DOI: 10.1590/S0034-8910.2013047003468

Jack Roberto Silva Fhon[I]

Idiane Rosset[II]

Cibele Peroni Freitas[III]

Antonia Oliveira Silva[IV]

Jair Lício Ferreira Santos[V]

Rosalina Aparecida Partezani Rodrigues[VI]

Prevalence of falls among frail elderly adults

ABSTRACT

OBJECTIVE: To measure the prevalence in frail elderly people, their consequences and associated demographic factors.

METHODS: This was an epidemiological and cross-sectional study with a probabilistic sample composed of 240 elderly people (≥ 60 years) living in Ribeirão Preto, Sao Paulo state. Data were collected between November 2010 and February 2011, through a questionnaire that included socio-demographic data, fall assessment and the Edmonton Frailty Scale. Uni-variate and bivariate analyses were carried out.

RESULTS: The mean age was 73.5 (± 8.4), with higher ages among women; 25% of the interviewees were aged 80 or older; 11.3% presented moderate frailty and 9.6% severe frailty. The prevalence of falls in frail elderly participants corresponded to 38.6%; higher levels were found among women and younger subjects (60 to 79 years old); 26.8% were victims of 1 to 2 falls, 27.1% of which occurred in the bedroom, 84.7% fell from their own height, 55.9% lost their balance, 54.2% suffered scratches and 78% were afraid of suffering a new fall. Higher fall prevalence levels were found in frail elderly 1,973 (1,094-3,556) compared to non-frail.

CONCLUSIONS: We highlight the importance of addressing the health of frail elderly people, especially regarding the risk of falls, as well as of increasing investment in prevention strategies of these syndromes and in the formation of train like a virgin ed human resources to better care for this population.

DESCRIPTORS: Aged. Frail Elderly. Accidental Falls. Risk Factors. Socioeconomic Factors. Cross-Sectional Studies.

[I] Programa de Pós-Graduação em Enfermagem Fundamental. Escola de Enfermagem de Ribeirão Preto. Universidade de São Paulo. Ribeirão Preto, SP, Brasil

[II] Departamento de Enfermagem. Escola de Enfermagem. Universidade Federal do Rio Grande do Sul. Porto Alegre, RS, Brasil

[III] Hospital das Clínicas. Faculdade de Medicina de Ribeirão Preto. Universidade de São Paulo. Ribeirão Preto, SP, Brasil

[IV] Departamento de Enfermagem. Centro de Ciências da Saúde. Universidade Federal da Paraíba. João Pessoa, PB, Brasil

[V] Departamento de Medicina Preventiva. Faculdade de Medicina de Ribeirão Preto. Universidade de São Paulo. Ribeirão Preto, SP, Brasil

[VI] Departamento de Enfermagem Geral e Especializada. Escola de Enfermagem de Ribeirão Preto. Universidade de São Paulo. Ribeirão Preto, SP, Brasil

Correspondence:
Rosalina Aparecida Partezani Rodrigues
Escola de Enfermagem de Ribeirão Preto - USP
Av. Bandeirantes, 3900 Campus USP
14040-902 Ribeirão Preto, SP, Brasil
E-mail: rosalina@eerp.usp.br

Received: 6/15/2011
Approved: 9/9/2012

Article available from: www.scielo.br/rsp

INTRODUCTION

Falls are one of the main causes of elderly people needing medical care, and are a serious public health problem for this population. Falls are considered the second most common cause of death by accidental and non-accidental injury.[a]

Approximately 28%-35% of those aged over 65 fall each year, with this figure increasing to 32%-42% in those aged over 70 living in the community.[20,21]

In Korea, 15% of elderly people suffer falls.[17] In Brazil, according to Ministry of Health, figures, 30% of elderly people fall each year.[b] Silva et al[18] assessed 30 elderly people with different levels of frailty and 66.7% reported having fallen in the 12 months preceding the interview. According to these authors, falls can produce a decrease in functional capacity with regards to everyday activities; moreover, developing frailty syndrome may interfere in the elderly's quality of life.

Frailty syndrome is a consequence of ageing and linked to the process of chronic illness. This syndrome is characterized by being multi-dimensional and means that the elderly person is more vulnerable. There is a decrease in physiological reserves and an increase in functional deficits, associated with physical changes which lead to adverse effects such as falling, increased morbidity, functional incapacity, prolonged hospital and care home stays and death.[8,12,22]

Rolfson et al[15] consider frailty to be a multi-dimensional, heterogenic and unstable process, making it more difficult to assess. The Canadian proposal, used in this study, views frailty as including biological, psychological, social and environmental factors which interact throughout the course of the person's life.[2]

Frailty associated with falling may bring health problems, categorized as the great geriatric syndromes of the 21st century. This condition affects functional capacity and leads to a loss of independence and capacity to work. There are few national and international studies which assess frailty in old age and associated factors, above all in the community, and which support appropriate public health policies for this population.

This study aimed to analyze the prevalence of falls, their consequences and associated demographic factors in the frail elderly.

METHODS

This was a cross-sectional study with 240 elderly subjects aged over 60, of both sexes, resident in the urban area of Ribeirão Preto, Southeastern Brazil between November 2010 and February 2011.

The city of Ribeirão Preto had a gross domestic product (GDP) *per capita* of R$ 26,083.97 in 2009. It has 978 health care establishments, 95 belonging to the Brazilian Unified Health System (SUS). There is a population of 604,682, of which 12.7% are elderly people aged 60 and over, of whom 58.7% are women.[c]

A two-stage probabilistic cluster sampling process was used. In the first stage, the census tract was used as the sampling unit, according to population size, and in the second stage, the individual aged ≥ 60 was the sampling unit. Twenty census tracts were drawn (from the 650 which existed).

The sample size was calculated considering a prevalence of 50% for the estimate, with a confidence interval of 95% and accuracy or error of 6.3%. A sample of 240 individuals, 12 per census tract, was calculated. The blocks o each sector and the respective streets were drawn and covered in a clockwise direction. The residences were visited up to three times on different days and at different times if no one answered on the first attempt. If the individual refused to participate, the researcher moved on to the next residence until reaching a total of 12 elderly people fulfilling the inclusion criteria. There was a refusal rate of around 5%.

Inclusion criteria were: being aged ≥ 60 and resident in the urban area of the city. Elderly people in care homes were excluded from the sample.

The data were collected in the subjects' homes using a structured interview carried out by previously trained undergraduate and post-graduate nursing students.

The questionnaire used included socio-demographic variables (age, sex, marital status, schooling, household income and living arrangements) and variables related to falls and frailty.

The World Health Organization[d] defines falling as any involuntary event in which a person loses balance and the body falls onto the floor or any other solid surface.

[a] Organización Mundial de la Salud. Centro de Prensa. Caídas. Ginebra; 2012. (Nota descriptiva, 344). [cited 2012 Nov 20]. Available from: http://www.who.int/mediacentre/factsheets/fs344/es/

[b] Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Envelhecimento e Saúde da pessoa idosa. Brasília (DF): 2006. (Cadernos de Atenção Básica, 19).

[c] Instituto Brasileiro de Geografia e Estatística. Censo 2010: indicadores sociodemográficos e de saúde no Brasil. Rio de Janeiro; s.d. [cited 2012 Apr 13]. Available from: http://www.censo2010.ibge.gov.br

[d] Organización Mundial de la Salud. Centro de Prensa. Caídas. Ginebra; 2012. (Nota descriptiva, 344). [cited 2012 Nov 20]. Available from: http://www.who.int/mediacentre/factsheets/fs344/es/

The questionnaire proposed by Schiaveto,[e] created based on a revision of the literature and validated by a judging body made up from experts in health care and geriatrics, was used to evaluate and characterize falls. The questionnaire is made up of 68 questions which describes falls according to the number, location, cause, type of injury and consequences, when the subject responded in the affirmative to the following question: "Have you fallen in the last six months?"

Fragile elderly people are characterized by their vulnerability and low ability to bear stress factors. This results in a greater susceptibility to illness and in the onset of syndromes which create dependence.[4]

The evaluation of frailness was carried out using the Edmonton Frail Scale by Rolfson et al[15] (2006), the Portuguese version validated by Fabrício-Wehbe et al.[7] This scale has nine sections and scores vary from 0 to 17 points (0-4: not frail; 5-6: appears vulnerable; 7-8: mild frailty; 9-10: moderate frailty; 11 and over: serious frailty).

The data were dichotomized according to the frailty scores: frail and not frail with a cutoff point of ≥ 5.

In order to create the database, an Excel® spreadsheet was created in which the data was entered in duplicate. The data were imported to the SPSS statistics program, version 17, in order to carry out descriptive analysis. The quantitative variables were analyzed using measures of central tendency (mean and median) and of dispersion (sd = standard deviation), and categorical variables, in absolute and relative frequency, considering 0.05 as the level of significance. The Chi-squared test was used for bivariate analysis between the presence of falls, demographic variables and the presence of frailty.

The research project was approved by the Committee of Ethical Research of the *Escola de Enfermagem de Ribeirão Preto da Universidade de São Paulo* (Protocol nº 1169/2010), in accordance with resolution 196/96 of the National Health Council. The subjects taking part signed consent forms.

RESULTS

Of the 240 interviewees, 62.9% were female; 25% were aged 80 and over; the mean age was 73.5 (sd = 8.4), the minimum age was 60 and the maximum age was 94; among the men, married men were predominant (79.8%) and among the women, widows were predominant (41.1%); 29.0% lived with a partner. The greatest proportion of individuals had between on and four years schooling (sd = 5.4) (Table 1).

The mean number of falls in the frail elderly subjects was 1.61 (sd = 0.5). Male and female subjects fell most often between one and two times in the last six months (Table 2).

More than half the falls (75%) occurred in the subject's own home and 84.7% were from standing height (Table 2).

More than half (55.9%) of the subjects reported loss of balance as an intrinsic factor causing falling. As regards extrinsic factors, 57.6% mentioned uneven and slippery surfaces as the main causes (Table 2).

The main consequence of falling was fear of falling again; "post-fall syndrome" (Table 2).

The rate of prevalence of falling was 33.3%, and was higher among women; 36.3% of the elderly subjects were not frail, whereas 66.7% showed some degree of frailty: 24.6% appeared vulnerable, 18.3% were had mild frailty, 11.3% moderate frailty and 9.6% serious frailty.

The rate of prevalence of falling was greater among those elderly subjects who were frail ($p = 0.023$) (Table 3) and was 59% higher among those deemed frail compared with those who were not frail (rp = 1.598).

Among the frail subjects, the prevalence rate of falling was 38.6%; women and the younger subjects (60 to 79 years old) showed a higher number of falls (Table 3).

DISCUSSION

There was a predominance of falls among female subjects and those aged 80 and over; this finding is similar to those of other research carried out in Brazil Brasil[13,18] and in other countries.[10,22]

It was observed that there was a higher proportion of widowed subjects among the females and married subjects among the males. This may be explained by shorter life expectancy in men and by inequality in social and cultural norms in Brazilian society, in which prejudices still exist, mainly when a widow wishes to marry again. The same does not occur in the case of widowers, who tend to remarry and do so to younger women.[3]

The majority simply live together. Of those who lived alone, the majority were women. This may be a result of being widowed, of grown children leaving the family home.[11]

The rate of prevalence of falls in the elderly population was 33.3%, similar to the rate observed by Siqueira et al[19] (34.8%) in a study carried out in seven

[e] Schiaveto FV. Avaliação do risco de quedas em idosos na comunidade [dissertação de mestrado]. Ribeirão Preto: Escola de Enfermagem de Ribeirão Preto da Universidade de São Paulo; 2008.

Table 1. Sociodemographic profile of the elderly living in the community according to sex, age group, marital status, schooling and living arrangements. Ribeirão Preto, Southeastern Brazil, 2011. (N = 240)

Variable	Mean	Sd	Median	Variation observed	Distribution in categories	n	%
Age (years)	73.5	8.4	73.0	[60;94]	60 to 64	43	17.9
					65 to 69	44	18.3
					70 to 74	47	19.6
					75 to 79	46	19.2
					80 and over	60	25.0
Sex					Male	89	37.1
					Female	15	62.9
Schooling (years)	5.4	5.0	4.0	[0;26]	Illiterate	35	14.6
					1 to 4	117	48.8
					5 to 8	42	17.5
					9 to 11	19	7.9
					12 and over	27	11.3
Marital status					Single	14	5.8
					married	138	57.5
					Divorced	10	4.2
					Separated	2	0.8
					Widowed	75	31.3
					Don't know /didn't respond	1	0.4
Elderly subject's monthly income	1,271.7	2,008.0		[0;20.000.0]	None	27	11.3
					< 510.00	6	2.5
					510.00	79	32.9
					> 510.00	128	53.3
Monthly household income	2,323.5	2,559.6		[0;20.000.0]	None	4	1.7
					< 510.00	13	5.4
					510.00	13	5.4
					> 510.00	210	87.5
Living arrangements					Alone	33	13.8
					Living with a partner	70	29.2
					Living with partner and children	37	15.4
					Living with partner children and son or daughter in law	5	2.1
					Living with children	14	5.8
					Living with children and grandchildren	21	8.8
					Living with grandchildren	3	1.3
					Other	57	23.8

Table 2. Falls according to number, location, type, factors and consequences in frail and non-frail elderly subjects living in the community. Ribeirão Preto, Southeastern Brazil, 2011. (N = 153)

Variable	Frail		Non frail	
	n	%	n	%
Number of falls				
None	94	58.8	66	41.3
Falls				
1 to 2	41	68.3	19	31.7
3 to 4	13	86.7	2	13.3
5 or more	5	100.0	0	0.0
Location				
Bedroom	16	94.1	1	5.9
Bathroom	15	83.3	3	16.7
Street	15	88.2	2	11.8
Yard	13	100.0	0	0.0
Pavement	9	75.0	3	25.0
Kitchen	24	70.6	10	29.4
Other	11	68.8	5	31.2
Type of fall				
From standing height	50	74.6	17	25.4
From the bed	8	88.9	1	11.1
From a chair	1	33.3	2	66.7
Other	74	66.6	37	33.3
Intrinsic factors				
Loss of balance	33	82.5	7	17.5
Muscle weakness	23	95.8	1	4.2
Dizziness/vertigo	21	91.3	2	8.7
Difficulty walking	20	100.0	0	0.0
Other	12	92.3	1	7.7
Extrinsic factors				
Uneven flooring	14	93.3	1	6.7
Slippery flooring	13	61.9	8	38.1
Step/change in floor level	7	77.8	2	22.2
Rugs	5	83.3	1	16.7
Objects on the floor	3	42.9	4	57.1
Other	35	77.8	10	22.2
Consequences of the falls				
Hospital admission	8	80.0	2	20.0
Surgery	2	50.0	2	50.0
Stitches	7	100.0	0	0.0
Closed fracture	2	50.0	2	50.0
Scrapes	32	86.5	5	13.5
Sprain or dislocation	0	0.0	2	100.0
Impaired walking	27	81.8	6	18.2
Dependency in day-to-day actions	12	100.0	0	0.0
Fear of falling again	46	85.2	8	14.8
Other	32	91.4	3	8.6

Brazilian states with subjects aged 65 and over. Higher rates of prevalence have been found in other national studies.[7,14]

The prevalence of frailty among the elderly living in the community in the United Sates was estimated to be 6.9%, varying from 3.2% among those aged 65 to 70, to 23.1% in those aged over 90,[9] considerably different to the percentage found here (63.7%). However, that study, in contrast to this one, used phenotypic evidence to assess falls.

The rate of prevalence of falls in the frail elderly was 38.6%, a figure which is higher than those found in studies conducted in the United States (20.5%[23] and 14%[5]).

The mean was 1.61 and the median was two falls in frail subjects, a figure higher than epidemiological data on falls which estimate 0.7 falls/person/year, with and interval of 0.2 to 1.6.[16]

Around 39.1% of elderly people are frail and frailty syndrome is more closely related to females. Fried et al[9] linked frailty to different variables such as low household income, suffering from chronic illness and sarcopenia, which are more commonly observed in females. Similar data were observed in research conducted by Varela-Pinedo et al,[22] in Peru, and by Fabricio-Wehbe,[f] in Brazil.

Ensrud et al,[5] using the rate of the Study of Osteoporosis Fractures (SOF), identified 13% of frail elderly subjects. Woods et al[23] verified that, of those aged between 70 and 79, 61.6% are frail and, of those aged between 65 and 69, this rate is 38.4%.

The frail elderly are more likely to suffer falls. There are few published studies on this topic, as it is only recently that this area of gerontology has become a concern. Veras et al[24] report that the elderly who need more care are those who have the highest degrees of frailty, as well as having a higher probability of falling ill, being admitted to hospital and suffering falls.

Research carried out by Ensrud et al[5] and Galucci et al[10] observed that the occurrence of falls among the elderly was related, in the majority of cases, to frailty syndrome. This caused serious functional incapacity and may increase the risk of the elderly subject ending up in a care home.

Ensrud et al[5] showed that there was a strong association between frailty and the risk of suffering falls, breaking the him, decreasing functional capacity and hospital admission; they also reinforced the concept of frailty as a geriatric syndrome.

[f] Fabricio-Wehbe SCC. Adaptação cultural e validade da "Edmonton Frail Scale (EFS) – escala de avaliação de fragilidade em idosos [tese de doutorado]. Ribeirão Preto: Escola de Enfermagem de Ribeirão Preto da Universidade de São Paulo; 2008.

Table 3. Prevalence of falls in elderly subjects according to the situation of frailty and among frail subjects according to sex and age group. Ribeirão Preto, Southeastern Brazil, 2011.

Variable	Fall (Yes)		Fall (No)		RP	RCP	p[a]
	n	%	n	%			
Prevalence	59	38.6	94	61.4			
Frailty (n = 240)							
Frail	59	38.6	94	61.4	1.598 (1.047;2.438)	1.973 (1.094;3.556)	0.023
Non frail	21	24.1	66	75.9			
Frail elderly subjects (n = 153)							
Sex							
Male	18	30.5	38	40.4	0.647 (0.324;1.291)	0.760 (0.487;1.188)	0.215
Female	41	69.5	56	59.6			
Age group							
Younger elderly subjects	35	59.3	64	68.1	0.684 (0.347;1.345)	0.795 (0.533;1.186)	0.270
Older elderly subjects	24	40.7	30	31.9			

RP: ratio of prevalence; RCP: radio of prevalence
[a] Test[2]
[b] Younger elderly subjects: 60 to 79
[c] Older elderly subjects: 80 and over

Silva et al[18] did not find any significant differences between the degree of frailty and the occurrence of falls, in contrast to the results of this study, in which those elderly subjects who suffered falls had a higher probability of being frail. Longitudinal studies may better explore the relationship between cause and effect and outcomes. Fried et al[9] reported that the elderly had a greater chance of falling.

Frailty and falling may be bi-directionally linked. Thus, just as falling may lead to the elderly person becoming frail, so frailty may lead to falling. This study, however, did not establish causality between these variables, as the data were collected in a transversal manner, i.e., the variables were measured once, simultaneously.

The location of the fall varied. Findings of studies on the topic were similar, suggesting that falls occur predominantly at home, especially in the living room, followed by the bathroom and the kitchen. Similar results were reported by Gai et al,[g] according to whom the main consequence were: serious injury, including fractures and scrapes. Shin et al[17] showed that falls cause fractures and injuries needing stitches, and these were the most serious consequences.

Nunes et al[13] stated that falling may lead to decreased functional capacity. This is related to the interaction of multi-dimensional factors which include aspects interlinked with mental and physical health in the elderly. Woods et al[23] and Ensrud et al[5] reported that frailty is one of the causes which may lead the elderly to need care in a residential or care home.

Elderly people who fall repeatedly, and who also have a certain degree of frailty, may be considered a group at high risk of falling again, a risk which increases with age. The consequences may or may not be serious, and may generate a high cost to society (cost of hospital admission, treatment and rehabilitation), and significant costs for the family due to the need to change the physical environment, the dependence and care of the elderly by either a family member or a carer.

"Post-fall" syndrome is among the main consequences described[6] and it cited in the research by Carvalhaes et al[h] involving elderly subjects aged between 75 and 84. The authors identified that the difficulties they encountered in carrying out tasks they considered to be complex may create a higher probability of suffering fall. Elderly people with a history of falling and of co-morbidities may find the day to day activities they are able to carry out reduced, which contributes to them becoming frailer.[23] This situation may have a psycho-social impact, such as "post-fall" syndrome", further limiting their activities.

The results of this study may lead health care professionals to reconsider the importance of these two geriatric syndromes: falling and frailty, which afflict this population, restricting their functional capacity.

[g] Gai J. Fatores associados a quedas em mulheres idosas residentes na comunidade [dissertação de mestrado]. Brasília (DF): Universidade Católica de Brasília; 2008.
[h] Carvalhaes N, Rodrigues RAP, Costa Júnior ML. Quedas. In: 1o Congresso Paulista de Geriatria e Gerontologia; 1998 jun 24-27; São Paulo, Brasil. Consensos de Gerontologia. São Paulo: Sociedade Brasileira de Geriatria e Gerontologia; 1998. p.5-18.

One of the limitations of the cross-sectional study and that it is not able to determine frailty as one of the predictors of falling. In order to do this, follow up studies are needed to assess this syndrome.

Health care for the frail elderly, especially bearing in mind greater life expectancy and the diverse syndromes resulting from the ageing process, calls for greater investment in strategies for promoting health and preventing accidents. Among these accidents, evaluating the risk of falls, as well as training human resources to deal with this eventuality, is a fundamental strategy for the health care of this population.

REFERENCES

1. American Geriatrics Society; Geriatrics Society; American Academy of Orthopaedic Surgeons Panel on Falls Prevention. Guideline for the prevention of falls in older persons. *J Am Geriatr Soc*. 2001;49(5):664-72. DOI:10.1046/j.1532-5415.2001.49115.x
2. Bergman H, Béland F, Karunananthan S, Hummel S, Hogan D, Wolfson C. Développement d'un cadre de travail pour comprendre et étudier la fragilité. *Gerontol Soc*. 2004;109:15-29.
3. Camarano AA. Mulher idosa: suporte familiar ou agente de mudança? *Estud Av*. 2003;17(49):35-63. DOI:10.1590/S0103-40142003000300004
4. Carvalho Neto N. Envelhecimento bem sucedido e envelhecimento com fragilidade. In: Ramos LR, Toniolo Neto J, editores. Guias de medicina ambulatorial e hospitalar: UNIFESP - Escola Paulista de Medicina. São Paulo: Manole; 2005. p.9-25.
5. Ensrud KE, Ewing SK, Cawton PM, Fink HA, Taylor BC, Cauley JA, et al. A comparison of frailty indexes for the prediction of falls, disability, fractures and mortality in older men. *J Am Geriatr Soc*. 2009;57(3):492-8. DOI:10.1111/j.1532-5415.2009.02137.x
6. Fabrício SCC, Rodrigues RAP, Costa Júnior ML. Causas e consequências de quedas de idosos atendidos em hospital público. *Rev Saude Publica*. 2004;38(1):93-9. DOI:10.1590/S0034-89102004000100013
7. Fabrício-Wehbe SCC, Schiaveto FV, Vendrusculo TRP, Haas VJ, Dantas RAS, Rodrigues RAP. Adaptação cultural e validade da *Edmonton Frail Scale* - EFS em uma amostra de idosos brasileiros.*Rev Latino-Am Enferm*. 2009;17(6). DOI:10.1590/S0104-11692009000600018
8. Fairhall N, Aggar C, Kurrle SE, Sherrington C, Lord S, Lockwood K, et al. Frailty intervention trial (FIT). *BMC Geriatr*. 2008;8:27. DOI:10.1186/1471-2318-8-27
9. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci*. 2001;56(3):M146-57. DOI:10.1093/gerona/56.3.M146
10. Gallucci M, Ongaro F, Amici GP, Regini C. Frailty, disability and survival in the elderly over the age of seventy: evidence from "The Treviso Longeva (TRELONG) Study. *Arch Gerontol Geriatr*. 2009;48(3):281-3. DOI:10.1016/j.archger.2008.02.005
11. McGoldrick M. As mulheres e o ciclo de vida familiar para a terapia familiar. In: Carter B, McGoldrick M, et al. As mudanças no ciclo de vidafamiliar: uma estrutura para a terapia familiar. Porto Alegre: Artes Médicas; 1995. p.30-64.
12. Nowak A, Hubbard RE. Falls and frailty: lessons from complex systems. *J R Soc Med*. 2009;102(3):98-102. DOI:10.1258/jrsm.2009.080274
13. Nunes MCR, Ribeiro RCL, Rosado LEFPL, Franceschini SC. Influência das características sociodemográficas e epidemiológicas na capacidade funcional de idosos residentes em Ubá, Minas Gerais. *Rev Bras Fisioter*, 2009;13(5):376-82. DOI:10.1590/S1413-35552009005000055
14. Ribeiro AP, Souza ER, Atie S, Souza AC, Schilithz AO. A influência das quedas na qualidade de vida dos idosos. *Cienc Saude Coletiva*. 2008;13(4):1265-73. DOI:10.1590/S1413-81232008000400023
15. Rolfson DB, Majundar SR, Tsuyuki RT, Tahir A, Rockwood K. Validity and reliability of the Edmonton Frail Scale. *Age Ageing*. 2006;35(5):526-9. DOI:10.1093/ageing/afl041
16. Rubenstein LZ, Josephson KR. The epidemiology of falls and syncope. *Clin Geriatr Med*. 2002;18(2):141-58.
17. Shin KR, Kang Y, Hwang EH, Jung D. The prevalence, characteristics and correlates of falls in Korean community-dwelling older adults. *Int Nurs Rev*. 2009;56(3):387-92. DOI:10.1111/j.1466-7657.2009.00723.x
18. Silva SLA, Vieira RA, Arantes P, Dias RC. Avaliação de fragilidade, funcionalidade e medo de cair em idosos atendidos em um serviço ambulatorial de geriatria e gerontologia. *Fisioter Pesq*. 2009;16(2):129-5. DOI:10.1590/S1809-29502009000200005
19. Siqueira FV, Facchini LA, Piccini RX, Tomasi E, Thumé E, Silveira DS, et al. Prevalência de quedas em idosos e fatores associados. *Rev Saude Publica*. 2007;41(5):749-56. DOI:10.1590/S0034-89102007000500009
20. Stalenhoef PA, Diederiks JPM, Knottnerus JA, Kester ADM, Crebolder HFJM. A risk model for the prediction of recurrent falls in community-dwelling elderly: A prospective cohort study. *J Clin Epidemiol*. 2002;55(11):1088-1094. DOI: 10.1016/S0895-4356(02)00502-4.
21. Tinetti ME, Speechley M, Ginter SF. Risk Factors for falls among elderly persons living in the community. *N Engl J Med*. 1988;319(26):1701-1707. DOI:10.1056/NEJM198812293192604.
22. Varela-Pinedo L, Ortiz-Saavedra PJ, Chávez-Jimeno H. Síndrome de fragilidad en adultos mayores de la comunidad de Lima Metropolitana. *Rev Soc Peru Med Intern*. 2008;21(1):11-5.

23. Veras RP, Caldas CP, Coelho FD, Sanchéz MA. Promovendo a saúde e prevenindo a dependência: identificando indicadores de fragilidade em idosos independentes. *Rev Bras Geriatr Gerontol*. 2007;10(3):355-70.

24. Woods NF, La Croix AZ, Gray SL, Aragaki A, Cochrane BB, Brunner RL, et al. Frailty: emergence and consequences in women aged 65 and older in the Women's Health Initiative Observational Study. *JAm Geriatr Soc*. 2005;53(8):1321-30. DOI:10.1111/j.1532-5415.2005.53405.x

This research was financed by the National Council for Scientific and Technological Development (grant CNPq-PEC-PG). The authors declare that there are no conflicts of interests.