

Original Research

Falls in the elderly: assessment of prevalence and risk factors

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Abstract

Background: Falls in elderly people can lead to serious health problems. There is limited knowledge about the prevalence of falls, risk factors and causes of falls in the United Arab Emirates.

Objective: To assess the prevalence of falls among older adults aged 60 years and above and to determine the risk factors associated with falls.

Methods: This cross-sectional study was conducted using an anonymous, 20-item questionnaire which was developed in English and Arabic to be delivered as a semi-structured interview. The pre-piloted questionnaire was distributed to 510 families with at least one elderly person. The study was conducted in Sharjah and Dubai, United Arab Emirates, from September to November 2017.

Results: Participants were Arabs (368; 99.5%), living with family (339; 91.6%), females (256; 69.2%), married (240; 64.9%), holders of a university Bachelor's degree (110; 29.7%), and unemployed (154; 41.6%). Almost half of the participants (188; 50.8%) had a fall in the past two years, and three quarters (141; 75%) of those claimed that their illness was the reason for their fall. The results indicate that female and 70 years and above old participants are more likely to experience falls than males and younger counterparts respectively. A larger proportion of elderly participants not taking medications did not experience falls, while those on 1-4 medications fallers were less than non-fallers. However as the number of medications increased to 5-8 and more than 8 the number of those experiencing falls was significantly higher than non-fallers.

Conclusions: Falls are prevalent among the elderly population studied and efforts should be made to decrease the incidence of falls, identify those at risk and increase awareness about falls and their health consequences among the elderly and the general public.

Keywords

Accidental Falls; Risk Factors; Aged; Surveys and Questionnaires; United Arab Emirates

INTRODUCTION

Falls are defined as accidental events in which a person falls when his/her center of gravity is lost and no effort is made to restore balance or when this effort is ineffective.¹ Falls are considered as the most common cause of injuries among the older population. Forty percent of traumatic injuries-related hospitalizations are due to falls.² The most common fall-related consequences are pain, bruising, lacerations, fractures including upper extremity and hip fractures, and intracranial bleeding in severe cases. Frequent falls in the elderly population can lead to serious health consequences and efforts to reduce their incidence are necessary.³⁻⁵ Nearly 28-35% of people aged 65 years and above fall each year^{3,6,7} and this percentage increases to 32-42% for those over 70 years of age.⁶⁻⁸ Moreover, 20% to 39% of people who fall experience fear of falling, which leads to further limiting of activity, independent of injury.⁹

Risk factors for falls that have been identified include history of falling, use of assistive devices, environmental hazards such as poor lightening, and various health conditions including muscle weakness, vertigo, gait and balance impairments, visual and hearing disorders, cognitive and sensory impairments, orthostatic hypotension, diabetes mellitus and osteoporosis.¹⁰⁻¹² Several studies have also associated certain medications with an increased risk of falls among older adults.¹³ The most common drugs that increase the risk of falls are different types of psychotropic drugs, such as hypnotics, sedatives, antipsychotics and antidepressants, which can cause sedation, impaired balance and coordination.^{5,14-16} Furthermore, cardiovascular drugs such as diuretics and beta-blockers may cause or worsen orthostatic hypotension and falls.^{17,18} Antihistamines and anticholinergic drugs may affect the cognitive skills of elderly patients and cause blurred vision, thereby increasing the risk of falls.¹⁹ It has also been stressed by the same authors that polypharmacy and the use of psychotropic drugs, especially when combined with cardiovascular medications increase the risk of falls in the elderly.¹⁹

While some risk factors cannot be changed, many are modifiable. Many falls result from interactions among multiple risk factors, and the risk of falling increases linearly with the number of risk factors.¹⁰ The incidence of falling changed from 8% among those with no risk factors to 78%

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Criteria	Frequency N=370	%
Gender		
Female	256	69.2
Male	114	30.8
Age		
60-64	192	51.9
65-69	63	17
70-74	47	12.7
75 and above	68	18.4
Ethnicity		
Arab	368	99.5
Non-Arab	2	0.5
Marital status		
Married	240	64.9
Widowed	103	27.8
Single, never married	15	4.1
Divorced	12	3.2
Education		
illiterate	105	28.4
Less than high school degree	68	18.4
High school degree	59	15.9
Bachelor's degree	110	29.7
Higher degree (masters, PhD)	28	7.6
Employment status		
Unemployed	154	41.6
Retired	130	35.1
Employed for wages	54	14.6
Self-employed	32	8.6
Living situation		
Living with family	339	91.6
Alone	27	7.3
Living with friends/relatives	3	0.8
In a nursing home	1	0.3

among those with 4 or more risk factors according to a previous study.⁸

In United Arab Emirates (UAE), there is a lack of studies on falls in elderly people. Hence, the aim of this study was to assess the prevalence of falls in the past two years among older adults who are aged 60 years and above and to determine the risk factors associated with falls.

METHODS

Ethical approval

Ethical approval for the study was obtained from the Ethical Committee of the Medical Campus at the University of Sharjah. The study participants completed the questionnaire without providing any identification information. Participants were assured of confidentiality and anonymity of the responses provided and written informed consent was obtained.

Subjects and data collection

The inclusion criterion was elderly persons aged 60 years and above. A total of 510 families with at least one elderly from Dubai and Sharjah-UAE were approached to participate in the survey. The surveys were distributed by hand and were collected over the study period of three months (September-November, 2017).

Development of study design

This cross-sectional study was conducted using an anonymous questionnaire to be delivered as a semi-

structured interview. The questionnaire consists of 4 sections and 20 questions and was designed by the researchers in both English and Arabic to collect specific data about the problem of falls in the elderly. All questions were close-ended questions, with 'Yes and No' as options. The questionnaire was pre-piloted by distributing it to 5 elderly persons who were interviewed face-to-face to check face validity of the questionnaire. Recommendations from the pilot study were considered to develop the final version of the questionnaire; however the participants were not included in the actual study. The first section of the questionnaire collects the socio-demographic characteristics of the participants. The second section is completed by participants who have experienced a fall and assesses the number, consequences and causes of falls and whether the participants visited a hospital for the fall. The third section discusses the health status of the participants, medications used and the number of medications. The fourth section includes questions to be answered by all participants concerning preventive strategies.

Statistical analysis

The data were analyzed using the program SPSS version 20 (Chicago, IL, USA). Pearson Chi-squared test was used to identify the influence of socio-demographics on the possibility of falling and differences between participants who experienced falls and those who did not with a significance level of $p < 0.05$.

RESULTS

A total of 370 participants completed the questionnaire giving a response rate of 72.6%. Table 1 shows the demographics of participants. The majority of participants were females (256; 69.2%), Arabs (368; 99.5%), married (240; 64.9%), and living with family (339; 91.6%). More than half of the participants were in the age group of 60-64 years age (192; 51.9%). Participants who hold a Bachelor's

Item	Frequency N=188	%
Number of falls		
1-2	118	62.8
3-4	48	25.5
≥5	22	11.7
Hospital visit after a fall		
Yes	112	59.6
No	76	40.4
Health consequences after a fall		
Pain	111	59
Bruising	103	54.8
Fracture	36	19.1
Laceration	23	12.2
Intracranial bleeding	0	0
Causes of falls		
My illness	141	75
Sense of dizziness when I stand up/balance problems	73	38.8
Loose carpets/ slippery floors	53	28.2
Vision problems	22	11.7
The shoes I'm wearing	20	10.6
The medications I take	19	10.1
Poor lighting	7	3.7

Table 3. Influence of selected socio-demographics on the possibility of falling.

Characteristic	Frequency (%), n=370		Total	Chi-square test p-value
	Fallers	Non-fallers		
Gender				
Female	146 (57)	110 (43)	256	< 0.001
Male	42 (36.8)	72 (63.2)	114	
Age				
60-64	80 (41.7)	112 (58.3)	192	< 0.001
65-69	30 (47.6)	33 (52.4)	63	
70-74	30 (63.8)	17 (36.2)	47	
75 and above	48 (70.6)	20 (29.4)	68	
Education				
Illiterate	79 (75.2)	26 (24.8)	105	< 0.001
Less than high school degree	36 (52.9)	32 (47.1)	68	
High school degree	23 (39)	36 (61)	59	
Bachelor's degree	44 (40)	66 (60)	110	
Higher degree (masters, PhD)	6 (21.4)	22 (78.6)	28	
Assistive device use				
Yes	78 (81.2)	18 (18.8)	96	< 0.001
No	110 (40.1)	164 (59.9)	274	

degree were 110 (29.7%) and 154(41.6%) participants were unemployed. About half (188; 50.8%) the respondents reported that they had a fall in the past two years. Table 2 shows the number of falls within the last two years in the elderly population studied. About two thirds (118, 62.8%) of the participants, who reported a fall, fell 1 or 2 times. More than half (112; 59.6%) of the participants who reported a fall visited a hospital after a fall (Table 2). The order of health consequences of the falls was pain (111, 59%), bruising (103, 54.8%), fractures (36, 19.1%) and laceration (23, 12.2%). None of the participants suffered intracranial bleeding during the study period.

Almost three quarters (141; 75%) of the 188 participants

who reported a fall claimed that their illness was the reason for their fall while 73 (38.8%) of them reported experiencing a sense of dizziness when they stand up and have balance problems. Loose carpets/slippery floors accounted for the falls of more than one quarter (28.2%) of fallers. Other causes of falls are shown in Table 2.

As shown in Table 3, a statistically significant association was observed between the prevalence of falls and gender (p<0.001), age (p<0.001), education level (p<0.001) and the use of assistive devices (p<0.001). Falls were more common in females, patients 75 years and above, illiterate respondents and those using assistive devices.

Table 4. Health status of participants and the medications they use.

Item	Frequency (%), n=370		Total	Chi-square test p-value
	Fallers	Non-fallers		
Number of medications taken daily				
0	16 (36.4)	28 (63.6)	44	< 0.001
1-4	89 (42.6)	120 (57.4)	209	
5-8	54 (66.7)	27 (33.3)	81	
More than 8	29 (80.6)	7 (19.4)	36	
The medications used				
Hypnotics, sedatives	25 (71.4)	10 (28.6)	35	0.012
Diuretics	85 (65.4)	45 (34.6)	130	< 0.001
Antidepressants	16 (72.7)	6 (27.3)	22	0.034
Antipsychotics	4 (66.7)	2 (33.3)	6	0.433
Antihistamines	45 (60)	30 (40)	75	0.120
Beta blockers	89 (61.8)	55 (38.2)	144	0.002
Insulin	61 (66.3)	31 (33.7)	92	0.001
Laxatives	30 (69.8)	13 (30.2)	43	0.008
Anticonvulsants	4 (57.1)	3 (42.9)	7	0.735
NSAIDs	46 (63.9)	26 (36.1)	72	0.013
None	26 (30.6)	28 (63.6)	85	< 0.001
The existing health conditions				
Weak eye sight	73 (53.7)	63 (46.3)	136	0.401
Osteoporosis	72 (64.3)	40 (35.7)	112	0.001
Hearing problems	50 (71.4)	20 (28.6)	70	< 0.001
Sleep disorders	39 (53.4)	34 (46.6)	73	0.618
Obesity	51 (56.7)	39 (43.3)	91	0.273
Osteoarthritis	84 (59.6)	57 (40.4)	142	0.017
Chronic respiratory disorders	28 (66.7)	14 (33.3)	42	0.029
Anemia	16 (50)	16 (50)	32	0.924
Vertigo or balancing disorders	49 (70)	21 (30)	70	< 0.001
Dementia	5 (55.6)	4 (44.4)	9	0.773
Hypotension	10 (62.5)	6 (37.5)	16	0.339
Hypertension	88 (55.3)	71 (44.7)	159	0.130
Diabetes	83 (56.8)	63 (43.2)	146	0.061
Bladder or Bowel incontinence	25 (71.4)	10 (28.6)	35	0.010
None	8 (28.6)	20 (71.4)	28	0.014

The risk factors as related to the health status of the participant, the medications used and the number of medications on the prevalence of falls are shown in Table 4. There was a strong significant association ($P < 0.001$) between the number of medications taken daily and the increased risk of falls in elderly participants. The majority (29, 80.6%) of respondents who take more than eight medications daily experienced falls in the past two years. Among participants who take 5- 8 medications per day a total of 54 (66.7%) participants had a fall in the past 2 years. As the number of medications/day is reduced to 1-4 medications daily, the risk of falls decreased, and among those who take 1-4 medications, 89 (42.6%) experienced a fall. On the other hand, only 16 (36.4%) of those who do not take medications experienced a fall in the past two years (Table 4).

There was also a significant association ($p < 0.001$) between taking certain medications and the incidence of falls. Participants taking beta-blockers comprised 144 (38.9%) and 89 (61.8%) of them fell in the last two years. The most common health condition reported by respondents was hypertension and about 88 (55.3%) of them had a fall. Nevertheless, there was a significant association between other co-morbid health conditions and the increased risk of falls; for example, of those (112; 30.3%) who stated that they have osteoporosis nearly 64.3% had a fall in the past two years.

Strategies used to prevent falls in elderly people include calcium and Vitamin D supplements, pharmacists counseling on drugs that may precipitate falls and participant's knowledge about fall prevention. Respondents taking calcium comprised only 165 (44.6%) and 186 (50.3%) participants were taking Vitamin D. The majority (292; 78.9%) of respondents reported that they have never received any counseling from a pharmacist regarding the possibility that their medications may cause falls and 230 (62.2%) of the respondents reported that they have no adequate information about strategies to prevent falls.

DISCUSSION

Falls in older individuals are common and may lead to serious health problems. They can be associated with various risk factors including intrinsic and extrinsic factors. Several studies assessed the prevalence of falls in older adults, and the related fall risk factors.²⁰⁻²² However, few studies addressed this issue in the Arab countries^{20,23,24} and to the authors' best knowledge there is lack of such studies in UAE. Therefore, in the present study we aimed to assess the prevalence of falls in the past two years among older adults aged 60 years and above and to determine the risk factors associated with falls.

In the present study, the prevalence of falls in older adults was 50.8% as compared to 60.3% in Egypt²⁰, 34.7% in Ecuador²¹, 27.6% in Brazil²², 42.4% in UK¹¹ and 32% in USA.²⁵ It has been stressed that half of the cases of falls in people over 65 years of age are recurrent.^{23,26} More than half of our responders visited the hospital after experiencing a fall and only 19.1% of participants who reported a fall reported that they had fractures after a fall. However, a study in Pakistan revealed that only 13% of

participants had an emergency plan in case of falls, and showed that fractures were the outcome of 51% of the falls reported in their study.²⁷ Almost three quarters of the 188 participants who reported a fall claimed that their illness was the reason for their fall. Other reasons reported include; experiencing a sense of dizziness when standing up and having balance problems, loose carpets /slippery floors, vision problems, shoes, medications and poor lighting problem. Numerous studies identified environmental hazards like poor lighting, and a variety of health conditions, such as muscle weakness, vertigo or gait and balance impairment, visual and hearing disorders, cognitive and sensory impairment, orthostatic hypotension, diabetes, and osteoporosis as risk factors of falls.^{10,12,13,28}

A primary finding of this study is that females are more likely to experience falls than males, and with advancing age, the prevalence of falls increases. This is consistent with earlier observations that females and advanced age (age above 75 years) were associated with a greater prevalence of falls.^{21,22} Such a higher prevalence of falls in females may be a consequence of the decline in their bone mass that occurs faster than that of males especially after menopause. Among other risk factors, sarcopenia defined as loss of skeletal muscle mass that occurs with aging has also been associated with a higher incidence of falls in females.^{29,30}

In the present study, illiterate elderly suffered more falls and the incidence of falls seems to decrease as the education level increase. Moreover, elderly people who use assistive devices such as canes are more exposed to falls. Such an influence of educational level on falls may be due to elderly people with low level of education perceive and worry less about their health status. Hence, they have fewer tendencies to engage in health recovery and are less aware of the preventive strategies and advice given by the healthcare professionals; therefore they are at increased risk of falls.³¹ The health status of the participant, medications taken and number of medications are also predictors for falls and the significant association between the number of medications taken daily and the increased risk of falls in elderly participants may be explained by the increased possible occurrence of side effects and drug interactions as a result of polypharmacy. Several studies reported a strong relationship between the use of three or more medications and risk of falls.³²⁻³⁵ These reports and the present study are further supported by earlier findings that the risk of falls increases significantly when more than four medications are taken regardless of the type of drugs taken.³⁶

The present observation on the association between the prevalence of falls and medications used by the elderly participants such as hypnotics/sedatives, diuretics, antidepressants, beta-blockers, insulin, laxatives, and NSAIDs are in accordance with other reported observations.³⁷⁻³⁹ It is known that hypnotics/sedatives and NSAIDs can cause sedation, dizziness and cognitive impairments while diuretics can result in postural hypotension, decreased alertness and fatigue. Sedation and postural hypotension by antidepressants and beta-blockers and the hypoglycemic effect of insulin also significantly contribute to the incidence of falls in the elderly.^{5,18,37,38} In

addition, the use of diuretics and laxatives cause the elderly to get up frequently and rush at a fast pace to use the toilet, usually without assistance thus increasing the risk of falls.

Surprisingly no association was observed between the incidence of falls and antipsychotic, antihistamine, and anticonvulsant medications. This might be related to physician/ pharmacist instruction on type of and time when to administer such drugs. Medications are one of the modifiable risk factors for falls. Therefore, special caution is necessary when treating elderly patients at risk.^{5,39} Dose adjustments or the use of alternative medicines with lower risks must be considered to reduce the risk of falls.

The most common risk related health condition reported by participants in this study was hypertension. Despite the fact that more than half of the participants with hypertension had a fall event during the study period, there was no association between the two. A similar finding was reported in a study in Qatar.²³ On the other hand, there was a significant association between osteoarthritis and the increased risk of falls. This is most likely due to gait disturbance and weakness associated with the condition.²¹

In agreement with the observation in Ecuador²¹, urinary incontinence was also found to be a significant risk factor for falls in the present study. Falls related to incontinence are generally thought to result from loss of balance when rushing to the toilet and because these patients need to get up more times to use the toilet. In addition, similar to the findings in elderly Greeks²⁶, it has been observed in this study that vertigo or balance disorders also contribute to the increased risk of falls.

Calcium and Vitamin D supplements are necessary in the elderly for bone health and to prevent osteomalacia, osteoporosis, muscle weakness and protect against falls. In the present study, almost half of the participants take calcium and Vitamin D supplementation. A previous report revealed that 1µg alfacalcidol daily significantly decreases the number of falls in elderly.⁴⁰

The majority of elderly included in this study reported that they have no adequate information about fall prevention and did not receive any counseling from the pharmacist regarding the possibility that their medications may cause falls. The value of educating elderly about medication-related fall risk has previously been stressed.³⁰ Both the physician and the pharmacist as forefront healthcare professionals have a major role to play in educating elderly patients and increasing their awareness of risk factors such

as medication side effect in order to reduce the incidence of falls.

Limitations of the study

A major limitation of this study is the collection of retrospective data about falls that may be susceptible to recall bias, and some elderly subjects may under-report the number of their fall episodes, leading to possibility of a reported lower prevalence rate in this study.

Another limitation is that the falls may be due to other potential risk factors that have not been included in our study which may require further investigations. These are, among others, physical activity, poor nutrition, fear of falling, Parkinson's disease, thyroid disorders, foot problems, Alzheimer's disease. Finally, more detailed information about the drugs doses and frequency of administration may have provided better understanding of whether drugs greatly affect risk for falls in elderly patients.

CONCLUSIONS

Falls are prevalent in the elderly population and there is an urgent need for public health strategies to decrease their incidence and identify those who are at risk. Physicians and pharmacists should, through counseling, educate elderly patients and their families on how to reduce the incidence of falls. Such counseling should include reviewing the medications prescribed for the elderly that may precipitate falls, avoiding drug-drug and drug-disease interactions, minimizing the side effects, recommending vitamin D and calcium supplementation and suggesting lifestyle and living environment adjustments. Implementation of falls prevention programs can also significantly reduce falls in the elderly.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest to disclose.

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