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Prevalence of falls and evaluation of mobility among institutionalized elderly persons

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Abstract

Objective: The present study aimed to estimate the prevalence of falls among institutionalized elderly persons and identify associated factors. *Method:* A cross-sectional study of elderly residents of Care Facilities For the Elderly in Natal, Rio Grande do Norte, was carried out. The elderly persons could walk independently and did not have severe cognitive impairment. Data was obtained about the institution and socio-demographic and health information was collected. A physical examination was performed to evaluate frailty, mobility and balance (Timed up and go, Berg Balance Scale, Gait speed and Sitting-rising Test - SRT). Statistical analysis was performed using the Chi-squared Test for a 5% significance level. *Results:* Sixty-three elderly persons were within the search criteria. Of these 22.2% had fallen in the past year. Only the SRT was associated with these falls. *Conclusion:* It was concluded that the studied population has a low prevalence of falls, and the ability to perform less than 5 repetitions in the SRT was associated with episodes of falling.

Keywords: Elderly. Accidental Falls. Movement. Homes for the Aged

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INTRODUCTION

The current epidemiological trend in Brazil is of an aging population, with a substantial increase in the number of elderly persons and a declining birth rate. With the growing number of individuals aged over 60 and many families unable to provide caregivers for specialized care, Long Term Care Facilities for the Elderly (LTCFEs) have emerged as a common housing option. However, many elderly persons living in these institutions are more frail or suffer from poorer health. In addition to these intrinsic characteristics, a lack of mobility and leisure stimuli within LTCFEs means residents are often less active than they would otherwise be, with resultant complications for health[1,2].

Complaints of postural instability are among the most common problems affecting these individuals[3]. A meta-analysis4 published in 2012 reported a prevalence rate of 3% for falls among the elderly, most of which could have been prevented or controlled. The risk factors for these falls were musculoskeletal diseases, metabolic disorders, depression and vestibular, neurological and cardiovascular diseases, as well as the presence of sedentarism, polypharmacy and large numbers of comorbidities[4,5].

As it affects mobility, lack of postural balance determines the dependence of individuals in the performance of activities of daily living. It also has psychological consequences (fear of falling and social isolation) and results in an increased risk of falls and poor quality of life. Elderly persons with limited mobility face a greater risk of falls during their daily activities[6], while the onset of dependence represents one of the greatest fears of this population[3]. In this context, it should be noted that other than high levels of morbidity, complications resulting from falls are the main cause of death for elderly persons over 65 years of age[7].

The mobility of elderly persons is, therefore, an important factor to be studied to prevent falls and their consequences. One of the most common methods for assessing mobility is by using physical performance tests to study posture, gait and transfer[6]. The justification for the present study is the possible determination of the profile and characteristics of the institutionalized elderly people who are most susceptible and have the greatest propensity to falls, with a view to establishing prevention strategies and reducing the risks arising from these incidents.

The present study aimed to estimate the prevalence of falls among elderly residents in ten Long Term Care Facilities For the Elderly registered with the Health Surveillance Department of the city of Natal in the state of Rio Grande do Norte. An additional aim was to establish an association between the mobility of elderly persons and falls.

METHOD

A cross-sectional study was performed with elderly persons living in LTCFEs in the city of Natal. All the institutions were registered with Vigilância Sanitária (VISA) (the Health Surveillance Department), and included both private and non-profit institutions. Of the 14 LTCFE registered with VISA four refused to participate in the study, leaving a total of ten participating institutions (five private and five non-profit organizations).

Included in the study were all the elderly persons who were present in the LTCFE when the research took place, providing they were able to walk, with or without assistance, and did not suffer from severe cognitive impairment, measured using the Pfeiffer questionnaire8. Bedridden patients and those in wheelchairs were excluded due to their inability to perform the physical tests for functional evaluation. Individuals with severely impaired communication, who did not speak Portuguese or who were disorientated or agitated at the time of the research were also excluded. The data was collected between the months of October and December in 2013.

Data collection was divided into two parts. First, a questionnaire was completed by the elderly individuals and caregivers and complemented with data collected from medical records. This was followed by a physical evaluation of the elderly persons.

Data regarding the occurrence of falls during the previous year was obtained from several sources through the direct questioning of each elderly person and their responsible caregiver or health professional. The responses were confirmed by searches of medical and nursing records to minimize recall bias and make the data as reliable as possible.

The descriptive variables, collected with the purpose of characterizing the study sample, were assessed using a data collection form with questions directed at the elderly individuals and caregivers, as well as using information collected directly from the medical records of said individuals. The variables were as follows: general variables related to each institution (type of institution, time resident in institution and elderly/caregiver relationship), sociodemographic data (gender, race, age, marital status and education) and health of patient (presence of illnesses, use of medications, presence of nocturia, dependence, fragility, depressive symptoms, fatigue, nutritional status, cognitive level and performance of physical exercises).

After the collection of this data, the following tests were performed to assess risk of falls: Timed Up and Go (TUG)[9], Sitting and Rising Test (SRT)[10], Gait Speed Test (GST)11 along with the tests which form the Berg Balance Scale (BBS)[12].

For the TUG[9] the values used were: performed in less than 20 seconds (low risk of falls); between 20 and 29 seconds (medium risk of falls); and 30 seconds or more (high risk of falls). For the SRT[10], the number of successive times that each elderly person was able to repeat the action of sitting then rising from a chair in 30 seconds was recorded. The results for this test were categorized based on median value. For the GST11, the time it took for each individual to walk a course of 4.6 meters was calculated. For statistical analysis, the results were converted into meter/second (m/s) units and adjusted by the median height for men and women.

To assess frailty, the five criteria proposed by Fried et al.[11] were considered: unintentional weight loss (more than 4.5 kg) in the past year; muscle weakness, using the Jamar® hand dynamometer and measured in kilogram-force (KGF); level of physical activity, measured using the short version of the International Physical Activity Questionnaire (IPAQ)[13]; exhaustion, evaluated by respondents' own reports of fatigue in response to questions seven ("I felt that everything I did was an effort") and twenty ("I could not get going") of the Center for Epidemiological Studies Depression Scale[14]; and GST[11]. Using this data, the frailty variable was classified and categorized into 'frail + pre-frail' and 'non-frail', as presented in the study.

Cognitive capacity was evaluated using the Pfeiffer[8] questionnaire and categorized into: absence of cognitive decline, slight, moderate or severe cognitive decline. Individuals with severe cognitive decline were excluded.

Symptoms of depression were evaluated using the Geriatric Depression Scale[15] and classified by the presence or absence of depressive symptoms.

Functional capacity was described using the Katz Scale16 and classified as either dependent or independent. Nutritional status was described using body mass index (BMI) and classified as underweight, healthy or overweight.

After data collection, descriptive analysis was performed to characterize the group, in addition to bivariate analysis using the Chi-squared test with a significance level of 5%.

The research conformed with all the criteria and requirements established by Resolution 466/2012 of the National Health Council and obeyed the recommendations of the Research Ethics Committee of the Universidade Federal do Rio Grande do Norte (Federal University of Rio Grande do Norte) (UFRN). It was approved under No. 013/2014 and CAAE No. 0290.0.051.000-11. All the elderly individuals involved consented to participate by signing a Free and Informed Consent Form.

RESULTS

The total number of elderly persons from the ten LTCFEs was 386. Following application of the inclusion and exclusion criteria of the study, 63 elderly people were classified and evaluated, as shown in Figure 1.

The majority of the elderly individuals who suffered falls were white women who resided in non-profit LTCFEs. They had been resident in such facilities for less than 42 months (Table 1) and were frail or pre-frail. They suffered from nocturia, were independent, and exhibited cognitive decline and signs of fatigue. They were also overweight, performed low levels of physical activity and made use of polypharmacy (Table 2). However, this data was only descriptive and did not identify differences between groups.

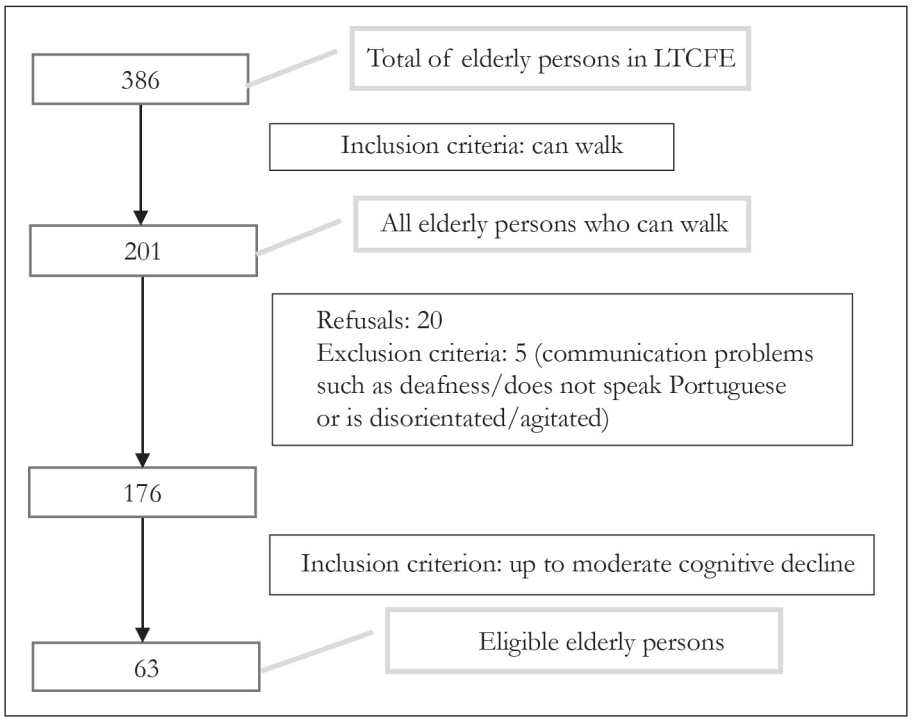

Figure 1. Flowchart of application of inclusion and exclusion criteria and total number of elderly persons eligible for the study. Natal, Rio Grande do Norte, 2013.

The median age for the studied population was 79 years, and those who suffered falls were between 65 and 92 years old with a median of 80.5 years. The prevalence of falls among the elderly persons evaluated was 22.2% (95% CI=11.94-32.46). Of the physical examinations used to evaluate the mobility of the elderly, only SRT was associated with falls (Table 3).

Table1. Characterization of institutionalized elderly persons according to sociodemographic data and information from the institution. Natal, Rio Grande do Norte, 2013.

	Falls n (%)	No Falls n (%)
Sociodemographic data		
Gender		
Female	10 (71.42)	40 (81.63)
Male	4 (28.57)	9 (18.36)
Schooling		
Illiterate-PSI	3 (21.42)	32 (65.30)
PSII and upwards	11 (78.57)	17 (34.69)
Skin color/ethnicity		
White/Caucasian	10 (71.42)	24 (48.97)
Others	4 (28.57)	25 (51.02)
Marital status		
Single, widowed or separated	14 (100)	46 (93.87)
Married	0 (0)	3 (6.12)
Data from institution		
Elderly person/caregiver relationship		

To be continued

Continued from Table 1

	Falls n (%)	No Falls n (%)
>7.5	6 (42.85)	33 (67.34)
Between 1 and 7.5	8 (57.14)	16 (32.34)
Time of residence		
43 months or more	5 (35.71)	28 (57.14)
42 months or less	9 (64.28)	21 (42.85)
Type of institution		
Non-profit/public	10 (71.42)	39 (79.59)
Private/commercial	4 (28.57)	10 (20.40)

PSI: Primary School I; PSII: Primary School II.

Table 2. Characterization of institutionalized elderly persons according to health parameters. Natal, Rio Grande do Norte, 2013.

	Falls n (%)	No Falls n (%)
Health data		
Nocturia		
Yes	11 (100)	34 (69,38)
No	0 (0)	6 (12,24)
Frailty		
Frail + pre-frail	12 (85.71)	42 (85.71)
Non-frail	2 (14.28)	7 (14.28)
Katz		
Dependent	4 (28.57)	12 (24.48)
Independent	10 (71.42)	37 (75.51)
Pfeiffer		
With cognitive decline	10 (71.42)	40 (81.63)
Without cognitive decline	4 (28.57)	9 (18.36)
Geriatric depression scale		
With depressive symptoms	6 (42.85)	17 (34.69)
Without depressive symptoms	8 (57.14)	32 (65.30)
Fatigue		
Yes	11 (78.57)	33 (67.34)
No	3 (21.42)	16 (32.34)
Nutritional scale		
Underweight	1 (7.69)	8 (17.77)
Eutrophic	4 (30.76)	16 (35.55)
Overweight	8 (61.53)	21 (46.66)
Level of physical activity		
Medium/Low	10 (71.42)	27 (55.10)
High	4 (28.57)	22 (44.89)
Number of illnesses		

To be continued

Continued from Table 2

2 or more	9 (64.28)	28 (57.14)
0 or 1	5 (35.71)	21 (42.85)
Number of medications		
5 or more	8 (57.14)	27 (55.10)
0 to 4	6 (42.85)	22 (44.89)

Table 3. Bivariate analysis: association between mobility and falls among institutionalized elderly persons. Natal, Rio Grande do Norte, 2013.

	Falls n (%)	No falls n (%)	*p*	PR (CI)
Risk of falls (Berg)				
Yes	7 (35)	13 (75)	0.107	2.69
No	7 (16.7)	35 (83.3)		(0.79-9.17)
Sitting-Rising Test				
<5	8 (38.1)	13 (61.9)	0.032*	3.69
>6	6 (14.3)	36 (85.7)		(1.07-12.68)
Gait Speed				
0 to 0.59	9 (29)	22 (71)	0.201	0.45
>0.6	5 (16.1)	26 (83.9)		(0.13-1.54)
Timed Up and Go				
Mean/high risk	8 (28.6)	20 (71.4)	0.182	2.32
Low risk	5 (14.7)	29 (85.3)		(0.66-8.13)

*p<0.05; Chi-squared test.

DISCUSSION

Falls among the elderly can be considered common events, with a lower occurrence among those living in the community than among institutionalized elderly individuals[18]. However, the prevalence of falls found in the present study (22.2%) was low in relation to the values found in several studies of elderly persons living in the community and in LTCFEs, which varied from 30 to 39%4,19-21. Possibly, the low mobility stimuli in the sample in the present acted as a decisive factor for a lower prevalence than those described in literature (the elderly persons fall less as they move little).

Several factors are associated with a greater risk and incidence of falls in the elderly population. Among these, living in a LTCFE assumes great prominence and relevance, considering the characteristics of the institutionalized elderly, who have a greater tendency to frailty and reduced functional capacity[21]. Frailty is predictive for the loss of functional capacity, and a prospective study determined that it is a marker for recurrent falls[22].

The female gender, as the study shows, is described in literature as a factor that increases the chance of falls among the elderly[5,19,23,24]. However, the causes that can explain and/or justify this finding are scarce and controversial, leading to discussion that the greater frailty of elderly women is the result of reduced muscle strength and lower lean mass[19]. Another justification may be related to the higher incidence of chronic diseases among elderly women and the greater exposure to behaviors considered as risk, linked to the role of women in the social and family context[19]. Despite this evidence, other studies have not identified

a significant difference between men and women for the risk of falls[25].

The high number of comorbidities is an important characteristic of the profile of the elderly who suffer from falls, with hypertension, diabetes and dyslipidemias the most common such diseases[23]. In this study, the majority of elderly people who had fallen in the last year had two or more associated diseases.

The use of polypharmacy was another characteristic of the elderly persons who suffered falls in the present study. Data has shown that polydrug use is considered a powerful risk factor not only for falls but also for fractures among the elderly[23], although this finding is not unanimous among studies[26]. The use of certain medications, such as opioids, antipsychotics, anxiolytics, hypnotics and antidepressants, may be associated with the presence of symptoms which can influence the occurrence of falls, such as dizziness, instability and fatigue.

Independent elderly persons fall more as they move around without help, and self-confidence is often the factor that leads to falls[27]. Gait itself is also considered a risk factor for falls among the elderly[28]. In this study, the prevalence of falls was higher among independent elderly persons, confirming that independence and mobility are closely associated.

Similarly, elderly persons with greater cognitive decline are more susceptible to falls as they do not adopt an adequate risk-protective posture. Dementia has been identified as a factor that increases the risk of falls[29]. In this study, it was found that the majority of elderly people who suffered falls had some degree of cognitive decline.

Other findings of this study were the greater prevalence of falls among overweight and fatigued elderly persons and those with a low level of physical activity, which explained the low body stimulation and instability. Elderly physical activity programs improve balance, flexibility, and gait speed, preventing falls[30].

In terms of physical state, mobility, balance and postural control disorders are considered the main contributors to the occurrence of falls[23]. Institutionalized elderly people with a mobility deficit, even if mild, are at risk for falls, and it is necessary to institute prevention strategies[31] that avoid the morbidities that arise from episodes of falling.

The present study used three instruments to evaluate the body and postural balance of the elderly, simulating activities of daily living, self-care and mobility: SRT, GS and TUG. The BBS was used to assess the possible risk of falls. However, the data found in bivariate analysis showed that episodes of falls are statistically associated to only one mobility test, the SRT, and that there was no difference in risk of falls compared to the BBS. A similar[32] study carried out in a LTCFE in Brazil also found that there was no association between the TUG and the BBS for the risk of falls.

The SRT shows that a lower ability to perform the requested repetitions in the test equated to a greater possibility of the individual falling. In this study, most elderly people who suffered falls performed fewer than five repetitions of sitting and rising movements, confirming their characteristics of frailty and movement limitations.

In contrast, some studies found associations between the BBS and the TUG regarding falls among the elderly[32,33], including that older an individual, the worse their functional balance and, consequently, the greater the risk of falls[33]. Also, in relation to GS, studies have found an association between change in gait and the occurrence of falls. It is likely that the reduced sample in this study was not able to reflect the situation of immobility and physical limitation of the institutionalized elderly in all the physical tests, and, therefore, the associations were not significant.

Some limitations were identified in this study, such as the possible memory bias of the elderly and/or caregivers when questioned about the presence of falls, bias related to the possible insufficient recording of the chronic diseases of the elderly in medical records, and the reduced number of elderly persons who underwent physical-functional evaluation, either due to physical limitations or refusal to participate in the study, thus impairing statistical analyzes. Despite this, the study of a common collective health event, as well as the functional evaluation of frail elderly persons, makes this study important.

As this is a cross-sectional study and therefore cannot infer cause-and-effect situations, it is suggested that further longitudinal studies are performed to evaluate the true influence of physical-functional deficits on falls among institutionalized elderly persons.

CONCLUSION

The institutionalized elderly population of Natal, Rio Grande do Norte, exhibited a prevalence of falls of 22.2%, and the capacity to perform fewer than five repetitions in the sitting and rising mobility test was associated with episodes of falling. Therefore, measures to stimulate mobility and activities that promote body balance should be established in such institutions with a view to improving spatial and corporal perception and as a form of prevention of falls and their complications.

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