

Prevalence and risk factors for falls among the community dwelling older adults of Thrissur: A pilot study

P. J. Mercy¹, Sandhya K. Neelamana², Vijayan C. Parameswaran Nair³

¹Associate Professor, Academic Staff College, Kerala University of Health Sciences, Thrissur, Kerala, India, ²Research Fellow, Kerala University of Health Sciences, Thrissur, Kerala, India, ³Pro-Vice Chancellor, Kerala University of Health Sciences, Thrissur, Kerala, India

ABSTRACT

Background: According to World Health Organization (WHO) statistics, every year 28–35% of people over 65 years and 32–42% of people over 70 years experience falls. Given that many falls are preventable, can occur in any population, and can result in significant morbidity and mortality, falls are receiving more attention as a major global issue. **Objective:** The objectives of this study were as follows: 1. To measure the prevalence of falls among the elderly living in the Thrissur Taluk Health Centre. 2. To identify the risk factors associated with falls in the elderly using the Centre for Disease Control and Prevention, Stopping Elderly Accidents, Deaths and Injuries (CDCs STEADI) 2019 scale and the Timed Up and Go (TUG) scale. 3. To find the association between the risk factors and the prevalence of fall among older people. **Materials and Methods:** A cross-sectional study was conducted to find the prevalence of fall among the elderly in Thrissur Taluk Health Centers. CDCs STEADI 2019 fall risk assessment tool was used to assess the risk factors associated with the elderly. TUG test was used to determine gait, balance, strength, and posture. **Results:** In our study, we discovered a prevalence of 41 percent of falls among the community-dwelling older adults of Thrissur. This study has shown that the risk of fall was higher among the female elderly population. 88% are found to be at high risk of fall, and 65% of the population were worried about fall. **Conclusion:** This study found out a high prevalence of falls among community dwelling older adults. A future study with a larger sample size would be more helpful to confirm the impact of different variables in relation to the risk of fall among the elderly.

Keywords: Elderly, geriatric, prevalence falls, risk factors

Introduction

The aging of the population is a modern demographic phenomenon. According to the World Health Organization (WHO) statistics, every year 28–35% of people over 65 years and 32–42% of people over 70 years experience falls.^[1] Furthermore, fall is a significant financial burden that is expected to rise significantly

as life expectancy rises. Falling is associated with decreased functioning, increased hospitalization, and use of health services, as well as productivity loss. In addition to fall-related injuries, many older people experience emotional problems such as loss of confidence, fear, and anxiety that may further restrict their day-to-day activities. The risk of fall increases exponentially with age, and falls are now a major public health issue for the elderly. Fall is the leading cause of morbidity and mortality due to injury in people over 65 years.^[2]

Although it is assumed that falls can be avoided by implementing personalized prevention plans that target patient-specific risk

Address for correspondence: Dr. Sandhya K. Neelamana, Research Fellow, Kerala University of Health Sciences, Thrissur - 680 596, Kerala, India. E-mail: drsandhyakn@gmail.com

Received: 15-12-2022

Revised: 07-06-2023

Accepted: 31-07-2023

Published: 04-04-2024

Access this article online

Quick Response Code:



Website:
<http://journals.lww.com/JFMPC>

DOI:
10.4103/jfmpe.jfmpe_2441_22

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Mercy PJ, Neelamana SK, Parameswaran Nair VC. Prevalence and risk factors for falls among the community dwelling older adults of Thrissur: A pilot study. J Family Med Prim Care 2024;13:875-80.

factors, older people continue to experience falls and their life-threatening and disabling consequences.^[1] According to the Global Burden of Diseases, Injuries, and Risk Factors Study 2017 (GBD 2017), falls were the 18th leading cause of age-standardized rates of disability-adjusted life years in 2017, outranking conditions such as chronic kidney disease, Alzheimer's disease and other dementias, and asthma.^[1] The WHO reports that most deaths from falls happen in those aged 65 and older. Each year, 25 to 30 percent of community-dwelling adults in the United States fall, and the total cost of fatal and nonfatal falls is nearly \$50 billion.^[3]

Risk factors that may lead to fall are demographic (age, ethnicity, and sex), biological (history of fall, neuromuscular conditions, gait disturbances, and sensory impairments), environmental (home or surrounding hazards and slippery surface), behavioral (balance confidence, medication, alcohol consumption, or sedentary behavior), socioeconomic (low education and lack of social interactions), and cognitive-related factors.^[4,5]

Given that many falls are preventable, can occur in any population, and can result in significant morbidity and mortality, falls are receiving more attention as a major global issue.

From 1990 to 2017, the age-standardized incidence of injuries from falls decreased by 8.8 percent in the high socio-demographic index (SDI) quintile, but increased in the middle, low–middle, and low SDI quintiles. The most common type of injury sustained by fall victims across all 21 GBD regions is a fracture of the patella, tibia or fibula, or ankle.^[6]

Physical performance tests such as the Timed Up and Go (TUG), thirty-second sit-to-stand (30-s STS), and the four-stage balance test (FSBT) have moderate to excellent sensitivity and specificity for identifying future fallers.^[7] The Centers for Disease Control and Prevention (CDC) developed the Stopping Elderly Accidents, Deaths and Injuries (STEADI) initiative to increase falls' screening and management.^[8]

The older population in India is growing rapidly. There are nearly 138 million elderly persons in India in 2021, including 67 million men and 71 million women, according to the report by the Ministry of Statistics and Programme Implementation titled "Elderly In India 2021."^[9] This demographic change has seen older people forming a more significant part of Indian society. For the last six decades, the proportion of individuals aged 60 and above in Kerala has experienced a significant surge, rising from 5.1% to 16.5%. This substantial increase positions Kerala as an exceptional case within India, which has a rapidly expanding population and is projected to become the most populous nation globally, with 1.4 billion inhabitants. This circumstance necessitates taking proactive measures to reduce the consequences related to aging, particularly falls. Thus, it is crucial to ascertain the extent of the issue regarding falls and the factors that contribute to it specifically in India. Additionally, it is essential to develop management strategies tailored to local requirements

and aligned with the primary and public healthcare systems in India. Considering the importance of the fall, a cross-sectional study was conducted to find the prevalence of fall among the elderly in Thrissur Taluk Health Centres.

The objectives of this study were as follows:

1. To measure the prevalence of falls among the elderly living in the Thrissur Taluk Health Centre.
2. To identify the risk factors associated with falls in the elderly using the CDCS STEADI 2019 scale and the TUG scale.
3. To find the association between the risk factors and the prevalence of fall among older people.

Materials and Methods

The study was quantitative in nature, with a cross-sectional design.

Setting of the study

Thrissur is a district of Kerala situated in the central part of the state, spanning an area of about 3,032 km². Thrissur District is home to over 9% of Kerala's population, and it has an area of 3,032 km² with a population of 32.4 lakhs (2018).

Thrissur District is further divided into talukas/blocks for administrative purposes. There are five talukas in Thrissur District—Chavakkad, Kodungallur, Mukundapuram, Thalappilly, and Thrissur. Kerala University is situated under the Jurisdiction of Thrissur Taluk.

Inclusion criteria

A person who is 60 years and above and able to walk at least 10 meters long without support was included.

Exclusion criteria

Elderly who are bedridden and are completely dependent for their activities of daily living (ADLs) and elderly who have acute disease were restricted to participate in the study.

Data collection procedure

After seeking the necessary permission from the District Medical Officer and medical officers in charge of the Thrissur Taluk Health Centres, the researcher enlisted the health centers under Thrissur Taluk Health Centres. The health centers from where the elderly should be selected were decided by the lottery method with replacement. A proportionate cluster sampling method was used to represent both urban and rural populations. Based on the above sample frame, the researcher identified the elderly living in the Primary Health Centre jurisdiction with the help of the Accredited Social Health Activist worker. Written informed consent was obtained from all the subjects. Privacy and confidentiality of data were assured. During the data collection, a researcher has taken adequate measures for the safety of the participants.

Key variables are as follows:

- Independent: Prevalence of fall.
- Dependent: Fall risk factors.

Study variables and questionnaire

A detailed questionnaire consists of socio-demographic data including sex, age, household income, and activities of daily living.

We adopted the WHO definition

A fall is an event that results in a person coming to rest inadvertently on the ground or floor or other lower level. Falls, trips, and slips can occur on one level or from a height.^[10] CDCs STEADI 2019 fall risk assessment tool was used to assess the risk factors associated with the elderly. The TUG test was used to determine gait, balance, strength, and posture. It is a simple screening test that is a sensitive and specific measure of probability of falls among older adults. Patients wore their regular footwear and used a walking aid, if needed. The patient started in a seated position. The patient stood up upon the research fellow's command: walks 3 meters, turns around, walks back to the chair, and sits down. The time stopped when the patient is seated.

The time taken for the interview was based on how fast the participants could respond to the specific question and their capability to perform the physical test; it took approximately 30 minutes per participant to conduct the study. Ethical clearance was obtained from the Kerala University of Health Sciences Research Review Committee before the commencement of this research (AXO4/SOP07A/V2).

Proper cross-cultural translation (including forward and backward translation) and content validity for Malayalam were completed before using the study. A suggested cross-cultural adaptation process based on Beaton *et al.* was used for this purpose.

Statistical analysis

The data obtained were tabulated and analyzed using Statistical Package for Social Science version 22, with a significance level of 0.05 and 95% confidence intervals. To test the association between the variables and risk of falls, Pearson's Chi-square test and Fisher's exact test were employed. Additionally, all covariates were analyzed individually with the risk of falls.

Results

A total of 100 participants were included in the pilot study.

In this study, 41% of the sample population belonged to the 60–65 age group. 68% of the sample were females. 89% of the sample were living in rural area. 93% of the population were having middle class or primary-level education. 60% of the population were having low income (<10,000). 72% of the population were active in basic activities of daily life, and 53% were active in instrumental activities of daily life. 84.1% of the population were

having normal body mass index. Hypertension was present in 65% of the population.

Other medical problems included diabetes (38%), hypercholesterolemia, (38%) cataract (6%), and osteoporosis (10%). 60% of the population were using antihypertensives, and 3% were using benzodiazepines. 55% of the population reported weakness of the lower limb. 8% of the population were having high hypertension. 19% of the population reported fracture following fall. The most common fracture was the fracture of the humerus ($n = 10$). Descriptive variables are shown in Table 1.

48% of the population reported a history of falls in the past 5 years in this study. Fracture of hands was the most common ($n = 8$). Most of them fell at the workplace. Back pain and pain in the legs were the most common complications after fall. Using the CDEAS study tool, it is found that 12% were having low risk and 88% were having high risk for fall. 98% of the population performed TUG without support. The descriptive variables of the CDEAS study tool are shown in Table 2.

There was a significant relationship between education, monthly income, activity in basic activities of daily life, and fall (P value = 0.08, 0.00, 0.024, and 0.009), respectively. There is no significant association observed between risk of fall and age, sex, basic activities of daily living, etc., with fall. The association between risk factors and falls is shown in Table 3.

Discussion

This was a pilot study to evaluate the prevalence and risk factors associated with the elderly in Thrissur Taluk. The common risk factors associated with fall were found to be aging (more than 80), gender (female), visual impairment, previous history of fall, depression, and gait problems.^[11] In our study, we discovered a prevalence of 41 percent. Several studies have previously suggested that the prevalence of falls is higher in low- and middle-income countries than in high-income countries.^[12]

In this study, we used the self-assessment history of fall. This could have resulted in either an underestimation or an overestimation of the burden of falls.^[13]

Fall happens more often to people with lower functional status, which was similar to the results obtained in this study.^[14] For the other covariates discussed in this present study, gender was not the risk factor for fall, which is in accordance with existing scientific guidelines for the prevention of falls^[15,14] 65% of the population reported that they feel unsteady when walking. Brito *et al.* in 2014 reported that the occurrence of falls was accompanied by depressive symptoms and disturbances in balance.^[14]

One notable finding in our study was the lack of association for falls with medication use for most groups of medications. This is in contrast to a recent meta-analysis,^[16] but this is similar to another Kerala study.^[17]

Table 1: Characteristics of the study population

Variables		n	%
Age (in years)	60-65	41	41
	66- 70	17	17
	71-75	27	27
	76-80	11	11
	Above 80	4	4
Gender	Male	32	32
	Female	68	68
Household	Living with family/caretaker	69	69
	Living alone	31	31
Educational Level	Graduate and above	2	2
	Diploma/Pre-Degree	5	5
	Middle class/Primary	93	93
Income	Own saving	14	14
	Spouse	59	59
	Children	16	16
	Both from spouse and son	9	9
Updated Monthly Income	No Income	2	2
	99931-199861	1	1
	10002-29972	39	39
	<10001	60	60
H/O Hypertension	Present	65	65
	Absent	35	35
H/O Diabetes	Present	38	38
	Absent	62	62
Hypercholesteremia	Present	39	39
	Absent	61	61
H/O Cataract	Present	6	6
	Absent	94	94
H/O Osteoporosis	Present	10	10
	Absent	90	90
H/O Medication	Taking antihypertensives	60	60
	Taking Benzodiazepines	3	3
Smoking	Never smoker	94	94
	Past Smoker	4	4
	Current Smoker	2	2
Alcohol Intake	Yes	2	2
	No	96	96
	Occasionally	2	2
Active in Basic activities of daily life	Yes	72	72
	No	28	28
Active in Instrumental activities of daily life	Yes	53	53
	No	47	47
History of falls in last 5 years	Yes	67	67
	No	33	33
Any problems of lower limb	Weakness of lower limbs	55	55
	No problems	45	45
BP	Normal	92	92
	High BP	8	8

A recent meta-analysis looked at the risk factors for prospective falls in community-dwelling elderly people. Deandrea *et al.* pooled 74 prospective cohorts. Most of the prospective studies included in the meta-analysis suggested that community-dwelling elderly women are at a higher risk.^[18] When compared to their male

Table 2: Descriptive statistics of CDC's study criteria

CDC s STEADI Criteria	Yes/No	n	%
1. I have fallen last year	Yes	41	41
	No	59	59
2. I use or have been advised to use a cane or walker to get around safely	Yes	15	15
	No	85	85
3. Sometimes I feel unsteady when I am walking	Yes	65	65
	No	35	35
4. I am worried about falling	Yes	66	66
	No	34	34
5. I need to push with my hands to stand up from a chair	Yes	35	35
	No	65	65
6. I have some trouble stepping up onto a curb	Yes	40	
	No	60	60
7. I often have to rush to the toilet	Yes	18	18
	No	82	82
8. I have lost some feeling in my feet	Yes	65	65
	No	35	35
9. I take medicines that sometimes make me feel lightheaded or more tired than usual.	Yes	21	21
	No	79	79
10. I take medicine to help me sleep or improve my mood	Yes	16	16
	No	84	84
11. I often feel sad or depressed.	Yes	79	79
	No	21	21
	Other	2	2
TUG completed with		n	%
Timed up and go	None (No support)	78	78
	Cane	18	18
	Walker	2	2
	Other	2	2
Time taken for timed up and go	High risk	34	34
	None/low/moderate	66	66

Characteristics associated with timed up and go test

counterparts, women are more likely to fall, which is similar to the current study. However, our study result is also similar to another large study of 12 684 individuals aged 85 years or older.^[15] We feel that the association between sex and risk of falls might vary according to the study population. Indeed, current clinical guidelines for the prevention of falls do not include sex as a risk factor (6 33), and thus, it may not be a settled question.^[14]

Several studies have reported that living alone during the daytime is a risk factor for falls in the elderly as suggested by the current study.^[18] In this study, we did not find an association with living alone.

Reduced capability for basic activity of daily life is also reported to be associated with falls in the elderly, which is similar to the current study. Yokoya *et al.* recently concluded that higher

Table 3: Association of variables with falls

Variables	Falls						P
	Low risk		High risk		Total		
	n	%	n	%	n	%	
Age							
60–65	9	22	32	78	41	100	0.080
66–70	1	5.9	16	94.1	17	100	
71–75	1	3.7	26	96.3	27	100	
76–80	0	0	11	100	11	100	
>80	1	25	3	75	4	100	
Gender							
Male	5	15.6	27	84.4	32	100	0.544
Female	7	10.3	61	89.7	68	100	
Education							
Graduate and above	2	100	0	0	2	100	0.000
Diploma	1	20	4	80	5	100	
Middle class/primary	9	9.7	84	90.3	93	100	
Income							
Own saving	2	14.3	12	85.7	14	100	0.685
Spouse	7	11.9	52	88.1	59	100	
Children	3	18.8	13	81.3	16	100	
Both spouse and children	0	0	9	100	9	100	
No income	0	0	2	100	2	100	
Monthly income							
99931–19,9861	1	100	0	0	1	100	0.024
10,002–29,972	4	10.3	35	89.7	39	100	
<10,001	7	11.7	53	88.3	60	100	
Active in basic activities of daily life							
Yes	8	11.1	64	88.9	72	100	0.009
No	4	14.3	24	85.7	28	100	

frequency of leaving home, higher exercise levels, and presence of interest in activities (e.g., meeting friends, shopping, and working in the garden) were associated with a reduced risk for fall in community-dwelling elders.^[19]

The CDC's STEADI tool checklist was developed by the Greater Los Angeles VA Geriatric Research Education Clinical Center and affiliates and is a validated fall risk self-assessment tool.^[20,21] The Fall Risk Questionnaire (FRQ) identified older adults who were at risk of falling based on self assessment. In this study, 88% are found to be at high risk of fall. 65% of the population were worried about fall, and 79% of the population often felt sad or depressed.

In low- and middle-income countries, there appears to be a lack of understanding about the consequences of falls. This is most likely due to a lack of data on falls reported from these areas. The dissemination of data from the current study, as well as similar studies from this region, is expected to raise awareness about falls. The same could spur research into interventional options for reducing fall-related mortality and morbidity. Interventional studies to prevent falls in the elderly are especially important in Kerala, which has the highest proportion of elderly people (12.6 percent) in India, according to the 2011 census. This is much

higher than the national average of 8.6%, making Kerala more appropriate for future intervention studies in this area.

Limitation

The self-reported finding was the limitation of the present study. A future study with a larger sample size would be more helpful to confirm the impact of different variables in relation to the risk of fall among the elderly.

Applied value of this project

The novelty of this study is to find out the prevalence of falls among older people and identify the risk factors related to fall to focus on preventive measure to reduce the risk among the elderly. Identification of risk factors will guide in planning fall prevention program in reduction in risk of fall among the elderly and significant improvement of their cognitive function. Identifying and implementing realistic and effective interventions to prevent fall may result in reduced healthcare burden and medical cost for this high-risk population.

Financial support and sponsorship

This study was done as a part of intramural project, Fall prevention in older people funded by Kerala University of Health Sciences.

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. WHO global report on falls prevention in older age. community health (Bristol) [Internet]. 2007;53. Available from: http://www.who.int/ageing/publications/Falls_prevention7March.pdf
2. Schnock KO, P Howard E, Dykes PC. Fall prevention self-management among older adults: A Systematic Review. *Am J Prev Med* 2019;56:747-55. doi: 10.1016/j.amepre.2018.11.007.
3. Available from: <https://www.cdc.gov/falls/data/index.html#>.
4. Rajagopalan R, Litvan I, Jung TP. Fall prediction and prevention systems: Recent trends, challenges, and future research directions. *Sensors (Basel)* 2017;17:2509.
5. Shyamala T, Wong SF, Andiappan A, Au Eong KG, Bakshi AB, Boey D, *et al*. Health promotion board-ministry of health clinical practice guidelines: Falls prevention among older adults living in the community. *Singapore Med J* 2015;56:298-300.
6. James SL, Lucchesi LR, Bisignano C, Castle CD, Dingels ZV, Fox JT, *et al*. The global burden of falls: Global, regional and national estimates of morbidity and mortality from the global burden of disease study 2017. *Inj Prev* 2020;26(Suppl 1):i3-11.
7. Shumway-Cook A, Brauer S, Woollacott M. Predicting the probability for falls in community-dwelling older adults using the timed Up and Go Test. *Phys Ther* 2000;80:896-903.
8. Stevens JA, Smith ML, Parker EM, Jiang L, Floyd FD. Implementing a clinically based fall prevention program.

- Am J Lifestyle Med 2020;14:71-7.
9. Available from: <http://www.indiaenvironmentportal.org.in/files/file/Elderly%20in%20India%202021.pdf>.
10. Available from: <https://www.who.int/publications/i/item/978924002191-4>.
11. Madhivanan A, Venugopal V, Dongre AR. Physical violence against doctors: A content analysis from online Indian newspapers. *Indian J Community Med* 2020;45:108-9.
12. Murray CJ, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, *et al.* Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: A systematic analysis for the global burden of disease study 2010. *Lancet* 2012;380:2197-223.
13. Kaur R, Kalaivani M, Goel AD, Goswami AK, Nongkynrih B, Gupta SK. Burden of falls among elderly persons in India: A systematic review and meta-analysis. *Natl Med J India* 2020;33:195-200.
14. Brito TA, Coqueiro RS, Fernandes MH, de Jesus CS. Determinants of falls in community-dwelling elderly: hierarchical analysis. *Public Health Nurs* 2014;31:290-7.
15. Grundstrom AC, Guse CE, Layde PM. Risk factors for falls and fall-related injuries in adults 85 years of age and older. *Arch Gerontol Geriatr* 2012;54:421-8.
16. Woolcott JC, Richardson KJ, Wiens MO, Patel B, Marin J, Khan KM, *et al.* Meta-analysis of the impact of 9 medication classes on falls in elderly persons. *Arch Intern Med* 2009;169:1952-60.
17. Sasidharan DK, Vijayakumar P, Raj M, Soman S, Antony L, Sudhakar A, *et al.* Incidence and risk factors for falls among community-dwelling elderly subjects on a 1-year follow-up: A prospective cohort study from Ernakulam, Kerala, India. *BMJ Open* 2020;10:e033691.
18. Deandrea S, Lucenteforte E, Bravi F, Foschi R, La Vecchia C, Negri E. Risk factors for falls in community-dwelling older people: A systematic review and meta-analysis. *Epidemiology* 2010;21:658-68.
19. Yokoya T, Demura S, Sato S. Relationships between physical activity, ADL capability and fall risk in community-dwelling Japanese elderly population. *Environ Health Prev Med* 2007;12:25-32.
20. Stevens JA, Phelan EA. Development of STEADI: A fall prevention resource for health care providers. *Health Promot Pract* 2013;14:706-14.
21. Rubenstein LZ, Vivrette R, Harker JO, Stevens JA, Kramer BJ. Validating an evidence-based, self-rated fall risk questionnaire (FRQ) for older adults. *J Safety Res* 2011;42:493-9. doi: 10.1016/j.jsr.2011.08.006.