosocial stressors were loss of the partner (widowhood), onset of diseases, disability, and disease in a close relative.

Regarding the MMSE, the associations found, regardless of the group, are described in Tables 3 and 4. There was a direct association between the MMSE score, education level, and the number of environmental factors; an inverse association was observed with age, drugs and CCI.

Regarding the comorbidities, COPD, CVA, and heart failure presented a lower score in the MMSE, regardless of the group. As expected, cognition showed worse results when associated with functional dependence.

Table 3 – Comparison between the quantitative variables and the *Mini Mental State Examination* in a population of elderly people, Belo Horizonte, 2007 to 2009.

Characteristics	Correlation coefficient	*p*-value
Age (years)	–0.214	< **0.001***
Education (years)	0.268	< **0.001***
Number of environmental factors	0.118	**0.002***
Number of medicines	–0.134	**0.001***
CCI	–0.400	**0.001***

CCI, Charlson comorbidity index.
*Spearman'S correlation coefficient.

Discussion

Elderly show a high prevalence of chronic diseases. This study aimed to address the most prevalent dysfunctions that can impact the lives of the individuals and their families.

Table 4 – Final model of linear regression for the *Mini Mental State Examination* variable in a population of elderly people, Belo Horizonte, 2007 to 2009.

Model	Coefficient	95% CI		Standard error	*p*-value
		Inferior	Superior		
Constant	**29.1**			**1.5**	< **0.001**
Education					
More than 12 years					
9 to 11 years	–1.1	–4.2	2.0	1.6	0.491
5 to 8 years	–0.8	–3.7	2.1	1.5	0.612
0 to 4 years					
COPD					
Yes	–3.2	–6.1	–0.3	1.5	0.031
No	–1.1	–2.1	–0.1	0.5	0.049
CVA					
Yes	–1.9	–2.9	–0.9	0.5	< 0.001
No					
Heart failure					
Yes	–1.7	–2.9	–0.5	0.6	0.003
No					
Basic ADLs					
Dependent	–1.1	–2.1	–0.1	0.5	0.045
Partially dependent	–9.2	–11.0	–7.4	0.9	< 0.001
Independent					
Instrumental ADLs					
Dependent	–1.7	–2.7	–0.7	0.5	< 0.001
Partially dependent	–3.0	–4.4	–1.6	0.7	< 0.001
Independent					

95% CI, 95% confidence interval; ADLs, activities of daily living; *COPD*, chronic obstructive pulmonary disease; CVA, cerebrovascular accident.

The most frequent comorbidities were SAH (74.3%), sleep disorders (48.3%), and dyslipidemia (28.9%), and they were similar to those found in outpatient clinics in patients aged 60 years or older.[26,27] In the studied population, there was a higher prevalence of comorbidities in the dementia group compared to the control group.

Urinary incontinence was more frequent among older patients with dementia, which is consistent with data found in other studies. Ko, et al.,[28] when studying a random sample of elderly people, observed that 25% of the individuals had difficulty in controlling their urine. Of these, 30% were older than 75 years. It must be highlighted that urinary incontinence leads to stigmatization and social isolation, is associated with depressive symptomatology, and is often neglected in the literature.[28]

Postural instability, also frequent in this study, is associated with balance dysfunction and results in risk of fall, but the physical and psychosocial sequelae of the excessive reduction in movements may be more detrimental than the fall itself.[29] This fact is probably related to the inclusion of individuals with advanced dementia, functional impairment, more frequent use of medicines, and high prevalence of falls.[30-32]

Constipation was associated with the dementia group, higher dependence regarding instrumental ADLs, CVA, urinary incontinence, and postural instability. This fact possibly results from the restricted mobility, the use of antidepressants, and the lack of physical activities. Constipation is also part of the iatrogenic cascade that may result in higher functional decline and deterioration in quality of life of the elderly people, as there is a need of more drugs and more daily care, making the role of the caregiver even more difficult.[33]

Folate (3.5%), vitamin B12 (23.6%), and anemia (6.2%) deficiencies were similar to other Brazilian studies,[34,35] and may be associated with nutritional factors and/or with the use of medications that may interfere with the absorption of nutrients.

Regarding renal function, it is known that the best method, even with all limitations for its evaluation, is to determine the glomerular filtration rate. This method is influenced by several factors, such as age and muscle mass.[36] This data is not emphasized because of the prevalence of renal changes (8.6%), but because of its iatrogenic potential, especially in people with dementia, as this group used a higher number of drugs and classes of drugs compared to the control group (median = 5 drugs; 6.2 times higher chance of using more than five different classes of drugs in comparison with the control group, with $p < 0.01$).

Researches showed differences in the type of comorbidity when comparing elderly people with dementia to control groups. Among them, in VD, a lower prevalence of CHF and higher prevalence of diabetes mellitus must be highlighted.[37]

Differences regarding the comorbidities among patients with or without dementia were not found in the literature. However, methodological differences make comparisons

difficult.[11] Zhu et al.,[38] in a study conducted with 180 patients with dementia, observed that half of them presented no comorbidities.

Few studies were performed with populations of elderly people with cognitive changes in Brazil. The existing studies are based on population studies, with analysis of self-reported diseases, or on cross-sectional observational studies. However, even in larger cohorts, there is a diagnostic bias on several specific conditions of the elderly, and the functional assessment is frequently neglected.[39] One of the difficulties in carrying out these studies is the time necessary for the correct diagnosis, with proper propedeutics, which can take weeks or months. Duarte and Rego,[34] in a study conducted in a geriatrics service, where depression and dementia were evaluated as comorbidities, found 95% of the individuals to have at least one chronic disease, mainly: SAH (62.2%), osteoarthritis (40%), and urinary incontinence (35%). These data were similar to the comorbidities found in this study.

It is likely that the comorbidities in patients with cognitive impairment are usually underdiagnosed and mistreated, possibly because patients with dementia show greater difficulty in objectively complaining about their issues.[40-42] Formiga et al.[27] found a prevalence of 51% of SAH in a cohort of patients with AD. Artza et al.,[42] observed a prevalence of 45% for this population. Schubert et al.[11] found a prevalence of 39% in a study conducted in patients with an average age of 75.6 years and diabetes mellitus.

Regarding several chronic diseases prevalent in elderly people with dementia, their percentages showed to be similar to those described in the literature, such as heart failure (14%), COPD (12.2%), osteoarthritis (41.1%), CVA (10.3%), and cancer (12%).[11] It is likely that these percentages vary according to the clinical diagnoses and the availability of autopsy. Fu et al.,[9] in a study conducted with 52 patients diagnosed with all types of dementia, and with availability of autopsy, evidenced 20% coronary artery disease, and 73% atherosclerotic cardiovascular disease.

An indirect way of verifying the presence of chronic comorbidities is to quantify medicines. In a study performed with 311 patients with dementia aged 64 years and older, Formiga et al.[27] found an average of six medicines, similar to that found by Lyketsos et al.[40] in a study conducted with 149 patients with dementia. Schubert et al.[11] found an average of 5.1 medicines in their studies. Also regarding the studies performed by Formiga et al.,[27] the percentage of 70% of patients with a chronic disease who take five medicines or more must be emphasized. Confirming this data, the present study showed an average of four medicines for the control group and an average of five medicines for the dementia and depression groups, which were not distinguished by class. When differentiating by class, there was a difference between the dementia and control groups (OR: 6.2; CI: 3.1-12.7).

In the present study, there was a statistically significant difference in the CCI between the groups, and this index was higher in the dementia group. Dementia is an item of the CCI; therefore, the score was not considered in the analysis of the groups. Thus, it can be concluded that dementia is a major impact factor on morbimortality of the elderly population, which is consistent with other studies.[11,25,39] In this study, the age-adjusted CCI was used. Thus, the index was higher in the dementia group, indicating not only a higher number, but also more severe comorbidities in the population, even excluding the dementia factor from the index.

The average of the MMSE in the study population diagnosed with dementia was 13, and the CCI was equal to 5.8, higher than that in the control group (4.3). It must be highlighted that the high number of comorbidities in the study population, together with their severity, may have influenced this data.

Artza et al.,[42] in a study performed in France with 579 patients with AD with an average age of 77.4 years and average MMSE score of 20.1, quantified the comorbidity with the non-age-adjusted CCI, showing an average of 1.5.

Formiga et al.[27] found, in patients with VD, an average age of 80.6 years, average MMSE score of 13.7, and comorbidities quantified by the CCI with an average of 2.1 VD.

Doraiswamy et al.[39] when evaluating 679 patients with AD of age and severity similar to those of the present study, found an average MMSE score of 11.8, however, not using the CCI; thus, not allowing for comparisons between the comorbidities.

Comparison between the dementia and control groups

Dementia should not be diagnosed late, as happens in many parts of the world.[38-41] A better understanding of the clinical manifestations, genetic basis, and molecular biology of the disease, as well as an improved definition of its pathogenesis, may contribute to the proper treatment of cases.[6] This study registered, for dementia, a long interval between the changes observed by the individuals and their family members and the diagnosis (median of 46 months), and the specific treatment with anticholinesterase (median of 48 months). This fact is possibly associated with the difficulty of access of patients to qualified professionals for the proper diagnosis of the disease. Even with recall bias, the beginning of the treatment was also late, considering the use of specific medicines to treat the disease.

Among the social and demographic factors related to the diseases, after a multivariate analysis, low education was associated with dementia diagnosis. Despite the existing controversies between different studies, Caamaño-Isorna et al.[43] showed, in a meta-analysis, that a low education level may be a risk factor for dementia, especially for AD. Individuals showing high cognitive reserve, which results from higher education, have an increased capacity to maintain their cognitive skills, regardless of neuropathological changes.[44] Education results in higher cognitive reserve through more complex education and labor activities, and triggers changes in lifestyle that allow for a reduction in the risk of brain damage – reduction in alcohol consumption and smoking, improved diet, and practice of physical activities.[45] Thus, low education level may result in a risk factor for dementia, especially in developing countries, where low education level is a frequent issue.

This study showed no association between smoking and dementia ($p = 0.907$), in disagreement with the literature. Cataldo, Prochaska, and Glantz,[46] through meta-analysis,

conducted studies that investigated the relationship between smoking and dementia. Their results demonstrated that, in cohort studies not sponsored by the tobacco industry, the average risk of AD, determined by smoking, was estimated at 1.72. These data indicate that smoking is a major risk factor for the disease.

The changes observed regarding functional decline and the MMSE were significant in the group of individuals with dementia. CDR was descriptively analyzed for the population with dementia. The majority of the patients with dementia presented a CDR score of 1 or 2 (87.3%), i.e., mild or moderate dementia. This favors the reliability of clinical data in comparison with other groups, as it is difficult to obtain information for accurate diagnoses in advanced stage dementia, due to the inability to communicate.[47]

By analyzing the sample of patients with AD only, it was observed that the occurrence of BPSD (43.7%) is consistent with the literature.[48] It was also noted that, in this group, the number of women was higher than the number of men, resulting from the higher prevalence of the disease among women, their higher survival rate in comparison to men, and their higher demand for health services, with increased diagnosis rates.[49] This factor relates to the high use of antipsychotics and antidepressants in this population.

Gill et al.[50] demonstrated a higher mortality in elderly people with dementia using antipsychotics, with an increased risk for conventional antipsychotics when compared with atypical antipsychotics. Therefore, they must be used carefully.

In the present study, both BPSD and depressive symptomatology itself may explain the association between sleep disorders and dementia (OR = 8.4, CI = 4.6-15.3), when comparing the dementia group with the control group.

After comparing the dementia group with the control group, a worse score in the MMSE was observed when the following characteristics were present: COPD, CVA, CHF, and deterioration in ADLs.

When separating the dementia group into dementia associated with depression and dementia only, a lower score was observed in the MMSE for the dementia group in comparison with the dementia group associated with depression, even when the other variables were controlled. This contradicts the literature, suggesting that depression associated with dementia affects cognition.[51,52] Thus, the MMSE may not have been sufficient to detect this change.

Regarding urinary incontinence, the MMSE showed a lower score in the multivariate analysis, with tendency for statistical significance (p = 0.056), probably related to more severe dementia and depression cases associated with changes in mobility. The possibility that the association between the MMSE and depression is due to the cause and effect of cognitive deterioration is highlighted.

Conclusion

The present study reinforced the need to approach the elderly person as a whole, especially those with dementia, who are fragile, have high prevalence of comorbidities, and use a large number of medicines. A careful evaluation may detect highly relevant clinical conditions that may change individuals' cognition and level of dependence, as well as influence their mortality, regardless of the development of dementia itself.

Elderly patients may develop dementia that may be associated with chronic diseases (mainly COPD, CVA, and heart failure), as evidenced in this study. A correct approach to these diseases may contribute to a cognitive and functional improvement for elderly people. Other studies may confirm this hypothesis.

The use of a specific medication for dementia should be associated with an indication of comorbidities. Accordingly, accuracy in prescribing drugs may help to improve and adapt the indication of anticholinesterase and glutamatergic drugs, anticipating side effects and interactions with other medications.

The results found may be useful to the physicians that attend to elderly patients, as they may provide information for approaching multiple conditions, requesting additional tests and polypharmacy for these patients, and contributing to a better quality of life for these individuals and their families.

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Conflicts of interest

The authors declare no conflicts of interest.

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