Research Paper

The Fall Risk Assessment and Correlated Factors Among Elderly Inpatients in 2020: A Cross-sectional Study

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ABSTRACT

Objectives: Patient falls are highly prevalent in hospitals, and are considered a complicated challenge. Thus, the present research assessed the prevalence of the fall risk assessment and the correlated factors among elderly inpatients.

Methods: The present analytical and cross-sectional research was conducted with 419 elderly patients meeting the inclusion criteria. The data collection instrument consisted of two parts including demographic information and the Johns Hopkins fall risk assessment tool (JHFRA). A convenience sampling method was used to select the elderly patients staying in the general wards of Allameh Bohlool Gonabadi Hospital, Gonabad City, Iran. The data analysis was done in SPSS software, version 23 using descriptive (frequency, Mean±SD) as well as inferential statistics (logistic linear regression analysis).

Results: The Mean±SD of participants' age was 72.09±9.46 and the prevalence of the fall risk was 85.9%. Statistically significant correlations were found between the elderly inpatients' fall risk and their age (P=0.001), sex (P=0.012), and cardiovascular diseases (P=0.001).

Discussion: Considering the high prevalence of fall risk among elderly inpatients, it is essential to plan for preventing and reducing the rate of elderly inpatients' falls.

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Highlights

- The prevalence of falls and the resulting damage in elderly patients hospitalized are significantly high.
- There were correlations between the fall risk and age, sex, and cardiovascular diseases.
- Falls among elderly inpatients in hospitals are of great concern in any healthcare system.

Plain Language Summary

Preventive programs and care should be taken to reduce the rate of falls and the adverse effects such as hospitalization, stress on elderly patients and their families, higher costs imposed on families and society, poor quality of life, and medical costs.

Introduction

As defined by the World Health Organization (WHO), the age above 60-65 years is considered the outset of elderly life [1]. The increase in age is often associated with a higher rate of chronic diseases such as hypertension, cardiovascular diseases, diabetes, cancer, respiratory diseases, urinary incontinence, loss of hearing or eyesight, skeletal-muscular diseases, and so on [2]. Many of the elderly population are recurrently hospitalized during their life for chronic diseases that cannot be treated as outpatients in clinics [3]. Unfortunately, hospitalization causes certain problems for the elderly including the risk of falls, which is very common among elderly patients, and can cause other relevant problems [4]. The fall risk is higher at a higher age along with more physical weaknesses and concomitant physiological changes. Moreover, due to the ever-increasing growth of the elderly population, the frequency of falls has increased in hospitals [5]. A patient's fall is defined as finding the patient on the ground (witnessing it on the spot or not), and hitting the floor in the presence of a nurse or caregiver [6]. On average, one out of every three elderly citizens above 65 years of age and one out of every two elderly citizens above 80 experience falling at least once a year [7]. This experience leads to injuries to the soft tissue, bruises, lesions, subdural hematoma [8], pelvic fractures, disability, loss of physical ability, mortality, and mental disorders such as low self-confidence [9], fear of falling and reduced longevity [10], limited daily activity, lengthened hospital stay, and higher costs imposed on individuals and society [11]. Also, falling can lead to post-fall syndrome including dependence, loss of autonomy, confusion, immobility, depression, restricted daily activities, loss of self-confidence, fear of falling, less interaction and interpersonal relations, aloofness and isolation, lower quality of life, higher anxiety and reference to nursing home and even mortalities caused by the fall (e.g. pulmonary embolism and infection) [12, 13].

Due to the high rate of falls among elderly inpatients in hospitals, this problem has turned into a major concern in any healthcare system [14]. As estimated, about one-third of the medical costs of accidents are accounted for falls, and two-thirds of the direct costs are due to hospitalization. It is also estimated that by 2050, the frequency and cost of damages caused by falls will be three times as high and the hospitalization rate induced by falls will be ten times as high [16]. Similarly, the prevention of falls in hospitals is essential to increase the quality of life among elderly patients [17]. Moreover, the prevalence of falls in hospitals, similar to bedsores and pain management is considered a key indicator of the quality of nursing services [5]. Nurses can learn to know which elderly patients are at a higher risk of falls and try to teach them how to prevent tragic inadvertent events in hospitals [18]. To prevent falls, it is firstly essential to identify the correlated factors [5]. There is research evidence that if patients at risk of falls are identified in advance, effective interventions minimize the risk of falls. Thus, not only can the rate of falls be reduced in elderly inpatients, but also the adverse effects such as the lengthier stay in hospital, mental and psychological pressures on patients and families, and the additional costs (of lengthened hospitalization) on families and society can be prevented [19]. In other words, identifying patients at a higher risk of falls is a key step in the prevention of prevalent falls [20]. Considering the high prevalence of falls among elderly inpatients and the adverse effects of falls on the quality of elderly patients' lives, an early recognition of the risk of falls is essential for this population. On the other hand, since various factors play a role in the occurrence of falls

in the elderly, it is necessary to use related tools to check the probability of falls. For this reason, the present research aimed to assess the risk of falls and its correlated factors among elderly inpatients.

Materials and Methods

The present analytical cross-sectional research was conducted in 2020. The research population consisted of all elderly inpatients at or above 60, hospitalized in the general wards of Allameh Bohlool Gonabadi Hospital, Gonabad City, Iran. The exclusion criteria were unwillingness to participate in the research, inability to get off the bed for some medical reasons (e.g. absolute rest, unconsciousness, etc.), or complete paralysis. The sample size was determined 384 patients using the formula for estimating the prevalence of the elderly fall by Salarvand et al. [20]. With an attrition rate of 10%, finally, the minimum sample size was decided to be 422. The elderly were selected through convenience sampling. The data collection instrument was a demographic information checklist that enquired about the patient's age, sex, education, marital status, and background diseases along with the Johns Hopkins fall risk assessment tool (JHFRAT).

The JHFRAT was developed by Poe et al. (2018) [21]. This instrument was used in the present research to assess the risk of falls among elderly inpatients. It consists of seven items to be answered by a nurse to assess the patient's "age", "fall history" within the past 6 months, "elimination, bowel, and urine", "medications", "patient care equipment", "mobility", and "cognition." Finally, a total score shows the probability of the fall risk for the elderly patients. If the final score is at or below 5, the fall risk is low. If the score is between 6 and 13, the fall risk is medium, and if it is at or above 14, the risk is high [21]. In Iran, the reliability and validity of the Persian-translated version of the questionnaire were, for the first time, assessed and reported by Hojati et al. (2016). The Cronbach α was estimated at 0.73 for the internal consistency [8]. Hojati et al. suggested that the reliability of the instrument be tested later on with larger samples. Thus, in the present study, we used the Cronbach α to check the internal consistency of the test with a sample of 120 inpatients. The estimated value was 0.847 [8].

The data collection began upon getting the required permission to carry out the research in the target place. The general wards of the hospital were visited and the inclusion and exclusion criteria were observed to select eligible participants. An informed consent was obtained and the demographic information questionnaire was submitted followed by the JHFRAT to collect the required data. SPSS software, version 23 was used to analyze the data statistically. Descriptive (frequency, Mean±SD) and inferential statistics (logistic regression analysis) were used to analyze the data. The significance level was set at <0.05.

Results

Regarding the patients' sex, 52.3% (n=219) of the sample were male and 47.7% (n=200) were female. As the findings revealed, the elderly inpatients were at a high risk of falls. Besides, the logistic regression analysis showed statistically significant correlations between fall risk and age, sex, and cardiovascular diseases (P<0.05). As each elderly patient was simultaneously afflicted with several diseases, the percentage of background diseases exceeded 100% (Table 1).

As seen in Table 2, the majority of participants (85.9%) were at risk of falling. All variables in Table 1 were tested and reported through the logistic regression analysis. The sex, age, and cardiovascular disease variables showed statistical significance. Considering the odds ratio, every one-unit increase in age is accompanied by an 11% increase in the risk of falling. Also, the fall risk of men was 4 times as high as women. The tabulated results also show that the odds ratio of falling among patients with cardiovascular disease was 4 times as high as others (those without any cardiovascular diseases) (Table 3).

Discussion

Patient fall is highly prevalent in hospitals. Thus, the present research explored the prevalence of fall risk and the correlated factors among elderly inpatients. As the findings showed, 85.9% of the participants had a moderate to high risk of falls.

In their research, Damar et al. reported the fear of fall among elderly patients as 83.4% [22]. The review results of Miertov et al. indicated a higher risk of fall among elderly inpatients with a background neural disease [23]. Similarly, the findings reported by Hajati and Bastani pointed to the correlation of age and the fear of fall among elderly patients with a history of orthopedic surgery [24]. which is consistent with our findings. In a study conducted by Salarvand et al. [20], the fall risk in elderly inpatients was reported to be 48.3%. This is not consistent with our research as the estimated value is lower than ours. This difference can be possibly due to the different measurement scales used. In their study, Salarvand et al. [20] used Morse's scale, which is a gen-

Table 1. Research participants' demographic information

Variables		No. (%)/Mean±SD
Sex	Male	219(52.3)
	Female	200(47.7)
Occupation	Housewife	155(37.0)
	Retired	95(22.7)
	Employed	13(3.1)
	Unemployed	156(37.2)
Marital status	Married	253(60.4)
	Single	166(39.6)
Education	Illiterate	199(47.5)
	Literate (reading and writing)	68(16.2)
	Below diploma	46(11.0)
	Diploma	56(13.4)
	Associate degree or higher	50(11.9)
Background disease	Diabetes	174(41.5)
	Hypertension	290(69.2)
	Cardiac	198(47.3)
	Cancer	33(7.9)
	Others	63(15.0)
Age		72.09±9.46
Duration of hospitalization		2.43±2.02
Fall risk		14.36±8.24

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eral scale for measuring the fall risk. This scale is used in all Iranian hospitals for all patients at all age groups. However, in our research, the Johns Hopkins scale was used, which is a specialized instrument to assess the fall risk among elderly population.

The present findings showed a statistically significant positive correlation between fall risk and age. Similarly, a significant positive association was found between the two variables in the work of research by Jafarian et al. [25]. Iranfar et al. also reported the highest frequency of falls and recurrent falls among the 80-89-year-old age group [26]. A body of research including Ambrose et al. [27], Salarvand et al. [20], Wagert et al. [28], Ackerman et al. [29], and Vakili et al. [30] also reported age as a factor accounting for a higher rate of falls.

In the study conducted by Najafi Ghezlcheh et al. [10], no statistically significant correlation was found between age and the fear of falls. This finding is not in agreement with our research. This divergence can be due to the higher average age of participants in our research than the aforementioned study [10]. The average age in our research was 79.02 years, but it was 67.63 in Najafi Ghezlcheh et al.'s study.

A higher age is associated with more physical, perceptual, and cognitive changes in the elderly. These along with an improper and insecure environment of hospitals

Table 2. Distribution of research participants' fall risk

Risk Factor Category		No. (%)
Age (y)	60–69	193(46)
	70–79	134(32)
	≥80	92(22)
Fall history (within 6 months before admission)	Yes	129(30.8)
	No	290(69.2)
Elimination, bowel, and urine	Incontinence	81(19.3)
	Urgency or frequency	71(16.9)
	Urgency/frequency and incontinence	34(8.1)
	Without problem	233(55.7)
Medications	On 1 high fall-risk drug	76(18.1)
	On 2 or more high-fall-risk drugs	288(68.7)
	Sedated procedure within the past 24 hours	29(6.9)
	Without medication	26(6.3)
Patient care equipment	One	179(42.7)
	Two	158(37.7)
	Three or more present	69(16.5)
	Without equipment	13(3.1)
Mobility	Requires assistance or supervision for mobility, transfer, or ambulation	208(50)
	Unsteady gait	120(29.5)
	Visual or auditory impairment affecting mobility	91(20.5)
Cognition	Altered awareness of the immediate physical environment	95(22.7)
	Impulsive	34(8.1)
	Lack of understanding of one's physical and cognitive limitations	91(27.7)
	Without problem	199(47.5)

can increase the odds of falls among elderly patients compared to the other age groups.

Our research revealed a statistically significant correlation between sex and fall risk. We found a higher rate of falls among women than men. This is consistent with a body of research including Najafi Ghezlcheh et al. [10], Ambrose et al. [27], and Neyens et al. [31], who found a significant correlation between female sex and fall risk. Memtsoudis et al. [32] found a higher risk of falls among men than women. However, Salarvand et al. [20] and Corsinovi [33] reported no significant correlation between fall history and sex, which was inconsistent with the results of our study. This may be due to the anatomical, physiological, and psychological differences between women and men. According to studies, with age, height fluctuations increase, which is more evident in women, and can increase the risk of falls [34]. In addition, it can be associated with a high prevalence of osteoporosis in women [6].

Table 3. Logistic regression analytic results for elderly participants

Variables	Levels	Estimate	SE	p	Odds Ratio	95% CI	
						Lower	Upper
Age		0.11	0.032	0.001	1.11	1.04	1.18
Sex	Male	Considered as the unmarked category (ref)					
	Female	1.52	0.60	0.012	4.60	1.40	15.07
Education	Illiterate	Considered as the unmarked category (ref)					
	Literate (reading and writing)	0.15	0.51	0.76	1.16	0.42	3.20
	Below diploma	0.41	0.60	0.49	1.51	0.46	4.97
	Diploma	0.25	0.61	0.68	1.28	0.38	4.25
	Higher	0.92	0.73	0.20	2.51	0.59	10.59
Marital status	Married	Considered as the unmarked category (ref)					
	Single	-0.27	0.41	0.50	0.76	0.33	1.70
Occupation	Freelance	Considered as the unmarked category (ref)					
	Employed	-0.20	0.92	0.82	0.81	0.13	5.01
	Housewife	-0.28	0.71	0.69	0.75	0.18	3.06
	Retired	-0.19	0.48	0.69	0.82	0.32	2.12
	Unemployed	-0.77	0.75	0.30	2.17	0.49	9.59
Hypertension	No	Considered as the unmarked category (ref)					
	Yes	0.50	0.35	0.14	1.66	0.83	3.31
Diabetes	No	Considered as the unmarked category (ref)					
	Yes	0.46	0.40	0.25	1.58	0.71	3.51
Cardiac	No	Considered as the unmarked category (ref)					
	Yes	1.57	0.44	0.00	4.84	2.02	11.58
Other	No	Considered as the unmarked category (ref)					
	Yes	0.64	0.48	0.18	1.91	0.74	4.92
Duration of hospitalization	0.15	0.098	0.11	0.11	0.96	1.41	-

SE: Standard error.

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The present research found a statistically significant correlation between cardiovascular diseases and fall risk. The latter was higher in patients with cardiovascular disease. This finding is consistent with several studies including Salarvand et al. [20], Salarvand et al. [35], Ambrose et al. [27], and Carey and Potter [36]. According to the existing body of research, cardiac diseases account for 77% of damages caused by elderly falls. Moreover, falls due to cardiovascular diseases account for a higher mortality rate than falls due to unknown reasons or reasons other than cardiovascular diseases [37].

The strength of this study is that a new tool was used to assess the probability of falling in the elderly population of Iran. As a limitation, because the study was conducted on hospitalized elderly people, the results cannot be

generalized to other elderly people. Therefore, it is suggested to carry out studies on other elderly people living in the community and nursing homes.

Conclusion

As the present findings showed, the fall risk is significantly high among elderly inpatients. Thus, preventive programs and care should be taken to reduce the rate of falls and consequences such as hospitalization, stress on elderly patients and their families, higher costs imposed on families and society, poor quality of life, and medical costs.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethics Committee of Gonabad University of Medical Sciences (Code: IR.GMU.REC.1399.069) and submitted to the Deputy of Research at Allame Bohlool Gonabadi Hospital.

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Authors' contributions

Conceptualization: Reza Noori and Maryam Moradi; Methodology: Reza Noori, Maryam Moradi and Leila Sadeghmoghadam; Investigation: Fatemeh Hosseini Moghaddam, Hamideh Mohammadzadeh; Supervision: Reza Noori; Writing original draft: Reza Noori, Maryam Moradi and Nasim Khajavian; Review and editing: Moosa Sajjadi and Leila Sadeghmoghadam; Supervision: Reza Noori; Funding acquisition and resources: All authors.

Conflict of interest

The authors declared no conflict of interest.

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