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Original Research Article

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

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ABSTRACT

Background: Falls are an important cause of morbidity and mortality in elderly people. Falls lead to multiple medical and psychological problems in the elderly**.** Aim was to study the prevalence of falls among the elderly and to find the associated risk factors for falls among the elderly living in an urban slum in Chennai.
Methods: A cross sectional study was conducted among elderly population over 60 years and above, in an urban slum area. About 150 elderly were selected using simple random sampling method, using the voters list as the sampling frame. A pretested questionnaire was administered to collect information about falls. In statistical analysis univariate and multivariate logistic regression was employed using SPSS version 22.
Results: Of the 150 elderly persons studied, prevalence of falls rate is 35.3% (95% CI 28.13 to 43.26). Of them 64.1% had one episode of fall and 35.8% had recurrent falls. The prevalence of fall among persons with comorbidities like hypertension or diabetes was 39.3% and 36.1% respectively .The rate of fall among those using a walking stick was 58.3%, having tremors was 15% and having abnormal gait was 40%. The risk factors found to be significantly associated in univariate analysis were gender and presence of tremors ($p<0.05$). In multivariate analysis none of the factors showed statistical significance.
Conclusions: Falls are very common among elderly. It is utmost important to prevent the falls by making necessary environmental modifications and following healthy lifestyle.

Keywords: Falls, Elderly, Risk factors, Urban slum

INTRODUCTION

The elderly population in India, (age 60 and above) has gone up from 6.0 to 8.6 percent.[1] Falls are one of the major problems in the elderly. They are considered one of the "geriatric giants", which includes immobility, instability, incontinence and impaired memory.[2] Recurrent falls are an important cause of morbidity and mortality in the elderly and are considered as poor prognostic factor.[3] Falls are commonly defined as "inadvertently coming to rest on the ground, floor or other lower level excluding intentional change in position to rest in furniture, wall or other objects.".[4] Falls are considered as one of the major public health problems that frequently requires medical intervention.[4] Falls lead to 20–30% of mild to severe injuries and are underlying cause of 10–15% of all emergency department visits.[5]

Falls in the elderly have multifactorial causation. They can be due to age related problems like poor vision, hearing problems, balance deficits, changes in the central nervous systems or musculoskeletal problems.

Pathological conditions and environmental factors like obstacles, slippery surfaces or improper footwear etc. can lead to falls in the elderly. Falls are underreported among elderly population as they are considered as part of normal ageing as also is attributed to embarrassment and fear of loss of independence.

Falls in elderly lead to reduced levels of independence, poorer quality of life and high level of anxiety.[6] There are very limited researches on healthy aging in developing countries like India.

Determination of the prevalence of falls and identification of risk factors will help in understanding the magnitude of the problem and finding the likely causal factors. Thereby help in planning effective preventive measures.

The present study was carried out to estimate the prevalence of fall and also identify the risk factors for fall among the elderly in an urban slum in Chennai.

METHODS

A community based cross-sectional study was conducted between January and March 2018 in TP Chatram, an urban slum in Chennai, Tamil Nadu. The sampling frame was the voters list. There were 7000 members in the voters list in TP Chatram. A total of 650 elderly were in the voter's list; out of them, 150 were taken up for study by simple random technique. Addresses from the voter's list were used to identify the houses. The literature review revealed that the prevalence rates of falls were 30%, with an absolute precision of 8% and confidence level of 95%, with a nonresponse of 10%, the estimated sample size worked out to be 150 elderly persons. People who were seriously ill were excluded from the study. A pre tested semi structured questionnaire was administered. History of fall in the previous 12 months was collected. Respondents with history of fall in the previous 12 months were included for detailed information on socio-demography, various risk factors like regarding various factors underlying medical disorders, drug intake history, and behavioral factors were recorded. Clinical examination including anthropometric measurements, body mass index and blood pressure examination were done. Ethical clearance was obtained from the institutional ethical committee. Informed consent was obtained from the study participants before the start of the study.

Statistical analysis

Data entry was made in the Microsoft Excel software in codes and analysis was done with SPSS-22 computer package. Occurrence of fall is expressed in percentage with confidence interval and other details relating to fall are expressed in percentage. The association between demographic and other risk factors for fall was tested for significance using chi square test and odds ratio was estimated. Variables with p values showing <0.05 were considered for multivariate analysis. Variables with $p<0.05$ was considered as statistically significant.

RESULTS

Table 1 shows the socio-demographic details of the participants. Most of the elders in our study population had a mean age was 66.61±5.87 in the study population, minimum age was 60 years and maximum age was 89 years in the study population (95% CI 65.66 to 67.55).

Table 1: Socio-demographic profile of the study population (n=150).

Variables	Frequency	%
Age group (years)		
60 to 75	138	92.00
76 and above	12	8.00
Gender		
Male	27	18.00
Female	123	82.00
Education		
illiterate	96	64.00
Primary	8	5.30
Secondary	45	30.00
Degree	1	0.70
Occupation		
Cooli	1	0.70
Employed	1	0.70
HM	16	10.70
Retired government	14	9.30
Security	3	2.00
Sweeper	1	0.70
Teacher	1	0.70
Unemployed/retired	113	75.30
Socio economic status		
Lower class	16	10.70
Lower middle	57	38.00
Upper class	6	4.00
Upper lower	56	37.30
Upper middle	15	10.00

Among the study population, 138 (92%) were aged between 60 to 75 years and 12 (8%) were 76 years and above. There were 27 (18%) male participants and 123 (82%) were female participants. The majority of the (64%) participants were illiterate. The majority of the (75.30%) participants were unemployed/retired. Around (38%) and (37.30%) of the participants were in lower middle class and upper lower class based on modified BG Prasad's classification, respectively. Around (37.30%) of the participants were living with their sons. The proportion of 20.70%, 25.30%, 8% and 8.70% were living with their daughters, spouse, others and alone respectively.

Figure 1 shows that, about 53 (35.3%) had fall (95% CI 28.13 to 43.26) in the past 12 months. Figure 2 shows

that 22.70% participants had one fall, 11.30% had two falls and 1.30% had three falls.

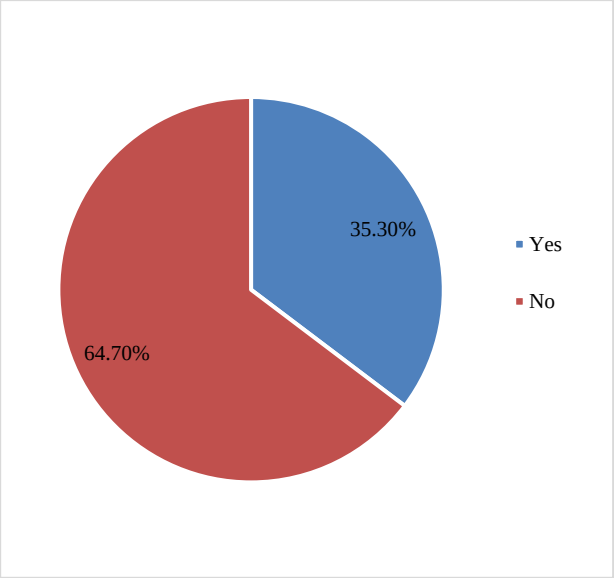

Figure 1: Prevalence of falls among elderly.

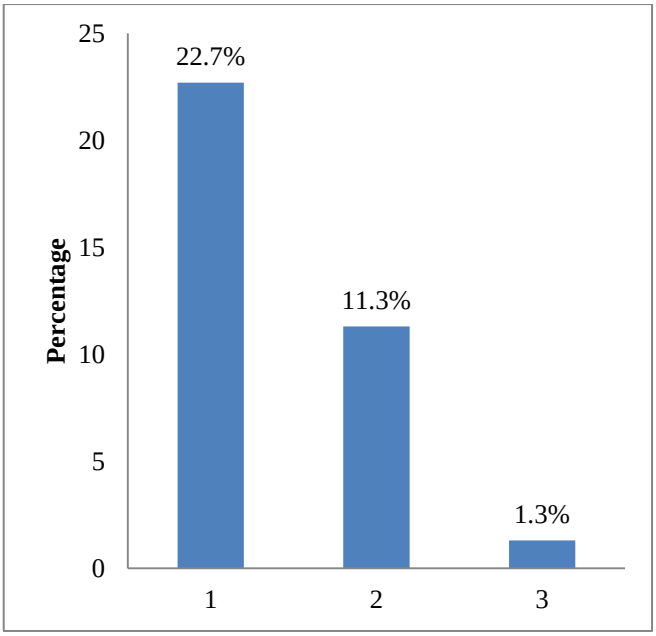

Figure 2: Number of falls among the elderly in the past 12 months.

Table 2: Association of fall with socio-demographic variables (n=150).

Variables	Falls		Chi square	P value
Age group (years)	**Yes (%)**	**No (%)**		
60 to 75 (n=138)	49 (35.5)	89 (64.5)	0.023	0.880
76 and above (n=12)	4 (33.3)	8 (66.7)		
Gender				
Male (n=27)	5 (18.5)	22 (81.5)	4.074	0.044
Female (n=123)	48 (39)	75 (61)		
Education				
Literate (n=54)	22 (40.7)	32 (59.3)	1.008	0.299
Illiterate (n=96)	31(32.3)	65 (67.7)		
Occupation				
Employed (n=37)	10 (27)	27 (73.0)	1.483	0.223
Unemployed (n=113)	43 (38.1)	70 (61.9)		
Socio economic status				
Lower class (n=16)	3 (18.8)	13 (81.3)	9.280	0.054
Lower middle (n=57)	19 (33.3)	38 (66.7)		
Upper class (n=6)	2 (33.3)	4 (66.7)		
Upper lower (n=56)	27 (48.2)	29 (51.8)		
Upper middle (n=15)	2 (13.3)	13 (86.7)		

*df=1.

Table 2 shows the association of fall with various sociodemographic variables. About 39% of females had history of fall as compared to 18.5% of males. About 38.1% of unemployed elders had a history of fall. The association between gender and fall was found to be significantly different ($p<0.05$).

Table 3 shows the association between falls with biological and behavioral variables. About 41.5% of elder persons with multiple comorbidity had history of fall. Around 37.4% of elders, who had history of medication intake, had a fall. Of the people who were using walking sticks or other mobility aids, 39.1% had history of fall. The association between tremors and history of fall was found to be statistically significant.

Table 4 shows multivariate logistic regression analysis for predictors for fall in the elderly. Age, gender and presence of tremors did not show any significant difference.

Table 3: Association of falls with biological and behavioral variables (n=150).

Variables	Falls		Chi square*	P value
	Yes (%)	No (%)		
Multiple comorbidity				
Present	27 (41.5)	38 (58.5)	1.933	12
Absent	26 (30.6)	59 (69.4)		
Living with relatives				
Yes	48 (35)	89 (65)	0.061	0.805
No	5 (38.4)	8 (61.5)		
H/O hypertension				
Present	42 (39.3)	65 (60.7)	2.509	0.113
Absent	11 (25.6)	32 (74.4)		
H/O diabetes				
Present	26 (36.1)	46 (63.9)	0.037	0.848
Absent	27 (34.6)	51 (65.4)		
Drug intake				
Present	49 (37.4)	82 (62.6)	1.942	0.163
Absent	4 (21.1)	15 (78.9)		
Visual problems				
Present	31 (33.7)	61 (66.3)	0.279	0.597
Absent	22 (37.9)	36 (62.1)		
Use of walking aids				
Yes	27 (39.1)	42 (60.9)	0.806	0.369
No	26 (32.1)	55 (67.9)		
Difficulty in getting up				
Yes	48 (37.8)	79 (62.2)	2.197	0.138
No	5 (21.7)	18 (78.3)		
Joint pain				
Present	43 (37.1)	73 (62.9)	0.675	0.411
Absent	10 (29.4)	24 (70.6)		
Living with partner				
Yes	11 (23.9)	35 (76.1)	3.787	0.052
No	42 (40.4)	62 (59.6)		
Smoking				
Yes	4 (44.4)	5 (55.6)	0.348	0.555
No	49 (34.8)	92 (65.2)		
Physical exercise				
Yes	36 (37.5)	60 (62.5)	0.548	0.459
No	17 (31.5)	37 (68.5)		
BMI				
Normal	16 (35.6)	29 (64.4)	0.001	0.97
Abnormal	37 (35.2)	68 (64.8)		
Tremors				
Present	3 (15)	17 (85)	4.176	0.041
Absent	50(38.5)	80 (61.5)		
Cataract				
Present	14 (33.3)	28 (66.7)	0.102	0.749
Absent	39 (36.1)	69 (63.9)		
Gait				
Normal	33 (33)	67 (67)	0.715	0.398
Abnormal	20 (40)	30 (60)		
Balance				
Normal	29 (34.9)	54 (65.1)	0.013	0.911
Impaired	24 (35.8)	43 (64.2)		

Continued

Variables	Falls		Chi square*	P value
	Yes (%)	No (%)		
Forgetfulness				
Present	29 (43.3)	38 (65.1)	3.350	0.067
Absent	24 (28.9)	59 (71.1)		

*df=1.

Table 4: Multivariate logistic regression analysis for the predictors of fall in the elderly.

Factors	Un adjusted odds ratio	95 % CI of odds ratio	P value
Age	1.002	0.941 to 1.066	0.958
Gender (base line=male)			
Female	2.786	0.975to 7.966	0.056
Tremors (base line=no)			
Yes	0.321	0.088 to 1.177	0.086

DISCUSSION

This study describes the prevalence of falls among elderly persons in an urban slum area and its association with sociodemographic variables and other risk factors. In our study, the prevalence of falls was found to be 35.3% (95% CI 28.13 to 43.26). In various studies conducted in India and abroad, the prevalence of falls ranged from 18.8% to 53%.[7-13] Tripathy et al conducted a community-based study among elderly in rural, urban, and slum areas of Chandigarh and reported the prevalence of falls to be 31%.[7] D'souza et al, in a study conducted among community-dwelling elders and old age home residents in Karnataka, reported the prevalence of falls to be 38% in the past 2 years.[8] In a cross-sectional study in rural, urban, and slum areas of northern India. Joshi et al reported that 51.5% of elderly had a history of fall.[9] These differences in the prevalence may have arisen due to differences in the study settings, sample size or methodology. Furthermore, the time span considered for fall history was different in various studies. D'souza et al reported falls in the past 2 years, while Joshi et al collected history of all falls in their study.[8,9] Some studies have collected a fall history of 6-month duration.[10]

Among factors studied in the present study, gender and tremors were found to be significantly associated with falls in univariate analysis. According to, Fried et al women may fall more often because of the lower amount of lean mass and muscle strength as compared to men of the same age group. In a study done by Yamashita et al, tremors were associated with fall in elderly.[11] Though in multivariate analysis , none of the factors were found to be statistically significant ($p<0.05$). Studies on fall among the elderly have reported that musculoskeletal disorders, functional disability, visual impairment, and urinary incontinence are associated with falls.

In previous studies, gait and balance abnormalities have also been shown to be associated with falls.[12-15] However, in our study, these factors were not found to be significantly associated with falls. This may be due to the community-based nature of the study, where ideal testing conditions are not present. The 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.

Temporal association of falls with associated risk factors cannot be established due to the cross-sectional nature of the study design. However, community-based nature of the study and high response rates are some of the strengths of the present study. Identification of the risk factors and taking appropriate corrective measures can help in preventing the falls and their consequent effects on the well-being of the elderly. It has been shown in various studies that modifications of the environment, community awareness, and regular exercises can reduce the rate of falls and the morbidity associated with it.[16] Prevention of falls bestows longer life expectancy and better quality of life to the elderly.

CONCLUSION

Prevalence of falls among elderly was 35.3% (27.65 to 42.95). Gender and presence of tremors were significantly associated with falls in univariate analysis. In multivariate analysis, none of the factors were significantly associated with falls. This may be due to the contribution of multiple risk factors for fall in elderly.

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REFERENCES

1. Census 2011. Government of India. Available at: http://www.censusindia.gov.in. Accessed on 15 April 2018.

2. A giant of geriatric medicine – Professor Bernard Isaacs (1924 –1995). Available at: https://www.bgs.org.uk/a-giant-of-geriatric-medicine-professor-bernard-isaacs-1924-1995-post-1. Accessed on 16 January 2019.
3. Tinetti ME, Williams CS. The effect of falls and fall injuries on functioning in community-dwelling older persons. J Gerontol A Biol Sci Med Sci. 1998;53:112–9.
4. WHO. Epidemiology of falls. WHO Global Report on Falls Prevention in Older Age. WHO Press; 2008.
5. Scuffham P, Chaplin S, Legood R. Incidence and costs of unintentional falls in older people in the United Kingdom. J Epidemiol Community Health. 2003;57:740-4.
6. Kumar S, Vendhan G, Awasthi S, Tiwari M, Sharma VP. Relationship between fear of falling, balance impairment and functional mobility in community dwelling elderly. Indian J Phys Med Rehabil. 2008;19:48–52.
7. Tripathy NK, Jagnoor J, Patro BK, Dhillon MS, Kumar R. Epidemiology of falls among older adults: A cross sectional study from Chandigarh, India. Injury. 2015;46:1801-5.
8. D'Souza AJ. Health of the elderly in rural Dakshina Kannada. Indian J Gerontol. 2011;25:329-44.
9. Joshi K, Kumar R, Avasthi A. Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India. Int J Epidemiol. 2003;32:978-87.
10. Fhon JR, Fabrício Wehbe SC, Vendruscolo TR, Stackfleth R, Marques S, Rodrigues RA. Accidental falls in the elderly and their relation with functional capacity. Rev Lat Am Enfermagem. 2012;20:927-34.
11. Yamashita T, Noe DA, Bailer AJ. Risk Factors of Falls in Community-Dwelling Older Adults: Logistic Regression Tree Analysis. Gerontologist. 2012;52(6):822–32.
12. Mizukami S, Arima K, Abe Y, Kanagae M, Kusano Y, Niino N, et al. Falls are associated with stroke, arthritis and multiple medications among community dwelling elderly persons in Japan. Tohoku J Exp Med. 2013;231:299-303.
13. Johnson SJ. Frequency and nature of falls among older women in India. Asia Pac J Public Health. 2006;18:56-61.
14. Ranaweera AD, Fonseka P, PattiyaArachchi A, Siribaddana SH. Incidence and risk factors of falls among the elderly in the District of Colombo. Ceylon Med J. 2013;58:100-6.
15. Cardona M, Joshi R, Ivers RQ, Iyengar S, Chow CK, Colman S, et al. The burden of fatal and non-fatal injury in rural India. Inj Prev. 2008;14:232-7.
16. Patel JC. Falls in elderly. Indian J Med Sci. 2000;54:350-2.

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