

Original Research Article

Risk of falls and its association with activities of daily living and depression among elderly residing in a rural area in Bangalore, Karnataka

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ABSTRACT

Background: According to 2011 censuses, elderly account for 8.6% of Indian population and is projected to become 20% by 2050. Early identification and prevention of fall-related factors would play a vital role in reducing the health costs in elderly. The objective of the study was to assess the risk of falls among elderly residing in Mugalur subcentre, Bangalore Urban.

Methods: A cross-sectional study was conducted at the ten villages of Mugalur subcenter, from March-May 2019 using a structured questionnaire that was administered through a face-validated interview. Systemic random sampling was done from the ten villages, proportionate allocation was done to reach a calculated sample size of 220. Timed up and go test (TUG) was done for all participants.

Results: Mean age of the study population was 69.05±8.3years. Among the study subjects, 40 (18.2%) had moderate risk of fall and 9 (4.1%) were seen to have high risk of fall. 26 (11.8%) subjects had a fall in past one year. TUG test showed a median value of 18.5 seconds, and 179 (81.4%) elderly had TUG result ≥ 13 sec. According to Geriatric Depression scale (GDS-15), 18 (8.2%) subjects were found to be severely depressed. Significant association was seen between the GDS-15 scores and risk of falls according to Fisher's exact test. The mean TUG score was shown to have a significant association with the risk of falls according to ANOVA.

Conclusions: Moderate to high risk of fall is seen among 22.3% of the elderly. Significant association was seen between age, TUG score and depression with risk of falls.

Keywords: Risk of falls, Elderly, Depression, TUG test

INTRODUCTION

Population around the world is rapidly ageing. In the developed world, the age of 60 years roughly equivalent to retirement ages is considered to be the beginning of old age.¹ From the year 2015 to 2020, the proportion of global elderly has nearly doubled from 12% to 22%. WHO also reports that by 2050, 80% of the older people will be living in the low and middle income countries.² According to 2011 censuses, elderly people account for

8.6% of the population in India and is projected to become 20% by 2050.³

Fall is described as "inadvertently coming to rest on the ground, floor, or other lower level, excluding intentional change in position to rest."⁴

Falls and resulting injuries in this growing segment of population has led to substantial loss of quality of life, disability, morbidity and mortality.⁵⁻⁸ It is seen to occur

more commonly for the physically active and mobile group and is most likely to result in fractures, head injury and loss of independence.⁹

Older people are often unaware of the risk of falling as they do not identify the risk factors and hence the opportunities for the prevention of falls are often neglected. Awareness of the possibilities of falls and trying to eliminate these factors are important in the prevention of falls.^{7,10} Most studies indicate that the etiology of falls is multifactorial and the interplay of various intrinsic and extrinsic factors are responsible for the same.^{11,12} The significant diversity among the reported risk factors strongly indicate that the identification of the etiology and the prevention strategies should be specific for target groups.

In community-living older people, approximately one third of them sustain a fall every year. The proportion of people sustaining at least one fall over one year period ranges from 28-35% among those ≥ 60 years and 32-42% in elderly ≥ 75 years.¹³ Multiple studies have identified over 400 risk factors for falling and many of them are preventable.¹⁴

Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) are essential and routine aspects of self-care in elderly. Decline or impairment in these factors can negatively affect the quality of life among these vulnerable group.¹⁵ Depression is the single largest contributor to global disability (7.5%, 2015) and a major contributor to suicides.^{16,17} Depression is the most prevalent mental health problem among older adults. Recent CDC Behavioral Risk Factor Surveillance data indicated that among adults age 50 or older, 7.7% reported current depression and 15.7% reported a lifetime diagnosis of depression.¹⁸

The concept of preventive health is usually not applied to problems concerning the geriatric population. Early identification and control of the fall related factors would play a vital role in reducing the health costs in elderly. There are few studies on the risk of falls among elderly in the rural areas.

The objectives of this study were to assess the risk of falls among elderly (≥ 60 years) residing in Mugalur sub centre, Anekal Taluk, Bangalore Urban and to determine the association between risk of falls with socio demography, depression, activities of daily living and environmental factors among elderly residing in Mugalur sub centre

METHODS

A cross sectional study was conducted at the ten villages of Mugalur subcenter, Anekal Taluk, Bangalore Urban District, for a period of 2 months, from March to May 2019 using a structured questionnaire. Ethical clearance

was obtained from Institutional Ethics Committee of St John's Medical College. Sample size was calculated as 220, with 5% fixed precision and 95% confidence limits, based on a previous study done in Chandigarh where the prevalence of falls among elderly was 28.7%.¹⁹ It was calculated using the formula:

$$n = Z^2(p \times q) \div d^2$$

z = relative deviate [at 95% confidence interval] i.e. 1.96

p = prevalence i.e., 28.7%

d = precision [5%]

q = 100-p

Systemic random sampling was done after getting a list of all the elderly in the ten villages of Mugalur as 720. Proportionate allocation was done from all the villages. All elderly above the age of 60 were included in the study and we excluded all those who were seriously ill and those who had issues with understanding and answering the questionnaire. Written Informed consent was taken from the participants, and a face-validated interview was conducted in local language. The study tool was a questionnaire consisting of different parts. Initial part was the sociodemographic details and other parts were standard questionnaires that included:

Katz Activities of Daily Living – scoring from 0 – 6. (0-2: severe functional impairment, 3-5: moderate impairment, 6: full functioning).

Lawton- Brody Instrumental Activities of Daily Living – Score- women (0-8): 0-low function, dependent; 1-7- moderate function; 8-high function, independent. men [0-5]: 0-low function, dependent; 2-4- moderate function; 5- high function, independent.

STEADI Tool (Stopping elderly accidents injuries and deaths): screen- patients for fall risk; assess- patient's risk factors; intervene- reduce risk by giving interventions.

Time to get up and go test (TUG test): for elderly 12 sec-normal; TUG test value ≥ 13 sec is at higher risk of fall.

Geriatric depression scale- 15: score- 0-4: normal; 5-8: mild; 9-11: moderate; 12-15: severe.

Data was entered into Microsoft excel and analyzed using standard statistical software Statistical package for social sciences (SPSS) version 21. Descriptive data were expressed as frequencies, percentages, mean and standard deviation.

Data was tested for normality using Shapiro Wilk test and found to be normally distributed. Tests of significance like chi-square test and Fisher's exact test where applicable and ANOVA test were used to associate the

mean TUG score with the risk of falls. A p value of <0.05 was considered significant.

RESULTS

A total of 220 individuals were included in the study. Out of 220 participants, 119 (54%) were women. Mean age of the study population was 69.05±8.3years.

Table 1: Socio-demographic data.

Variables	No. of participants (%)
Age (years)	
60-69	113 (51.3)
70-79	69 (31.4)
>80	38 (17.3)
Educational status	
Illiterate	150 (68.2)
Primary school	22 (10)
Middle school	32 (14.5)
High school	14 (6.4)
PUC	2 (0.9)
Type of family	
Nuclear	110 (50)
Joint	50 (22.7)
Three generation	60 (27.3)
Employment status	
Unemployed	167 (75)
Labourer	21 (9.5)
Salaried employee	2 (0.9)
Agriculture	30 (13.6)
Religion	
Hindu	210 (95.5)
Muslim	6 (2.7)
Christian	4 (1.8)
Modified BG Prasad socio-economic scale	
Upper	9 (4.1)
Upper middle	35 (15.9)
Middle	81 (36.81)
Lower middle	47 (21.4)
Lower	48 (21.8)

Nearly three fourth of them 155 (70.5%) were currently married. About 110 (50%) belong to the nuclear family and there was almost equal distribution between joint and the three-generation families.

Most of them were illiterate, 150 (68.2%) and 167 (75.9%) were unemployed. According to Modified BG Prasad socioeconomic scale, 81 (36.8%) belonged to middle class (Table 1).

Based on Katz Index of Independence in activities of daily living based on the scoring of ≤2 severe functional impairment, 3-5 moderate impairment, 6 fully functional, about 209 (95%) of the elderly where fully functional, 10

(4.5%) moderate impairment and 1 (0.5%) severe functional impairment. (Table 2) According to Lawton

Table 2: KATZ index of independence in activity of daily living (n =220).

Katz score	Katz Index	Frequency (%)
≥2	Severe impairment	1 (0.5)
3-5	Moderate impairment	10 (4.5)
6	Fully functional	209 (95)

Table 3: Lawton-Brody Instrumental Activities of Daily Living [IADL] [n = 220].

Gender	IADL score	Functioning	Frequency (%)
Male (n=101)	0	Low function - dependent	7 (6.9)
	1-4	Moderate function	28 (27.8)
	5	High function - independent	66 (65.4)
Female (n=119)	0	Low function- dependent	8 (6.7)
	1-7	Moderate function	103 (86.6)
	8	High function - independent	8 (6.7)

Table 4: Risk of falls according to STEADI algorithm.

Risk grade	Frequency (%)		Total number (%)
	Male	Female	
Low risk	83 (37.7)	88 (40)	171 (77.7)
Moderate risk	14 (6.6)	26 (11.8)	40 (18.2)
High risk	6 (1.8)	5 (2.3)	9 (4.1)

Table 5: Other factors related to risk of fall.

Factors	Frequency (%)
Polypharmacy (≥4 tab)	15 (6.8)
Diabetes mellitus	53 (24.1)
Hypertension	55 (25)
Psychiatry medicine	5 (2.3)
Pain killers	20 (9)
Environmental factors	
Dim light	29 (13.2)
Slippery floors	7 (3.2)
Cluttered objects	8 (3.6)
Using walking	11 (5)

Brody instrumental activities of daily living (IADL), our study found 15 (13.6%) subjects had low function and were dependent. Women were scored in 8 areas of

functioning, men in 5 areas - food preparation, laundry and housing keeping were excluded (Table 3). Based on stay independent brochure, risk of fall was present among 75 (34%) study subjects according to step 1 of STEADI tool. Risk of falls were higher (21.8%) among females according to this calculation. Among the study subjects, 40 (18.2%) had moderate risk of fall and 9 (4.1%) was

seen to have a high risk of fall. The risk of fall was seen to be higher among the female population for all three grades of risk. In the study, 26 (11.8%) subjects had a fall in past one year (Table 4). Other risk factors were assessed including other comorbidities, use of medications and environmental factors were assessed (Table 5).

Table 6: Association between different variables and the risk of falls.

Factors	Risk of fall (%)			P value (<0.05- significant)
	Low (%)	Moderate	High	
Age group (years)				
60-69	89 (78.8)	21 (18.6)	3 (2.6)	0.037*
70-79	58 (72.6)	21 (23.6)	1 (1.2)	
≥80	24 (63.3)	9 (23.6)	5 (13.1)	
Katz ADL				
Severe impairment	0	1	0	0.001*
Moderate impairment	3 (30)	5 (50)	2 (20)	
Fully functional /Normal	168 (80.3)	34 (16.2)	7 (3.5)	
Lawton Brody IADL				
Low function, dependent	7 (46.7)	5 (33.3)	3 (20)	0.016*
Moderate function	101 (78)	24 (18.6)	4 (31)	
High function, independent	63 (82.9)	11 (14.5)	2 (2.6)	
Geriatric depression scale				
Normal	142 (86.7)	21 (12.6)	3 (1.7)	0.001*
Mild	16 (72.8)	3 (13.6)	3 (13.6)	
Moderate	6 (42.8)	6 (42.8)	2 (14.4)	
Severe	7 (39)	10 (55.5)	1 (5.5)	
Mean TUG score	19.6	41.9	47.7	0.001**

*Fisher exact test- $p \leq 0.05$ is significant, ** ANOVA- $p < 0.05$ is significant

Timed up and go test (TUG)

TUG test showed a median value of 18.5 sec, and 179 (18.4%) elderly had TUG result ≥ 13 sec.

Geriatric depression scale

18 (8.2%) subjects were found to be severely depressed according to GDS -15. Majority of 166 (75.5%) of the elderly were found to be normal according to this scale.

There was significant association between the age group and functional impairment with the risk of falls according to Fisher's exact test. Significant association was seen between the GDS scores with the risk of falls according to fisher's exact test. The mean TUG score was also shown to have a significant association with the risk of falls according to ANOVA (Table 6).

DISCUSSION

In the present study it was noted moderate to high risk of falls is seen among 22.3% of the elderly population. The incidence of fall in the past 12 months was 11.8% (n=26), with higher proportion of females reporting falls. The incidence of falls in various studies had wide range of

values depending on the study setting and the time span taken considered for the history of fall.¹⁹⁻²¹ In a study conducted among the community dwelling elderly in Karnataka, the history of falls in the past two years was reported to be 38%. A cohort study conducted among rural elderly of Telangana showed that 13% of participants reported falls in the past 12 months.²² This finding was in close similarity to our study due to the similarity in socio-demography of the study groups.

Majority of the subjects with high risk of falls are above the age of 70. This was an expected results as the increasing fragility of bones and other comorbidities were higher among the oldest subjects.²¹

Katz Index of Independence in activities of daily living showed that 5% of elderly in our study had moderate to severe functional impairment. Lawton Brody instrumental activities of daily living (IADL), our study found 13.6% subjects had low function and were dependent. Similar study done in Andhra Pradesh showed the prevalence of functional dependence for ADL as 21.8% and IADL as 51.7%.²²

It was also noted that among the elderly 8.2% were severely depressed. Studies have shown that major depression in older adults ranged from 5 to 12%

depending on the type of dwelling and demography.²³ A study done to assess the prevalence of depression among elderly in rural Tamil Nadu showed that among the participants, 28.3% had mild depression and 7.2% had severe depression which correlated with the results of our study.²⁴

Among the study subjects, 81% had an abnormal TUG score. The TUG score is considered as a useful predictor of risk of fall among the elderly. A study done in Gujarat to assess the use of Timed Up and Go test as a predictor of risk of falls, it was concluded that the best cut-off value was 14.5 seconds for older adults in India.²⁵

Environmental factors such as dim light, cluttered objects, uneven surfaces and slippery floors may have played a vital role. Greater proportion of the elderly are unemployed (76%) and thereby causing loneliness, financial difficulty and depression. Studies from North India also reported slippery floors and other environmental factors associated with risk of falls.²⁶

CONCLUSION

Moderate to high risk of fall is seen among 22.3% of the elderly. Significant association was seen between age, TUG score and depression with risk of falls.

Recommendations

Health education for elderly regarding the causes and prevention of falls. Subjects having high risk of fall to be followed up by health workers of the respective villages. Referral of elderly with depression to the psychiatric clinics conducted under the Manochaitanya programme by the Government of Karnataka for integrating mental health into primary health care.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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