



## Original Article

## The relationship between the risk of falling and fear of falling among aged hospitalized patients

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## ABSTRACT

**Background & Aim:** Identifying aged people at risk of falls in hospitals is particularly important for the prevention of falls. A review of the literature revealed that the association of falls and fear of falls had not been investigated extensively in previous studies in Iran. This study aimed to determine the relationship between falling and fear of falling among aged hospitalized patients.

**Methods & Materials:** In this descriptive-correlational study, 1123 subjects were recruited. Of all subjects, 385 aged hospitalized patients, 60 years old and above, were conveniently selected based on inclusion criteria in Shahroud Imam Hossein hospital from March to December 2016. Johns Hopkins fall risk assessment tool (JHFRAT) was used to evaluate the risk of falls among older adults and the Falling Efficiency Scale (FES) was applied to assess fear of falling. SPSS software version 19 with the significance level of  $p < 0.05$ . Chi-Square test and exact test of Fisher and logistic regression has been used for data analysis.

**Results:** All aged patients ( $n=1123$ ) admitted in the emergency room were assessed for eligibility to inclusion in the study. Of all subjects, 385 patients were included in this study. The subjects' mean of age was  $71.68 \pm 4.32$  years, age range: 60-84. Of all samples ( $n=385$ ) of study 90 (23.4%), 151 (39.2%) and 144 (37.4%) had a low, middle, and high risk of falls, respectively. Of all participants of the study, 193 (51%) subjects were male and 192 (49%) were female. One-third (36.4%) of the subjects had a fear of falls and (33.8%) experienced fall in the last six months before admission. A statistically significant relationship was found between the incidence of falls and fear of falling ( $P < 0.001$ ).

**Conclusion:** This study found JHFRAT and FES as two applicable instruments for assessment of aged people. The result of this study concluded that evaluation of fear of falling and the risk of falls among aged hospitalized patients is recommended as a routine procedure to predict the risk of falls. Nurses are in the best position to evaluate the fear of falls and risk of falls, so it is recommended considering the fear of falls as a potential risk factor for falls in the hospital.

## Introduction

Fall is a common health problem in the hospital. It is estimated that 30 to 50% of elderly patients experience falls in clinical settings (1). Moreover, falls account for 40% of deadly injuries (1, 2). Fall is defined as an event that results in a person coming to the ground floor or other lower level or position and rest (3). It is recommended to assess aged patients for risk of falls before admission in hospital (2, 3).

Elderly patients are at a higher risk of falling than the others; in every 1000 days of hospitalization, 20 incidences of falls have occurred in elderly departments (1, 2). Older people are at risk of falls due to deferent reasons such as polypharmacy, cognitive disorders, mobility defects, chronic diseases, balance disorder, physical activity disorders, functional defects and visual impairment (4). Common injuries caused by falls among the elderlies include damages of soft tissue, dura mater hematoma, and fracture. Other side effects of falls are fear, anxiety, decreased self-confidence and depression (5,6,7).

Fear of falls has attracted researches' attention as a hidden risk factor for falls (8). However, among all risk factors of falls in

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older adults, fear of falling is one that has not been studied intensely (3, 9). Fear of falling means that the person does not trust one's abilities to participate in particular daily routine activities without falling and loss of balance (3, 9). According to the World Health Organization, the elderly suffering from this fear are in the category of high-risk people (2). Anxiety and lack of self-confidence result in activity restriction in self-care, which causes a reduction of muscular power and balance and also keeps the older adult in danger of falls (10). Although the fear of falls has mentioned as a potential risk factor for falls (3, 11), surprisingly, fear of fall has not been considered as a risk factor for fall in most falls risk assessment tools in hospitals, including Johns Hopkins Falls Risk Assessment Tool (JHFRAT) (2, 12). Therefore, researchers and clinicians who investigate the risk of falls in the hospital, usually ignore the assessment of fear of falls among elderly hospitalized patients. The dual goals of this research include a) to identify the risk of falls and fear of falls among elderly hospitalized patients and b) to explore the relationship between risk of falling and fear of falls in hospitalized aged people.

## Methods

In this descriptive-correlational study of 1123 potentially eligible subjects, 385 aged hospitalized patients (60 years old and above) were selected consecutively for the study, according to inclusion/exclusion criteria, at Shahroud Imam Hossein hospital from March to December 2016. Inclusion criteria of the study were aged (60 years old and above) patients who have been hospitalized longer than 8 hours (based on the instruction of the instrument), being hospitalized in one of the general wards, oriented to time, place and person. Moreover, being in acute condition of any disease, bedridden hospitalized older people or under Complete Bed Rest (CBR) order were excluded from the study. Due to the lack of opportunities to maintain accurate

records of the diseases of the elderly in the hospital, the maximum falling possibility in older people has been considered 50 % in the elderly to determine the sample size. Selected subjects were assessed for hospital risk of falls using Johns Hopkins Falls Risk Assessment Tool. The JHFRAT have been coined by Poe and his colleagues in 2007 with a two-year overview study and expert observation (7). The reliability of the Persian Version of this tool has been reported in the Hojati et al. study with Cronbach's alpha of 0.732 (2). The JHFRAT has seven sections that must be completed by a nurse in triage unite before admission inward (12). At the end of the assessment, the sum of scores in JHFRAT shows the risk of falls in hospitalized aged people. If the score is less than or equal to five, the risk of falling is considered as low, and if the score is between 6 to 13, the risk of falling is considered as moderate (12). Also, scores equal to or more than 14 indicate the high risk of falls (2, 12).

To assess fear of falls, the Falls Efficiency Scale (FES), that indicate fear of fall during some specific activities was applied. This scale has been coined by Tinetti et al. in 1990 (3, 13). The reliability of the Persian version of this tool has been reported with Cronbach's alpha of 0.895 in Dadgari et al.'s study (3, 11). Moreover, the reliability of the test in this study was calculated as Cronbach's alpha of 0.88. The FES includes 10 questions about ten daily activities. The elderly subjects were asked to score their fear of fall from 1 to 10, in which 1 represents the full trust to one's abilities and not having any fear of falling, while the score of 10 indicates having full fear of falls during the daily activities. The cut of point of the scale is 70. It means that the subjects who scored 70 or higher had a fear of falling, while those with scores less than 70 did not suffer from fear of falls (3).

To analyze the data SPSS software version, 16, with the significance level of  $p < 0.05$  were applied. Chi-Square test and exact test of Fisher and logistic regression has also been used for data analysis. This article is extracted from a master's degree

dissertation and registered in Shahroud University of Medical Science Research System under research code of conduct 94106 and research code of ethics IR.SHMU.REC1394.91. All subjects of the study signed informed consent. They were informed about the objectives of the study. Also, they were assured about the confidentiality of the results. Moreover, they had permission to leave the study at any stage for any reason.

## Results

The results of subjects' demographic characteristics based on Johns Hopkins Falls Risk Assessment Tool (JHFRAT) showed that in this study, 1123 elderly patients were potentially eligible for the study. According to the inclusion/exclusion criteria, 385 aged hospitalized patients were purposefully selected. Excluded subjects were mostly suffering from a low level of orientation (n=545), early discharge (less than 8 hours hospitalization based on JHFRAT protocol) (n=112), suffering from an acute medical condition not being able to complete the assessment (n=79) and rejecting to sign the consent form (n=2). The mean age in the subjects was  $71.68 \pm 9.32$  years old. Also, based on age category, 169 subjects (43.9%) were young-old (between 60 to 69 years old), 146 subjects (37.9%) were in middle old age category (70 to 79 years old), and 70 (18.2%) subjects were oldest old (80 years old and above). Other results of the study on JHFRAT such as a history of falls, elimination, medication, equipment used for patient care, and mobility, are summarized in Table 1. Moreover, Table 1 presents the relationship between variables in JHFRAT to fear of falls among subjects of the study.

According to Table 2, 90 (23.4%) subjects of the study had a low risk of falls, 151 subjects (39.2%) had a moderate risk of falls, and 144 subjects (37.4%) had severe risk of falls. Of all subjects, 130 aged subjects (33.8%) of them had a history of falling in the last 6 months before hospitalizing. The relation of risk of falls and elderly demographic variables are also shown in

Table 3. There was a significant relationship between the age of 70 and over and the risk of falls ( $p < 0.000$ ). Additionally, there was a significant relationship between the risk of falls and the female gender ( $p < 0.001$ ) and the subjects' marital status ( $p < 0.000$ ).

According to the results of the study, the efficiency of fall, 140 people (36.4%) have reported fear of falls and 245 subjects (63.6%) has not reported any fear of falls. As it is shown in Table 4, a significant relationship is reported between fear of falls and ages 80 and over ( $p < 0.000$ ). There was a statistical relationship between female gender and fear of falling, and women had more fear of falling than men ( $p < 0.001$ ). There was also a significant relationship between marital status and fear of falls; the elderly without spouse had more fear ( $p < 0.001$ ).

As Table 4 shows (low fall risk was considered as reference category), based on the multinomial regression model, although gender and marital status enhance the chance of fall risk at the middle and high levels by 1.39 to 1.92 and 1.32 to 1.56, respectively, they were not statistically significant. Increasing participant's age, having a history of falls, polypharmacy, and fear of falling, showed a significant increase in the chance of risk of falls in the elderly.

With age, the risk of moderate to severe falls in the age group 79-70 and  $\geq 80$  increased 1.62 to 18.82 times, which was considered a significant difference. Experience of a previous fall history increased the risk of falls 2.6 to 12.2 times, which are moderate to severe. Moreover, the subjects suffered from the fear of fall showed 5.43 to 11.11 times increase in the risk of falling, which is interpreted as moderate to severe risk of fall. Regarding the issue of polypharmacy, with the increasing number of drugs, the risk of falls increased from 1.2 to 8.12 times. This figure indicates the significant role of polypharmacy in the risk of falls among older people.

**Table 1.** Relationship of demographic characteristics based on Johns Hopkins falls risk assessment tool parameters of fear of fall

Variables	N (%)	Mean score fear of fall	F	P value	
		(Mean±SD)			
Age*	60-69	169 (43.9)	59.88±9.68	7.452	0.001
	70-79	146 (37.9)	68.42±9.74		
	≥80	70(18.2)	77.81±8.15		
Gender**	Female	192(49.9)	67.45±9.86	0.729	0.003
	Male	193(50.1)	64.46±9.46		
History of fall (last 6 months)**	No	255(66.2)	62.30±9.78	7.318	0.001
	Yes	130(33.8)	73.08±6.11		
Fall risk*	Low	90(23.4)	55.43±8.27	198.849	0.001
	Middle	150(39)	64.83±6.52		
	High	145(37.7)	73.61±6.18		
Poly-pharmacy**	No	136(35.3)	61.84±10.15	6.633	0.001
	Yes	249(64.7)	68.17±8.80		
Cognition (multiple selected)***	Intact	267(69.4)	63.99±9.30	7.124	0.001
	Altered	32(8.2)	66.81±13.10		
	Impulsive	26(6.8)	73.77±5.44		
	Lack of understanding	37(9.6)	73.33±9.02		
	Altered & impulsive	3(0.8)	68.92±8.38		
	Altered & lack of understanding	14(3.6)	73.13±6.19		
	Impulsive & lack of understanding	3(0.8)	72.67±7.57		
Mobility*	Intact	207(53.8)	61.50±9.64	37.937	0.001
	Unsteady gait	99(25.7)	66.78±8.31		
	Audiovisual impairment affecting mobility	79(20.5)	72.85±8.13		
Patient care equipment*	No	219(56.9)	64.13±9.61	6.799	0.001
	1	136(35.3)	67.96±9.47		
	2	28(7.3)	69.44±9.61		
	≥3	2(0.5)	77±1.41		
Elimination, bowel, and urine*	No	235(61.0)	63.66±10.10	17.895	0.001
	Incontinence	41(10.7)	69.36±8.25		
	Urgency or frequency	109(28.3)	65.42±7.61		
	Urgency/frequency and incontinence	26(6.8)	70.19±9.77		

\* One way ANOVA

\*\* Independent samples t-test

\*\*\* Cognition is a multi-select option in JHFRAT, in which three options and combination of the options can get points. The three options are a) Altered awareness of immediate physical environment (1 point), b) Impulsive (2 points) and c) Lack of understanding of one's physical and cognitive limitations (4 points)

**Table 2.** Relationship of risk of falling with demographic variables in hospitalized aged patients

Variables		Risk of falls			P value
		Low	Moderate	High	
		N (%)	N (%)	N (%)	
Age (years)	60-69	54(31.9)	79(46.8)	36(21.3)	P<0.000
	70-79	30(20.5)	53(36.3)	63(43.2)	
	≥80	6(8.6)	19(27.1)	45(64.3)	
Gender	Male	58(30.1)	78(40.4)	57(29.5)	P<0.001
	Female	32(16.7)	73(38)	87(45.3)	
Marital status	Married	79(27.5)	117(40.8)	91(31.7)	P<0.000
	Alone	11(11.2)	34(34.7)	53(54.1)	

**Table 3.** Relationship of fear of falling with demographic variables in hospitalized elderly patients

Variables	Fear of falls		P value
	No	Yes	
	N (%)	N (%)	
Age (years)	60-69	127 (31.9)	P<0.000
	70-79	90(20.5)	
	≥80	28(8.6)	
Gender	Men	139(30.1)	P<0.001
	Female	106(16.7)	
Marital status	Married	197(27.5)	P<0.001
	Living alone	48(11.2)	

**Table 4.** Adjusted multinomial regression model in hospitalized elderly patients

Variables	Fall risk	
	Middle	High
	Adjusted OR (CI 95%), P value	
Age category	60-69	-
	70-79	1.62(0.708-3.717), 0.023
	≥80	4.33(1.430-13.135), 0.010
Gender	Male	18.82(5.175-61.994), <0.001
	Female	-
History of fall	No	1.39(0.634-3.030), 0.431
	Yes	1.92(0.694-5.348), 0.208
Polypharmacy	No	-
	Yes	2.60(0.416-16.667), <0.001
Number of medication	No	12.20(0.760-27.434), <0.001
	Yes	-
	0	1.76(0.775-4.016), 0.016
	1-2	5.10(1.472-17.534), 0.010
	≥7	-
Fear of fall	1-2	0.90(0.001-1.801), 0.090
	3-4	3.701(0.001-1.250), 0.191
	5-6	1.20(1.823-7.939), < 0.001
	≥7	4.75(2.42-9.302), <0.001
Marital status	No	5.86(3.447-9.954), <0.001
	Yes	6.96(6.900-6.960), <0.001
Fear of fall	No	-
	Yes	5.43(1.255-19.256), 0.024
Marital status	Married	11.11(2.324-18.772), <0.001
	Alone	-
Marital status	Married	-
	Alone	1.32(0.412-2.442), 0.760
Marital status	Married	-
	Alone	1.56(0.427-5.070), 0.501

- Reference category

## Discussion

To our best of knowledge, the present study used the John Hopkins Falls Risk Assessment Tool in Iran for the first time to measure the risk of falls in elderly subjects. In this study majority of the subjects reported to be indifferent levels of fears of falls. Similarly, a Chinese study (14), found that about 82 % of the elderlies had an average or high risk of falling. An essential finding of the current study was the relationship between falling and increasing age. Base on the results of the study, subjects aged 70 or above were at higher risk of falls, which is supported by a previous similar study (15).

Moreover, Ash et al. confirmed the direct relationship between older ages and the risk of falls (16). It is concluded that subjects in

older ages are suffering more from different musculoskeletal disorders such as Sarcopenia, which justifies the relationship between risk of falls and increased age. However, in some other Iranian studies, there was no report on the relationship between falling and increasing age (17, 18). It can be due to a lack of enough subjects in the oldest-old (+80) range of age in that study. On the other hand, the reason for the high risk of falls between the ages of 80 years old and above can be the fact that older people are more likely to have a functional and visual impairment and multiple medicine consumption (Polypharmacy). It seems that with increasing age, the balance efficiency-related physiologic body systems decreases, and the stability of the body deteriorates (19).

Most of the previous studies suggested that female subjects had more fear of falling than Male subjects (3, 20) which are supported in the current study. Similarly, the current study found a significant relationship between gender and the risk of falls. In other words, female subjects were more at risk of falls than men which are confirmed in most previous studies (3, 21). Most probably, it is due to a smaller bulk of muscle in females than males (22).

Moreover, a relationship between falls and marital status was revealed in the current study; the subjects without a spouse were at higher risk of falls than the others. It can be due to their loneliness and lack of support in terms of not having a helping partner and having emotional and mental problems, which, in turn, can increase the chance of decreased physical function and self-confidence in activities of daily living (23). Furthermore, they use sedative medications and mostly use their medications in inappropriate time which can result in less concentration and more functional decline (24). All these reasons put the widowed or divorced elderly at a higher risk of falls. In the current study, 36.4% had a fear of falling. The range of fear of falls in Dadgari et al. study (3) was 60%, and BorhaniNezhad's study was 31.82 % (25). In Najafi's study, fear of falls was measured by 160 people in a nursing home in Tehran, which was reported as 76.2 (21). In two studies, researchers had an agreement on the relationship between falling and increasing age (24, 25).

In the current study, a significant relationship between fear of falls and gender in univariate analysis was noted. However, in the regression model, this significance has disappeared after adjusting for other variables. The influence of gender has been the focus of attention in most of the similar studies. Most of the related literature emphasis the influence of gender in the relationship between falls and fear of falls. Researchers reported a significant relationship between "fear of falls" and "falls" in the female gender (25-27).

Moreover, the current study found a significant relationship between fear of falls

and marital status in Univariate analysis; the elderly without a spouse were higher risk in the regression model; this significance disappeared after adding other variables. BorhaniNezhad has reported a relationship between marital status and fear of falls in his study (25). However, Dadgari, et al. (3) did not report any significant relationships between marital status and fear of falls.

According to Tables 4, in this study a statistical relationship between fear of fall and age, gender and marital status ( $p < 0.000$ ) was reported, meaning that the older participants with higher chance of fall risk have more fear of falls, older age, history of fall, polypharmacy in past medical history, which is in coordination with most of the similar studies (2, 3, 24, 25). However, one study reported that a history of falls was not a predictor for fear of falls (26).

## Conclusion

From the findings of the current study, it can be concluded that assessing fear of falls in elderly patients is necessary to evaluate the risk of falls. Nurses are in the best position to evaluate the fear of falls and risk of falls, so it is recommended considering the fear of falls as a potential risk factor for falls in the hospital. Since the JHFRAT is designed for assessing the risk of falls in the hospital, the findings of the current study cannot be generalized in elderly community dwellers. Moreover, in this study, variables in JHFRAT were assessed as risk factors for falls. Therefore, other possible risk factors for falls were not considered.

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**Conflict of Interest:**

The authors of this study declare no conflicts of interest.

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