DOI: 10.4025/cienccuidsaude.v13i1.20033

ASSESSMENT OF COGNITIVE STATUS AND FRAILTY OF ELDER ELDERLY LIVING AT HOME[1]

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ABSTRACT
As a result of increased population aging, an important rise in morbidity can be verified, not only referent to the emergence of chronic illnesses, but also the detection of important cognitive changes and physical disabilities. One example is frailty, a syndrome defined as a physiological condition of greater vulnerability to stressors, involving biological, physical, cognitive, social, economic and environmental factors. Thus, the objective in this study was to assess the cognitive status, using the Mini-Mental State Examination (MMSE), and frailty through the Edmonton Frail Scale (EFS), as well as to identify the relations between the cognitive function and frailty in *elder elderly* living at home. A cross-sectional observation study was undertaken. Data were collected at home with ethics committee approval. Fifty elderly were interviewed with a mean age of 84.48 years, mostly female, married and predominantly with low education levels. It was observed that 83.3% of non-frail elderly do not display any cognitive deficit. Among the frail elderly, 20.4% presented cognitive deficit, 30% of whom were women. A correlation was verified between the gross MMSE score, age and frailty in the study sample. From these data, there is the importance of a multidimensional geriatric evaluation with special attention to the cognitive state and frailty. It's suggested that the MMSE and EFS are instruments to used in this assessment of the elderly.

Keywords: Aged 80 and over. Cognition. Frail elderly. Aging.

INTRODUCTION

In developing countries, a more rapid growth of the elderly population has been occurring in relation to other age groups. Such fact, among other aspects, may result from decreased fertility and mortality, leading to an increase in life expectancy[(1)], related to decreased mortality due to communicable diseases and increased morbimortality due to chronic non-communicable diseases[(2)].

In Brazil, the number of *"older aged individuals*" (long-living elderly people) aged 80 or over has presented a relative increase of 49.3% between 1990 and 2000, which represents 12.8% of the elderly population and 1.1% of the entire Brazilian population[(1)]. Such growth constitutes a challenge for public authorities concerning the development of specific policies for the elderly population, provided that new demands for healthcare appear accordingly to changes in morbimortality standards.

Currently, frailty in elderly people represents one of these challenges. In the literature, frailty has several definitions ranging from a clinical syndrome with specific physiopathology and manifestations to a geriatric syndrome with age-related deficit accumulation[(3-4)]. The Ministry of Health establishes as frail elderly or in frailty situation those who are aged 75 or over, living in Homes for the Aged (HA), bedridden, hospitalized and with functional disabling

[1] Original Manuscript presented to the Comissionof Graduation at RibeirãoPreto Nursing School, Universidade de São Paulo-EERPUSP, as Course Completion for the Nursing title. Funded by Conselho Nacional de Desenvolvimento Científico e Tecnológico.

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diseases, including dementia syndromes and neurodegenerative diseases.

Nevertheless, researchers agree this is a multifactor condition characterized by vulnerability to the adverse effects in relation to lower impact stressors whose signs and symptoms are predictors of several complications, such as, institutionalization, functional decline, hospitalization and death[3-6].

In this study, frailty is understood as a geriatric syndrome whose development may be associated with the interaction of biological, psychological, cognitive and social factors experienced over time, with potential to prevention and treatment of symptoms, specially when early identified[3,5].

Studies conducted with frail elderly individuals have been verifying a possible association among frailty, cognitive alterations and advanced age. A survey carried out with Spanish elderly individuals living in community revealed that 9.6% were frail and 47% pre-frail, and also that at the age of 85 or over, the presence of depressive symptoms, comorbidities and cognitive impairment is associated with frailty[7].

In light of these facts, a nurse acting as a member of health public policies is required to implement interventions to ensure prevention and treatment for frailty in elderly people. Nevertheless, in accordance with findings related to an integrative review conducted between 2000 and 2010[6], the number of publications by nurses concerning frailty in elderly people is still quite limited, which reinforces the need for nurses to get involved in the development of research, as well as in the disclosure of the outcomes achieved within the academic and scientific environments, specially with regard to the issue of frailty in the elderly.

Thereby, given the rapid growth of the elderly population, and since this group is more likely to present frailty with multiple chronic or disabling conditions, the current study proposes to assess the cognitive status and frailty of older aged people living in community.

A nurse is required to be acquainted to elderly people, as well as the difficulties experienced by them, especially those related to daily activities performed at their homes. It is known that a number of these activities are limited not only due to physical disabilities, but also to cognitive ones. Both global and multidimensional assessment of the elderly, which includes the cognitive assessment, may allow the acknowledgment of real and potential needs, and frailty in the elderly, in order to assist the development of interventions to prevent or postpone damages related to aging and even to restore the health of elderly people with evident disabilities.

METHODOLOGY

This is an observational, cross-sectional study conducted with 50 elderly people aged 80 or over, both male and female, who live in Ribeirão Preto (São Paulo state, Brazil). This sample is part of a thematic study entitled "Living, health and aging conditions: a comparative study" which was performed in the urban area of Ribeirão Preto, São Paulo state[1].

In this thematic project, the sampling procedure occurred through two-stage clusters: in the first stage, census sectors were considered as sampling unit and, in the second stage, a 60-year old individual. A sample of 240 elderly individuals was established, with a maximum error of 6.3% and 95% of probability. To reach the sample number, 20 sectors were randomly selected among 650 census sectors.

Within this sample of 240 elderly people, 60 were aged 80 or over. Among these, 10 individuals were excluded due to denials, death and address changes. Thus, 50 elderly people aged 80 or over, of both sexes and living in Ribeirão Preto, São Paulo state, were effectively interviewed. Data were collected between July and December of 2011.

The following instruments have been employed: demographic profiles with the variables age, sex, marital status, number of children and social profile containing data on level of education, elderly and their family incomes, which were developed by the Geriatric and Gerontology Nursing Research Group at the University of Sao Paulo at Ribeirão Preto

[1] Funded by the National Program of Academic Cooperation (PROCAD/CAPES) established between the Federal University of Paraíba and the University of São Paulo at Ribeirão Preto College of Nursing.

College of Nursing /USP (NUPEGG, as per its acronym in Portuguese);

- Mini Mental State Examination (MMSE) which is a cognitive assessment test aiming at assisting the investigation of possible cognitive deficits in individuals at risk of developing dementia syndromes; comprised by questions grouped in seven categories, each one of them designed for assessing specific cognitive functions: orientation to time (5 points), immediate memory (3 points), attention and calculation (5 points), evocation (5 points), remembrance of words (3 points), language (8 points) and visual construction ability (1 point). MMSE was translated and adapted to Brazil[8] and has a score ranging from 0 to 30 points. For analysis of data, this variable will be dichotomized as with and without cognitive deficit based on the cut-off point suggested by the authors above mentioned: for those identified as illiterate, 13 points will be scored; for those with low/medium education levels, 18 and for those with high education level, 26 points.
- *Edmonton Frail Scale (EFS)*[5], developed at the University of Alberta, Edmonton, Canada; translated and validated in Brazil[9]. Through this scale, nine key areas are assessed: cognition (clock drawing test application), overall health, functional independence, social support, use of medications, nutrition, mood, continence and functional performance (timed up and go test for assessing balance and mobility). The scale score ranges from 0 to 17 points, which represents the highest level of frailty. The elderly are classified accordingly to the scoring achieved: 0-4, no frailty; 5-6, apparently vulnerable; 7-8, mildly frail; 9-10, moderately frail; 11 or higher, severely frail. Nevertheless, for data analysis, this variable was dichotomized as frail (mildly, moderately and severely frail) and not frail (no frailty and apparently vulnerable).

Quantitative variables were analyzed with measures of central tendency (medium) and dispersion (standard deviation); and the categorical variables with the comparison of mean test (Mann-Whitney Test) and Pearson's correlation test (for quantitative variables), with 5% significance level.

The study was developed to ensure the compliance with Resolution 196/96 from the National Research Ethics Committee and the Ministry of Health, under approval of Research Ethics Committee of the University of Sao Paulo at Ribeirão Preto College of Nursing (EERP/USP), in accordance with procedure No. 1317/2011. The Informed Consent form was developed in compliance with the requirements described in Resolution 196/96. Before proceeding with interviews, this form was read and signed in two copies by the elderly individuals, with one of them being handled to the interviewee.

RESULTS AND DISCUSSION

Among the 50 elderly individuals interviewed, 56% were aged between 80 and 84, with a mean age of 84.48 years (=4.07). Most participants were women (60%) and married (54%), as presented in Table 1.

Most interviewees were women, and this fact has been discussed by several authors who state that the *"older"* the contingent studied, the higher the proportion of them being women. In Brazil, women tend to live longer than men, resulting in the phenomenon of feminization of old age[10].

Regarding marital status, the current study has revealed that most of the elderly interviewed were married. A survey conducted in 11 countries of Europe with elderly individuals over 60 years old found that around 70% were married[11]; on the other hand, other studies conducted in Brazil with older aged individuals showed that most participants were widowed, mainly women[12-13].

In addition, low education levels (1 to 4 years of study) were observed. This may be related to the fact that, in the early 20th century, children and young people were motivated to dedicate to rural and family work due to economic factors,

as well as to the difficult access to basic education and lack of parental stimuli, disfavoring children literacy and discouraging their permanence in school[11-12].

Table 1. Older aged individuals living in community as per social demographic data. Ribeirão Preto, 2011.

Variables	Mean (=sd)	[Min – Max]	N	%
Sex				
Male			20	40.0
Female			30	60.0
Age	84.48 (=4.07)	[80 – 95]		
80 – 84			28	56.0
85 – 89			16	32.0
90 – 94			5	10.0
95 years or over			1	2.0
Marital Status				
Single			1	2.0
Married			27	54.0
Widowed			21	42.0
Divorced			1	2.0
Education	3.98 (=4.93)	[0 – 26]		
Illiterate			12	24.0
1 – 4 years			28	56.0
5 – 8 years			5	10.0
9 – 11 years			3	6.0
12 years or more			2	4.0
Income of the aged individual	1,253.30 (=1,660.81)	[0 – 10000]		
Income of the aged individual and family	2,243.40 (=1,856.39)	[0 – 12510]		
Family Arrangement	3.0 (=1.4)	[1 – 7]		
Alone			6	12.0
With spouse			13	26.0
With spouse and children			7	14.0
Three generations			1	2.0
Only with children			5	10.0
Aged individual, children and grandchildren			8	16.0
Others			10	20.0

For 44% of the elderly, the monthly income was a minimum wage[2] and, with respect to family income, 60% earned four minimum wages or more. Nevertheless, this income remained above the values presented in other studies conducted with elderly people[11] and, for such comparison, the additions assigned by the federal government in the last few years should be considered, thus, it is possible to say that there were no improvements in the family financial condition of the elderly.

Concerning the family arrangement, 26% lived with a spouse and 16% reported three generations arrangement, this means they lived with grandchildren, nephews and siblings. These data differ from the study conducted with elderly people in Rio Grande do Sul state, in which most elderly lived with their children, and less significant percentage was observed concerning arrangements involving three generations (grandchildren, nephews, siblings) and elderly living with spouses[12].

The prevalence of frailty, according to the EFS application, was observed at 12% for no frailty, 24% for apparently vulnerable and 64% frail. Among those classified as frail, 38% were mildly frail, 14% moderately frail and 12% severely frail.

Regarding the nine key areas assessed by EFS, the highest deficit presented by the elderly was in

[2] Value of Brazilian minimum wage in July 2011: R$ 540.00.

the cognitive domain (92% of the elderly failed to pass the clock drawing test), followed by functional performance (88%) and functional independence (80%). The most successful domains were social support (76%), mood (72%) and nutrition (60%).

With regard to the cognitive deficit, 20% of the elderly presented this problem. When verifying the presence of cognitive deficit in frail elderly, 20.4% of the elderly with a certain level of frailty presented cognitive deficit (Table 2). These data confirm other studies which showed that alterations in cognitive status may be directly related to frailty[13-15].

Table 2. Aged individuals living in community as per cognitive status, frailty. Ribeirão Preto, 2011.

	With cognitive deficit		Without cognitive deficit	
	n	%	n	%
Frailty Classification				
Non-frail	1	16.7	5	83.3
Frail	9	20.4	35	79.6
Sed				
Male	1	5.0	19	95.0
Female	9	30.0	21	70.0

A longitudinal study conducted with Mexican elderly individuals identified the association between decreased grip strength, which is one of the measures employed in this study for frailty identification, with significantly decreased MMSE performance, considering the fact that elderly with high grip strength tended to maintain cognitive performance[15].

Another study recently conducted in Brazil with 384 elderly individuals living in community identified frailty as a predictor of cognitive deficit and that such limitations were not associated with any specific cognitive function, this means, frail elderly individuals presented the worst performance in memory, verbal fluency and executive function tests[14]. In addition, another longitudinal study conducted in Mexico demonstrated that non-frail elderly individuals with cognitive impairment were more likely to become frail as compared with those who did not present cognitive impairment[16], this means, cognitive impairment has influenced the emergence of frailty and not the reverse.

In agreement with the outcomes, MMSE gross score, age and frailty have presented a negative correlation, and MMSE gross score along with the years of education have presented a positive correlation (Table 3). Therefore, it has been characterized that the higher the frailty score, the higher the cognitive deficit, this means, the worst performance of the elderly in MMSE test. The same has occurred concerning the age: the older the individual, the worst the performance in the test, which demonstrates a higher cognitive deficit.

In multivariate models adjusted to age, sex and education, each measure of frailty was associated with cognitive decline and mortality[13], thus, the authors state that there is a direct relation between frailty and cognitive deficit.

Table 3. Association between MMSE score with age, frailty and years of education among older aged individuals living in community. Ribeirão Preto, 2011.

	MMSE gross score	
	*r	p- value
Age	-0.379	0.007**
Frailty gross score	-0.513	0.000**
Years of education	0.358	0.011**

* Pearson's correlation; ** $p < 0.05$.

In the current study, a relation between MMSE gross score and frailty and age was observed. Nevertheless, low education levels, which were demonstrated by the total of years of education, may be directly related to the cognitive deficit. Brazilian scholars state that elderly individuals who completed few years of education presented higher cognitive deficit as compared with others with more years of education[9].

Moreover, the elderly who completed more years of education maintained better outcomes in several cognitive functions within a period of three years as compared with elderly who had fewer years of education[12].

Female elderly individuals presented a frailty gross score mean significantly higher than among men, this means, a higher level of frailty (Table 4).

Table 4. Association between frailty score with gender and presence of a partner among older aged individuals living in community. Ribeirão Preto, 2011.

		Frailty gross score			
	Mean (=sd)	**Median**	**Minimum**	**Maximum**	**p-value***
Sex					
Male	6.35 (=2.207)	6.50	2	11	0.040
Female	7.80 (=2.552)	8.00	2	14	
Partner					
Yes	6.96 (=2.244)	7.00	2	12	0.201
No	7.52 (=0.794)	8.00	2	14	

* Mann-Whitney Test

These data agree with those from studies conducted in Brazil[9, 13] and abroad[14, 17], with one of them claiming that frailty likely would be typical to female elderly. In one of their conclusions about frailty consequences, researchers alert that the higher the probability of becoming frail, the higher the risk of adverse effects, such as, death, institutionalization, use of health services, cognitive deficit accumulation, comorbidities and other deficits related to aging[18]. Furthermore, women accumulate more deficits than men, even though men present the highest mortality rates to any level of deficits[15, 18].

In a study conducted in the United States, in which elderly women have been monitored for six years, authors identified that those with cognitive deficit or low performance in the MMSE test were significantly more prone to have low walking speed and lower muscle strength; both factors were assessed in order to identify frailty regardless of the demographic region in which they lived, comorbidity conditions or other relevant confounding factors[19].

Therefore, these data lead to a reflection regarding the importance of professional education built on a comprehensive basis, encompassing issues related to promotion, prevention, treatment and rehabilitation of the elderly[20], also including issues targeted to a multidimensional assessment of the elderly covering cognitive and frailty aspects, among others.

In addition, they demonstrate that the cognitive function should be considered in the frailty assessment because this may enhance frailty measurement capacity in order to better predict impairments, increased need for healthcare and death[15].

CONCLUSION

Outcomes have indicated 64% of frailty prevalence. Among these, 38% were mildly frail, 14% moderately frail and 12% severely frail. There was association among the MMSE, sex, age, years of education and frailty classification. In addition, the frailty level and cognitive deficit were strongly correlated.

These data demonstrated the importance of a multidimensional geriatric assessment focusing particularly on cognitive status and frailty. Thus, MMSE and EFS are suggested as instruments for elderly health assessment. Both instruments may assist the identification of interventions directed to affected or at risk areas as an alternative to reduce frailty prevalence, especially in elderly individuals with altered cognitive function.

Therefore, professionals involved in providing care for the elderly at their homes are required to develop strategic interventions aiming at minimizing frailty and cognitive deficit, as well as promoting a better life condition to aged people.

One of the limitations of this study is related to the number of patients in the sample studied; however, such contribution is essential as considering the elderly population growth. Therefore, the authors suggest the development of other studies involving a larger population of aged people in order to guide the relation between being frail and presenting cognitive deficits.

AVALIAÇÃO DO ESTADO COGNITIVO E FRAGILIDADE EM IDOSOS MAIS VELHOS, RESIDENTES NO DOMICÍLIO

RESUMO

Com o crescente envelhecimento populacional é possível verificar um importante aumento de morbidades, não apenas no que se refere ao surgimento de doenças crônicas, mas também à detecção de importantes alterações cognitivas e incapacidades físicas. Como exemplo, cita-se a fragilidade, síndrome definida como um estado fisiológico de maior vulnerabilidade aos estressores, envolvendo fatores biológicos, físicos, cognitivos, sociais, econômicos e ambientais. Desta forma, o objetivo deste estudo foi avaliar o estado cognitivo, através do Miniexame do Estado Mental (MEEM), a fragilidade por meio da Edmonton Frail Scale (EFS) e identificar as relações entre a função cognitiva e fragilidade de *idosos mais velhos* que vivem no domicílio. Trata-se de uma pesquisa observacional do tipo transversal. A coleta de dados foi realizada no domicílio, após aprovação do Comitê de Ética. Foram entrevistados 50 idosos com idade média de 84,48 anos, em sua maioria do sexo feminino, casados e com predomínio de indivíduos de baixa escolaridade. Observou-se que 83,3% dos idosos não frágeis não apresentam déficit cognitivo. Dentre os frágeis, 20,4% apresentaram déficit cognitivo, sendo 30% de mulheres. Foi possível verificar correlação entre o escore bruto do MEEM, idade e fragilidade na amostra estudada. A partir desses dados, verifica-se a importância de uma avaliação geriátrica multidimensional com especial atenção ao estado cognitivo e à fragilidade. Assim, sugere-se que o *MEEM* e a *EFS* sejam instrumentos utilizados na avaliação de saúde dos idosos.

Palavras-chave: Idoso de 80 anos ou mais. Cognição. Idoso fragilizado. Envelhecimento.

EVALUACIÓN DEL ESTADO COGNITIVO Y FRAGILIDAD EN EL ADULTO MAYOR MÁS VIEJO QUE VIVEN EN EL DOMICILIO

RESUMEN

Con el creciente envejecimiento poblacional es posible observar un importante aumento de morbilidades, no sólo a lo que se refiere al surgimiento de enfermedades crónicas, sino también a la detección de importantes alteraciones cognitivas e incapacidades físicas. Como ejemplo, se cita a la fragilidad, síndrome definido como un estado fisiológico de mayor vulnerabilidad a los factores de estreses, envolviendo factores biológicos, físicos, cognitivos, sociales, económicos y ambientales. De esta forma, el objetivo de este estudio fue evaluar el estado cognitivo, por medio del Mini Examen del Estado Mental (MEEM), la fragilidad por medio de la *Edmonton Frail Scale* (EFS) e identificar las relaciones entre la función cognitiva y fragilidad de *ancianos más viejos* que viven en el domicilio. Se trata de una investigación observacional de tipo transversal. La recolección de los datos fue realizada en el domicilio después de la aprobación del Comité de Ética. Fueron entrevistados 50 ancianos con edad media de 84.48 años, en su mayoría del sexo femenino, casados, con predominio de individuos de baja escolaridad. Se observó que el 83.3% de los ancianos no frágiles no presentaron déficit cognitivo. Entre los frágiles, el 20.4% presentaron déficit cognitivo, siendo el 30% mujeres. Fue posible verificar la correlación entre el puntaje bruto del MEEM, edad y fragilidad en la muestra estudiada. A partir de estos datos, se verifica la importancia de una evaluación geriátrica multidimensional con atención especial al estado cognitivo y a la fragilidad. Así, se sugiere que el MEEM y la EFS sean instrumentos utilizados en esta evaluación de salud de los ancianos.

Palabras clave: Anciano de 80 años o más. Cognición. Anciano frágil. Envejecimiento.

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Submitted: 05/03/2013
Accepted: 25/11/2013