Original Research Article

A cross sectional study on the prevalence and risk factors of fall among the elderly in an urban area of Chidambaram

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ABSTRACT

Background: In India, the elderly people constitute 8.6% of the total population. Fall is a major cause of injuries and can increase the risk of early mortality among elderly. The objective of this study was to determine the prevalence of falls among elderly and its associated risk factors.
Methods: A cross sectional study was conducted among elderly population over 60 years and above, in an urban area. About 115 elderly were selected using convenient sampling method. A predesigned semi structured questionnaire was administered to collect information about falls. In statistical analysis, descriptive statistics and chi square test was employed using SPSS version 21.3.
Results: The prevalence of fall in the past 12 months was found to be 27%. Among these, 77.4% of the participants had single fall and 22.6% had two episodes of falls. The majority (84.2%) of falls occurred indoors, 60.5% falls occurred during morning hours. Half of the participants had reported the reasons for falls as slippery floor (55.6%). Age was found to be significantly associated with falls.
Conclusions: Falls are very common among elderly. Identification of factors significantly affecting elderly falls can help in planning public health policies and programs for prevention of falls.

Keywords: Falls, Elderly, Risk factors, Urban

INTRODUCTION

Aging population is the current problem that the world is facing. Owing to the continued decline in fertility rates and increased life expectancy, ageing of the world's population is quite visible.[1] This demographic change has eventually resulted in increasing numbers and proportion of people who are over 60 years.[2] Hence, in this fast-paced world, the time when there will be more older people than younger people is rapidly approaching. According to population census 2011, there are nearly 104 million elderly persons (aged 60 years or above) in India, accounting for 8.6% of the total population. It is not surprising to state that India houses the world's second-largest geriatric population, which is about 1/8th of the total geriatric population of the globe.[3]

Geriatric syndromes are characterized by the emergence of several complex health states that tend to occur only later in life that is in older age. They are often the consequence of multiple underlying factors and include frailty, urinary incontinence, falls, delirium and pressure ulcers. Hearing loss, cataracts and refractive errors, back and neck pain and osteoarthritis, chronic obstructive pulmonary disease, diabetes, depression, dementia are common health conditions in old age. However, among many health issues that are faced by the elderly, falls are an essential concern and happen to be one of the leading causes of death in geriatric persons.[4]

According to world health organization, a fall is defined as "in- advertently coming to rest on the ground, floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects".

The fall is determined by multifactorial circumstances, in which intrinsic (aging characteristics and age-related physiological changes, presence of comorbidities) and extrinsic (environmental risks due to slippery floor or poor lighting, those related to daily activities) factors are involved. Falls occur mostly from the interaction between these factors.[1,4]

Various studies show that falls are a leading cause of death in older adults.[5] Falls lead to 20 to 30% of mild-to-severe injuries, and are the underlying cause of 10 to 15% of all emergency department visits. This causes considerable economic burden to the person as well as the family.[6]

Healthcare impacts and costs of falls in older age are increasing all over the world. The prevention of falls is of utmost importance because falls cause considerable mortality, morbidity and suffering for older people and their families, and incur social costs due to hospital admissions.[4] By identifying the risk factors and initiating plans of care to address these factors, falls can be prevented. Hence, the present study was undertaken to determine the prevalence of falls among the elderly and risk factors associated with falls in an urban area.

METHODS

A community-based, cross-sectional study was conducted in the urban field practice area of the Rajah Muthaiah medical college hospital (RMMCH) in Chidambaram, Tamil Nadu. Out of 33 wards in Chidambaram municipality, one ward was selected conveniently. Elderly persons aged 60 years and above residing in the area for the past 12 months or more were included in the study. This ward has 5 streets and the survey began from the first street starting from the right side first house and the subsequent houses were surveyed till the first house on the left side was reached, then the second street was surveyed. The survey was stopped, once we reached the required sample size.

Participants were interviewed with a predesigned semi structured questionnaire. The questionnaire was developed on the basis of WHO conceptual framework to identify risk factors contributing to fall.[4] Information regarding self-reported or physician-diagnosed chronic health conditions, medication use, and current use of alcohol or smoking was recorded. Patient's medical records were also reviewed in their homes.

History of falls in the past 12 months were asked. Information regarding fall such as number of falls, place and time of falls, reasons for falls, injuries sustained and hospitalization after the falls were recorded.

Falls due to assault and RTA were not included in this study, elders not present on more than two consecutive visits or not willing were excluded from the study.

Sample size was calculated using the prevalence 26% and taking an absolute precision of 8% with level of confidence interval as 95%, the sample size was calculated using the formula:[7]

$$n = z^2 pq \div e^2$$

Where, z=1.96 (table value for α=0.05)
p=prevalence=0.26,
q=1-p=0.74,
e=absolute precision (fixed as 8%)

By applying the above values, the sample size was calculated to 115 study participants.

Data collection period was from June to December 2019. House-to-house visit was done for all the participants.

Ethical clearance was obtained from the institutional ethical committee, prior to the study. Then all the participants found during the visit were told about the purpose of the visit and consent was obtained from the participants and family members.

Data were entered in Microsoft excel 2019 and statistical analysis was carried out using statistical package for social sciences (SPSS) software (version 21.3). Statistical methods applied were descriptive statistics. The association between demographic and other risk factors for fall were tested for significance using chi square test. Variables with $p < 0.05$ was considered as statistically significant.

RESULTS

Table 1 shows the demographic characteristics of the study participants. Out of the 115 participants, 63 (54.8%) were women and 52 (45.2%) were men. Sixty-nine (60%) were in the age group of 60-69 years, 34 (29.6%) in the age group of 70-79 years and 12 (10.4%) were in the age group 80 years and above. Mean age of the study participants was 69.8 years. Half of the participants (54.8%) were currently married and 52 (45.2%) were widow/widowers. Majority of the participants (86.1%) were living with family (children or spouse). Sixty-six (60%) of the participants were illiterate, 48 (41.7%) participants were currently working and 67 (58.3%) participants were not working. Source of financial support for the participants were from their salary (40.9%), pension (9.6%) and children (49.5%). 72 participants (62.6%) were receiving the amount of Rs.1000 of old age pension by the government.

Figure 1 shows the prevalence of falls in the study participants for the past 12 months. In our study, 31 study participants had contributed to a total of 38 falls in the past 12 months. The prevalence of fall in the past 12 months was found to be 27%. Among these, 77.4% of the participants had single fall and 22.6% had two episodes of falls.

Table 2 shows the demographic characteristics of the study participants and association with falls. Increasing age was found to be associated with a risk of having fall (p<0.001). Women had higher fall rate than men, however it was not significant. Other variables were not found to be significant.

Table 3 shows the health-related characteristics of the study participants and their association with falls. Out of the 115 participants, 48 (41.7%) reported of having hypertension, 39 (33.9%) of having diabetes and 13 (11.3%) of having joint conditions. 11 (9.6%) of the participants reported of having cardiovascular disease and 10 (8.7%) of having visual problems, 8 (7%) reported of having hearing difficulties and 3 (2.6%) having breathing problems. Smoking and alcohol consumption were found in 18.3% of the study participants. Nearly half of the participants 49 (42.6%) were not using any medications for their health problems, 17 (14.8%) were using single medication, 27 (23.5%) were using 2 medications and 22 (19.1%) were using 3-5 medications. Forty-five (39.1%) were having one comorbidity and 42 (3%) were having two comorbidities. Of the people who were using walking aids, 50% of them had history of fall. All these variables were not found to be significant in chi square test.

Table 1: Demographic characteristics of the study participants (n=115).

Characteristics	Frequency (N)	Percentage (%)
Age (years)		
60-69	69	60
70-79	34	29.6
≥80	12	10.4
Gender		
Male	52	45.2
Female	63	54.8
Marital status		
Married	63	54.8
Widow/separated Unmarried	52	45.2
Occupation		
Working	48	41.7
Not working	67	58.3
Source of financial support		
Salary	47	40.9
Pension	11	9.6
Children	57	49.5
Living with		
Family	99	86.1
Alone	16	13.9

Table 2: Association of socio-demographic variables of the study participants with falls (n=115).

Variables		Falls history present N (%)	Falls history absent N (%)	Chi square value	P value
Age (years)	60-69	9 (13)	60 (87)	19.885	<0.001
	70-79	14 (41.2)	20 (58.8)		
	>80	8 (66.7)	4 (33.3)		
Sex	Male	10 (19.2)	42 (80.8)	2.877	0.097
	Female	21 (33.3)	42 (66.7)		
Marital status	Married	13 (20.6)	50 (79.4)	2.828	0.139
	Widow/separated/ unmarried	18 (34.6)	34 (65.4)		
Occupation	Working	11 (22.9)	37 (77.1)	0.683	0.523
	Not working	20 (29.9)	47 (70.1)		
Financial support	Salary	9 (19)	38 (80.9)	2.568	0.277
	Pension	4 (36.4)	7 (63.6)		
	Children	18 (31.6)	39 (68.4)		
Living with	Family	27 (27.3)	72 (72.7)	0.036	1
	Alone	4 (25)	12 (75)		

Table 3: Association of biological and behavioural characteristics of the study participants with falls (n=115).

History	Variables		Falls history present N (%)	Falls history absent N (%)	Chi square value	P value
Medical history	Diabetes	Yes	8 (20.5)	31 (79.5)	1.244	0.375
		No	23 (30.3)	53 (69.7)		
	Hypertension	Yes	13 (27.1)	35 (72.9)	0.001	1
		No	18 (26.9)	49 (73.1)		
	Joint conditions	Yes	6 (46.2)	7 (53.8)	2.743	0.109
		No	25 (24.5)	77 (75.5)		
	Visual problems	Yes	4 (40)	6 (60)	0.946	0.455
		No	27 (25.7)	78 (74.3)		

Continued.

History	Variables		Falls history present N (%)	Falls history absent N (%)	Chi square value	P value
	Hearing difficulties	Yes	4 (50)	4 (50)	2.319	0.208
		No	27 (25.2)	80 (74.8)		
	Breathing problems	Yes	0 (0)	3 (100)	1.137	0.562
		No	31 (27.7)	81 (72.3)		
	Cardiovascular problems	Yes	3 (27.3)	8 (72.7)	0.001	1
		No	28 (26.9)	76 (73.1)		
Personal history	Use of smoking and alcohol		4 (19)	17 (81)	0.816	0.428
	Not using		27 (28.7)	67 (71.3)		
No. of medications	0		14 (28.6)	35 (71.4)	1.075	0.783
	1		5 (29.4)	12 (70.6)		
	2		8 (29.6)	19 (70.4)		
	3 -5		4 (18.2)	18 (81.8)		
No. of comorbidities	0		5 (17.9)	23 (82.1)	2.119	0.347
	1		15 (33.3)	30 (66.7)		
	2-3		11 (26.2)	31 (73.8)		
Use of walking aid	Yes		5 (50)	5 (50)	2.954	0.130
	No		26 (24.8)	79 (75.2)		

Table 4: Fall related characteristics of the study participants (no. of falls=38).

Fall related characteristics		N (%)
Place of falls	Within the residing house	32 (84.2)
	House surroundings	3 (7.9)
	Public place (street)	3 (7.9)
Place of falling in the house (within residing house and house surroundings)	Stairs	1 (2.9)
	Bathroom	24 (68.6)
	Bedroom	5 (14.3)
	Front doorstep	4 (11.4)
	Kitchen	1 (2.9)
Time of falls	Morning	23 (60.5)
	Afternoon	0
	Evening	10 (26.3)
	Night	5 (13.2)
*Reasons for fall	Poor lighting	8 (17.8)
	Slippery floor	25 (55.6)
	Uneven floor	5 (11.1)
	Getting out of bed /chair	3 (6.7)
	Poor fitted footwear	1 (2.2)
	Lost balance	3 (6.7)
Injuries	Bruises/laceration	19 (50)
	Fractures	11 (29)
	Dislocation	4 (10.5)
	No injuries	4 (10.5)
Required hospitalisation after falls	Yes	21 (55.3)
	No	17 (44.7)

*Multiple responses possible.

Table 4 shows the falls related characteristics of the study participants. In most of the cases (84.2%), the place of fall was home, followed by surroundings of the house and public place (mostly street) (7.9%). Most of the falls occurred during morning hours (60.5%), evening (26.3%) and night (13.2%). Predominantly the place of falls within the home was bathroom (68.6%), followed by bedroom (14.3%), front doorstep (11.4%), kitchen and stairs (2.9%). Half of the Participants had reported the reasons for falls as slippery floor (55.6%)

Out of the 38 falls reported, 34 (89.5%) sustained injuries following the fall. Most common type of injury was bruise and contusion (50%), while 29% suffered fractures and 10.5% suffered dislocations. Elderly who had sustained injuries utilized health care services, including hospital admission and 21 (55.3%) of the injured study participants required hospitalization after fall. higher fracture rates were found in elderly women (72.7%) when compared with men (36.3%).
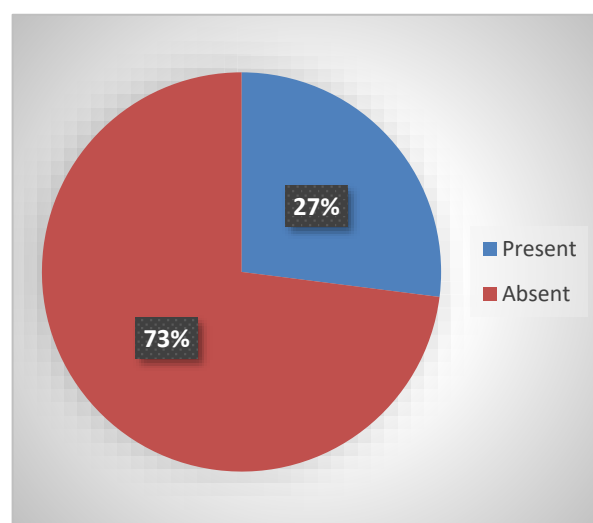

Figure 1: The prevalence of falls among the study participants in the past 12 months.

DISCUSSION

This study reported the prevalence of falls among elderly persons in an urban area and its association with socio demographic variables and chronic health conditions.

In our study, the prevalence of falls was found to be 27%. Various studies conducted in India reported the prevalence to vary from 14 to 53%.[6] Chacko et al in a community-based study among elderly has reported the prevalence of falls to be 26%, whereas Savita et al has reported the prevalence of falls to be 29.8% in the past 12 months in their community based cross sectional study in an urban area.[7,8] Joshi et al reported that 51.5% of elderly had a history of fall in a cross-sectional study in rural, urban, and slum areas of northern India.[9] Sirohi et al conducted a cross sectional study and reported the proportion of falls to be 36.6%.[10] These differences in the prevalence may have emerged due to differences in the study settings, sample size or the time span mediated for fall history in various studies.

Among the various risk factors studied in our study, age was found to be significantly associated with falls. This association was similar to a study done by Chacko and Sirohi et al.[7,10] Women had higher fall rate than men which was similar with various other studies.[10,11] Mobility aids are commonly adopted by older adults to enhance their functional activities, but it has been identified as one of the risk factors associated with falls.[6,8,10] However, it was not significantly associated with falls in our study. Use of mobility aids might hamper the ability of older adults to recover balance and leading to destabilizing biomechanical effects during balance recovery thus increase the risk of falls.[12]

Majority of elders (60.5%) in our study had experienced falls in the morning as observed in other studies.[7,10,13] The reason may be that they were engaged in activities more in the morning hours. The place of falls helps to identify where falls occur commonly and measures to reduce it. In our study, majority of the falls (84.2%) occurred within the residing home. Among the falls that occurred outside, the common location was along the roadside which was similar to studies done by D'souza and Dhargave et al.[6,13]

Regarding the place of fall within the residing house, the most common place was bathrooms. This is in consistent with earlier studies where bathroom in the house of older adults was considered as a dangerous area of fall.[6–8] The presence of slippery flooring, poor lighting and uneven floor could be the reasons in the bathroom which were reported by the elderly in our study.

The overall injury rate following fall was 89.5% in our study which is similar to various other studies.[8,14] Most common type of injury was bruise and contusion (50%), while 29% suffered fractures and 10.5% suffered dislocations. Elderly who had sustained injuries utilized health care services, including hospital admission and 21

(55.3%) of the injured study participants required hospitalization after fall.[8,15] Fracture rate was high in our study when compared to other studies reported in India.[8] Fracture rate was high in elderly women (72.7%) when compared with elderly men (36.3%), the reasons may be due to underlying risk factors like osteoporosis and osteomalacia. The results of this study are also consistent with previous findings that fall injuries become more frequent with increasing age.[6,9]

Our study has some limitations like a small sample size. Also, as the fall history over a period of 1 year was collected, some participants might not remember minor falls, leading to an underestimation of the prevalence of falls and associated risk factors. Moreover, individuals who might have died due to a fall were not considered in this study. This could have led to an underestimation in the prevalence of falls.

Assessment of risk factors for fall is important to develop effective fall prevention programmes and thereby reducing mortality and morbidity among the elderly. The costs due to medical management, hospital stay, and rehabilitation of fall-related injuries may affect a person's financial status, reflecting on economic burden of caregivers, and eventually contributing to neglect of older adults. Fall-specific comprehensive assessments should be insisted at primary health centres for older adults. Assessment of the home and bathroom for hazards is important, especially for older adults with a history of fall. Problems specific to Indian older adults such as osteoporosis, anaemia, visual defects, and non-communicable chronic diseases need to be addressed. Prevention of falls bestow longer life expectancy and better quality of life to the elderly.

CONCLUSION

Prevalence of falls among the elderly was 27% in our study. Falls are common among the elderly and identification of risk factors and their prevention must be included in health programs for the elderly.

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