

Predictors of increased Fall Risk in Elderly patients Attending Outpatient Clinics

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Abstract

Background: Older people are more susceptible for fall. Fall is one of the most common geriatric syndromes that affects the quality of life of the elderly persons. It is the leading cause of severe injuries, as hip fractures in older population. Such injuries can result in "disability, chronic pain, loss of independence, poor quality of life, and in severe cases, death. Falls result from mix of biological, medical, behavioral or environmental risk factors.

Aim: to assess risk of falls in older people at outpatient clinics

Methods: A cross sectional study, 120 older adults were collected from outpatient clinics of Ain Shams Hospital. Geriatrics assessment was accomplished and fall risk assessment was completed using Morse fall scale (MFS) and timed up and go test (TUGT).

Results: The risk of falls was 41.67% and assessed by Morse Fall Scale among patients visiting geriatrics outpatient clinics. Older age, cognitive decline, functional dependency, and use of antipsychotic were significant predictors of increased fall risk among elderly attending outpatient clinics.

Conclusion: We concluded that increased risk of falls in older adults attended outpatient clinics is multifactorial.

Keywords: Falls, Risk, Morse Fall Scale, Timed-up and go test.

Background

A fall can be defined as a sudden, unintentional change in position causing an individual to land at a lower level, on an object, the floor, or the ground, other than because of sudden onset of paralysis, epileptic seizure, or overwhelming external force. ⁽¹⁾ Older adults often fall, causing a substantial burden on patients and the healthcare system at the same time. Falls and fall-related injuries are a common and major problem among older adults. It is the leading cause of severe injuries, as hip fractures in older population. ⁽²⁾ Also, the post-fall anxiety syndrome, fear of falling, is another consequence of falls, this in turn lead to deconditioning, weakness and gait problems and may actually increase risk of falls. ⁽³⁾ Globally, falls are a major public health problem. The most prevalent fall-related injuries among older adults are fractures of the hip, spine, upper arm, forearm, and bones of the pelvis, hand, and ankle. Of these, the most serious injury is hip fracture, a leading cause of morbidity and excess mortality among older adults. Older adults are hospitalized for fall-related injuries five times more often than they are for injuries from other causes, and women are nearly three times more likely than men to be hospitalized for a fall-related injury. ⁽⁴⁾ It is a

serious public health issue, with a substantial impact on health and healthcare costs. Elderly people attending geriatric outpatient clinics are a distinctive group that has different characteristics from those of the ordinary population or those in other institutions. Consequently, it is favorable to establish the profile of falls among the geriatric outpatient clinical population to establish care strategies for this group. ⁽⁵⁾

METHODS

Study Design: Cross-sectional study was conducted in Ain-Shams University Hospital at outpatient clinics. The study included 120 older adults ≥ 60 yrs. old (males and females) who attended outpatient clinics. All the patients were able to walk independently and their condition was stable. Patients who had acute illness or overt dementia were excluded.

METHODS: All participants were assessed regarding their demographic characteristics including age, gender, marital status, educational level and body mass index (BMI). Also, baseline data of participants were assessed as the presence of comorbidity or number of them (≥ 3 or < 3) and types of medications used or

number of them.

Moreover, functional level was assessed as activities of daily living (ADL) ⁽⁶⁾ and instrumental activities of daily living (IADL). ⁽⁷⁾ Cognitive status was evaluated with Arabic version ⁽⁸⁾ of mini-mental status examination (MMSE). ⁽⁹⁾

Risk of falls was assessed by Morse fall scale (MFS) ⁽¹⁰⁾ which is a fall assessment tool. It consists of 6 variables: History of falling (immediate or previous); secondary diagnosis (≥ 2 medical diagnoses); ambulatory aid (none/bed rest/nurse assist, crutches/cane/walker and furniture); intravenous therapy/heparin lock; gait (normal/bed rest/wheelchair, weak and impaired) and mental status (oriented to own ability or overestimates/forgets limitations). There are three types of fall risk to be extracted from the final score: below 25 is considered low fall risk, 25-44 moderate and ≥ 45 high fall risk.

Also, assessment of risk of fall was assessed with TUGT, ⁽¹¹⁾ patient got up out of an armchair seat height of approximately 46 cm (18.4 inch), and walked 3 m (10 ft.), then turned, walked back to the chair and sat down. The patient wore his regular footwear and, allowed to use any walking aid (e.g., cane or walker). No physical assistance was allowed. The time was taken used a wristwatch with a second hand. The interpretation of the TUGT ⁽¹²⁾ is: ≤ 10 seconds = Normal; 20 seconds = Good mobility and can go without gait aid ≥ 30 seconds = can't go outside alone and require gait aid and a score of more than or equal 14 seconds has been shown to indicate high risk of falls.

Ethical Consideration: Informed oral consent was taken from every patient after explanation of the study aim and procedure and the study methodology was reviewed and approved by the Research Review Board of the Geriatrics and Gerontology Department, Faculty of medicine, Ain Shams University.

Statistical methods: Analysis of data was performed by using the Statistical Package for Social Science (SPSS16). Qualitative data were presented as numbers and percentages. The associations between variables and falls that occurred in the past 12 months were analyzed by the Chi-squared test.

Results

Description of the demographic data presented in [table 1] showed that the mean age of the participants was 71 yrs.; most of them were females (60%) and (40.00%) were males. Most of them were married (70.83%) and (60.0%) had less than 5 yrs. education. About (72.5%) were overweight and 73% had less than 2 diseases.

The prevalence of increased risk of falls was about 41.67% divided into 31.67% and 10.0% with low and high risk respectively assessed by Morse Fall Scale among study population. (Figure 1)

Table (2) summarizes univariate analysis between

different participants' variables and increased risk of falls assessed by (MFS). It shows that ageing and less than 5 years of education had highly statistical significant associated with increased risk of falls (MFS) ($p < 0.001^*$).

Neither Number of drugs nor comorbidities had significant relation to risk of falls (P-value = 0.760, 0.105) respectively. However, Use of sedative hypnotics was statistically significant related to increased risk of falls (P-value=0.011*).

Functional assessment by ADL/IADL was related to increased risk of falls both with (P-value < 0.001) Also, Cognitive impairment by using MMSE was statistically significant associated with increased risk of falls (PV $< 0.001^*$). Moreover, prolonged time in TUGT was associated with increased risk of falls (PV $< 0.001^*$) in studied population. [Table 3]

The association between different risk factors and risk of falls (assessed by MFS) was evaluated using Logistic regression analysis. It was observed that IADL and prolonged TUGT scores were independent risk factors of falls after adjustment of other risk factors ($P < 0.001$) as shown in [Table 4].

Table (1): Demographics and Baseline characteristics of studied population

Baseline data	No	%
Age: (Mean SD 71 ± 5.580)		
<70 Years	61	50.83
≥ 70 Years	59	49.17
Gender:		
Male	48	40.00
Female	72	60.00
Marital state:		
Single	24	3.33
Married	85	70.83
Widow	77	20.00
Divorced	7	5.83
Education:		
< 5 Years	72	60.00
≥ 5 Years	48	40.00
BMI:		
Normal (18-24.9)	87	72.50
Overweight (25-29.9)	9	7.50
Obese (≥ 30)		
N. of Chronic diseases:		
<3 Diseases	73	60.83
≥ 3 Diseases	47	39.17
	DM (56)	(46.67)
	HTN (54)	(45.00)
	JD (39)	(32.5)

BMI- Body Mass Index.

Table (1): Characteristics of the Studied Population:

	Morse Fall Scale										X2	P-value
	High		Low		Normal		Total		N	%		
	N	%	N	%	N	%	N	%				
Age	<70 Years	1	8.33	9	23.68	51	72.86	61	50.83	33.464	<0.001*	
	>70 Years	11	91.67	29	76.32	19	27.14	59	49.17			
Gender	Female	7	58.33	25	65.79	40	57.14	72	60.00	0.783	0.676	
	Male	5	41.67	13	34.21	30	42.86	48	40.00			
Marital status	Divorced	0	0.00	2	5.26	5	7.14	7	5.83	1.853	0.933	
	Married	9	75.00	27	71.05	49	70.00	85	70.83			
	Single	0	0.00	1	2.63	3	4.29	4	3.33			
	Widower	3	25.00	8	21.05	13	18.57	24	20.00			
Educational status	Less than 5 Years	12	100.00	32	84.21	28	40.00	72	60.00	28.947	<0.001*	
	More than 5 Years	0	0.00	6	15.79	42	60.00	48	40.00			
BMI	Normal	3	25.00	13	34.21	8	11.43	24	20.00	9.245	0.055	
	Overweight	9	75.00	22	57.89	56	80.00	87	72.50			
	Obese	0	0.00	3	7.89	6	8.57	9	7.50			
N. of Chronic diseases	<3 Diseases	4	33.33	23	60.53	46	65.71	73	60.83	4.510	0.105	
	≥3 Diseases	8	66.67	15	39.47	24	34.29	47	39.17			
Medication uses	Antidepressants	1	8.33	0	0.00	2	2.86	3	2.50	2.686	0.261	
	Antihypertensives	6	50.00	15	39.47	28	40.00	49	40.83	0.467	0.792	
	Sedative hypnotics	1	8.33	1	2.63	5	7.14	7	5.83	1.064	0.587	
	Antipsychotics	1	8.33	0	0.00	0	0.00	1	0.83	9.076	0.011*	
	Diuretics	2	16.67	5	13.16	15	21.43	22	18.33	1.150	0.563	
	Benzodiazepines	0	0.00	1	2.63	1	1.43	2	1.67	0.443	0.801	
No. of drugs	Two	3	25.00	8	21.05	15	21.43	26	21.67	4.979	0.760	
	Three	5	41.67	14	36.84	16	22.86	35	29.17			
	Four	2	16.67	8	21.05	19	27.14	29	24.17			
	Five	2	16.67	7	18.42	15	21.43	24	20.00			
	Six	0	0.00	1	2.63	5	7.14	6	5.00			
ADL	Independent	4	33.33	33	86.84	69	98.57	106	88.33	42.42	<0.001*	
	Assisted	8	66.67	5	13.16	1	1.43	14	11.67	5		
IADL	Independent	0	0.00	13	34.21	70	100.00	83	69.17	128.4	<0.001*	
	Assisted	0	0.00	18	47.37	0	0.00	18	15.00	10		
	Dependent	12	100.00	7	18.42	0	0.00	19	15.83			
MMSE	Cognitive impairment	6	50.00	2	5.26	0	0.00	8	6.67	41.33	<0.001*	
	Normal	6	50.00	36	94.74	70	100.00	112	93.33	5		

Table (3): Relation between TUGT increased risk of falls assessed by (MFS).

		Morse Fall Scale								Chi-Square or ANOVA		
		High		Low		Normal		X2 or F	P-value			
		N	%	N	%	N	%					
TUGT	abnormal	12	100.00	34	89.47	17	24.29	54.034	<0.001*			
	normal	0	0.00	4	10.53	53	75.71					
	Range	34	-	73	12	-	56	11	-	38	104.474	<0.001*
	Mean ±SD	49.000	±	11.037	30.316	±	8.847	17.771	±	5.751		

Figure (1): MFS-Morse Fall Scale

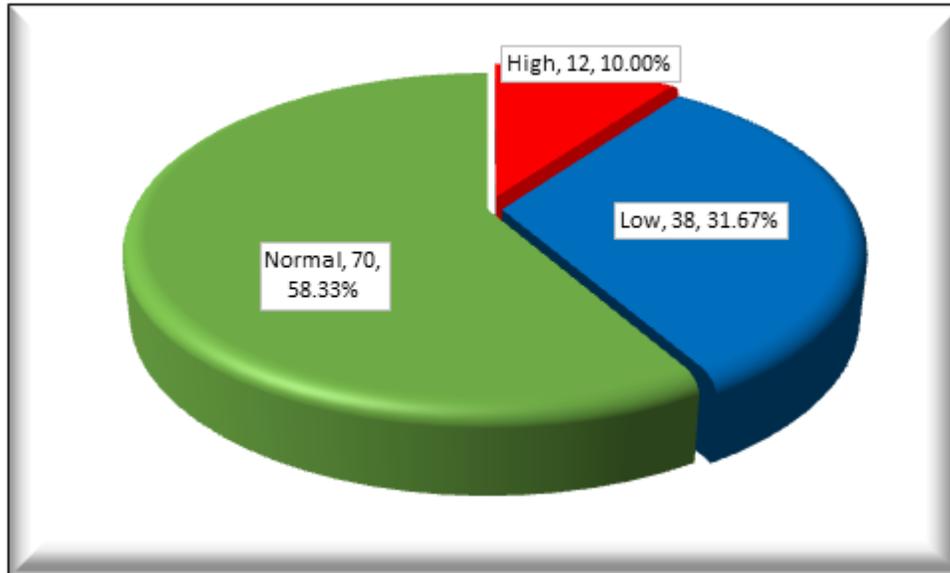


Table (4): Logistic regression analysis of risk of falls

	Unstandardized Coefficients		Standardized Coefficients	t	P-value
	B	Std. Error	Beta		
Age (Years)	0.133	0.171	0.051	0.776	0.439
Educational status	-1.283	1.710	-0.043	-0.750	0.455
Cognitive impairment	-0.831	3.519	-0.013	-0.236	0.814
ADL	2.723	3.038	0.060	0.896	0.372
IADL	8.440	1.266	0.439	6.664	<0.001*
TUGT	0.469	0.103	0.399	4.540	<0.001*

Dependent Variable: Morse Fall Scale

Discussion

The risk of falls has been assessed in geriatric outpatients and it was shown that fall risk was about 42% of the studied population. Many factors were significantly associated with increased risk of fall including aging, low educational level, cognitive impairment and more importantly impaired function. The present study found that cases with functional impairment (assisted/dependent) in ADL & IADL had significant association with increased risk of falls which was consistent with a prospective follow up study 1779 inpatients admitted to Ain Shams university hospitals. They found that elderly fallers had impaired ADL and IADL scores in comparison to non-fallers.

“Being dependent” in instrumental daily activities, was one of the independent risk factors of falling among elderly.⁽¹³⁾

Regarding age, the current study showed that, there was a statistically significant association between chronological age and the increased risk of falls. Aging is associated with decline in multiple physiological systems including visual, vestibular musculoskeletal, cardiovascular, slowed postural responses, proprioception, coordination, and cognitive function⁽¹⁴⁾ Many studies reported that falls increase with age.⁽¹⁵⁾⁽¹⁶⁾ These disagreed with a cross-sectional study conducted in Longtan Community, Beijing. A total of

1512 individuals aged 60 years or over were selected. The prevalence of falls was 18.0% on the average among 1512 participants, higher in women (20.1%), this difference may be due to larger study sample and the history of fall was restricted to the previous year only.⁽¹⁷⁾

The findings regarding the gender, as with some previous studies, the falls prevalence increased with age among both genders. This might be attributed to age-induced declines in physical, sensory, and cognitive function, as well as an increase in the number of comorbid conditions.⁽¹⁸⁾ Another study conducted in Germany; the fall rates increased with age in men but not women.⁽¹⁹⁾ The opposite was found in Nigeria where women were more likely than men to report falls.⁽²⁰⁾ These different findings in different countries between elderly men and women could be related to unmeasured biological, social or environmental characteristics.

As for marital status, the result agreed with *Kamel et al. (2013)* who found that there was no statistical difference as regard educational level or marital status among fallers and non-fallers.⁽²¹⁾ However, a study conducted on the risk factors of home injury among elderly people in Malaysia found that fewer married elderly people (4.9%) were likely to experience injuries at home than divorced/widowed (8%) or single elderly people (8%)⁽²²⁾ and might be explained by the benefits of marriage with regard to health behaviors, such as diet and physical activity level.

The findings showed that the frequency of falls was inversely related to patient's educational levels, which may be an important risk factor for falls. In comparison with a study done regarding the effect of lower education levels on increased risk of falling, showed that the risk increased among the uneducated elderly.⁽²³⁾ This could be explained by the lack of resources to learn information on how to prevent injuries. The lack of the knowledge therefore leads to the absence of preventive measures and activities. This disagreed with who found that there was no statistical difference as regard educational level or marital status among fallers and non-fallers.⁽²¹⁾

In the current study, BMI had no add difference on risk of falls as previous studies, indicated that increased BMI adds no risk of falls.⁽²⁴⁾ Overweight and obese older adults have been shown to adopt a more tentative gait pattern, with a slower walking velocity and an increased base of support.⁽²⁵⁾ As a result of these adaptations, stability is in fact improved.⁽²⁶⁾ These alterations may inadvertently represent a protective effect against falls. In addition, those with obesity were more likely to meet the reduced physical activity frailty criterion. This would suggest that adults with obesity present with less opportunity to fall as they are less

physically active. However, a relationship between obesity in the elderly and falls has been shown, and it has been proposed that a lower BMI leads to a higher risk of severe injury.⁽²⁷⁾

Regarding Medications used, the current study found that, there was no significant association between the number of medications used (polypharmacy) and increased risk of falls but there was significant association between the type of drugs used as antipsychotics and increased risk of falls. The other studies identified links between medications used and increased risk of falls that was associated either with the type of medications taken or, as in some situations were linked with an increase in the number of medications used per day. (28)

The current study demonstrated that number of chronic diseases had no significant association with increased risk of falls. Although this result disagreed with other studies as a systematic review of observational studies on risk factors for falls in community-dwelling older people showed that certain health conditions and impairments contribute independently to the risk of falls or experiencing a fall injury.⁽²⁹⁾

In the current study, cases with cognitive impairment in MMSE had significantly increased risk of falls. Walking requires paying attention to various environmental features to avoid trips and slips and quickly recovering from postural perturbations to regain a stable base of support. Previous studies have also shown that older adults with cognitive impairment have a higher prevalence of gait impairment and higher risk of falling than cognitively normal older adults.⁽³⁰⁾⁽³¹⁾⁽³²⁾⁽³³⁾ Thus, older adults with MCI are a population at risk, not only for future dementia, but also for falls, and should perhaps be specifically targeted for interventions to reduce fall risk.

In the current study, cases with prolonged time in TUGT had significantly increased risk of falls. In a six-month prospective cohort study involved frail elderly individuals living in long-stay institutions in Sweden, found that a performance on the TUGT greater than 15 seconds identified the risk of falls with 96% sensitivity and 32% specificity.⁽³⁴⁾

Conclusion: The results allow the conclusion that elderly people with worse physical performance and less independence in motor tasks especially in IADL and those with prolonged TUGT present a higher risk of fall.

Recommendation: Identifying factors related to falls among elderly is important in helping to detect the risks of occurrences of falls, as well as for proposing strategies for preventive care and/or rehabilitation among elderly people who have already suffered falls.

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