

Characteristics and circumstances of falls leading to severe fractures in elderly people in Rio de Janeiro, Brazil

Características e circunstâncias das quedas seguidas de fratura grave entre idosos no Rio de Janeiro, Brasil

Evandro Silva Freire Coutinho ¹
Kátia Vergetti Bloch ²
Laura C. Rodrigues ³

Abstract

The circumstances associated with falls among elderly people have been well described in some developed countries, but little is known about such accidents in middle-income countries. The aim of this paper is to report the circumstances and characteristics associated with falls leading to severe fractures among elderly people living in Rio de Janeiro, Brazil. Cases were obtained from two case-control studies on risk factors for severe fractures due to falls among individuals 60 years or older. Fallers were stratified according to clinical and socio-demographic variables and circumstances of the accident. Women comprised three-fourths of the sample. The femur was the most frequently fractured bone, more common among individuals over 70 years of age. Most falls occurred at home, between 6:00 AM and 6:00 PM, but the rooms where they occurred differed according to gender and age. Most individuals did not attribute their falls to tripping or slipping. This sample's data did not differ substantially from studies in developed countries.

Aged; Accidental Falls; Bone Fractures

Introduction

Falls leading to severe fractures are a problem for the elderly and can lead to disability, severe morbidity, and death ^{1,2,3,4}.

The circumstances associated with falls leading to fractures have been well described in some developed countries, but little is known about such accidents in middle-income countries, where the elderly population is increasing rapidly. Knowledge of the characteristics and circumstances associated with these accidents can help plan preventive measures and treatment resources. This paper reports on the characteristics of individuals aged 60 years or older in Rio de Janeiro, Brazil, who sustained falls and required hospitalization, and the circumstances associated with these falls.

Method

Data were obtained from cases in two case-control studies ^{5,6} conducted to investigate risk factors and consequences of severe fractures due to falls among individuals 60 years or older, from 1998 to 2004. The five participating hospitals admitted about half the cases of fractures among the elderly in the city and are located in different geographic areas. Statistical significance for differences between men and women and age

¹ Escola Nacional de Saúde Pública Sergio Arouca, Fundação Oswaldo Cruz, Rio de Janeiro, Brasil.

² Instituto de Estudos em Saúde Coletiva, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brasil.

³ Department of Infectious and Tropical Diseases, London School of Hygiene & Tropical Medicine, London, U.K.

Correspondence

E. S. F. Coutinho
Departamento de
Epidemiologia e Métodos
Quantitativos em Saúde,
Escola Nacional de Saúde
Pública, Fundação Oswaldo
Cruz,
Rua Leopoldo Bulhões 1480,
sala 816, Rio de Janeiro, RJ
21041-210, Brasil.
esfcoutinho@ensp.fiocruz.br

groups was evaluated using the chi-square and Student's *t* tests.

The study was approved by the Institutional Review Board of the National School of Public Health, Oswaldo Cruz Foundation (ENSP-FIOCRUZ), Rio de Janeiro, Brazil.

Results

Analysis was based on 414 individuals with fractures requiring hospitalization after sustaining falls. Of these, 77.5% were women. Female cases were older (74.8 years, SD = 8.3) than male cases (72.3, SD = 8.1; $p = 0.01$). About 17% of cases were living alone. Almost half of the cases had less than a complete elementary education, and low schooling was more frequent among women. Proportionally more men than women were working just before the fall. About two-thirds of all cases reported good-to-excellent self-perceived health.

Table 1 shows the characteristics of fractures, circumstances of the fall, history of previous falls, and attitudes towards risk of future falls.

The most commonly fractured bone was the femur, and this incidence increased with age ($p < 0.01$). Most falls occurred between 6:00 AM and 6:00 PM. Most falls took place at home, and this proportion increased with age. Half of the household falls occurred either outdoors or in the bedroom, but there was some variation according to gender and age: falls in the kitchen were relatively more common in women ($p = 0.04$) and younger cases ($p = 0.08$), while those in the bedroom were relatively more common in men ($p = 0.09$) and older cases ($p = 0.04$).

For men and women and both age groups, half the falls took place while walking. One-fifth of cases attributed their falls to tripping, and this was more prevalent among women ($p = 0.01$). Another one-fifth reported slippery floors as the cause for the fall, and this was more frequent in the younger age group ($p = 0.03$).

History of at least one fall in the previous 12 months was more common among the older group ($p = 0.05$). Women appeared to be more worried about falling again than men ($p = 0.09$).

Discussion

Data on circumstances of falls in elderly people are rare in middle-income countries. One study in Brazil focused on elderly people with vestibular disorders⁷. Consistent with most findings from developed countries, in our sample, falls leading to severe fractures occurred predomi-

nantly in women^{1,8,9}. This finding probably reflects both the higher rates of falls among women found in most incidence studies^{10,11} and the fact that women are more likely than men to sustain fractures when they fall.

As reported in other studies, the most common health consequence of a fall was fracture of the hip¹². As found in other studies, few falls leading to severe fractures occurred during the night^{3,7}. However, we did find a difference in the time of the falls: while other studies reported most falls occurring in the morning^{7,13,14}, in our study there were as many falls in the morning as in the afternoon. Some authors have attributed the predominance of falls in the morning to greater potential for falls in such activities as getting up, getting dressed, and starting the day^{13,14}. Lehtole et al.¹⁵ found that the risk of fractures due to falls was higher in the morning and in the evening as compared to the afternoon among a group of Finnish seniors (85 years or older) living at home.

Most falls leading to fractures in our study occurred at home, but the pattern showed a borderline difference according to gender and age. A higher proportion of falls in women and individuals 70 years or older occurred at home, as compared to men and those under 70. Similar findings have been reported in studies in developed countries^{14,16}. Half of the falls at home occurred outdoors or in the bedroom. Falls in the kitchen were more common among women than men, probably reflecting the fact that older men rarely cook in Brazil. Falls in the bedroom were more common among individuals 70 years or older, probably reflecting worse health status and increasing physical limitations of daily activities in this age group.

Most of the falls in our sample occurred while the person was walking, which is consistent with findings in developed countries^{1,7,13,17}. In our cases, more than half of the falls were not attributed to an extrinsic factor. Falls not caused by tripping or slipping suggest such intrinsic factors as vestibular failure, altered proprioception, musculoskeletal weakness, postural hypotension, or arrhythmias, and tend to increase with age. Lower limb weakness, slower gait, decreased mobility, and pain, all outcomes of hip arthrosis, have already been identified as risk factors for falls¹. This is consistent with the fact that, in our study, fewer cases 70 years or older reported extrinsic factors, as compared to younger cases. Brocklehurst et al.¹⁸ also found relatively fewer extrinsic factors among elders with fractures of the femur due to falls. According to Cummings & Nevitt¹⁹, the slow walking pace of the elderly makes falling directly downwards more likely

Table 1

Characteristics of falls leading to fractures in a sample of elderly individuals in Rio de Janeiro, Brazil, by gender and age group.

Variable	Male (%) [n = 93]	Female (%) [n = 321]	60-69 years (%) [n = 128]	≥ 70 years (%) [n = 286]	Total (%)
Fracture site (bone) *					
Femur	67.8	68.8	45.7	83.2	68.6
Arms/Elbow, hand	19.4	15.9	37.3	13.6	16.7
Leg/Ankle	9.7	7.4	13.6	5.6	8.0
Knee	3.2	3.4	5.1	2.6	3.4
Other	3.2	4.7	6.6	3.9	4.6
Required surgery					
Yes	97.8	99.4	99.2	99.0	99.0
Period of fall					
Morning: 6 to 12 noon	27.5	37.5	32.0	36.7	35.3
Afternoon: noon to 6 PM	38.5	32.2	37.5	31.8	33.6
Evening: 6 to 12 midnight	23.0	23.8	25.9	23.0	23.6
Night: midnight to 6 AM	11.0	6.5	5.5	8.5	7.5
Location					
Own home	58.1	67.9	50.0	72.7	65.7
Other people's home	21.5	13.1	21.9	11.9	15.0
Street	14.0	15.0	18.7	12.9	14.7
Other	6.4	4.1	9.4	2.5	4.6
Room **					
Outdoors	27.8	28.0	34.3	25.8	27.9
Bedroom	31.4	20.7	13.4	25.8	22.8
Living room	14.8	20.7	17.9	20.1	19.6
Bathroom	16.7	11.7	10.5	13.4	12.7
Kitchen	3.7	14.0	17.9	10.1	11.9
Other	5.6	4.9	6.0	4.8	5.1
Activity at time of fall					
Standing	12.0	14.0	14.8	13.3	13.8
Walking	48.4	50.8	46.9	51.8	51.1
Getting up	7.5	9.0	4.7	10.5	8.7
Sitting down	1.1	3.4	2.3	3.2	2.9
Lying down	2.2	0.6	2.3	0.4	1.0
On steps or ramps	17.2	11.5	19.5	9.8	12.8
Running	0.0	1.3	1.7	0.7	1.0
Other	10.8	9.4	7.8	10.5	9.7
Tripped					
Yes	12.1	24.4	19.7	22.5	21.6
Slipped – wet floor					
Yes	21.5	22.0	29.4	18.4	21.9
Other fall in previous 12 months					
≥ 1	36.6	43.0	34.4	44.6	41.5
Afraid of falling again					
Yes	61.1	73.1	72.9	69.7	70.4

* Total greater than 100%, due to multiple fractures;

** Only included 276 that fell in their own homes.

than among younger persons, who tend to lurch forward when they trip. Additionally, during walking by the elderly, the lower height of the contralateral foot (which, if raised higher, could

be used to keep from tripping) increases the risk of such accidents. This phenomenon, plus the fact that a smaller proportion of our cases were under 70, led us to expect a high proportion of

cases reporting intrinsic factors. The proportion that reported tripping was indeed lower than in studies in the United States by Davis et al.¹⁴ and in Australia by Bell et al.²⁰, both of which reported around 50%.

We investigated the use of high heels or slippers, but fewer than 2% of the falls involved such footwear.

In short, the basic characteristics and circumstances surrounding falls leading to severe fractures observed in a middle-income country (Brazil) did not differ substantially from those reported by studies conducted in developed countries.

Resumo

A informação sobre as circunstâncias envolvendo as quedas em idosos estão bem descritas em alguns países desenvolvidos. No entanto, pouco se conhece sobre elas nos países em desenvolvimento. O objetivo desse artigo é descrever as circunstâncias e características das quedas que produziram fratura grave entre idosos do Rio de Janeiro, Brasil. Os casos foram obtidos de dois estudos caso-controle para investigar fatores de risco para fraturas graves decorrentes de quedas em indivíduos com 60 anos ou mais. Esses indivíduos foram estratificados por variáveis clínicas, sócio-demográficas e circunstâncias do acidente. Cerca de ¾ da amostra era composta de mulheres. Fratura de fêmur foi a mais comum, sendo mais freqüente no grupo acima de 70 anos. A maioria das quedas ocorreu no domicílio, entre 6 e 18 horas, mas os locais em que se deram variaram segundo sexo e idade. A maior parte dos acidentes não foi atribuída a escorregar ou tropeçar. Os dados observados nessa amostra não diferiram substancialmente daqueles encontrados em estudos conduzidos em países desenvolvidos.

Idoso; Acidentes por Queda; Fraturas Ósseas

Contributors

E. S. F. Coutinho and L. C. Rodrigues contributed to the study concept, design, and statistical analysis. E. S. F. Coutinho contributed to the data acquisition and study supervision. All three authors contributed to the data analysis and interpretation and drafting of the manuscript.

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