Functional disability and associated factors in urban elderly: a population-based study

Incapacidade funcional e fatores associados em idosos de área urbana: um estudo de base populacional

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Abstract – Population aging may cause impaired functional abilities in the elderly population, with increased rates of functional disability. Early detection of functional disability makes it possible to postpone possible complications and helps with health action planning. The objective of this study was to investigate the factors associated with functional disability in urban elderly. We conducted an analytical and cross-sectional household survey with 1,691 urban elderly individuals in Uberaba (MG), Brazil, in 2012. The questionnaire included socioeconomic and clinical information. We used the following instruments to assessed the participants: Abbreviated Geriatric Depression Scale, Katz Index, and Lawton and Brody Scale. We performed a descriptive bivariate analysis and used a logistic regression model (p<0.05). The prevalence of functional disability in basic activities of daily living was 21.2%; whereas the prevalence of functional disability in instrumental activities of daily living was 65.9%. The following factors were associated with functional disability in basic and instrumental activities of daily living, respectively: age of 80 years old and older [(OR= 2.18; p<0.001), (OR=3.30, p<0.001)]; larger number of self-reported diseases [(OR=1.24, p<0.001), (OR=1.12; p<0.001)]; and symptoms of depression [(OR=1.49; p<0.003), (OR = 1.75, p<0.001)]; whereas no schooling (OR=1.88; p<0.001) was related to functional disability in instrumental activities of daily living. We found significant impairment of functional status, especially in instrumental activities of daily living and in association with socioeconomic and health variables; those aspects support the implementation of actions aimed at monitoring and controlling the factors that interfere with the functional ability of the elderly.

Key words: Activities of daily living; elderly; health status.

Resumo – O envelhecimento populacional pode conferir, dentre outros aspectos, comprometimento da funcionalidade do idoso e, consequentemente, maiores níveis de incapacidade funcional. A identificação precoce resulta na possibilidade de postergar possíveis complicações e contribuir para o planejamento de ações em saúde. O estudo teve por objetivo verificar os fatores associados à incapacidade funcional em idosos de área urbana. Trata-se de um inquérito domiciliar, analítico e transversal, conduzido em 2012 com 1691 idosos de área urbana em Uberaba-MG. Foram utilizados formulário contendo informações socioeconômicas e clínicas e as escalas (Depressão Geriátrica Abreviada, Katz e Lawton e Brody); e realizadas análises descritiva, bivariada e modelo de regressão logística (p<0,05). A prevalência de incapacidade funcional para as atividades básicas de vida diária correspondeu a 21,2% e nas atividades instrumentais de vida diária, representou 65,9%. Foram associados à incapacidade funcional para as atividades básicas e instrumentais de vida diária, respectivamente: a faixa etária de 80 anos e mais [(OR=2,18; p<0,001); (OR=3,30; p<0,001)], o maior número de morbidades autorreferidas [(OR=1,24; p<0,001); (OR=1,12; p<0,001)] e o indicativo de depressão [(OR=1,49; p<0,003); (OR=1,75; p<0,001)]; enquanto que a ausência de escolaridade (OR= 1,88; p<0,001) à incapacidade funcional para as atividades instrumentais de vida diária. Conclui-se que o comprometimento do estado funcional foi expressivo, especialmente para as atividades instrumentais de vida diária e associado a variáveis socioeconômicas e de saúde; aspectos esses que fornecem subsídios para a implementação de ações direcionadas ao monitoramento e controle dos fatores que interferem na capacidade funcional do idoso.

Palavras-chave: Atividades cotidianas; Idoso; Nível de saúde.

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INTRODUCTION

Population aging is characterized by increased longevity and life expectancy along with decreased fertility rates. This phenomenon is taking place in countries with different levels of development[1], and there are global estimates that between 2000 and 2050 the number of people older than 60 years old will double in percentage, raising from approximately 11% to 22%[2].

In this sense, demographic and epidemiological transitions bring challenges to elderly health issues, with increased rates of chronic diseases and functional disability[3]. Functional disability is a general term used to describe limitation and restriction of activities[4], which can be defined as the need for help or difficulty in performing basic or more complex daily functions that are essential for an autonomous life in society[5].

In Brazil, a study conducted with elderly in Avare (SP) found the following prevalence rates of disability: 8.49% for basic activities and 10.96% for instrumental activities.[6] Other national studies with urban elderly found that the prevalence rates for functional disability ranged from 13.8% to 50.31%[7,8], whereas an international study with older people found 20.1% of functional disability[9].

According to the literature, functional disability in elderly may be associated with several individual factors[10], such as socioeconomic variables[7,8,11,12], presence of diseases[7,11,12], and psychosocial factors[11,13]. It is noteworthy that detecting these factors that have an influence on the functional ability of older people is essential to understand and implement prevention and intervention measures[10,14,15] based on the observation of a specific population. Because most epidemiological studies on the theme focused on the South and Southeast regions of the country, there is a shortage of information about the reality of the population living in smaller towns[8].

Therefore, preserving functional ability should be a priority aspect in terms of elderly health care because, in addition to compromising the autonomy[16] of older people, impaired functional ability brings consequences to the family, community, health system, and the elderly themselves, causing greater vulnerability and dependence in old age, having an impact on their quality of life[3,17], and increasing their chances of geriatric syndromes[3].

Considering the influence of functional disability on the health of the elderly, as well as its social and economic implications, the objective of this study was to investigate the factors associated with functional disability in urban elderly.

METHODOLOGICAL PROCEDURES

We conducted a household survey with a quantitative approach and cross-sectional analytical design involving urban elderly from the city of Uberaba (MG), Brazil. This study is part of a research project that started to be conducted in 2005, with a sample size calculation of 24,714 elderly individuals. Other characteristics of the study are 95% confidence interval,

study power of 80%, margin of error of 4.0% for interval estimates, and an estimated ratio of p = 0.5 for ratios of interest. Therefore, the sample size was estimated at 2,116 elderly individuals.

In 2012, the interviewers visited the homes of 2,116 older people. Of these, 1,691 individuals were interviewed according to the inclusion criteria of the study: age of 60 years old or older, resident of the urban area of the municipality, and absence of cognitive decline. Exclusions and/or losses of participants were related to deaths (265) and cognitive decline (160).

Ten interviewers were selected to perform data collection. The principal investigator provided training on how to approach elderly individuals, questionnaire administration, and ethical aspects of the research. The interviews were reviewed by supervisors who checked for incomplete fields or inconsistency in the answers. If there were incomplete fields or inconsistent answers, the questionnaire was returned to the interviewer, who had to contact the interviewee again to properly complete the questionnaire.

Cognitive status was assessed using the version of the Mini-Mental State Examination (MMSE) translated and validated in Brazil[18] to check if the individuals had cognitive decline, considering one of the inclusion criteria of this study. The MMSE consists of a total score ranging from 0 to 30 points. The cutoff points for cognitive decline vary depending on the educational level of the elderly individual: 13 points for no schooling, 18 points for schooling from 1 to 11 years, and 26 points for more than 11 years of schooling[18].

The sociodemographic and economic data and the detection of self-reported diseases were collected using a structured form. Functional disability (dependent variable) in basic activities of daily living (BADL) was measured by means of the Katz Index of Independence in Activities of Daily Living adapted to Brazil[19]. This scale consists of six items that measure the individual's performance in terms of self-care activities, such as bathing, dressing, toileting, getting in and out of bed, eating, and controlling urination and/or evacuation[19]. The limitations in instrumental activities of daily living (IADL) were assessed by the Lawton and Brody Scale adapted in Brazil[20]. This scale consists of nine items, such as using the phone, going to distant locations using any means of transport, shopping, preparing meals, cleaning and tidying the house, taking medications, and dealing with finances[20]. Functional disability was diagnosed when the elderly individual had one or more partial and/or total dependence for both BADL and IADL.

Symptoms of depression were assessed using the Abbreviated Geriatric Depression Scale. This scale is used for screening depression and it was developed by Yesavage in 1986 and validated in Brazil by Almeida and Almeida[21]. It consists of 15 closed questions with objective yes or no answers. Positive screening for depression was established when the score was higher than five points.

The following variables were included in the study: gender (male and female), age in years (60-69, 70-79, 80 or older), schooling in years (no schooling; 1-4, 4-8, 8, 9-11, and 11 or more), and individual income in

minimum wages (no income, <1, 1, 1-3; 3-5; >5); self-reported diseases (none, 1-4, and 5 and more); symptoms of depression (yes/no); functional disability in BADL (dependent/independent) and IADL (dependent/independent).

After data collection, an electronic database was built using Excel. Data were processed by two people using a personal computer (double entry). We checked for duplicate records and consistency of fields. When inconsistent data were found, the original interview was revised for correction. Later, the database was imported into the Statistical Package for the Social Sciences (SPSS) version 17.0 for data analysis.

Descriptive statistical analysis for categorical variables was conducted, and the values were expressed as absolute frequencies and percentage. To identify the factors associated with functional disability in basic and instrumental activities of daily living, we conducted a preliminary bivariate analysis using the chi-square test. Tests were considered to be significant at p<0.10.

According to the inclusion criteria (p<0.10), the variables of interest were included in the multivariate regression model. At this point, according to the regression model, age, educational level, and income were considered to be dichotomous variables; whereas the number of self-reported diseases was considered a quantitative variable.

The factors associated with functional disability in basic and instrumental activities of daily living were identified by multivariate analysis with estimates of odds ratios of prevalence using a logistic regression model (saturated model). We considered a significance level of 5% (p<0.05) and a 95% confidence interval (CI).

The project was submitted to the Research Ethics Committee at the UFTM and approved under the report no. 2265. The interviewers visited the participants' homes, presented the Informed Consent Form and, after answering the questions of the participants, asked them to sign the form. After that, the interviews were conducted.

RESULTS

Most of the 1,691 interviewees were female, aged between 70 and 80 years old, and their educational level was 4-8 years of schooling. Most elderly men were married (p < 0.001), and most female elderly had an individual monthly income of 1 minimum wage (p < 0.001). Table 1 shows the frequency distribution of sociodemographic and economic variables.

The prevalence of functional disability in BADL was 21.2% (n=359); whereas the prevalence of functional disability in IADL was 65.9% (n=1,115).

Regarding the associated factors, the variables of the preliminary bivariate analysis submitted to multivariate analysis, according to the inclusion criteria (p < 0.10) for functional disability in BADL, were: age group of 80 years old or older (p < 0.001), female (p < 0.001), no schooling (p = 0.056), presence of five or more diseases (p < 0.001), and symptoms of depression (p < 0.001). In terms of functional disability in IADL, the

associated factors were: age group of 80 years old or older (p < 0.001), no schooling (p < 0.001), individual monthly income of one minimum wage (p < 0.001), presence of five or more diseases (p < 0.001), and symptoms of depression (p < 0.001).

Table 1. Frequency distribution of sociodemographic and economic variables. Uberaba (MG), Brazil, 2012.

Variables	Overall		Male		Female		p*
	n	%	n	%	n	%	
Age group (years)							
60-69	645	38.1	242	39.4	403	37.4	
70-79	735	43.5	262	42.7	473	43.9	0.716
80 or older	311	18.4	110	17.9	201	18.7	
Marital status							
Never married or living with a partner	89	5.3	29	4.7	60	5.6	
Married	729	43.1	394	64.2	335	31.1	<0.001
Separated/Divorced	190	11.2	122	19.9	560	52.0	
Widower/Widow	682	40.3	69	11.2	121	11.2	
Educational level (years)							
No schooling	345	20.4	120	19.5	225	20.9	
1-4	437	25.8	147	23.9	290	27.0	
4-8	603	35.7	218	35.5	385	35.8	0.163
8	104	6.2	44	35.5	60	5.6	
9-11	33	2.0	17	2.8	16	1.5	
11 or more	168	9.9	68	11.1	100	9.3	
Monthly individual income (in minimum wages)*							
No income	115	6.8	12	2	103	9.6	
< 1	30	1.8	5	0.8	25	2.3	
1	808	47.8	253	41.4	555	51.5	<0.001
1-3	572	33.8	251	41.1	321	29.8	
3-5	104	6.2	56	9.2	48	4.5	
< 5	59	3.5	34	5.6	25	2.3	

*Differences tested using the chi-square test (p < 0.05); **Minimum wage during the data collection period: BRL 678.00

The variables included in the multivariate logistic regression model are shown in Tables 2 and 3. The factors associated with functional disability in BADL were established as follows: age group of 80 years or older (p < 0.001), larger number of self-reported diseases (p < 0.001), and symptoms of depression (p = 0.003). In terms of functional disability in IADL, the following associated factors were determined: age group of 80 years or older (p < 0.001), no schooling (p < 0.001), larger number of self-reported diseases (p < 0.001), and symptoms of depression (p < 0.001). Tables 2 and 3 show the final logistic regression model for the variables associated with functional disability in BADL and IADL.

Table 2. Final logistic regression model for the variables associated with functional disability in BADL. Uberaba (MG), Brazil, 2012.

Functional disability in BADL			
Variables	OR*	95%CI**	p***
Gender			
Male		1	
Female	1.13	0.86-1.50	0.363
Age group (years)			
60-79		1	
80 or older	2.18	1.62-2.93	<0.001
Educational level (years)			
No schooling	0.96	0.71-1.31	0.830
Any number of schooling years		1	
Number of self-reported diseases	1.24	1.19-1.29	<0.001
Depression symptoms			
Yes	1.49	1.14-1.95	0.003
No		1	

*OR: Odds Ratio; **CI: Confidence interval. BADL: Basic activities of daily living; ***$p<0.05$; 1: Reference category.

Table 3. Final logistic regression model for the variables associated with functional disability in IADL. Uberaba (MG), Brazil, 2012.

Functional disability in IADL			
Variables	OR*	95%CI**	p***
Age group (years)			
60-79		1	
80 or older	3.30	2.35-4.63	<0.001
Educational level (years)			
No schooling	1.88	1.40-2.51	<0.001
Any number of schooling years		1	
Monthly individual income****			
No income	1.01	0.66-1.54	0.958
Some income		1	
Number of self-reported diseases	1.12	1.08-1.16	<0.001
Depression symptoms			
Yes	1.75	1.33-2.30	<0.001
No		1	

*OR: Odds Ratio; **CI: Confidence interval; IADL: Instrumental activities of daily living; ***$p<0.05$; 1: Reference category; ****Minimum wage during the data collection period: BRL 678.00

DISCUSSION

Considering national research, a study conducted in the city of Lafaiete Coutinho (BA)[11] found a prevalence rate of functional disability in BADL of 24.7%, which is similar to our rate, whereas a study conducted in Pelotas

(RS)[22] found a higher rate (26.8%), and other studies conducted in Porto Alegre (RS)[23] and Montes Claros (MG)[12] found rates of 15.5% and 6.6%, respectively. Conversely, in terms of international research, a study conducted in Spain (26.4%; 34.6%)[14,24] and another one conducted in Chicago (38%)[25] showed higher percentages of disability when compared to our study.

The higher prevalence of functional disability in IADL compared to BADL is in agreement with the national study conducted in Lafaiete Coutinho (BA) (56.2%; 24.7%) and the international study conducted in Chicago (USA) (65%; 38%)[11,25.] However, national studies conducted in Pelotas (RS) (28.8%), Porto Alegre (RS) (26.1%) and Montes Claros (MG) (25.9%) and one international study conducted in La Coruña (Spain) (53.5%) showed prevalence rates of disability in IADL lower than our study[23,12,22,24].

Differences in the prevalence rates in BADL and IADL occur because of the different instruments used[23] and the socioeconomic differences between the regions both in terms of national and international studies. In addition, a stricter requirement of cognitive and physical integrity to perform IADL reveals the importance of using hierarchical scales of functional ability considering the gradual loss of function with aging[26]. Therefore, high percentages of functional disability in these activities are detected in most studies with the elderly.

As for the associated factors, we found an association between functional disability in BADL and IADL with older age, which is in agreement with national and international studies[23,24,27]. Older age is a major risk factor for the deterioration of the functional ability in elderly individuals[23]. This is due to the integration of multiple physiological systems involved in the ability to perform a certain task that generally declines with advanced age[26]. Nevertheless, this relationship cannot be understood as a common phenomenon in the elderly, and strategies to prevent this limitation should be developed[15].

In agreement with our survey, another study conducted in Brazil with elderly individuals found an association between no schooling and functional disability in IADL[23]. An international study using another assessment tool to evaluate disability found an association between low educational level and higher chances of developing disability in activities of daily living[28].

Higher educational levels result in preservation of functional ability because of the increased contribution of this variable to the understanding of medical diagnosis and health care, whereas the opposite is true for the development of functional disability[29]. Furthermore, an possible explanation for this result is based on the greater need of intellectual functions to perform IADL[23]. This was detected in a study investigating the relationship between the activities of taking medication, using the telephone, handling money, shopping, and using means of transport and individuals who had no schooling[11].

Thus, because it is a risk factor, illiteracy must be addressed early by multidisciplinary teams based on interventions involving both the elderly and

their families to prevent compromised treatment and poor understanding of information[27]. In addition, adequate educational activities according to the individuals' educational level[11] are able to reduce the risk for dependence[27].

Concerning symptoms of depression and functional disability, national studies found an association with BADL and IADL[11,15], whereas international studies found this association only with IADL[13]. This relationship may be due to the heterogeneity of the development of depression that results in the association between cognitive impairment and decline in the physical function. The mechanism for this cycle remains unknown; however, some behavioral and biological conditions are able to negatively influence functional ability[13].

In addition, depressive symptoms may have a negative impact on the quality of life and social relations of the elderly[11]. Therefore, strategies of early detection and intervention in older adults at risk of developing depressive symptoms can prevent or reverse functional disability and thus preserve autonomy and independence[11,13].

Regarding the number of diseases, national and international studies have shown similar results to this study in terms of the association with functional disability in ABVD and IADL[10,12,24,26]. This happens because chronic diseases can be considered factors associated with loss of functional ability[12,27]. However, having a disease does not necessarily mean showing impaired performance of daily tasks[30].

It should be noted that the presence of various diseases is a challenge of the aging process, a situation that may contribute to difficulties in activities of daily living because of the impact on independence and autonomy[11,30].

The limitations of the present study are related to its cross-sectional design, which does not allow to establish causal relationships between the variables, and the use of questionnaires that may underestimate or overestimate some of the data collected. The strengths of our study include a significant sample of the elderly population, the use of the MMSE for cognitive assessment as an inclusion criterion, and the cross-sectional design of the study, which is important to provide health information and promote the development of public policies and strategies.

CONCLUSIONS

The prevalence rate of functional disability in BADL was 21.2% and it was associated with age group of 80 years old or older, larger number of diseases, and symptoms of depression. The prevalence of functional disability in IADL was 65.9% and it was associated with age group of 80 years or older, no schooling, larger number of self-reported diseases, and symptoms of depression.

Such data support the implementation of strategic actions aimed at monitoring and controlling the factors related to functional ability among the elderly. Of these actions, we support those aimed at stimulating the functional ability and independence of older people.

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