Original Article

Prevalence and factors associated with fear of falling in elderly people with no history of falls*

Prevalência e fatores associados ao medo de cair em idosos sem histórico de quedas

Prevalencia y factores asociados al miedo a las caídas en personas mayores sin antecedentes de caídas

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Abstract: Objective: to analyze the prevalence and factors associated with the fear of falling in community-dwelling elderly people with no history of falls. **Method:** a cross-sectional study, conducted between June and August 2018, with 140 people aged 65 years or older with no history of falls, registered in the Family Health Strategies. The dependent variable was assessed by the Falls Efficacy Scale - International - Brazil and the explanatory variables by questionnaire and validated instruments. Descriptive and bivariate analyses were performed, as well as the Poisson multiple regression model. **Results:** the prevalence of fear of falling was 65%. The factors associated with the dependent variable were depressive symptoms plus polypharmacy use and social group attendance. **Conclusion:** the prevalence found of fear of falling was high. There was an association of the outcome with the interaction of polypharmacy and depressive symptoms and the variable frequent social group presented as a protective factor.
Descriptors: Aged; Fear; Accidental Falls; Geriatric Nursing; Cross-Sectional Studies

Resumo: Objetivo: analisar a prevalência e os fatores associados ao medo de cair em idosos sem histórico de quedas residentes na comunidade. **Método:** estudo transversal, realizado entre os meses de junho e agosto de 2018,

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com 140 pessoas de 65 anos ou mais sem histórico de quedas, cadastrados nas Estratégias de Saúde da Família. A variável dependente foi avaliada pela *Falls Efficacy Scale - International -* Brasil e as explicativas por questionário e instrumentos validados. Foram empreendidas análises descritiva, bivariada e o modelo de regressão múltipla de *Poisson*. **Resultados:** a prevalência do medo de cair foi de 65%. Os fatores associados à variável dependente foram sintomas depressivos mais uso de polifarmácia e frequentar grupo social. **Conclusão:** a prevalência encontrada do medo de cair foi alta. Houve associação do desfecho com interação de polifarmácia e sintomas depressivos e a variável frequenta grupo social apresentou-se como fator de proteção.
Descritores: Idoso; Medo; Acidentes por Quedas; Enfermagem Geriátrica; Estudos Transversais

Resumen: Objetivo: analizar la prevalencia y los factores asociados al miedo a las caídas en personas mayores sin antecedentes de caídas residentes en la comunidad. **Método:** estudio transversal, realizado entre junio y agosto de 2018, con 140 personas de 65 años o más sin antecedentes de caídas, registradas en las Estrategias de Salud de la Familia. La variable dependiente se evaluó mediante la Falls Efficacy Scale - International - Brasil y las variables explicativas mediante un cuestionario e instrumentos validados. Se realizaron análisis descriptivos, bivariados y el modelo de regresión múltiple de Poisson. **Resultados:** la prevalencia del miedo a caer fue del 65%. Los factores asociados a la variable dependiente fueron los síntomas depresivos más el uso de polifarmacia y la asistencia a un grupo social. **Conclusión:** se encontró que la prevalencia del miedo a las caídas es alta. El resultado se asoció con la interacción de polifarmacia y síntomas depresivos, y la variable grupo social frecuentado fue un factor protector.
Descriptores: Anciano; Miedo; Accidentes por Caídas; Enfermería Geriátrica; Estudios Transversales

Introduction

The fear of falling (FF) is one of the most important threats to the independence and autonomy of the elderly, as it causes physical, functional and psychosocial changes, with negative impacts on the lives of these individuals and health professionals, added to the increase in demand and care costs.[1-2]

It is associated with negative health outcomes, initiating a spiral of debilitating events that can culminate in falls, functional decline, institutionalization and hospitalization, negatively impacting the quality of life of the elderly.[1,3-4] It is a phenomenon present in the lives of the elderly and can persist in a significant portion of them, regardless of the history of falls.[5-6]

Although there is knowledge about the prevalence of FF in elderly people with no history of falls, studies have presented these frequencies in this population only as a secondary outcome[7-8] and the factors that may lead these elderly people to develop FF are still unclear.

A systematic review study that investigated the prevalence of FF among elderly people who have fallen and those who have not fallen showed that the FF among those who have not fallen is higher than 50.0%.[7] Another literature review study conducted in the United States showed a prevalence of FF of 12% to 65% in elderly who have not fallen.[8]

As far as falls are concerned, the association between FF and this event is well established. There is a bidirectional relationship in which older people are more likely to fall and from that moment on they can develop FF. Likewise, it is known that both FF and falls result from common risk factors, such as having advanced age, being female, having balance and gait disturbances, having depressive symptoms, mobility deficit, activity restriction, and reduced social activities.[3,9]

So far, no studies were found aiming to verify the factors associated with FF exclusively in the elderly without a history of falls, which makes it relevant to know the particularities of this phenomenon in this population. Given the above, the question arose: what factors are associated with FF in the elderly without a history of falls living in the community?

The identification of factors associated with FF in the elderly who have never fallen is important to expand the knowledge about the phenomenon and plan care actions that can prevent and/or minimize FF in these individuals. The study aimed to analyze the prevalence and factors associated with FF in elderly people with no history of falls living in the community.

Method

Cross-sectional study, with probability sampling, undertaken with people aged 65 years or older, registered in 11 Family Health Strategy (FHS) units located in the Northern region of the city of Cuiabá, Mato Grosso, Brazil.

The sample size calculation was performed from the universe of 1804 elderly individuals aged 65 years or older, registered in the FHS, based on a finite population, confidence level of

95%, sampling error of ±8%. Considering the variation of 12% to 65% in the proportion of elderly individuals with FF without history of falls found in the literature,[8] and not finding more exact values in the Brazilian literature, we adopted the median of 38% as the most parsimonious value for the sampling, and this prevalence was the most representative for this study. The minimum sample required for this study was 131 elderly individuals, however, nine more elderly individuals were included who expressed their desire to participate in the study during data collection, totaling 140 participants.

The study included people 65 years of age or older, registered at the FHS and living in the urban area, walking in the orthostatic position, with or without a walking aid, with preserved cognitive and communication skills assessed by the Mini Mental State Examination (MMSE).[10] Bedridden elderly individuals, wheelchair users, those who reported having fallen at least once after turning 60, those with stroke sequelae, hearing and visual impairment, those suffering from Parkinson's and Alzheimer's diseases, as well as other mobility and/or vestibular deficits reported by the elderly individuals themselves or their caregivers, were excluded. Elderly people not found after three search attempts or, in cases of death, were replaced by a new lottery.

Data collection was conducted between the months of June and August 2018 by means of a structured interview in the homes of the elderly, by the main researcher accompanied by community health agents, after signing the Informed Consent Form, which ensured that there were no missing data regarding the variables of interest.

For the characterization of independent variables, we used a structured questionnaire of sociodemographic data and health conditions and assessment instruments validated in Brazil. The independent variables studied were age group, gender, marital status, occupational status, years of study, family arrangement and income, self-assessment of health, self-reported health problem and number of problems, self-reported vision and hearing alterations, continuous use of medication, main medication, polypharmacy - defined as the concomitant use of five or more

medications[11] prescribed or not, practice of physical activity, functional capacity, mobility, mood, and nutritional status performed through anthropometric measurements, classified as underweight (BMI ≤ 22), eutrophic (BMI >22 and <27), and overweight (BMI≥27).[12]

Validated instruments such as the Katz scale[13] were also used to assess the functional abilities of the elderly in the performance of activities of daily living (ADL). The elderly who reported performing all activities independently without the need for help were classified as independent, and those who reported needing help to perform at least one of the activities were classified as dependent.

To evaluate the functional abilities of the elderly in performing instrumental activities of daily living (IADL), the Lawton and Brody scale was used (score of 9 to 27 points).[14] The elderly who presented a score ≥19 points were classified as independent and those who presented a score ≤18 points were classified as dependent.

Mobility was assessed using the Timed Up and Go test, which evaluates the time (in seconds) it takes the elderly to get up from a chair where they are sitting with their backs supported, stand up, walk three meters, turn around, go back to the chair, and sit down again.[15] In this study, the elderly who performed the test in a time of up to 10 seconds were classified as normal (no mobility deficit), and those who performed the test in a time ≥11 seconds were classified as having mobility deficits.

The variable mood was evaluated using the Geriatric Depression Scale (GDS-15), composed of 15 questions in which the score can vary from 0 to 15 points.[16] Mood was rated as normal (0 to 5 points) and depressive symptoms (6 to 15 points).

The outcome variable, FF was obtained by means of the Falls Efficacy Scale - International - Brazil (FES-I-BRAZIL).[1,5,17-19] This instrument consists of 16 questions, scored on a Likert scale from 1 to 4, in which the participants identify the concern with the possibility of falling during the performance of ADLs, IADLs, and social participation, imagining how they normally perform the activity and, if they do not currently do it, answering as if they had to perform such activity.

The total score is obtained by the sum of the points that can vary from 16 to 64 points and allows the assessment of the degrees of FF. The elderly with a score of 16 to 22 points and the elderly with a score of 23 to 64 points were classified as not having FF.[18-19]

Data was managed using STATA software version 12.0. In the descriptive analysis, the variables were described in absolute (n) and relative (%) frequencies. In the bivariate analysis, the associations between the outcome variable (FF) and the other exposure variables were identified by calculating the prevalence ratio (PR) using the Mantel-Haenszel chi-square method or Fischer's exact test when necessary, with a 95% confidence interval. Two stratified analyses were carried out: the first, stratifying the comparison between sex and FF by age group; in the second, the use of polypharmacy variables were used in the stratification of the analyses to compare the presence of depressive symptoms and FF. The variables that presented p ≤ 0.20 were selected for multiple analysis by means of Poisson Regression, using the hierarchical method of variable inclusion. In the final model, by means of Poisson Regression to evaluate potential confounding effects not measured, the associations that presented a significance level lower than 0.05 were maintained.

The study was approved by the Research Ethics Committee of the Federal University of Mato Grosso, under opinion number 2.666.399 of 05/21/2018. All ethical precepts involving research with human beings were respected. This research is part of the multicenter study "Active aging: health promotion and prevention of functional and cognitive disability" (PROCAD Edital No. 071/2013) conducted with the support of the Coordination for the Improvement of Higher Education Personnel - Brazil - (CAPES).

Results

A total of 140 elderly individuals participated in this study. The prevalence of FF in the elderly without a history of falls is 65% (CI: 56.49 - 72.86), with a mean total score of the FES-I-BRAZIL in the evaluated population of 26.85 points.

Of the 91 elderly with FF, most (64.8%) are female, married (57.1%) and never studied (58.2%). A large part (46.1%) is in the age range of 70 to 79 years, with a mean age of 70.95 years (SD±5.27). There was a predominance of retired elderly (83.5%), with an income of up to one minimum wage (73.6%). Most of the elderly (53.8%) attend social groups such as church and community center.

Regarding health conditions, most of the elderly (86.8%) report having two or more health problems, of which the most frequent are vision problems (76.9%) and Systemic Arterial Hypertension (73.6%). Most (72.5%) of the elderly are independent to perform the basic and instrumental activities of daily living (69.2%). As for the perception of health 52.7% self-evaluate as regular, 54.9% make continuous use of up to four medications, mainly antihypertensive (72.5%). Most (84.6%) do not practice physical activity, most (45%) are overweight, and 52.7% have depressive symptoms.

In the bivariate analysis, the socio-demographic variables that were associated with FF were: female gender (PR=1.42 95% CI 1.08-1.86), age 70 years or older (PR=1.18 95% CI 0.92-1.51), retired (PR=2.09 95% CI 1.07-4.05), and social group attendee (PR=0.70 95% CI 0.55-0.89), the latter being a protective factor and the others risk factors for FF (Table 1).

Table 1 - Prevalence and prevalence ratio of FF in elderly who never fell according to socio-demographic characteristics. Cuiabá-MT, 2018.

Variables	Fear of falling			
	n/N[*]	%	RP[*] bruta (IC[*] 95%)	Value of p[§]
Sex				
Male	32/61	52.5	1	
Female	59/79	74.7	1.42 (1.08 - 1.86)	**0.006**
Age group				
65 - 69 years	41/69	59.4	1	
70 years and more	50/71	70. 4	1.18 (0.92 - 1.51)	**0.173**
Marital status				

With partner	52/81	64.2	1	
Without partner	39/59	66.1	1.02 (0.80 - 1.31)	0.816
Schooling in years				
4 years and more of study	26/37	70.3	1	
0 to 3 years	65/103	63.1	0.89 (0.69 - 1.16)	0.434
Family arrangement				
Accompanied	75/117	64.1	1	
Alone	16/23	69.6	1.08 (0.80 - 1.46)	0.616
Occupational status				
Working	6/18	33.3	1	
Retired	85/122	69.7	2.09 (1.07 - 4.05)	**0.002**
Per capita income				
More than 1 MW	15/26	57.7	1	
0 to 1 MW	76/114	66.7	1.15 (0.81 - 1.64)	0.388
Attends social group				
Yes	49/63	77.8	0.70 (0.55 – 0.89)	**0.004**
No	42/77	54.5	1	
Practices physical activity				
Yes	14/22	63.6	1	
No	77/118	65.2	1.02 (0.72 - 1.44)	0.884

N[*]=140; PR[†]: Prevalence Ratio; CI[‡] 95%: confidence interval for the 95% proportion; P§: significance level considering the Chi-Square distribution (p-value≤0.05). MW - minimum wage.

In relation to the bivariate analysis of the health condition variables and their relationship with FF, a statistically significant association was found with: hearing loss (PR=1.21 95% CI 0.93 - 1.57), polypharmacy (PR=1.21 95% CI 0.95-1.54), low weight/overweight (PR=1.34 95% CI 1.01-1.77), mobility deficit (PR=1.20 95% CI 0.92-1.56) and depressive symptoms (PR=1.32 95% CI 1.04-1.68) (Table 2).

Table 2 - Prevalence and prevalence ratio of FF in elderly who have never fallen according to health conditions. Cuiabá-MT, 2018.

Variables	Fear of falling			
	n/N[*]	%	Gross PR[†] (95% CI[‡])	Value of p§
Self-assessment of health				
Positive	29/40	72.5	1	
Negative	62/100	62	0.85 (0.66 - 1.09)	0.241
Reported health problem				

No	5/6	83.3	1	
Yes	86/134	64.2	0.77 (0.52 - 1.12)	0.337
Number of health problems				
Up to 1 problem	12/16	75	1	
2 or more	79/124	63.7	0.84 (0.62 - 1.16)	0.374
Reported health changes				
Vision				
No	21/33	63.6	1	
Yes	70/107	65.4	1.02 (0.76 - 1.37)	0.851
Hearing				
No	72/115	62.6	1	
Yes	19/25	76	1.21 (0.93 - 1.57)	**0.204**
Use of medication				
No	12/17	70.5	1	
Yes	79/123	64.2	0.90 (0.65 - 1.27)	0.607
Polypharmacy				
No	62/101	61.4	1	
Yes	29/39	74.4	1.21 (0.95 - 1.54)	**0.150**
Basic Activities of Daily Living (Katz)				
Independent	66/105	62.9	1	
Dependent	25/35	71.4	1.13 (0.87 - 1.46)	0.358
Instrumental Activities of Daily Living (L&B)				
Independent	63/99	63.6	1	
Dependent	28/41	68.3	1.07 (0.83 - 1.38)	0.600
Body mass index (BMI)				
Eutrophic	29/54	53.7	1	
Underweight/overweight	62/86	72.1	1.34 (1.01 - 1.37)	**0.026**
Mobility (TUG)				
Normal	33/57	57.9	1	
Mobiity deficit	58/83	69.9	1.20 (0.92 - 1.56)	**0.145**
Mood (GDS)				
Normal	43/76	56.6	1	
Depressive symptoms	48/64	75	1.32 (1.04 - 1.68)	**0.023**

N[*]=140; PR[†]: Prevalence Ratio; CI[‡] 95%: confidence interval for the 95% proportion; p§: significance level considering the Chi-Square distribution (p value≤0.05).

When stratifying the comparison between gender and FF by age groups dichotomized into 65 to 69 and 70 years and older, in both there were statistically significant associations. However, it is noted that among the younger elderly, female individuals showed a greater association with FF compared to men, in relation to the same comparison among the elderly (Table 3).

Table 3 - Prevalence ratio and confidence interval (95% CI) of sex and FF stratified by age group. Cuiabá, MT, Brazil, 2018.

Variable	FF		Without FF		PR[†]	CI[‡]	Value of p[§]
	n[*]	%	n[*]	%			
65 to 69 years							
Female	31	68.89	14	31.11	1.65	1.03-2.76	**0.029**
Male	10	41.67	14	58.33		1	
70 years and more							
Female	28	82.35	6	17.65	1.38	1.01-1.88	**0.036**
Male	22	59.46	15	40.54		1	

N[*]=140; PR[†]: Prevalence Ratio; CI[‡] 95%: confidence interval for the 95% proportion; p[§]: significance level considering the Chi-Square distribution (p value≤0.05).

In the comparison between the presence of depressive symptoms and FF, stratified by the use of polypharmacy, only among those who use polypharmacy there was this association (Table 4).

Table 4 - Prevalence ratio and confidence interval (95% CI) of depressive symptoms and FF stratified by polypharmacy use. Cuiabá, MT, Brazil, 2018.

Variable	FF		Without FF		PR[†]	CI[‡]	Value of p[§]
	n[*]	%	n[*]	%			
Does not use polypharmacy							
Presence of depressive symptoms	26	66.7	13	33.3	1.14	0.84-1.56	0.389
Absence of depressive symptoms	36	58.1	26	41.9		1	
Use of polypharmacy							
Presence of depressive symptoms	22	88	3	12	1.76	1.02-3.03	**0.019**
Absence of depressive symptoms	7	50	7	50		1	

N[*]=140; PR[†]: Prevalence Ratio; CI[‡] 95%: confidence interval for the 95% proportion; P[§]: significance level considering the Chi-Square distribution (p value≤0.05).

Finally, for multiple analysis, using the hierarchical Poisson Regression model, all variables with p≤0.20 were included. Of these, the variables frequenting social groups and use of polypharmacy with depressive symptoms remained associated with FF (Table 5).

Table 5 - Analysis of the final Multiple Poisson Regression model for variables associated with FF in elderly who have never fallen. Cuiabá, MT, Brazil, 2018.

Variables	PR* (95% CI⁺)	Value of p⁺
Attends social group	0.74 (0.58 – 0.93)	0.021
Polypharmacy and depressive symptoms	1.37 (1.12 – 1.67)	0.002

PR*: Prevalence Ratio; CI⁺95%: confidence interval for the 95% proportion; p⁺: Significance level considering the Chi-Square distribution (p-value≤0.05). Adjusted for the variable sex.

Discussion

This is pioneering research because it is one of the first studies that specifically investigated the factors associated with FF in community-dwelling elderly individuals with no history of falls. The high prevalence of FF in the elderly found in this research is not surprising and may be related to the older age of the participants. It is known that, as age advances, changes inherent to aging can influence the evaluation of the elderly as to their risk of falling, such as physical-functional decline and decreased physiological reserves, alterations in the musculoskeletal, neuromuscular, and sensory systems.[5] In addition, the emergence of new chronic conditions such as osteoporosis and musculoskeletal diseases, weakness, pain, imbalance, and walking difficulties,[1,20] may also lead to increased FF.

Another explanation for this result may be the fact that most participants are female, because in addition to comorbidities, low bone density and loss of muscle mass due to hormonal decline,[1] make their bone and muscle structure more fragile compared to men.[21] In addition, when it comes to health, women are better able to identify risks.[1]

Most of the women participating in the study were classified as independent for both basic activities and instrumental activities of daily living. It is possible that, for having

knowledge about the risks and consequences of falls to which they are exposed when performing those activities, the elderly women develop the FF, even without ever having fallen.

In this study, in the elderly males in the age group 65 to 69 years the FF is lower than in those in the age group 70 years and older. This finding can be explained by the fact that younger elderly men, despite their aging, tend to overestimate their physical capabilities and underestimate their functional limitations.[22] However, the FF among older men is close to that found in older women. Probably, the reason for this result is because men in this age group have greater limitations, since the changes resulting from aging accumulate progressively, which may contribute to the development of FF in older age.[5,17]

The variables commonly associated with FF, such as dependence to perform ADL and IADL, mobility deficit, negative self-perception of health, advanced age and female gender, were not associated with FF in this study. One possible explanation is that older adults with a history of falls may present different characteristics from those who have never fallen.

One of the main results of this study is the association between FF and the presence of depressive symptoms plus polypharmacy use. That is, when people who have depressive symptoms use polypharmacy, the risk of developing FF is higher.

The association between FF and depressive symptoms is a finding supported by other results found in the literature.[22-23] It is possible that the presence of depressive symptoms is a risk factor for the development of FF, since they can compromise gait and balance, as they are often accompanied by fatigue and decreased energy, interfering with body stability and functional abilities, making the elderly less secure and confident in their physical abilities leading them to have FF.[22-23]

Pharmacological treatment aimed at depressive symptoms such as anxiolytics, antidepressants and antipsychotics, can have effects on the central nervous system that alter cognitive and psychomotor aspects of the body and its main effects can be sedation, hypnosis and muscle relaxation.[24]

In the case of the elderly, the characteristics of aging such as reduced functional reserves and physiological changes can alter both pharmacokinetics and pharmacodynamics, and may result in reduced or increased bioavailability of the drug due to changes in drug absorption, metabolism, distribution, and elimination.[24-25] When added to polypharmacy, it can contribute to the occurrence of drug-related problems such as the accentuation of depressive symptoms, drug interactions, and adverse reactions.[26]

Iatrogenic occurrences due to medications can lead to altered balance, postural hypotension, drowsiness, decreased reflexes, dizziness, bradycardia, fatigue, and the need to urinate more frequently.[10,24] To the extent that these factors occur at the same time, it may increase the chance of the elderly developing FF.

In this study, attending social groups was found to be a protective factor for FF. This association was identified in a previous study conducted with elderly people.[27] This probably occurs because the elderly in social groups establish relationships that provide encounters with people with similar conditions. These meetings allow them to exchange information and construct significant knowledge about their daily lives[28], favoring the knowledge about falls and the consequences that their peers had.

Although the current pandemic context caused by Covid-19 requires preventive measures such as social distancing, the participation in groups also allows the elderly to establish new bonds and friendships, which contribute to a better quality of life.[28] In addition, the groups provide self-care practices through physical activities that remove the elderly from a sedentary condition, influencing their physical and psychological health.[29]

Community involvement can be a significant factor in improving the perception of personal confidence, as it can promote physical, cognitive, and psychological well-being[30] and contribute to reducing the occurrence of FF. This participation may be resumed by the elderly to the extent that the population is vaccinated and the spread of the virus is reduced.

One can point out as a limitation the fact that the information was obtained by self-report, and there may be underestimation of the prevalence of some health conditions, as well as the possibility of other biases, especially memory bias. However, the use of the FES-I-BRAZIL, considered the gold standard for the study of this phenomenon, allows the results to be comparable with other national and international publications that study FF.

The results of this study indicate that health professionals should include in the geriatric evaluation the identification of FF in the elderly who have never fallen, to the extent that this phenomenon can bring negative impacts on the lives of these elderly, putting their autonomy and independence at risk. They can also support the planning of actions aimed at health promotion, prevention and reduction of FF in the elderly, clarifying doubts about the FF and the repercussions it can generate in the lives of the elderly, family members and caregivers, especially in those with modifiable risk factors such as polypharmacy and depressive symptoms.

Conclusion

The prevalence of FF in the elderly with no history of falls was high. The concomitant presence of polypharmacy and reference of depressive symptoms was predictive of FF. The participation in social groups was inversely associated with the reference of FF and presented as a protective factor.

These results are important because they demonstrate the importance of assessing FF in all elderly people in order to identify this condition early. This directly impacts the clinical practice of health professionals, since this phenomenon causes physical, functional, and psycho-emotional changes in the lives of older people. In addition, it points to the need to plan fall prevention actions and establish appropriate strategies to ensure healthy aging.

It is suggested that new studies on FF be carried out with the elderly population without a history of falls in order to compare with the results presented, as well as to verify the effectiveness of interventions to reduce the FF in these elderly.

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