Original Article

Functional capacity and associated factors in the elderly: a population study*

Capacidade funcional e fatores associados em idosos: estudo populacional

Capacidade funcional y factores asociados en ancianos: estudio poblacional

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ABSTRACT

Objective: To analyze the association of impaired functional capacity with health conditions and sociodemographic and behavioral factors among elderly residents in a community of northeastern Brazil. **Methods:** A cross-sectional population-based study, conducted with 316 elderly residents in Lafaiete Coutinho-BA. Functional capacity was evaluated by hierarchical scaling, by verifying association with health conditions and sociodemographic and behavioral factors by the technique of multinomial logistic regression. **Results:** The dependence for independent activities of daily living (IADL) was associated with the age group ≥ 80 years, use of two or more medications and cognitive impairment. Dependency in basic activities of daily living and IADL was associated with those in the age group ≥ 80 years, with a lack of participation in religious activities, hospitalization in the past 12 months, cognitive impairment and who were overweight. **Conclusion:** There was an association with impaired functional capacity, health conditions and sociodemographic factors among elderly residents in a community in northeastern Brazil.
Keywords: Aged; Activities of daily living; Socioeconomic factors; Health of the elderly; Risk factors

RESUMO

Objetivo: Analisar a associação do comprometimento da capacidade funcional com condições de saúde e fatores sociodemográficos e comportamentais entre idosos residentes em comunidade do interior do Nordeste brasileiro. **Métodos:** Estudo transversal de base populacional realizado com 316 idosos residentes em Lafaiete Coutinho-BA. A capacidade funcional foi avaliada por escala hierárquica, verificando associação com condições de saúde e fatores sóciodemográficos e comportamentais pela técnica de regressão logística multinomial. **Resultados:** A dependência nas atividades independentes da vida diária (AIVD) foi associada ao grupo etário ≥ 80 anos, uso de dois ou mais medicamentos e comprometimento cognitivo. A dependência nas atividades básicas da vida diária e AIVD foi associada ao grupo etário ≥ 80 anos, falta de participação em atividades religiosas, hospitalização nos últimos 12 meses, comprometimento cognitivo e sobrepeso. **Conclusão:** Houve associação com comprometimento da capacidade funcional e condições de saúde e fatores sociodemográficos entre idosos residentes em comunidade no Nordeste brasileiro.
Descritores: Idoso; Atividades cotidianas; Fatores socioeconômicos; Saúde do idoso; Fatores de risco

RESUMEN

Objetivo: Analizar la asociación del compromiso de la capacidad funcional con condiciones de salud y factores sociodemográficos y comportamentales entre ancianos residentes en una comunidad del interior del Noreste brasileño. **Métodos:** Estudio transversal de base poblacional realizado con 316 ancianos residentes en Lafaiete Coutinho-BA. La capacidad funcional fue evaluada por una escala jerárquica, verificando asociación con condiciones de salud y factores sociodemográficos y comportamentales por la técnica de regresión logística multinomial. **Resultados:** La dependencia en las atividades independentes de la vida diaria (AIVD) fue asociada al grupo etáreo ≥ 80 años, uso de dos o más medicamentos y compromiso cognitivo. La dependencia en las actividades básicas de la vida diária y AIVD fue asociada al grupo etáreo ≥ 80 años, falta de participación en actividades religiosas, hospitalización en los últimos 12 meses, compromiso cognitivo y sobrepeso. **Conclusión:** Hubo asociación con compromiso de la capacidad funcional y condiciones de salud y factores sociodemográficos entre ancianos residentes en una comunidad del Noreste brasileño.
Descriptores: Anciano; Actividades cotidianas; Factores socioeconómicos; Salud del anciano; Factores de riesgo.

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INTRODUCTION

Population aging is characterized by the progressive growth of people aged 60 years or older considering the general population and the increased life expectancy [1]. It is estimated that in 2025, Brazil will have the sixth elderly population in the world, with about 32 million people (approximately 14% of the population) [2].

The human aging process is dynamic and progressive, triggering declines in functional capacity of the elderly [3], defined as the individual's ability to perform survival related activities in an autonomous and independent manner [4,5].

Functional capacity is considered, as the basis of an efficient geriatric assessment, giving a broad and interdisciplinary approach to health status [6]. Thus, the various dimensions that affect the lives of the elderly are included, as their health status, social relationships, physical environment and the demographic, socioeconomic, cultural and psychological conditions [7]. These individuals are incorporated, in a context in which public health is gradually understood in a holistic and interdisciplinary approach [8] .

The assessment of functional capacity in the elderly should still consider the gradual decline with age [9], designating the importance of using a hierarchical scale, not observed in clinical practice and other studies related to the topic. Through a parameter for assessment of functional capacity in the elderly, it is possible to implement a data collection so that municipal and state policy makers of the Unified Health System promote the construction of local health initiatives, aimed at maintaining functional capacity, guideline from the current National Health Policy for the Elderly, for promoting an active and healthy aging [10].

Moreover, it is noted that in addition to the heterogeneity regarding the aging process, the research was conducted in a region with unique cultural and sociodemographic characteristics, which can intervene in the functionality of these individuals. Thus, studies are needed with the methodology used to distinguish the various health conditions in the country in order to offer subsidies to the planning of Public Policies and a better foundation for the practice of health professionals.

The aim of this study was to analyze the association of functional capacity with health conditions and sociodemographic and behavioral factors among the elderly living in a community in the northeast of Brazil.

METHODS

This is a cross-sectional study that analyzed data from an epidemiological research characterized as home-based, entitled "Functional capacity, risk behaviors and health conditions of elderly from Lafaiete Coutinho-BA." The city studied is located in Bahia, during the period of data collection, had 4162 citizens, distributed in urban (52.9%) and rural areas (47.1%). The city has low educational and socio-demographic indicators.

A census was conducted in that city in January 2011 with residents in urban areas aged ≥ 60 years (n = 355), located through information obtained from the Family Health Strategy, which has the records of all elderly in the city. From the 355 elderly who comprised the study population, 315 (89.0%)participated in the study; a total of 17 refusals (4.8%) were registered and 22 (6.2%) individuals were not located after three visits on alternate days, they were considered sample losses.

A form, created by the author, was used and applied through individual interviews at their homes, based on the questionnaire used in the research Health, Well-being and Aging – SABE – (http://hygeia.fsp.usp.br/sabe/Questionario.html) in seven countries of Latin America and the Caribbean [11], except for the physical activity questionnaire [12]. Prior to data collection, members of the research team underwent training and calibration process; a pilot study with 30 elderly people from a neighbor city was also carried out.

The elderly underwent a Mini Mental State Exam [13]; at the beginning of the questionnaire to assess their cognitive status in order to verify the reliability of responses. When the score was not reached, an informant was requested to respond to the Pfeffer questionnaire[14], with information related to the elderly, assessing the need for a substitute informant during the interview.

The research project was approved by the Research Ethics Committee of the State University of Southwest Bahia (Protocol No. 059/2010). Participation was voluntary, and all study participants signed a Consent Form.

Functional capacity (dependent variable)

The functional capacity assessment was conducted using information about the Basic Activities of Daily Living -ADL- (bathing, feeding, moving in and out of a bed, toileting, dressing and controlling sphincters) [15] and Instrumental Activities of Daily Living – IADL – (preparing meals, managing money, going outside of walking distance, shopping, using the phone, doing light housework, doing heavy housework, taking medication) [16]. According to the questionnaire, participants were asked about the presence of difficulty or need human help in every activity. The elderly were classified as independent, when reported no need for help to perform any ADL and IADL activity, and dependents when cited need help in at least one of the activities

of each dimension. A hierarchical functional incapacity scale [17] was constructed, distinguishing three categories: independent, dependence in IADL, dependence in IADL and ADL. The elderly who reported dependence on ADL, but not in instrumental activities were classified in the last category, referring to the dependence on both dimensions.

This instrument can be influenced by the cognitive aspect, however, in this study this issue was evaluated previously, reducing the possibility of bias.

Independent Variables

Sociodemographic characteristics: gender, age group (60-69, 70-79 and ≥ 80 years), skin color/ethnicity self-reported (white or nonwhite); educational level assessed by knowing how to write and read a message (yes or no); income per capita divided into terciles (low = ≤ R$ 255, medium ≥ R$ 255 to ≤ R$ 510 and high ≥ R$ 510), marital status (with union and non-union), participation in religious activities.

Health Condition: self-perception of health classified as positive (excellent, very good and good) or negative (fair and poor), self-perception of health compared with others of the same age (better, equal and worse); falls during the last 12 months; number of chronic diseases (none, one and two or more) considering hypertension, diabetes, cancer (except skin tumors), chronic lung disease; heart, circulatory, rheumatic and osteoporosis problems; hospitalization in the last 12 months, amount of medication (none, one and two or more); depressive symptoms assessed by the Geriatric Depression Scale (GDS) [18] (score <6 points = no symptoms; score ≥ 6 points = symptoms), cognitive status assessed by Mini Mental State Examination [13] (score > 12 = uncommitted and score ≤ 12 = committed); weight status, assessed by body mass index (BMI < 22 kg/m^2 = underweight, 22 kg/m^2 ≥ BMI ≤ 27 kg/m^2 = adequate and BMI > 27 kg/m^2 = overweight) [19].

Behavioral factors: alcohol consumption (≤ 1 day/week and > 1 day/week); smoking (smoker, ex-smoker and has never smoked); habitual physical activity, assessed by the International Physical Activity Questionnaire (IPAQ), long version [13] (< 150 minutes in moderate or vigorous physical activity per week = insufficiently active and ≥ 150 minutes per week = active) [20].

Statistical procedure

To estimate the association between functional capacity, the multinomial logistic regression technique was used. All independent variables which reached statistical significance, at least 20% ($p \leq 0.20$) in the unadjusted analysis were included in the multivariable model. The category classified as independent functional capacity was defined as the reference group, and a significance level of 5% ($p \leq 0.05$) was used to construct confidence intervals of 95% (95% CI) for odds ratio (OR). Data were tabulated and analyzed using The Statistical Package for Social Sciences for Windows (15.0 SPSS, 2006).

RESULTS

The study population consisted of 173 women (54.7%) and 143 men (45.3%). The age ranged between 60 and 105 years, with mean of 74.2 years ± 9.8. The mean per capita income among the elderly was R$ 383.63 ± 252.88. Through the evaluation of the Mini Mental State Examination and the Pfeffer Questionnaire, it was noticed that 67 individuals needed substitute informants (proxy) for the interview.

Regarding the descriptive characteristics of the study population, it was found that most could not read or write a message (66.8%), declared themselves as nonwhite (78.9%), reported two or more chronic diseases (45.5%) and reported participation in some religious activity (92.4%).

The variable functional capacity had a response rate of 97.2%. Figure 1 shows the distribution of the elderly analyzed according to their functional capacity, noting that most elderly (57.6%) were considered dependent on at least one type of activity. The data showed a higher frequency dependence in the ADL variable sphincter control (8.5%), primarily urinary incontinence (7.6%), followed by bathing (5.4%). Among the IADL, there was a greater reliance on using the telephone (36.6%), and going outside of walking distance (25.1%).

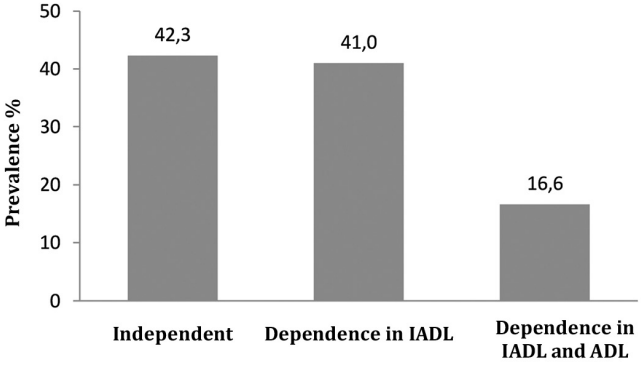

Figure 1 – Distribution of elderly according to functional capacity. Lafaiete Coutinho – BA, Brazil, 2011.

Analyzing the prevalence of independent, dependence in IADL and dependence in ADL and IADL, according to the exposure of the variables studied, it was observed that only Dependence in IADL was significantly more prevalent in the elderly females in the age group ≥ 80 years, who could not read and write

and who self-reported as skin color/ethnicity non-white. It was also observed higher frequency among those with worse health perception, compared to those who reported two or more diseases and use of two or more drugs, which showed the presence of depressive symptoms, cognitive impairment and were insufficiently active. There was no statistical difference regarding the variables: per capita family income, participation in religious activities, self-perception of health, weight status, alcohol consumption, smoking, falls and hospitalization in the last 12 months.

The dependence on both ADL and in IADL showed statistical significance in patients aged ≥ 80 years, who could neither read or write nor participate in religious activities. Moreover, it was more frequent in those with worse self-perception of health compared to the occurrence of falls and hospitalization, reported two or more diseases and use of two or more drugs, showed the presence of depressive symptoms, cognitive impairment, underweight, overweight and were considered insufficiently active. The differences related to gender, per capita family income, marital status, skin color/ethnicity, self-perception of health, alcohol consumption and smoking were not significant.

The results of the unadjusted analysis showed that all variables except for per capita family income and smoking, were within the criteria ($p \leq 0.20$) for inclusion in the multiple model. The data in Table 1 show the results of the adjusted analysis (multiple multinomial logistic model) to functional capacity in relation to explanatory variables in the study which remained associated ($p \leq 0.05$). The dependent only in IADL was positively associated with age group ≥ 80 years ($p = 0.007$), use of two or more drugs ($p = 0.041$) and cognitive impairment ($p = 0.048$). Additionally, the dependence in IADL and ADL was positively associated with age group ≥ 80 years ($p = 0.005$), without participation in religious activities ($p = 0.025$), hospitalization in the past 12 months ($p = 0.014$), cognitive impairment ($p = 0.013$) and overweight ($p = 0.025$).

Table 1 – Factors that remained associated with functional capacity in multiple multinomial logistic model. Lafaiete Coutinho -BA, Brazil, 2011

Variables	Dependence in IADL			Dependence in ADL and IADL		
	OR*	CI 95%	p-value	OR*	CI 95%	p-value
Age group (years)						
60-69	1			1		
70-79	1.09	0.49-2.41	0.831	1.11	0.33-3.77	0.861
≥ 80	3.51	1.41-8.73	0.007	6.98	1.79-27.21	0.005
Participation in religious activities						
Yes	1			1		
No	2.11	0.53-8.49	0.291	6.54	1.26-33.99	0.025
Hospitalization in the last 12 months						
No	1			1		
Yes	1.84	0.81-4.21	0.146	4.37	1.35-14.11	0.014
Amount of medication						
None	1			1		
One	2.15	0.61-7.65	0.235	2.54	0.49-13.21	0.268
Two or more	2.83	1.04-7.65	0.041	1.59	0.40-6.40	0.513
Cognitive Status						
Uncommitted	1			1		
Committed	2.27	1.01-5.11	0.048	4.63	1.38-15.54	0.013
Weight Status						
Underweight	1.74	0.76-3.99	0.188	3.09	0.83-11.50	0.093
Adequate	1			1		
Overweight	1.20	0.52-2.79	0.672	4.75	1.22-18.51	0.025

* Adjusted for all variables with $p \leq 0.20$ in the unadjusted analysis.

DISCUSSION

This study allowed us to make inferences about the potential determinants of functional capacity in the elderly population in a city with low social and economic indicators. It is believed that these results may also serve as parameters for other regions or sites with similar characteristics. As the functional capacity was assessed using instruments widely used in the literature, the results made possible the comparison with national and international studies, with regard to the functional health of older people and associated factors.

The distribution of functional capacity in this study is consistent with other research [9], which also showed higher prevalence of dependence in IADL, because these activities require greater physical and cognitive integrity compared to ADL. These findings relate to the importance of using a hierarchical scale of functional capacity, which considers the gradual loss of function with aging. The results also identified as the greater dependence in ADL sphincter control, which is in agreement with the literature [21]. Among the IADL, there was a greater reliance on the use of phone, possibly related to high illiteracy rates among these elderly.

The results of this study show that the probability of dependence in IADL was higher in the age group ≥ 80 years, in those who used two or more drugs and who also presented cognitive impairment.

The ability to perform a task involving the integration of multiple physiological systems, such as the nervous and musculoskeletal, which usually in longevous elderly (≥ 80 years) are at greater decline. Thus, the subject avoids or limits their activities, gradually increasing incapacity [22]. This association is consistent with studies that analyzed data from another population of Brazil [8] and other nationalities [23], using the same methodology.

The medication usage is related to exposure to chronic diseases such as diabetes and cardiovascular diseases (diseases included in this study), which may increase the likelihood of mortality and incapacity [24,25]. It was also found that diabetes causes an accelerated cognitive deterioration by accelerating the aging of central nervous system, relating to memory loss. This deterioration may have implications for treatment adherence and medication (an IADL) [25].

The association between cognitive impairment and dependence in IADL shows the importance of this aspect for performing activities that require a higher level of independence and autonomy. IADL variables, such as using the telephone, managing money and medication are tasks that require multiple cognitive functions such as memory and planning, making them more vulnerable to this commitment [26]. In another study, intellectual activity and social role, factors related to cognitive status were identified as predominant for functional decline in the IADL only [24].

In this study, the multiple regression model has also shown that age group, cognitive impairment, hospitalization, weight status and participation in religious activities were associated with dependence in ADL and IADL. Similar results were found in cross-sectional population studies, regardless of the manner of determining the functional dependence [4.24].

From the age of 80, with the physiological decline, there is a reduction in the ability to perform ADLs, regardless of health status, but varying the degree of intensity and frequency on health conditions, behavioral and contextual factors over the life of elderly [27].

The association between cognitive impairment and dependence may be explained by the fact that the elderly with lower cognitive levels are less likely to be involved in treatment programs and control of chronic diseases, which may result in increased hospitalizations, causing major limitations [25]. Subjects with better cognitive status may be able to make choices and maintain lifestyle more favorable to health [28].

Hospitalization is an indicator of the occurrence of diseases that requires specialized care, which in itself results in a greater likelihood of functional incapacity. Another study [29] observed that hospitalization exposures elderly patients to a substantial decline in functional status due to the loss of lower-limb strength and decline of aerobic capacity, induced by physical inactivity and bed rest.

The impact of overweight on the dependence observed in the present study may be explained by the excessive body fat associated with several disabling comorbidities, such as the ones with a cardiovascular origin. Another issue to be mentioned is that obesity and sarcopenia among the elderly may potentiate one another (sarcopenic obesity) [30].

The association of dependence with the lack of participation in religious activities is not related to the health status of the participants, but, with greater independence of subjects who frequent social institutions [31]. One must also consider the social aspect, because these relationships influence the maintenance and improvement of functional capacity, through socialization, a sense of control and self-efficacy, or physiological processes that cause neuroendocrine and immune responses which may minimize incapacity [5].

Comparison with other studies becomes limited due to methodological differences, because there are no studies which used a hierarchical scale for the assessment of functional capacity. The association of impaired function with age was confirmed in an international study [9], which also found association with hospitalization. In a study performed with the elderly in

Sao Paulo [32], which used a different tool for assessing instrumental activities, found a correlation between age and ADL and IADL; also, it was observed that cognitive changes were more strongly associated with IADL than with ADL.

Comparing with a study performed in the Northeast of Brazil, which has used the same instruments of the present study [8], an association between age and functional capacity in both domains was found, however, age was analyzed as a continuous variable. All other associations, such as poor health perception for ADL and female gender, illiteracy, marital status, depressive symptoms and poor health perception for IADL showed disagreement with those of this study, highlighting the distinction even with communities in the same region of Brazil.

It is emphasized that this study was conducted in a small city, which has similar characteristics with most Brazilian cities, presenting results that might represent the reality of health conditions of the elderly in these communities. The characteristics of the elderly belonging to the studied region contributed to the understanding of the heterogeneity of the aging process.

This study has limitations inherent to the cross-sectional design, making it difficult to establish the temporal relationship between the variables. The assessment of cognitive status was performed by an instrument containing mathematical questions, requiring a higher level of education, not recurring to this city elderly. It was used as a methodological option a self-reported instrument, but the need for some substitute informants for cognitive impairment in some elderly may suggest it as a possible limiting factor.

CONCLUSION

The evidence presented in this study suggest a distinction between the factors associated with IADL and ADL, which shows that different ways of assessing functional capacity influence the geriatric assessment. The study also examined the association of functional incapacity with health conditions and sociodemographic factors among the elderly living in a small city in the northeast of Brazil. However, behavioral factors assessed in this study were not associated with functional incapacity.

The framework found in the literature supports the evidence of the explanatory model of factors associated with functional capacity in this population, providing useful information for the actions and policies of public health, social network support in meeting the demand of the elderly, covering the problematic for other regions of the country with similar characteristics. One can also suggest the use of methodological model in other epidemiological studies and in clinical practice of many health professionals who work in the field of gerontology for the assessment of functional capacity, an important factor in understanding the health status of this population.

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