Factors associated with falls in older adults: a household survey

Fatores associados a quedas em idosos: inquérito domiciliar

Factores asociados con las caídas de mayores: encuesta domiciliaria

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ABSTRACT

Objective: To identify the prevalence of falls at home among older adults and associated factors. **Methods:** This quantitative observational and analytical cross-sectional study used a household survey of 212 older adults treated at a Primary Health Care Center in Fortaleza, Ceará, Brazil, to check for relationships of demographic, social and clinical aspects with self-reported falls in the past 12 months. Descriptive analysis was performed using absolute and percentage frequencies. Inferential analysis consisted of an unadjusted model to test the association between the outcome (occurrence of falls) and the associative variables using the Wald Test with a significance threshold set at p<0.20 for inclusion in the model. Poisson Regression was used in the adjusted model considering p<0.05. **Results:** The prevalence rate of falls was 63.7%, with a predominance of people aged between 60 and 79 years old (63.7%), women (53.8%), people who used carpets at home (66.5%), and people who had two or more comorbidities (41.5%). The occurrence of falls was associated with female gender (PR=1.96; p<0.03), history of two or more comorbidities (PR=0.407; p<0.04), and episodes involving carpets (PR=1.975; p<0.03). **Conclusion:** There was a high prevalence of falls in the older adults analyzed. The identification of factors, the prevention of comorbidities and the removal of slippery accessories from the house are changes that can be encouraged by health professionals.

Descriptors: Aged; Risk Factors; Accident Prevention; Primary Health Care.

RESUMO

Objetivo: *Identificar a prevalência de quedas e fatores associados em idosos no ambiente domiciliar.* ***Métodos:*** *Estudo transversal quantitativo, tipo inquérito domiciliar, observacional e analítico, realizado com 212 idosos atendidos em uma Unidade de Atenção Primária, em Fortaleza, Ceará, que relacionou aspectos demográficos, sociais e clínicos correspondendo ao autorrelato de quedas nos últimos 12 meses. A análise descritiva foi realizada por meio de frequências absolutas e percentuais. A análise inferencial ocorreu no modelo não ajustado para teste da associação entre o desfecho (ocorrência de quedas) e as variáveis associativas por meio do teste do qui-quadrado de Wald, considerando p<0,20 como critério de entrada, e, no modelo ajustado, utilizou-se a regressão de Poisson, considerando-se p<0,05.* ***Resultados:*** *A prevalência de quedas foi de 63,7%, com predomínio*

em pessoas na faixa etária entre 60 e 79 anos de idade (63,7%), do sexo feminino (53,8%), que usavam tapetes no domicílio (66,5%) e apresentavam duas ou mais comorbidades (41,5%). Sua ocorrência foi associada ao sexo feminino (RP=1,96; p<0,03), com histórico de duas ou mais comorbidades (RP=0,407; p<0,04) e episódios que envolveram tapetes (RP=1,975; p<0,03). **Conclusão:** Encontrou-se elevada prevalência de quedas nos idosos investigados. A identificação dos fatores, a prevenção de comorbidades e a remoção de acessórios escorregadios nos domicílios constituem mudanças que podem ser estimuladas pela abordagem dos profissionais de saúde.

Descritores: Idoso; Fatores de Risco; Prevenção de Acidentes; Atenção Primária à Saúde.

RESUMEN

Objetivo: Identificar la prevalencia de caídas y sus factores asociados en mayores en el ambiente domiciliario. **Métodos:** Estudio transversal cuantitativo del tipo encuesta domiciliaria, observacional y analítico con 212 mayores asistidos en una Unidad de Atención Primaria de Fortaleza, Ceará, Brasil, el cual ha relacionado los aspectos demográficos, sociales y clínicos de los relatos de caídas en los últimos 12 meses. El análisis descriptivo ha sido realizado a través de las frecuencias absolutas y porcentuales. El análisis inferencial se dio con el modelo no ajustado para la prueba de asociación entre el resultado (ocurrencia de caídas) y las variables asociativas a través de la prueba de chi-cuadrado de Wald, considerando p<0,20 como el criterio de entrada y, para el modelo ajustado, se utilizó la regresión de Poisson considerándose p<0,05. **Resultados:** La prevalencia de las caídas ha sido del 63,7% con el predominio de personas en la franja de edad entre 60 y 79 años de edad (63,7%), del sexo femenino (53,8%), que usaban alfombras en el domicilio (66,5%) y que presentaban dos o más comorbilidades (41,5%). Su ocurrencia se ha asociado con el sexo femenino (RP=1,96; p<0,03), el histórico de dos o más comorbilidades (RP=0,407; p<0,04) y los episodios con alfombras (RP=1,975; p<0,03). Conclusión: Se ha encontrado una elevada prevalencia de caídas en los mayores investigados. La identificación de los factores, la prevención de las comorbilidades y la remoción de los accesorios resbaladizos en los domicilios son cambios que se puede estimular a través del abordaje de los profesionales sanitarios.

Descriptores: Anciano; Factores de Riesgo; Prevención de Accidentes; Atención Primaria de Salud.

INTRODUCTION

Falls in older adults are seen as an important public health problem related to risk factors that can lead to disabilities, injuries and death. They are considered geriatric syndromes that affect people's ability to manage their own lives as a result of physical, psychological, social and economic disabilities[1]. By definition, falls are generally associated with unintentional displacement of the body when the support sought is not found, and they are caused by multifactorial circumstances which can result in physical and psychological damage[2].

According to the World Health Organization (WHO), prevalence rates for at least one fall episode per year in people over 65 years of age range 28%-35%. In people aged over 70 years, prevalence rates range 32%-42%[3]. Official data from the Ministry of Health of Brazil obtained through services delivered by the Unified Health System (*Sistema Único de Saúde – SUS*), there were 93,312 hospitalizations of people over 60 years of age who suffered a fall episode in 2013. Of all these cases recorded, 8,775 people died from this cause[4]. In Brazil, falls are one of the main reasons for hospitalization and causes of accidental death of people over 65 years of age. It is also a major cause of morbidity and mortality, with rates above those for age-related diseases, such as non-communicable diseases[5].

Fall-related morbidity and mortality in older adults is a topic of great relevance, but these injuries are still not being satisfactorily recorded or are underreported[6].

International studies have found fall prevalence rates among older adults to be 21% in East Asia[7] and 19.1% in Poland[8]. In Brazil, studies have shown different prevalence rates for the same condition in different municipalities, such as Natal (68.2%), Uberaba (28.3%)[9], Florianópolis (18.9%)[10], São Carlos (27.6%)[11], Cuiabá (37.5%)[12], Sete Lagoas (30%)[13] and Catanduva (51%)[14].

The Brazilian capitals had the highest records of falls of people aged 60 years or older. The records included both cases that resulted in death and hospitalizations associated with this condition. The highest rates of mortality were found in Vitória, Goiânia, Florianópolis and Porto Velho, which had the highest fall-related mortality rates. The capitals with the highest hospitalization rates were São Paulo, Natal, Belo Horizonte and Porto Alegre. Among the Brazilian regions, the Southeast, the Northeast and the Midwest, followed by the South and North, were the most representative for this condition[15].

In Ceará, a study analyzing scientific articles and interviewing 50 older adults found that 53.8% of the studies reported inadequacies of the environment as the main risk factors for falls. During the interviews, it was observed

that 42% of the interviewees had had an episode of fall in the last two years and that 57% of these were related to the domestic environment[16].

It should be noted, however, that 60 to 70% of the records of falls in older adults are related to episodes taking place at home or in its surroundings, and that the older the person, the greater the risk, especially for people over 75 years of age[17]. Therefore, it is understood that it is necessary to recognize the risk factors to develop preventive and health promotion measures in the community and in the households.

There are intrinsic risk factors, which are directly related to the older person, such as physiological changes in the life cycle, pathologies, use of medication and reduced functional capacity, and extrinsic risk factors, which are related to environmental conditions, such as exposure to slippery floors and carpets, poorly lit environments, absence of handrails, unstable furniture, and presence of animals[18]. Among institutionalized older adults, falls were related to diseases and the use of medications, with falls occurring mainly in the environment in which they lived, such as the bedroom, the hallway, and the bathroom[19].

Every day new tools are being used early to stratify people's risk of falling ill with different pathologies in their different life cycles in order to identify them early while they are still at their primary level, thereby facilitating the planning and development of actions for disease prevention and health promotion in the population[20].

Thus, it is understood that disease prevention and health promotion actions in the context of Primary Health Care related to risk factors that may lead to falls in older adults are still incipient. Furthermore, these activities must be included in the strategic planning of the work processes of the Family Health Strategy teams. Promoting health and seeking to build healthy spaces are ways to lead to the adoption of health education measures from the perspective and understanding of health problems in order to promote possible solutions[21].

This study is supported by the WHO's encouragement to expand the knowledge of predictors of falls in older adults as it understands that this is one of the pillars of the fall prevention model. In that regard, the objective of this study was to identify the prevalence of falls and the risk factors associated with falls at home among older adults.

METHODS

This is a quantitative observational and analytical cross-sectional study that used a household survey. We sought to follow all stages of the study, description and analysis of the object in a descriptive, clear, concise and coherent manner according to the standards of observational studies and the recommendations outlined in the Strengthening The Reporting of Observational studies in Epidemiology (STROBE) statement[22].

The research setting was the Primary Health Care Center (*Unidade de Atenção Primária em Saúde – UAPS*) located in the area covered by the Regional Secretariat IV, which has a population of approximately 51,160 inhabitants. The UAPS serves communities in the Dendê, Itaperi and part of Serrinha neighborhoods, and it is located in the Itaperi neighborhood. The selected Family Health team is called Serrinha 5 and has a registered older population of 330 people, 183 of whom are women and 147 are men.

Inclusion criteria were: being 60 years of age or older, being a resident in the coverage area, and being treated at the UAPS. Exclusion criteria were: any health condition that could generate bias in the study, such as having severe cognitive impairment, dementia, and Parkinson's disease in a severe or terminal stage. After applying the criteria, the sample comprised 212 older adults – 135 women and 77 men.

Data were collected in the older adults' households from February to May 2018 through semi-structured interviews, that is, interviews using closed- and open-ended questions on demographic, social and clinical aspects involving intrinsic and extrinsic factors corresponding to the self-report of falls in the last 12 months. The interviews were conducted by an ESF nurse, a community health worker (CHW), two medical students and a professor from the same university who trained the others to approach the older adults considering the ethical issues involved in the research.

The outcome variable in the present study was the occurrence of falls (yes or no). The explanatory variables were distributed as follows: Sociodemographic: sex, age, marital status, years of study and income; Environmental: characteristics of the dwelling (street conditions, presence of gardens, type of construction, type of dwelling) and household environment (number of rooms, presence or absence of stairs, type of floors, prevention system, lighting and bathroom characteristics, presence or absence of animals, type of animals and place of residence); Health status: whether or not the participant uses medication (number of pills, type of medication), whether or not the participant smokes, whether or not the participant drinks, presence or absence of comorbidities, regular physical activity or physical inactivity; Access to the health service: transportation used, number of times the participant sought care, whether or not the participant has had previous surgery, whether or not the participant has access to guidelines on

falls; and, finally, Information about falls: occurrence or absence of falls, how many times the participant has fallen before, what was the reason for falling, location of the fall, presence or absence of a fracture, presence or absence of another type of trauma after a fall; type of post-fall trauma; whether or not the participant has sought medical care, whether or not the participant has been hospitalized, whether or not the participant has taken any measures to prevent accidents after the fall; whether or not the participant has attended physical therapy.

A field journal was used for the observation of the household environment. The purpose was to take notes on the researcher's subjective impressions (perceptions, reactions, feelings, etc.). After collection, the data were tabulated in Excel version 11.0 and analyzed using the Statistical Package for the Social Sciences for Windows (SPSS) version 23.0.

Descriptive analysis was carried out by calculating absolute and percentage frequencies. In the unadjusted inferential analysis, the existence of an association between the outcome (occurrence of falls, absence of falls) and associative variables was tested using the Wald test considering as entry criterion the descriptive level p<0.20. In the adjusted multiple regression model, Poisson regression was used considering only the significant variables (p<0.05).

The study followed the determinations listed in Resolution No. 466 of December 12, 2012, which deals with Regulatory Guidelines and Norms for Research involving Human Beings. The study was approved by the Ethics Committee under Approval No. 2.482.985.

RESULTS

Interviewees were 212 older adults – 135 women and 77 men. Regarding the sociodemographic variables, most respondents were aged 60-79 years (n=179; 84.5%), women (n=135; 63.7%), unmarried (n=114; 53.8%), had a household income (n=202; 95.3%), and were retired (n=125; 58.9%).

As for housing conditions, 83.9% of the participants lived in houses located on poorly maintained streets with more than five rooms, inadequate floors and with carpets. Adequate lighting and easily accessible rooms were found in 98.5% of the houses, but there were no grab bars or bath chairs. Just over half (54.9%) of the participants had animals at home.

With regard to health status, 86.3% of the older adults reported using medications for health treatment, a history of comorbidities and previous surgeries. Another 68.3% of the participants used the primary health care center for their health needs and 97.2% said they had never received guidance on falls (Figure 1).
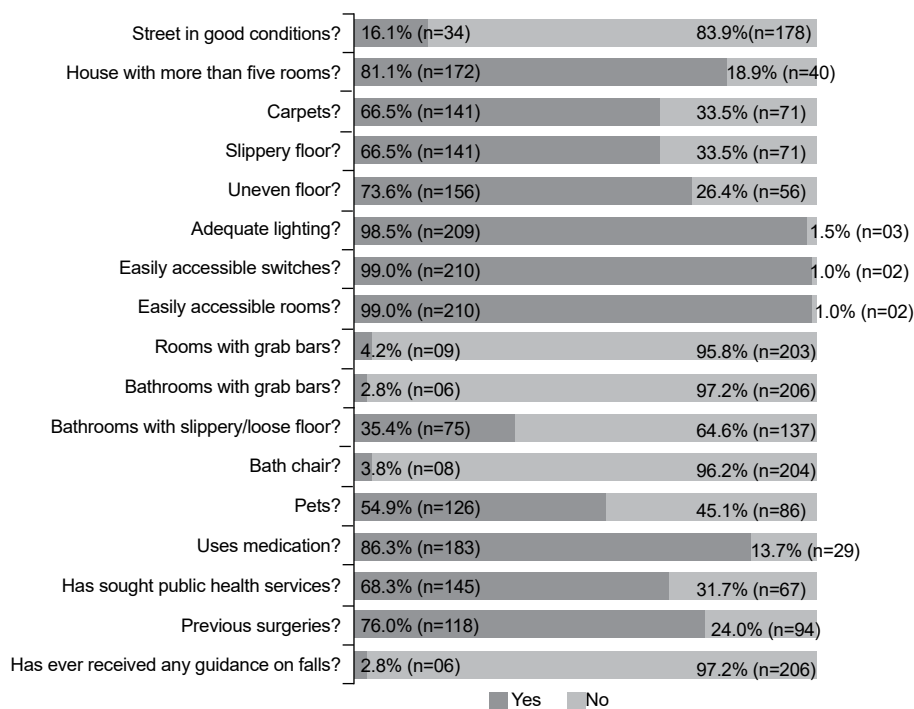
Source: own construction (2018)
Figure 1 - Characteristics of housing, health status and access to health services in the community by the older adults in the study. Fortaleza, 2018.

After checking for correlations between falls and associative variables in the statistical analysis in the unadjusted model (p<0.20), statistically significant correlations were found with the following variables: sex, marital status, use of carpets, type of floor, use of grab bars and health status (comorbidities) (Table I).

Table I - Occurrence of falls in relation to the associative variables in the unadjusted model. Fortaleza, Ceará, 2020.

Variables		Falls					PR	95%CI	p
		n	Yes	%	n	%			
Sex	Women	135	96	71.1	39	28.9	2.398	1.341 - 4.290	**0.003**
	Men	77	39	50.6	38	49.4			
Marital status	Married	98	57	58.2	41	41.8	1.13	0.951 - 1.343	**0.163**
	Unmarried	114	78	68.4	36	31.6			
Use of carpets	Yes	141	97	68.8	44	31.2	0.522	0.290 - 0.939	**0.003**
	No	71	38	53.5	33	46.5			
Type of floor	Ceramic tiles	161	106	65.8	55	34.2	3.81	0.917 - 3.673	**0.116**
	Cement	41	21	51.2	20	48.8			
	Other	10	8	80	2	20			
Use of grab bars	Yes	09	08	88.9	01	11.1	5.015	0.556 - 45.554	**0.151**
	No	203	127	62.6	76	3.7.4			
Health status	One comorbidity	124	69	55.6	55	44.4			
	More than one comorbidity	88	66	75	22	25	0.418	0.230 - 0.761	**0.004**

PR: prevalence ratio; 95%CI: 95% confidence interval. p: chi-squared test

The multivariate model adjusted using Poisson regression with a significance threshold of p<0.05 found statistically significant correlations with sex, use of carpets and comorbidities. Prevalence ratio for women was 1.960 compared to men, whereas prevalence ratio for use of carpets was 1.975 in relation to non-use of carpets, and prevalence ratio for more than one comorbidity was 0.407 in relation to one comorbidity. Therefore, the protective factors for falls in older adults found in the present study were: being men, not using carpets and having only one comorbidity (Table II).

Table II - Occurrence of falls in relation to the associative variables in the multivariate adjusted model. Fortaleza, Ceará, 2020.

Variables		PR	95%CI	P
Sex	Women	1.960	1.014 - 3.789	0.045
	Men			
Use of carpets	Uses carpets	1.975	1.38 - 3.760	0.038
	Does not use carpets			
Health status	More than one comorbidity	0.407	0.217 - 0.764	0.004
	One comorbidity			

PR: prevalence ratio; 95%CI: 95% confidence interval. p: chi-squared test

DISCUSSION

In the present study, after the final statistical analysis using the adjusted multivariate model, statistical significance was found in the analysis of risk factors: sex, use of carpets and comorbidities. The chance of falling was almost twice as high in women compared to men.

The identification of the female sex as a risk factor for the occurrence of falls may be related to greater exposure to domestic factors, clinical changes, illness resulting from less muscle strength, and chronic diseases. Some studies indicate an association of falls in women with older age, morbidities, not having a partner, lower levels of education, and use of medications[23,24].

Another risk factor found was the use of carpets, which causes twice as many falls in older adults than the non-use. Another study showed that extrinsic factors, such as carpets, are associated with inadequate environmental conditions in the older person's walking routine, causing falls inside the house or in its surroundings during the performance of their daily activities, such as walking or going to the bathroom, especially at night[25].

In line with these studies, researchers recommend avoiding the use of rugs and carpets – particularly at home – as a preventive measure. If there is a need for using them, they must be well fixed and stretched – preferably glued to the floor[26]. Preventive measures are still poorly implemented in the home environment due to lack of information on the part of the family and lack of training in preventive health on the part of health professionals[27].

The health status of the other adults was another significant intrinsic risk factor. In our study, people who had more than one comorbidity were more likely to fall than people who had only one comorbidity.

Comorbidities, such as cardiovascular diseases, high blood pressure, diabetes mellitus, lung disease, cancer, stroke, and osteoporosis, present in most older adults, increase the risk of falls and thus lead to greater vulnerability in the home environment and in the hospital environment, which can compromise functional capacity, autonomy and quality of life of older adults[28].

The final analysis also revealed some risk factors were not statistically significant, such as marital status, type of floor and use of grab bars. However, such factors deserve attention focused on prevention and health promotion actions at home.

With regard to marital status, living alone can lead to a higher risk of falls due to the older adult being unable to share daily tasks or not getting any help to carry out personal activities[29].

Risk factors related to environmental conditions, the type of floor and the use of grab bars also interfere with the risk of falls, thus requiring a financial investment to implement preventive measures that affect the social conditions of the older adults and their families[30].

Some limitations were observed while conducting the present study, including the difficult access to the house due to the family's distrust in participating in the study. Also, the study was carried out in a community assisted by only one Family Health team; thus, it may reflect a peculiar reality, although other studies in other regions have shown results that are similar to those found in the present study.

However, understanding that the etiology of falls in older adults is multifactorial, we emphasize that prevention and health promotion measures targeted at this age group require multiprofessional and multidisciplinary actions. It should also be noted that of the risk factors identified in this study, the prevention of comorbidities and the removal of slippery accessories at home are changes that can be encouraged by health professionals.

CONCLUSION

The 63.7% prevalence rate of falls found in the older adults analyzed occurred at home. Female gender, presence of two or more comorbidities, and presence of carpets inside the house were risk factors associated with falls.

CONFLICTS OF INTEREST

The manuscript does not present any relationships that may represent potential conflicts of interest.

CONTRIBUTIONS

All the authors participated in the conception and design of the study, in the analysis and interpretation of data, in the writing or relevant critical review of the intellectual content of the manuscript, in the final approval of the version to be published, and approved the final version sent, so that everyone has responsibility over all aspects of the work, including ensuring its accuracy and integrity.

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