Prevalence of fall and associated risk factors among the elderly living in a rural area of Kolar

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ABSTRACT

Background: Falls in elderly persons are one of the leading causes of death. Falls are responsible for 10–15% of all emergency department visits among elderly. The study was conducted to determine the prevalence of falls in rural areas and to assess the various socio-demographic factors associated with falls. Methodology: It was a community-based, cross-sectional study conducted in Rural Health Training Centre (RHTC), Devarayanamudra, Department of Community Medicine, among the elderly persons aged ≥60 years. The total sample size was 511, calculated using a previous study using OpenEpi software. The data were collected using a pretested semi-structured questionnaire. The period prevalence of falls was assessed by asking for history of falls in the past 12 months. Chi-square and regression analysis were performed with statistically significant P value defined as less than 0.05. Results: Out of 511 elderly persons aged ≥60 years, females accounted for about 54.8% and most of them were of 60–69 years age-group. The majority of the study subjects were illiterates (77.3%), and most of them were married (77.2%). The prevalence of falls in elderly persons was 46.8%. The elderly aged ≥70 years, females, chronic diseases, and use of walking aid were observed to have a statistically significant association with falls (p < 0.005). Conclusion: Elderly falls are very common. The primary healthcare providers in rural areas play an important role in prevention of falls in elderly. Caregivers, along with elderly, should be given more detailed health education related to fall prevention.

Keywords: Elderly fall, risk factors, rural

Introduction

The number of persons aged ≥60 years globally is growing faster than the other age-groups; it is estimated to grow to almost 2 billion by 2050.[1] India houses the world’s second largest geriatric population, which is about 1/8th of total geriatric population of the world. About 103.2 million people in India are aged 60 years and above, accounting for about 8.6% of the entire population.[2] The elderly persons aged ≥60 years are the most at-risk groups in the society. They face diverse problems in their later lives, such as declining physical functions, increasing disability, chronic illnesses, and socioeconomic problems.[3-5] Chronic diseases such as diabetes mellitus, coronary heart diseases, osteoporosis, depression, Alzheimer’s disease, and cerebrovascular disease are the most common in elderly people. Among many health issues that are faced by the elderly, falls are an important concern and many times it may lead to death or disability.[6-9]

Elderly are vulnerable to falls because with aging normal reactions of a person start waning. Extrinsic factors include environmental risks due to poor lighting, slipperiness, clutters, unsecured mats, and risky behaviors, such as climbing chairs or stairs, and those related to daily activities. They are also prone to injuries because of the fragility of organs, and time required to recover is longer due to the slow recovery process.[10,11] The frequency of falls
increases with age; about 28–35% of people aged 65 and above and 32–42% of the people aged 70 years fall each year. Falls are responsible for 10–15% of all emergency department visits among elderly. Injuries sustained due to fall are responsible for significant disability and loss of independence. Data on epidemiology of falls among elderly and factors affecting it are limited in rural settings of Kolar. Determination of the prevalence of falls, identification of associated factors among them will help in understanding the causal factors and planning the preventive measures. Hence, the study was conducted among the elderly residing in rural areas of Kolar to determine the period prevalence of falls and to assess the various socio-demographic and other risk factors associated with it.

Materials and Methods

A cross-sectional study was conducted on elderly population aged 60 years and above residing in Devarayanasamudra Primary Health Centre (PHC), rural field practice area of the Department of Community Medicine, Sri Devaraj Urs Medical College (SDUMC), Kolar. The study was conducted from January 1, 2019, to March 31, 2020. The sample size was estimated based on the prevalence of falls among elderly people in rural areas of India (36.6%) (p), with 95% confidence interval and 5% absolute error (d) using OpenEpi software with a design effect of 1.5; the derived sample size was 511. The Rural Health Training Centre (RHTC), Devarayanasamudra, has 20 villages with a total population of 9846. A total of nine villages were selected randomly. By probability proportional to size (PPS) sampling, data collection was performed in each village. The list of all elderly persons in these selected clusters was obtained from RHTC. The subjects who were fulfilling the eligibility criteria were included from the selected clusters continuously till the required sample size was achieved. The households of all the elderly persons selected for the study were visited, and the consent was obtained in a written format. Pretested semi-structured questionnaire translated to the local language was administered by interview method. The basic demographic details such as use of tobacco in any form, alcohol consumption habits, and the presence of chronic diseases were collected. History of fall during the previous 12-month period, the time, place of fall, and injuries sustained following fall was assessed. The analysis of data was performed using SPSS version 22 and STATA version 12. The summarized data are presented as frequencies and proportions. The association between fear of falling and history of fall was analyzed using the Chi-square test. Risk analysis for the study outcomes is performed using logistic regression analysis and is expressed as prevalence ratio with 95% confidence intervals. Study was started after obtaining institutional ethical committee clearance (IEC/SDUMC/KLR/IEC/124/2018-19). Written informed consent was taken from the participants and recorded.

Results

A cross-sectional study was conducted in rural areas of Kolar District covering 511 elderly persons aged 60 years and above. More than half of the elderly persons (51.5%) were between the age-group of 60 and 65 years (young old); the mean (±SD) age was 70.0 (±7.7) years. 54.8% of them were females, most of them (77.3%) were illiterates, and 51.3% were either shop owners or farmers. Majority (74.2%) of the elderly were married, and 67.3% of them belonged to middle and upper middle class. Most of the elderly (60.9%) were residing in joint families, and 58.5% of them were smokers. About 66.5% had chronic disease like type 2 diabetes mellitus, hypertension, cardiac disease, bronchial asthma, thyroid disorders, etc., [Table 1].

| Variables                  | Frequency (n=511) | Percentage |
|----------------------------|-------------------|------------|
| Age category               |                   |            |
| 60-69                      | 263               | 51.5       |
| 70-79                      | 164               | 32.1       |
| 80-89                      | 71                | 13.9       |
| >90                        | 13                | 2.5        |
| Sex                        |                   |            |
| Male                       | 231               | 45.2       |
| Female                     | 280               | 54.8       |
| Marital status             |                   |            |
| Married                    | 379               | 74.2       |
| Unmarried                  | 4                 | 0.8        |
| Widow                      | 128               | 25.0       |
| Education                  |                   |            |
| Illiterate                 | 395               | 77.3       |
| Primary                    | 33                | 6.5        |
| Secondary                  | 68                | 13.3       |
| Higher secondary           | 6                 | 1.2        |
| Bachelor                   | 9                 | 1.8        |
| Socioeconomic class        |                   |            |
| Lower class                | 12                | 2.3        |
| Lower middle               | 107               | 20.9       |
| Middle                     | 162               | 31.7       |
| Upper middle               | 182               | 35.6       |
| Upper                      | 48                | 9.4        |
| Type of family             |                   |            |
| Nuclear                    | 200               | 39.1       |
| Joint                      | 72                | 14.1       |
| Three generation           | 239               | 46.8       |
| Occupation                 |                   |            |
| Unemployed                 | 82                | 16.0       |
| Homemaker                  | 154               | 30.1       |
| Semiskilled                | 6                 | 1.2        |
| Skilled                    | 7                 | 1.4        |
| Shop owners, farmers       | 262               | 51.3       |
| Caregiver                  |                   |            |
| Absent                     | 15                | 2.9        |
| Present                    | 496               | 97.1       |
| Chronic disease            |                   |            |
| Absent                     | 171               | 33.5       |
| Present                    | 340               | 66.5       |
| Tobacco use                |                   |            |
| Yes                        | 299               | 58.5       |
| Alcohol use                |                   |            |
| Yes                        | 19                | 3.7        |
The prevalence of falls among elderly in the past 12 months was found to be 46.8%. Majority (73.2%) of them reported to have fallen once, while 20.5% of them have fallen twice and 6.3% of them have fallen thrice or more. In 61.1% of subjects, the cause of fall was slipping and 41.4% of them sustained minor injuries such as cuts and abrasions. The place of fall in majority (79.1%) of the individuals was outside the home [Table 2].

As per the univariate analysis, the risk factors associated with falls in elderly were age, female gender, being separated/divorced, unemployment, presence of chronic disease, and use of walking aid. Further, in multivariable logistic regression analysis, the associated risk factors for falls were increasing age, female gender, presence of chronic disease, and use of walking aid (p < 0.05) [Table 3].

### Discussion

The prevalence of fall among elderly persons in the past 12 months was 46.8% which is higher when compared to the other studies conducted in India. This indicates that the prevalence of fall is still worryingly high and contributes to a significant proportion of morbidity and mortality. The prevalence of falls varied from 19.5 to 42.2% in urban settings[27‑29] and 13 to 41.9% in rural settings.[26‑31] The wide range can be attributed to a high degree of underreporting in Indian community, and the prevalence varies in terms of geographic regions, fall history criteria, and methods.

In the present study, frequency of falls was more among females (60.3%) than males, which is similar to the findings in other studies.[27,28] The reason could be increased life expectancy of women compared to men, falls that can be overrated, and the number of women subjects being majority. The rate at which falls occur increases with age as observed in many similar studies, the reason being decline in functional reserve, less coordinated, and more dangerous gaits among elderly.

Among the elderly who reported to have falls, 26.8% of them had recurrent falls in the present study. The recurrence could be attributed to the decline in physical fitness, postural instability, and unfavorable environmental conditions. It is observed that the majority (41.4%) of them had sustained cuts and abrasions and 20.1% of the participants reported to have fractures in the present study. The findings were consistent with other studies.[28] However, the proportion of fractures was comparatively higher in this study when compared to other studies conducted in rural settings. The reason for the high proportion could be the varied environmental conditions such as poor construction of roads, lighting, and severity of fall.

In the present study, it is observed that the prevalence of falls was 78.2% among participants with chronic disease. The frequency of falls among elderly with chronic diseases was higher in the present study compared to other studies.[27,28] About 23.8% of falls were reported among elderly who used walking aids, and the findings were not consistent with other studies. This varied difference could be due to various chronic diseases included in the different studies and the sample size. The findings of our study are congruent with the similar study conducted by Joyce LWS et al in 2020.[12] The proportion was comparatively lesser in this study; this difference may be attributed to the usage of different mobility aids which may not be used in this study setting. This could result from the fact that users of such assistive devices have inherent poor balance and lower limb muscle weakness which may have led to falls. Risk factors associated with falls in the elderly were increasing age, female gender, presence of chronic disease, and use of walking aid. Also, elderly who were separated/divorced had significantly higher odds of reporting falls; however, this association lost its significance in multivariable analysis.

The main strength of the study is the community-based nature of the study and high response rates. This includes the identification of many intrinsic and extrinsic factors associated with having fall. This may help in fall prevention programs. Findings of this study also reiterated the importance of continuing fall prevention programs to prevent devastating complications including fractures and death. The study is not without limitations. As with other cross-sectional studies, our study has an inherent recall bias, as the duration of the recall period was 1 year, and we have not captured previous history of falls which is one of the potential predictors for fall. Although home was found to be the most common place of fall, the assessment of home environment was not conducted in this study.

### Conclusion

The present study revealed that elderly with increasing age, female gender, presence of chronic disease, use of walking aid,
and separated/divorced are at risk of fall. It is recommended that caregivers, along with elderly, should be given more detailed health education related to fall prevention. The primary healthcare providers in rural areas play an important role in prevention of falls in elderly. Therefore, intervention protocols and prevention methods need to be established to help those at high risk for falls. The present study stresses the opportunity for primary care physicians to screen their patients for history of fall every year and educate the prevention of fall by tailored interventions.

**Key points**

The percentage of falls among the elderly in the present study is quite high, which is a threat to the independence of older persons. Most of the falls in the elderly are due to medical and behavioral factors that are predictable, and hence they are preventable. Identification of possible risk factors and appropriate corrective measures can help in preventing falls and their consequent effects on the health and well-being of the elderly persons.

**Declaration of patient consent**

The authors certify that they have obtained valid patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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**Table 3: Association of fall with various socio-demographic characteristics among elderly (n=511)**

| Socio-demographic variables | Number of elderly (n=511) | Had fall (n=239) | Unadjusted PR (95% CI) | Adjusted PR (95% CI) |
|-----------------------------|---------------------------|-----------------|------------------------|----------------------|
| Age                         |                           |                 |                        |                      |
| 60-69 years                 | 263                       | 96 (40.2%)      | 1                      | 1                    |
| 70-79 years                 | 164                       | 84 (52.2%)      | 1.4 (1.1-1.7)*         | 1.3 (1.0-1.6)**      |
| 80 years and above          | 84                        | 59 (24.6%)      | 1.9 (1.6-2.4)*         | 1.6 (1.1-2.2)**      |
| Sex                         |                           |                 |                        |                      |
| Male                        | 231                       | 95 (39.7%)      | 1                      | 1                    |
| Female                      | 280                       | 144 (60.3%)     | 1.3 (1.0-1.5)*         | 1.3 (1.1-1.6)**      |
| Education                   |                           |                 |                        |                      |
| Illiterate                  | 388                       | 181 (75.7%)     | 1.0 (0.6-1.7)          | 0.7 (0.4-1.5)        |
| School                      | 108                       | 51 (21.3%)      | 1.0 (0.6-1.8)          | 0.9 (0.4-1.9)        |
| College                     | 15                        | 7 (3%)          | 1                      | 1                    |
| Occupation                  |                           |                 |                        |                      |
| Employed                    | 275                       | 116 (48.5%)     | 1                      | 1                    |
| Unemployed                  | 236                       | 123 (51.5%)     | 1.2 (1.0-1.5)*         | 1.1 (0.9-1.3)        |
| Socioeconomic status (SES)  |                           |                 |                        |                      |
| Lower                       | 243                       | 107 (44.8%)     | 1                      | 1                    |
| Middle                      | 156                       | 73 (30.5%)      | 1.1 (0.9-1.3)          | 1.1 (0.9-1.3)        |
| Upper                       | 112                       | 59 (24.7%)      | 1.2 (1.0-1.5)          | 1.1 (0.9-1.4)        |
| Marital status              |                           |                 |                        |                      |
| Married                     | 379                       | 159 (66.5%)     | 1                      | 1                    |
| Others                      | 132                       | 80 (33.5%)      | 1.4 (1.2-1.7)*         | 0.9 (0.8-1.1)        |
| Type of family              |                           |                 |                        |                      |
| Nuclear                     | 200                       | 82 (34.3%)      | 1                      | 1                    |
| Extended                    | 311                       | 157 (65.7%)     | 1.2 (1.0-1.5)*         | 1.1 (0.9-1.3)        |
| Tobacco use                 |                           |                 |                        |                      |
| Absent                      | 212                       | 102 (42.7%)     | 1                      | 1                    |
| Present                     | 299                       | 137 (57.3%)     | 1.0 (0.8-1.1)          | 0.9 (0.7-1.2)        |
| Alcohol use                 |                           |                 |                        |                      |
| Absent                      | 492                       | 233 (97.5%)     | 1                      | 1                    |
| Present                     | 19                        | 06 (2.5%)       | 0.7 (0.3-1.3)          | 0.8 (0.4-1.5)        |
| Chronic disease             |                           |                 |                        |                      |
| Absent                      | 171                       | 52 (21.8%)      | 1                      | 1                    |
| Present                     | 340                       | 187 (78.2%)     | 1.8 (1.4-2.3)*         | 1.7 (1.4-2.0)**      |
| Walking aid                 |                           |                 |                        |                      |
| No walking aid              | 436                       | 182 (76.2%)     | 1                      | 1                    |
| Use of walking aid          | 75                        | 57 (23.8%)      | 1.8 (1.5-2.2)*         | 1.4 (1.2-1.8)**      |

PR: prevalence ratio, CI: confidence interval, *in unadjusted PR P<0.05 significant, **in adjusted PR P<0.05 significant
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