

# Fall Among Geriatric Patients: Prevalence, Risk Factors and Clinical Outcomes

Zainol Akbar Zainal<sup>1\*</sup>, Rosnani Hashim<sup>1</sup> and Nur Aisya Abu Bakar<sup>2</sup>

<sup>1</sup>Faculty of Pharmacy, University of Cyberjaya, Cyberjaya, Selangor, Malaysia

<sup>2</sup>Department of Pharmacy, Hospital Kajang, Selangor

\*Corresponding author email: zainol.akbar@cyberjaya.edu.my

## ABSTRACT

**Introduction:** Fall among geriatric patients has become a great concern that leads to public health problem, including in Malaysia. To date, there is lack of local published studies on the prevalence of fall among geriatric patients and its associated clinical outcomes.

**Objective(s):** This cross-sectional study was conducted to determine the prevalence, risk factors and clinical outcomes of falls among geriatric patients.

**Methodologies:** Convenient sampling method was used to select patient admitted to Hospital Tengku Ampuan Rahimah (HTAR), Klang in 2016 and 2017. Morse Fall Scale (MFS) was used to classify the risk of falls. Regression analysis was used to measure the association between demographic factors and clinical characteristic with falls. Independent T-test was used to measure the difference in mean number of comorbidities and length of stay in hospital between fallers.

**Results:** A total of 132 patients were included in this study. This study found that the prevalence of fall was 30 cases among geriatrics. Majority of fallers (73.3%) were classified with high risk of falling. There was a statistically significant association between kidney impairment and falls (OR= 3.14; p=0.018). There was a statistically significant difference in the mean length of stay in hospital between fallers with  $\leq 1$  comorbidity and those with  $\geq 2$  comorbidities.

**Conclusion:** Fall is prevalent among geriatric patients and more effective prevention methods are important especially for patients with kidney impairment and multiple comorbidities.

**Keywords:** Geriatric, fall, prevalence, risk factors, outcomes

## INTRODUCTION

A study conducted among 69 geriatrics in Australia found that the incidences of falls are increasing due to population ageing that leads to accidental injuries and injury-related deaths (Bird et al., 2010). Previous studies have reported that individuals with history of previous falls have risk doubles or triples in the presence of cognitive impairment (Aama, 2017; Ambrose et al., 2013). The prevalence of falls has also been reported to increase with increasing comorbidities. Geriatric with underlying neurological diseases such as stroke, Alzheimer's disease and Parkinson's disease will experience more fall incidences compared with healthy older adults (Bao et al., 2017). Apart from these factors, environmental factors can also lead to increased incidence of falls. A study among 1520 geriatrics found that the most common place where elderly experience falls is their own homes (64%) and followed by the falls on streets (26%). The study also found that the incidence of falls mostly happens in bedroom and bathroom, and this can be prevented by

using non-slippery flooring material, adequate lighting, and absence of rugs (Rodrigues et al., 2014).

Patient who experiences falls suffers high costs, increase length of stay in hospital and liability (Bouldin et. al., 2013). The hospital stays with an average of 6-12 day or more will cause higher costs among patients with serious injuries. Increased length of hospital stay may cause other complications such as increased risk of nosocomial infection among elderly patients (Dunne et. al., 2014).

There is lack of published studies conducted on Malaysian geriatric population related to fall and its clinical outcomes. This cross-sectional study was conducted to investigate the risk factors and clinical outcomes of falls in elderly population.

## METHODOLOGIES

This retrospective cross-sectional study was conducted at geriatric and medical wards at HTAR, Klang. All geriatric

patients admitted in 2016 and 2017 were sampled conveniently, screened and selected based on the pre-set inclusion and exclusion criteria. Data was collected using a data collection form which contains 3 sections namely Section 1 (demographic data), Section 2 (fall episodes) and Section 3 (other geriatric syndromes). Morse Fall Scale (MFS) was used to classify the fall risk among patients. Regression analysis was used to measure the association between demographic factors and clinical characteristic with falls. Independent T-test was used to measure the difference in mean number of comorbidities and length of stay in hospital between fallers. All characteristics of the study and related protocols were reviewed and authorized by National Medical Research Register (NMRR Malaysia), Clinical Research Centre (CRC Malaysia) and Medical Research and Ethics Committee (MREC Malaysia). The study protocol and data collection form used in this study were submitted to NMRR for evaluation and registration. Ethical approval to conduct the study was endorsed by MREC [NMRR-18-780-40357].

**RESULTS**

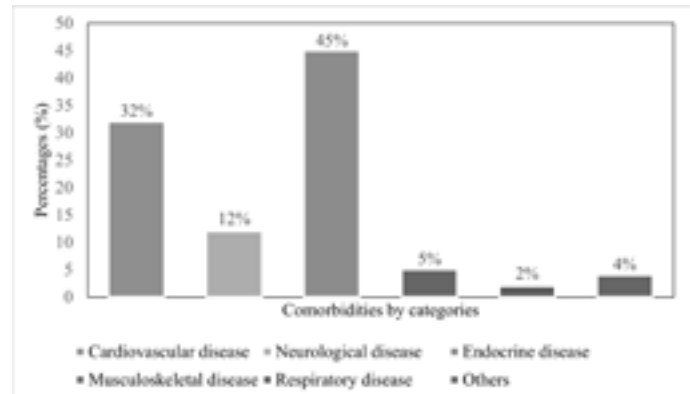
A total of 132 geriatric patients were included for final analyses. Majority of the patients were below 80 years old, females and of Malay ethnicity. The patients' demographics are as shown in Table 1.

**Table 1: Demographic characteristic of study population (N = 132)**

Variables		n (%)
Age range (in years)	60-79	105 (79.5)
	80 and above	27 (20.5)
Gender	Male	23 (17.4)
	Female	109 (82.6)
Ethnicity	Malay	49 (37.1)
	Chinese	36 (27.3)
	Indian	42 (31.8)
	Others	5 (3.8)

Of the 132 patients, 72.7% were found to have ≥ 2 comorbidities. The distribution of comorbidity categories is as shown in Figure 1.

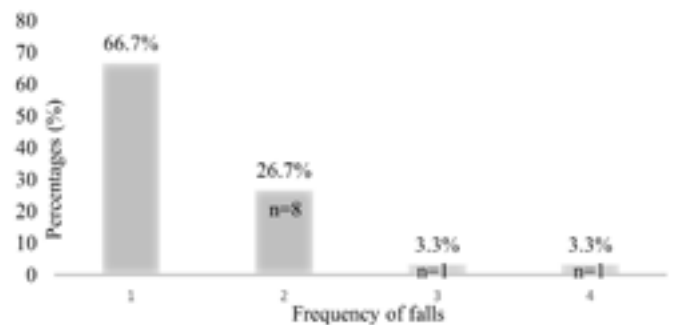
This study found that among the endocrine diseases, majority of the cases (69.2%) were type 2 diabetes mellitus (T2DM). This finding is consistent with previous local studies that found, among 2764 geriatrics in Malaysia, the prevalence of T2DM was higher among geriatrics with 34.4% compared with 20.8% for population aged 30 and above (Ho et al., 2014). Another study reported that T2DM could be associated with chronological age where both reductions in insulin sensitivity and muscle mitochondrial dysfunction were commonly observed phenomena among geriatric patients (Teh et al., 2014).



**Figure 1: Comorbidity cases among patients (N = 286)**

**Fall prevalence**

This study found that the overall prevalence of fall was 30, giving an overall fall rate of 22.7%. Majority of patients have experienced at least 1 fall episode in a year. The mean number of falls experienced by 30 fallers was 1.43 (± 0.73). Figure 2 shows the frequency of falls among the 30 patients who have previous fall.



**Figure 2: Frequency of fall episodes among fallers (N = 30)**

**Fall risk factors**

Results from univariate analyses showed that only kidney impairment (P=0.018, OR=3.14 [1.22-8.09]) was statistically significantly associated with falls. Patients with kidney impairment were 3.14 times more likely to experience falls than were patients with no issue of kidney impairment. The finding from this study is consistent with the results published in 2007. In a study involving 489 geriatric patients, it was reported that decreased renal function was associated with falls. The potential mechanism was the creatinine clearance (CrCL) associated with declined vitamin D receptors (VDR) in muscle. Hence, this could lead to decrease of muscle strength and predispose more in incidence of falls (Gallagher et. Al., 2007). A meta-analysis of 39 high-quality evidence published in 2020 highlighted that the risk of fractures increased when kidney function worsened, with the highest risks in the patients with stage 5 CKD or dialysis (Goto et. Al., 2020). The relationship between demographic and clinical factors among fallers and non-fallers is as summarized in Table 2.

**Table 2: Demographic factors and clinical characteristics between fallers and non-fallers.**

Variables	Non-fallers (n=102) n (%)	Fallers (n=30) n (%)	OR* (95%)	P value
<b>Age range (in years)</b>				
60-79	81 (77.1)	24 (22.9)	0.96 (0.35-2.67)	0.964
80 and above	21 (77.8)	6 (22.2)		
<b>Gender</b>				
Male	17 (73.9)	6 (26.1)	1.25 (0.44-3.51)	0.673
Female	85 (78.0)	24 (22.0)		
<b>Cardiovascular disease</b>				
Hypertension	62 (73.8)	22 (26.2)	1.78 (0.72-4.37)	0.213
Heart Failure	5 (62.5)	3 (37.5)	2.16 (0.48-9.60)	0.310
<b>Respiratory disorder</b>				
Asthma	6 (85.7)	1 (14.3)	0.55 (0.06-4.77)	0.589
<b>Musculoskeletal Disorder</b>				
Osteoarthritis	8 (61.5)	5 (38.5)	2.30 (0.71-7.81)	0.613
<b>Neurological Disease</b>				
Stroke	16 (76.2)	5 (23.8)	1.07 (0.36-3.22)	0.897
Epilepsy	3 (75.0)	1 (25.0)	1.14 (0.11-11.36)	0.912
Alzheimer's disease	7 (87.5)	1 (12.5)	0.47 (0.06-4.00)	0.500
<b>Endocrine disease</b>				
Type 2 DM	71 (78.9)	19 (21.1)	0.75 (0.32-1.78)	0.517
Kidney Impairment	14 (58.3)	10 (41.7)	3.14 (1.22-8.09)	0.018
Dyslipidemia	15 (93.8)	1 (6.2)	0.20 (0.03-1.58)	0.127
<b>Others</b>				
Cancer	5 (62.5)	3 (37.5)	2.16 (0.48-9.60)	0.484

**Fall sites and clinical outcomes**

In this study, most falls took place in bathrooms and only 16.7% occurred outdoors. This finding is consistent with another study that reported the bathroom as the most hazardous place compared to outdoor locations. Increasing time amount spent indoors was one of the reasons. In this study, the major extrinsic factor of falls was slippery bathroom floor (Sebestina et. al., 2008). In this study, most of geriatric patients who experience the fall episodes reported to have suffered some kind of injury (80.0%). The most common injuries were scrapes, bruises or blisters and fractures. The findings were similar to another study among 389 geriatrics in Brazil and found that scratches, abrasions and bruises were the main consequences of falls (Ferretti et. al., 2013). This study also found that there was a statistically significant difference in the mean length of hospital stay between fallers with  $\leq 1$  comorbidity and those with  $\geq 2$

comorbidities. The summary of fall incidences among the patients is as shown in Table 3.

**Table 3: Details of incidence of falls (n=30).**

Variables	n (%)
No injury	6 (20.0)
Fractures	6 (20.0)
Type of injuries	Concussion/Brain injury 3 (10.0)
Scrapes, bruises, or blisters	11(36.7)
Lacerations	4 (13.3)
No injury	6 (20.0)
Site of injuries	Hip 5 (16.7)
Head (include facial bones)	14 (46.7)
Knee and lower leg	5 (16.7)
Bathroom	11 (36.7)
Place of Falls	Living room 7 (23.3)
Ward (bedside)	6 (20.0)
Others	5 (16.7)

**CONCLUSION**

This study has showed that fall is common among the geriatric populations. Majority of the fall cases occurred indoor and resulted in some degrees of injuries. Patients with comorbidities, especially those with chronic kidney diseases, was shown to have higher odds to fall. This study concludes that fall among the elderly can lead to more severe clinical outcomes and that appropriate preventative strategies should be taken by the patients and healthcare professionals.

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