Alzheimer's disease: functional decline and stage of dementia

Doença de Alzheimer: declínio funcional e estágio da demência

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Abstract

Objective: To determine how Alzheimer's disease stage is correlated with the functional ability of elderly people, according to the Functional Independence Measure.

Methods: This observational and cross-sectional study involved elderly people diagnosed with Alzheimer's disease and their caregivers. For data collection, the Functional Independence Measure and the Clinical Dementia Rating scale were used.

Results: The sample consisted of 67 elderly people (mean age, 79 years). Severe dementia was found in 46.3%, moderate dementia in 22.4%, and mild dementia in 31.3%. The mean scores on the Functional Independence Measure were 107.9, 84.5, and 39.7 for participants with mild, moderate, and severe dementia, respectively. A correlation was found between the Functional Independence Measure and dementia stage ($p<0.001$).

Conclusion: The stage of dementia is an important predictive factor for functional performance problems in elderly people with Alzheimer's disease.

Resumo

Objetivos: Verificar como o estágio da doença de Alzheimer se correlaciona com a capacidade funcional do idoso segundo a Medida de Independência Funcional.

Métodos: Trata-se de estudo observacional e transversal envolvendo idosos com diagnóstico de doença de Alzheimer e seus cuidadores. Para coleta de dados utilizou-se a Medida de Independência Funcional e a escala de Avaliação Clínica de Demência.

Resultados: A amostra foi composta por 67 idosos com média de idade de 79 anos. Demência grave foi encontrada em 46,3%, demência moderada em 22,4% e demência leve em 31,3%. As médias da Medida de Independência Funcional encontradas foram 107,9, 84,5 e 39,7 em idosos com demência leve, moderada e grave, respectivamente. Encontrou-se correlação entre o nível de independência funcional e o estágio de demência ($p<0,001$).

Conclusão: O estágio de demência é um fator preditivo importante do comprometimento funcional de idosos com doença de Alzheimer.

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Introduction

The growing number of elderly people worldwide is reflected in an increase in chronic and degenerative diseases, which are responsible for impaired physical abilities, poor quality of life, and emotional suffering for the elderly and their caregivers.

Functional capacity is a main component of health among the elderly, and its measurement has emerged as a fundamental part of the assessment of geriatric health, especially in patients with disabling diseases such as Alzheimer's disease (AD).

Alzheimer's disease is responsible for roughly 50% to 70% of all dementias.[1] It is a progressive neurodegenerative disease with insidious onset that is often identified according to differential clinical criteria.[2] Many research efforts have sought to slow the evolution of symptoms and avoid complications, which might worsen the disease or cause death.[3]

A strong correlation exists between the stage of dementia and the ability to accomplish activities of daily living. Even in the mildest stage of the disease, the performance of these activities is compromised.[4]

As part of the clinical management of patients with dementia, it is necessary to verify their ability to maintain Alzheimer's disease. For the health care team, the assessment of functional ability becomes as essential as diagnosis because it helps determine the impact of the disease on the individual. Assessing functional ability shows whether the patient avoids or has difficulty with activities of daily living and indicates the patient's and family's quality of life, with repercussions for the health system as a whole.[5] In addition to the effects of Alzheimer's disease on the patient, caring for a demented elderly person may result in caregiver strain.[6,7]

The nursing and multidisciplinary team's assessment of elderly people provides a more precise view of disease severity, the impact of dementia on the family, and knowledge of the level of care the elderly need.

Functional assessment of the elderly is part of nursing care, with emphasis on support systems that patients and their families can use to address their needs. Nurses establish, perform, and assess the care delivered to the elderly; by delivering care effectively, nurses support both the patient and the family .

Given the vulnerability of the elderly population to chronic debilitating conditions such as Alzheimer's disease this study was undertaken to evaluate the level of functional independence of aging persons with this disease. The findings could help health professionals, society, and government develop the most appropriate therapy for patients with Alzheimer's disease, encourage investment in education about the disease, and support families as they assist elderly family members in performing activities necessary for daily life. The assessment of the functional independence level according to severity of Alzheimer's disease will provide data to help nurses establish a care plan and work with the family in delivering home care.

The aim of this study was to determine how Alzheimer's disease stage is correlated with the functional ability of elderly people according to the Functional Independence Measure (FIM).

Methods

An observational and cross-sectional study was conducted. The Clinical Dementia Rating (CDR) scale was used to verify the correlation of dementia stage and functional performance of elderly people with Alzheimer's disease in accomplishing Alzheimer's disease according to the functional independence measure.

The study sample consisted of elderly people aged 60 years or older diagnosed with Alzheimer's disease and their caregivers. Participants received care at the Behavioral Neurology Outpatient Clinic of the *Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo* (ANCP-HCFMRP-USP) between January 2003 and December 2008. All individuals resided in Ribeirão Preto, São Paulo, Brazil. Inclusion criteria were medical diagnosis of Alzheimer's disease with clinical dementia rat-

ing score of 1 (mild), 2 (moderate), or 3 (severe); elderly resident of Ribeirão Preto; and presence of a caregiver. We excluded elderly persons with mixed dementia and previous psychiatric illness.

After we applied the inclusion criteria, 103 elderly were selected. Of these, 36 (34.9%) were excluded: 26 died, seven could not be found, and three declined to participate. Hence, the sample was composed of 67 elderly patients.

Investigators contacted the people responsible for the elderly participants and their caregivers by phone to explain the objective of the study. After their approval, a home visit was scheduled to administer the assessment instruments.

The study was carried out in two steps: In the first step, the researchers were trained to use the measurement instruments, and in second step, data were collected.

The clinical dementia rating scale was validated in Brazil by Chaves et al.[8] The scale has a sensitivity of 91.2% and a specificity of 100%. It is usually used in geriatrics and gerontology services and in scientific research to classify dementia severity associated with cognitive losses and elderly patients' ability to conduct basic and instrumental activities of daily living.

The functional independence measure was validated and adapted to Brazilian Portuguese by Riberto.[9] It is an ordinal scale with 18 items; each item receives a score from one to seven that evaluates the independence level in performing basic activities of daily living. The total score of the instrument also has good reliability (intraclass correlation coefficient = 0.98 for inter-observer reliability and 0.97 for test/retest reliability).

Data analysis was descriptive, univariate (frequency tables), and bivariate (contingency tables for qualitative variables). Measures of central tendency were compared by using quantitative variables (Mann-Whitney test). In addition, the Spearman correlation coefficient was calculated between ordinal and quantitative variables, and linear regression was used to determine the independent association between stages of dementia and functional limitation.

Development of this study followed national and international ethical and legal aspects of research on human subjects.

Results

Sixty-seven elderly patients were assessed, 52 of whom (77.6%) were women. The mean age was 79 years (SD, 7.2) and ranged from 60 to 100 years. Thirty-three patients were widowed (49.3%), most were retired (56.7%), and 38 (56.7%) had 1 to 4 years of schooling. Severe dementia was present in 31 patients (46.3%), mild dementia in 21 (31.3%), and moderate dementia in 15 (22.4%). The mean time since the dementia diagnosis was 5.01 years (SD, 2.5), varying between one and 14 years.

As shown in table 1, no strong correlation was found among formal education, dementia severity, and sex.

When mean functional independence measure (FIM) scores were compared with dementia severity (Table 2), the total scores were 107.9, 84.5, and 39.7 for mild, moderate, and severe dementia, respectively. The mean motor FIM measure scores were 82.5, 65.5, and 31.6, and the mean cognitive FIM scores were 25.4, 19.0, and 8.0 for mild, moderate, and severe dementia, respectively.

For the 18 items of the FIM, scores were 5 to 6 (indicating supervision and modified independence) for elderly patients with mild dementia, 4 to 5 (minimal dependence and supervision) for those with moderate dementia, and 1 to 2 (complete and maximum dependence) for those with severe dementia.

Sex, age, education, and stage of dementia were considered for multiple linear regression analysis, with total scores as the dependent variable. The stage of dementia was an important predictive factor for the low performance of elderly persons, as showed in table 3.

The results revealed that the elderly in more advanced stages of dementia showed worse performance in accomplishing activities of daily living.

Table 1. Distribution of Elderly Patients Diagnosed with Alzheimer's Disease

Variable	Mild dementia n(%)	Moderate dementia n(%)	Severe dementia n(%)	Spearman R	p-value
Age range				0.046	0.711*
60 – 69	1(4.7)	2(13.3)	3(9.7)		
70 – 79	13(61.9)	8(53.3)	13(41.9)		
80 – 89	6(28.6)	4(26.7)	12(38.7)		
90 or +	1(4.75)	1(6.7)	3(9.7)		
Formal Education (years)				-0.127	0.307*
Illiterate	1(4.7)	-	3(9.7)		
1 – 4	9(42.9)	12(80.0)	17(54.8)		
5 - 8	5(23.8)	-	4(12.9)		
≥9	6(28.6)	3(20.0)	7(22.6)		
Sex				-	0. 948**
Female	16(76.2)	12(80.0)	24(77.4)		
Male	5(23.8)	3(20.0)	7(22.6)		
Total	21(31.3)	15(22.4)	31(46.3)		

Legend: * Spearman; ** Mann-Whitney

Table 2. Mean Functional Independence Measure Scores

FIM	CDR 1*	CDR 2**	CDR 3***	r****
Motor dimension Self-care	82.5+ 7.8	65.5+ 23,5	31.6+ 21,3	-0. 901
Eating	6.5 + 0.7	5.6 + 0.9	2.4 + 1.6	-0. 850
Grooming	6.4 + 0.7	4.5 + 1.2	1.8 + 1.6	-0. 819
Bathing	6.4 + 0.8	4.6 + 2.0	1.8 + 1.5	-0. 820
Upper dressing	6.2 + 0.9	4.6 + 2.0	1.8 + 1.7	-0. 761
Lower dressing	6.3 + 0.8	4.7 + 2.0	1.9 + 1.7	-0. 777
Toileting	6.5 + 0.6	4.9 + 2.0	1.7 + 1.6	-0. 821
Sphincter control				
Bladder management	5.9 + 1.7	3.9 + 2.5	2.1 + 2.0	-0. 672
Bowel management	6.4 + 1.2	5.5 + 2.0	2.1 + 2.1	-0. 718
Mobility				
Bed/chair transfer	6.6 + 0.8	5.7 + 2.0	3.4 + 2.3	-0. 637
Toilet transfer	6.6 + 0.6	5.7 + 2.0	3.2 + 2.3	-0. 650
Tub/shower transfer	6.7 + 0.6	5.7 + 2.0	3.3 + 2.3	-0. 663
Locomotion				
Walk or wheelchair	6.4 + 0.7	5.5 + 2.3	3.7 + 2.2	-0. 561
Stairs	5.7 + 1.1	4.6 + 2.1	2.3 + 2.1	-0. 579
Cognitive dimension				
Communication	25.4+ 2.7	19.0+ 2.8	8.0+ 4.1	-0. 778
Comprehension	5.9 + 0.7	4.2 + 1,0	2.3 + 1.4	-0. 815
Expression	6.0 + 0.9	4.9 + 1.0	1.9 + 1.3	-0. 848
Social cognition				
Social interaction	6.1 + 0.8	4.8 + 1.0	1.7 + 1.4	-0. 865
Problem solving	4.0 + 1.3	2.7 + 1.2	1.2 + 0.5	-0. 811
Memory	3.4 + 1.0	2.5 + 1.1	1.0 + 0.4	-0. 836
Total FIM scores	107.9 + 9.9	84.5 + 26.0	39.7 + 24.4	-0. 825

Legend: CDR = Clinical Dementia Rating; *Mild Dementia (n=21); **Moderate Dementia (n=15); *** Severe Dementia (n=31); ****Spearman Correlation; $p < 0.001$

Table 3. Linear regression analysis result based on Functional Independence Measure

Independent variable	b	T	p-value
Sex	-0. 126	-1. 718	0. 091
Age	-0. 035	-0. 480	0. 633
Education	0. 187	2. 390	0. 020
CDR	0. 752	- 7. 958	< 0. 001

Legend: b - ß regression coefficient; T – Test Value; CDR – Clinical Dementia Rating

Discussion

The limitation of this study was the small convenience sample of elderly persons assisted at a specialized and tertiary service that, in general, serves elderly persons with severe dementia. As a result, comparison of these findings with the general population may be limited.

Systematized nursing care can help identify problems, aid in the development of planning, prioritize family support, and execute and evaluate individualized care plans, respecting the different stages of dementia and the dependence level the of each elderly person. Therefore, nurses need to know how the disease evolves and work in partnership with both a multiprofessional team and the family.

This study found that the functional ability of the elderly patients was compromised as dementia stage advanced. The relevance of studying functional ability in the elderly (mainly elderly people with dementia) is a recent theme among nursing professionals. Until recently, such assessment was more restricted to other health care professionals, but knowledge of elderly patients' abilities to accomplish activities of daily living helps nurses to systemize an individualized plan for home care nursing.

The goal of care delivery to elderly people with Alzheimer's disease is mainly related to maintenance of physical security and reduction of anxiety and agitation.[10] In the initial phase of dementia, the care process focuses on supervision to prevent accidents because patients have difficulty discerning risky and dangerous situations.[11]

We observed that for motor functions, none of the elderly patients with mild dementia were completely dependent, except for bladder management. Concerning cognitive functions, a small number of elderly persons were completely independent in the problem-solving domain. Even among elderly with mild dementia, compromised memory is an important factor; none of these patients in our study were completely independent for this domain. Elderly people with Alzheimer's disease can have severe cognitive deficits before any functional capacity deficit, mainly for basic activities of daily living.[12]

Elderly persons with moderate dementia were distributed between complete/modified independence and moderate dependence for motor domains, except for bladder management. For the cognitive domain, they were distributed between moderate and complete dependence.

The elderly patients with severe dementia showed complete dependence—that is, they needed maximal or total care to accomplish the activities investigated. The main difficulties faced by elderly persons were bathing and grooming, as demonstrated in other studies.[12,13] Concerning transfer and locomotion activities, a significant portion of the elderly showed complete independence. Eating is one of the last activities with which the elderly need assistance.[14]

The process of motor deterioration greatly varies, and progress of dementia in this regard is different in each patient. On the other hand, cognitive deterioration becomes more consistent and homogeneous; the stage, independent of the dementia type, is mainly based on cognitive dysfunction.[13,15]

In general, functional performance is significantly associated with dementia severity.[14,16] In patients with mild cognitive damage, losses are first detected in instrumental activities of daily living, and losses in basic activities occur in more advanced stages of dementia.[13,16] Our results showed that as the dementia becomes more advanced, functional performance worsens, as demonstrated by other authors.[6,13,17]

Until recently, strategies for care and treatment of patients with Alzheimer's disease fo-

cused on initial stage of the disease, although the major losses occur in more advanced stages.[18] A detailed assessment of the functional performance of elderly persons with dementia is essential in order to offer an adequate, personalized care plan. Loss of function in the more advanced stage of Alzheimer's disease is not homogeneous, and each patient's needs differ considerably.[17]

The results of this study can support nursing practice. The close relationship of these professionals with the family, the elderly, and their caregivers presents an opportunity to improve living conditions of the patients and those responsible for care delivery. Caregivers of elderly persons with Alzheimer's disease need to be supported while they assist the patient with activities such as bathing and grooming.[15]

Interest in the functional ability of elderly patients with Alzheimer's disease has been increasing. Understanding of the evolution of the disease, the need for early diagnosis, and the degree of dependence will help nurses determine the level of care needed. It should be emphasized that this care is often delivered at home and usually by family members, who are often unfamiliar with the disease and its consequences.

Research that updates knowledge of Alzheimer's disease and dependent elderly people can contribute to the development of relevant health policies.

Conclusion

Our results showed that dementia stage was an important predictive factor for the low performance of elderly people with Alzheimer's disease.

Collaborations

Talmelli LFS; Vale FAC; Gratão ACM; Kusumota L and Rodrigues RAP contributed to the conception of the study and with analysis, interpretation and critical drafting of manuscript to improve its intellectual content, and also approval the final proofs. Talmelli LFS and Rodrigues RAP contributed to the design of the research and with interpretation of data, critical drafting of manuscript, and also approval of final proofs.

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