Relationship of Falls and Fall-Related outcomes among older adults in nursing homes

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KEYWORDS

: fall, fall related injuries, fear of falling, elderly people

ABSTRACT

Background and aim: Elderly people living in the community frequently experience falls and fall-related injuries. The purpose of this study was to determine the prevalence of falls, fear of falling, and their impact on depression among elderly people in nursing homes.
Material and methods: A total of 125 nursing home residents were enlisted to participate in the study. Personal interviews with patients and examinations of hospital medical records were used to gather data. Three assessment instruments were used: a personal characteristics questionnaire, clinical characteristics and findings from the evaluation of functional dependence, depression, and the severity of cognitive impairment.
Results: Twenty-six percent of adults 65 and older reported at least one fall in the previous six months, and 32 percent of adults 65 and older reported at least one fall-related injury. The Mini Mental State Examination (MMSE), Barthel Index (BI), Functional Ambulation (FA), and Geriatric Depression Scale (GDS) results showed positive correlations with the number of falls, falls-related injuries, and fear of falling. Compared to older adults without functional disabilities, those with these difficulties reported a higher percentage of falls and injuries from falls (p=0.041). Additionally, there was a significant difference between participants who used devices and those who did not in terms of the frequency of falls, fall-related injuries, and fear of falling.
Conclusion: Our findings indicate that age, MMSE, FA, depression, and the reduction of functional dependence were correlated with falls, fall-related injuries, and fear of falling.

INTRODUCTION

Elderly people living in the community frequently experience falls and fall-related injuries (Hentschke et al., 2021), which have a substantial financial impact on public health (Folstein et al.,1975) because they can result in disability and occasionally complications leading to death (Patil et al., 2014). A serious fall in this age group may lead to reduced independence, activity limitations, depression (Tsai et al., 2021), and death (Society, 2001).

The elderly, due to balance disorder, weakening of muscle strength, comorbidities, and the risk of falling, must use mobility devices (Liu et al., 2011). These devices, such as canes, walkers and wheelchairs, assist the elderly in lowering their risk of falling (Van Riel et al., 2014).

It is estimated that between 35 and 40 percent of adults 65 and older who live in communities fall every year (Schoene et al., 2019), and in half of these cases the falls occur frequently (Tsai et al., 2021). If there is cognitive impairment or a history of falls, the risk increases by two or three times. The proportion of adults over 65 who had a fall or a fall-related injury increased with age (Briana Moreland et al., 2020). Although the majority are benign and injury-free, 10 to 25 percent lead to fractures and/or hospitalization (Tsai et al., 2021).

Falls are associated to a higher risk of functional impairment, morbidity, and mortality in this age group (Society, 2001).

Older adults are also more likely to experience fear of falling and to limit their activities because of this fear, which is linked to a decline in their independence and health-related quality of life (Denkinger et al., 2015). A cautious gait, decreased physical activity levels as a result of activity avoidance, and social disengagement have all been connected to fear of falling (Folstein et al.,1975). The aging trajectory and quality of life are significantly impacted by negative effects like anxiety, depression, and decreased mobility, which are linked to even non-injury falls (Gill et al., 2013).

Evaluating depression is essential because it provides data on how well therapeutic interventions work, which has significant implications for everyday activities and quality of life outcomes (Alexiou et al., 2018).

The purpose of this study was to determine the prevalence of falls, fear of falling, and their impact on depression among older adults in nursing homes.

MATERIALS AND METHODS

Design

Cross-sectional study of residents in nursing homes.

Participants

One hundred and twenty-five residents were recruited to the trial. Consecutive sampling was done. The inclusion criteria were patients over the age of 65 living in nursing homes. People were excluded from the study if they had unstable cardiovascular disease, severe illness or had other serious diseases that precluded participation in the study. All patients included in the study were treated according to standard clinical practice. Written informed consents were required to participate in the study. The procedures were compliant with the Declaration of Helsinki and were approved by the Ethics Committee of the Faculty of Medicine, University of Prishtina.

Data collection

Data collection and clinical assessments for the present study was conducted between June 1 2024 and October 15 2024. Data were collected by personally interviewing patients and reviewing hospital medical records.

Assessment procedures

Three assessment instruments have been utilized: 1) a questionnaire collecting the personal characteristics of patients 2) a questionnaire collecting the clinical characteristics of patients 3) depression, severity of cognitive impairment and functional dependence assessment results. The questionnaire contained questions on individual data, including age, gender, level of education, ambulation, experience of fall in the previous 6 months, fear of falling, and injuries.

The primary outcome was to assess the number of falls over a 6-month period. Secondary outcomes were to assess the number of fall-related injuries, fear of falling, ambulation, functional disability, cognition, and depression.

Measurements

We asked participants if they were using any mobility device in the last six months, including cane, walker, and wheelchair. Participants were also asked "In the last 6 months, have you fallen down?" (Yes/No); "In the last 6 months, how many time (1,2,3,4) have you fallen down?"; In the last 6 months, after you fallen down have you been injured (Yes/No); We defined fear of falling through a question asking participants if they were worried about falling; (Yes/No); A fall was determined as "an unexpected event, in which the participant comes to rest on the ground floor, or lower level" (Tinetti et al., 1988).

Functional ambulation (FA) was classified into participants who: did not walk independently and those who walked independently.

The Mini Mental State Examination (MMSE) was used to measure the severity of cognitive impairment (Folstein et al.,1975). The MMSE contains specific subscales assessing orientation (ten points), registration (three points), attention and calculation (5 points), recall (3 points), language and praxis (9 points). The five subscales were summed to obtain the MMSE score (all 30 points). Scores 24 and higher indicated no dementia, whereas scores ranging from 9 and lower indicated a severe dementia.

The Geriatric Depression Scale (GDS) is composed of 15 questions. Of the 15 questions, if 10 are circled they indicate the presence of depression, while the remaining questions (numbered 1, 5, 7, 11, 13) indicate depression if not circled. Scores of 0-4 are considered normal, 5-8 indicate mild depression; 9-11 indicate moderate depression; and 12-15 indicate severe depression (Sheikh & Yesavage, 1986).

Functional disability was evaluated with the Barthel Index (BI). The original version has 10 categories as follows: feeding, bathing, grooming, dressing, bowel control, bladder control, toileting, chair transfer, ambulation, and stair climbing. The total score of the index ranges from 1 to 100, meaning the higher the score, the greater the degree of functional independence (Mahoney & Barthel, 1965).

To determine the number of comorbidities that participants had, we noted all of their self-reported chronic diseases, which were of the 18 chronic diseases recorded in ELSA, including diabetes, hypertension, stroke, myocardial infarction, congestive heart failure, angina, lung disease, chronic obstructive pulmonary disease, asthma, arthritis, osteoporosis, cancer, hearing problems, Parkinson's, Alzheimer's disease, dementia, macular degeneration, and glaucoma (Dhalwani et al., 2017).

Data analysis

For the descriptive analysis, we calculated percentages, as well as mean with standard deviation (SD) for the distribution of variables (see Table 1 and 2). The relationship between quantitative variables was analyzed using the Pearson's r correlation coefficient (see Table 2 correlation coefficients). Considering GDS as a dependent variable, the relationship between GDS and the independent variables was analyzed in order to identify the factors related to it. We performed analysis of variance (ANOVA) to detect BI differences in participants with fallen experiences in the past 6 months, fear of falling, fall related injuries, and age. Associations of mobility device use with incident falls were also evaluated stratifying the population by fall history. The significance level for the different analyses was established as $p < 0.05$. The data analysis was performed using SPSS Statistics for Windows, version 24.

RESULTS

The socio-demographic and clinical characteristics of the patients are shown in Table 1. The study included 125 patients with a mean age of 76.52 (SD 7.83), the majority of patients were women (66%), high school and secondary school graduates (72%), and with comorbidity (48%). The studied sample had a high incidence of reported falls (54%). Twenty-six percent of adults aged ≥65 years reported at least one fall in the past 6 months, and 32% of adults aged ≥65 years reported at least one fall-related injury. The percentage of adults reporting a fall-related injury increased with age, such as 38.5% ($p<0.001$) among ≥85 years old reported fall related injury compared to 28.6% among 65-74 years old. Overall, a higher percentage of women reported at least one fall (28.9%; $p<0.001$) or fall-related injury (36.1%; $p<0.001$) than did men in the past 6 months (23.8% reported a fall and 21.4% reported a fall-related injury). However, when stratified by age group, the percentages of adults aged ≥85 years reporting a fall (50% of women and 50% of men; $p = 0.592$) or fall-related injury (50% of women and 50% of men; $p = 0.538$) did not differ significantly by sex.

The correlations between the different test Index scores and other variables are shown in Table 2. There were positive associations between number of falls, falls related injuries and fear of falling with the MMSE, BI, FA, and GDS results. These results indicate that older adults who reported a greater number of falls, falls related injuries and fear of falling also reported higher cognitive impairment, higher BI, and GDS clinical depression. The difference of those who could walk independently versus with assistance on MMSE, BI, and GDS was also significant indicating that the beneficial effect of walking independently.

Regardless of age group, older adults with functional disabilities reported a higher percentage of falls and fall-related injuries than did those without these difficulties ($p=0.041$; see Table 3). There was also significant difference in incidence of falls, fall related injuries, and fear of falling among participants device used compared to those who did not use any device (see Table 4).

DISCUSSION

Our analysis took into account a number of factors that could complicate the relationship between falls, fall-related injuries, and fear of falling.

The evaluation of the sociodemographic and clinical characteristics that were independently associated to falls, fall-related injuries, and fear of falling revealed that our models supported earlier findings that linked falls to advancing age, gender, and the presence of more medical comorbidities (Chang & Do, 2015). Despite earlier research showing a strong association between

lower education and frequent falls (Ganz & Latham, 2020), our data did not support this independent finding.

Recent study (Ehrlich et al., 2019) has shown that a history of falls increases the current risk of falls. Another finding of our study was the high prevalence of fear of falling. The reported prevalence of fear of falling among older adults living in the community varied from 3 to 85 percent, depending on the study and its measurement method, according to a systematic review by Scheffer et al., 2008. They discovered that having experienced falls in the past, being a woman, and being older were the primary risk factors for fear of falling. Our study found that ambulation capacity is strongly linked to fear of falling and consequent activity restriction, but their review did not identify it as a significant risk factor.

Furthermore, some studies (Patil et al., 2014; Ehrlich et al., 2019) has also proposed that fear of falling is significantly associated with falls. Fear of falling is often caused by a history of falls. Patil R et al., 2014 suggested that fear of falling may grow even after a non-injurious fall. Subsequently, older adults might get into a vicious cycle where they become less active, which makes them less functional. In order to prevent this vicious cycle, we recommend early prevention of falls in elderly adults. When creating fall prevention programs, older adults' fear of falling and reluctance to adopt behaviors that could prevent future falls should be taken into account (Patil et al., 2014).

It is currently unknown whether depression and falls in older adults are related. Furthermore, a fear of falling can exacerbate depression. According to our current findings, depression can also influence fall risk. A study conducted among older adults in the United States (Hentschke et al., 2021) conclude that prevalence of falls and fear of falling was high causing reduced quality of life, functional limitations, limited activity and depression. These findings are consistent with literature published in older people in general (Gell et al., 2015, Amarilla-Donoso et al., 2020). A history of stroke, alcohol consumption, perceived sleep deprivation, health conditions requiring assistive devices, and below-average general health may all contribute to depression and the risk of falls or fall-related injuries (Grundstrom et al., 2012). In contrary, a study (Denkinger et al., 2015) found no correlation between depression in older adults and exposure to falls or fear of falling.

A recent systematic review (Peeters et al., 2016) found significant negative correlations between quality of life and health status and female gender, comorbidity, low physical or psychosocial functioning, and pain. Age, MMSE, functional ambulation, depression, and functional dependence were all significantly correlated with falls, fall-related injuries, and fear of falling, according to our study's univariate analysis. Similar results to our study were found in the subsequent multivariate analysis, which confirmed the correlation between depression (Brown et al., 2017) and quality of life and the performance of instrumental and basic activities of daily living (Feng et al., 2010). This may be explained by the fact that poor balance, physical limitations, fall-related chronic health conditions, increased medication use, and functional decline can all contribute to a poor quality of life and a severe emotional state.

Functional decline, increased medication use, and chronic health disorders associated to falls are just a few of the many fall risk factors that increase with age (Dionyssiotis, 2012). Over the course of 24 months, a short-term multicomponent exercise intervention decreased falls, injurious falls, and fear of falling in a study of older adults living in the community who were at high risk of falling (Hentschke et al., 2021). In light of this finding, we believe that more research is necessary to determine how fall risk factors differ among people over 85 and to identify focused interventions that can successfully address their needs.

In terms of the use of mobility devices among our participants, it was more prevalent among those with less functional dependence and increase with age, which is consistent with previous studies (Boyd & Stevens, 2009). Additionally, compared to people who did not use mobility devices, those who did experienced a higher frequency of falls, fall-related injuries, and fear of falling. In this context, a few studies (De Jong et al., 2013) are encouraging because they have demonstrated evidence of a higher risk of falls associated with the use of mobility devices. The use of mobility devices won't stop falls in the elderly, and there are many risk factors for falls in this population, which is probably the cause of this. In contrast to our research, a study (Xu et al., 2022) found that older adults who used mobility devices reported falling at a similar rate to those who did not use them, indicating that using mobility devices did not increase the risk of falls when compared to those who did not use them.

Limitations

There are several limitations to the results of this study. First, self-reported data can be skewed by recall bias, particularly when it comes to falls that occurred months before the study or no injuries were sustained. Additionally, this research is cross-sectional. Falls and fall-related injuries were associated to depression, cognitive decline, and functional dependents; however, it is impossible to say whether these factors were caused by or preceded a fall.

CONCLUSION

In summary, our research shows that the fall, fall related injuries, and fear of falling were correlated with age, MMSE, functional ambulation, depression and functional dependence reduction.

Fall prevention programs, such as multi-component exercise regimens that combine strength, gait, balance, and vitamin D supplementation, should be promoted to patients by geriatricians and general practitioners. Future research should examine the effectiveness of falls prevention strategies in this demographic.

AUTHORS` CONTRIBUTION

AM and SS were closely monitoring this research project and had complete access to the study's data. In the meantime, they took on the responsibility of ensuring the integrity of the data.

Study Design: AM, SS, NA

Instruction on the use of instruments for the outcome measures used in this study: SR, AM, SS

Analysis and interpretation of data: SR, AM, SS

Manuscript preparation: AM, SS, NA

Statistical Analysis: SR, AM, SS

DISCLOSURE STATEMENT

No competing financial interests exist for all authors.

AVAILABILITY OF DATA

The data supporting the findings of this study can be obtained from the corresponding author upon reasonable request.

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Table 1. Characteristics of the study population by the number of total population and fall experiences.

	Total		Fall experiences		No fallen experiences	
	No	(%)	No	(%)	No	(%)
Characteristics						
Sex						
Male	42	33.6%	18	26.9%	24	41.1%
Female	83	66.4%	49	73.1%	34	58.6%
Age group (years)						
65-74	56	44.8%	30	44.8%	26	44.8%
75-84	43	34.4%	23	34.3%	20	34.5%
85+	26	20.8%	14	20.9%	12	20.7%
Education						
Primary school	53	42.4%	35	52.2%	18	31.0%
Secondary school	42	33.6%	20	29.9%	22	37.9%
University	30	24%	12	17.9%	18	31.0%
Marital status						
Single	5	4%	4	6.0%	1	1.7%
Married	54	43.2%	23	34.3%	31	53.4%
Divorced	6	4.8%	1	1.5%	5	8.6%
Widow	60	48%	39	58.2%	21	36.2%
Functional ambulation						
Walk independently	64	51.2%	31	46.3%	33	56.9%
Do not walk independently	61	48.8%	36	53.8%	25	43.1%
No participants with ≥1 falls during the 6 months						
1 fall	33	26.4%	29	43.3%	4	6.9%
2 falls	10	8%	10	14.9%	0	0%
3 falls	7	5.6%	6	9.0%	1	1.7%
4 falls	3	2.4%	3	4.5%	0	0%
Fall related injuries						
Yes	40	32%	38	56.7%	2	3.4%
No	85	68%	29	43.3%	56	96.6%
Comorbidities						
1-4	64	51.2%	32	47.8%	32	55.2%
5-8	59	47.2%	34	50.7%	25	43.1%
>9	2	1.6%	1	1.5%	1	1.7%
MMSE						
Severe cognitive impairment	1	0.8%	1	1.5%	0	0%
Moderate cognitive impairment	26	20.8%	16	23.9%	10	17.2%
Mild cognitive impairment	36	28.8%	20	29.9%	16	27.6%
Mild cognition	62	49.6%	30	44.8%	32	55.2%
GDS						
Without depression	67	53.6%	35	52.2%	32	55.2%
Depression	58	46.4%	32	47.8%	26	44.8%

Abbreviations: MMSE- Mini Mental State Examination, GDS- Geriatric Depression Scale Source: Authors

Table 2. Correlations Among the Main Variables.

	1	2	3	4	5	6	7	8
1. Age	-							
2. Education	.09	-						
3. FA	.34***	.12	-					
4. Falls in the last 6 months	.12*	-.21	.09	-				
5. Fall related injuries	.11**	-.27**	.12	.59***	-			
6. Fear of falling	.01	-.30**	.34***	-.43**	.44***	-		
7. MMSE	.17*	-.15*	.14**	.25**	.23*	.16*	-	
8. BI	.12*	.11	.09*	-.01	-.01	.15*	.21**	-
9. GDS	.18*	.02	.17**	.18*	-.16*	-.19*	-.15*	.17*
M	76.52	2.18	1.49	1.79	1.48	1.41	22.54	65.99
SD	7.83	.79	.50	1.00	.49	.14	4.49	19.67

Abbreviations: FA- Functional Ambulation, MMSE- Mini Mental State Examination, BI-Barthel Index, GDS-Geriatric Depression Scale, M-Mean, SD-Standard deviation

Note. *p < .05, **p < .01, ***p < .001.

Source: Authors

Table 3. ANOVA results for the differences based on BI in participants with fallen experiences, fall related injuries, and increased age.

	Mean square	F	Sig
Fear of Falling	2.23	1.87	.024
Fallen experiences	2.24	3.65	.008
Fall related injuries	3.59	5.58	.020
Age	2.54	1.42	.241

Source: Authors

Table 4. Chi square test on the differences between participants with walking mobility device and fallen experiences, fall related injuries, and fear of falling.

	Chi square value	df	Sig
Fear of Fall	0.10	4	.031
Fallen experiences	0.21	4	.020
Fall related injuries	0.12	1	.016

Source: Authors