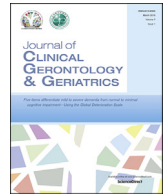




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Original article

Prevalence of risk factors for falls among elderly people living in long-term care homes

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ABSTRACT

Background: Falls are common among the geriatric population, causing frequent morbidity and mortality. There is an increased risk of fall among older people living in long-term care homes. Identifying risk factors for falls among older people living in old-age homes can help in the care and prevention of falls in this population.

Aim: To evaluate the prevalence of various risk factors for falls among older people living in long-term care homes.

Methods: A total of 163 elderly men and women aged 60–95 years were studied. History of falls revealed by participants, Long Term Care Fall Risk Assessment Form, Mini Mental State Examination, Berg Balance Scale, Fall Factors Assessment Form, and Dynamic Gait Index were used as the assessment tools in this study. The odds ratio for the risk factors for falls was calculated. The association between the risk of fall and the risk factors was assessed using the χ^2 test. The degree of functional disability between the high-risk and low-risk groups was analyzed using an independent *t* test.

Results: The following risk factors were significantly associated with falls: poor vision [odds ratio (OR) = 1.851], chronic conditions (OR = 1.633), vertigo (OR = 2.237), imbalance (OR = 3.105), fear of falling (OR = 3.227), and previous falls (OR = 5.661) (all $p < 0.001$). There was a significant difference between high-risk and low-risk groups for all functional and cognitive measures: Long Term Care Fall Risk Assessment ($t = 20.824$), Mini Mental State Examination ($t = -6.18$), Berg Balance Scale ($t = -12.59$) and Dynamic Gait Index ($t = -14.7$) (all $p < 0.001$).

Conclusion: We found that history of falls, poor vision, use of multiple medications, chronic diseases, use of walking aids, vertigo, and balance problems were associated with falls among the elderly population living in long-term care homes. Women had a higher risk of falls than men.

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1. Introduction

In India, the geriatric population is expected to increase from 76.6 million in 2006 to 173.1 in 2026.¹ This segment of the population faces multiple problems in India. Medical and psychological problems are considered to be disabling for the elderly population. Falls are considered one of the more serious problems among all age groups. A fall is defined as “inadvertently coming to rest on the ground, floor or other lower level, excluding intentional change to the rest in furniture, wall, or other objects.”² It is a common

geriatric syndrome leading to morbidity and mortality. Recurrent falls are an important cause of morbidity and mortality in the elderly and are a marker of poor physical and cognitive status. In India, the prevalence of falls has been estimated as 14–53%.³ Evaluation of the fall profile, the impact of various factors on falls, and their impact on function are an essential part of comprehensive assessment by physiotherapists for providing fall prevention care in the elderly population. There are several intrinsic and extrinsic factors considered responsible for falls in elderly people. Important factors are weakness, arthritis, history of falls, impaired activities of daily living, gait deficit, depression, balance deficit, cognitive impairment, use of assistive devices, age > 80 years, visual deficits, medications (certain psychiatric drugs, antiarrhythmic drugs, combination of > 4 drugs), neurological deficits (affecting cerebellum, basal ganglia and peripheral nerves, and reduced sensation

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and proprioception) cardiovascular deficits, and physical and social environmental conditions such as poor light and slippery or uneven surfaces.^{2,4–6}

Typically, elderly people tend to live with their family, alone in their residence, or due to changing social attitudes of reduced care, some of them live in long-term care homes.^{7–9} Although falls are common among the elderly population, recent research conducted in Kerala State, India, has found a greater increase in falls in elderly women residing in long-term care homes compared with women living in the community.¹⁰ This has created a need to investigate various factors involved in the risk of falls among men and women living in geriatric care homes and to categorize the elderly people into those with a high and low risk of falling.

2. Methods

2.1. Participants

This was a cross-sectional study in four geriatric homes in Nagpur, Maharashtra State, and Bangalore, Karnataka State, India. Men and women aged ≥ 60 years, able to move indoors with or without walking aids, and not receiving any physiotherapy or any other training for physical fitness were included. Men and women not able to walk with or without assistive devices, with severe medical problems, and uncooperative individuals were excluded. A total of 163 participants were enrolled after screening for eligibility. Informed consent was obtained from every participant. Their basic demographic details were collected. A single assessment was done in their own geriatric home set up. Assessments were carried out by a qualified physiotherapist. Every participant received a questionnaire. The participants were instructed to fill in the forms and the physiotherapist assisted with completion when necessary. The questions included: (1) history of any falling incident as remembered by the participant; (2) sociodemographic data including age, height, weight, income, educational qualifications, marital status, and medical history; and (3) risk factors for falls including using a cane or walker, a fall during the past 3 months, acute or chronic illness, types and numbers of drugs, and physical deficits (balance and gait disorders, weakness, pain related to arthritis, visual and auditory impairment, epilepsy, parkinsonism, vertigo, syncope, dizziness upon standing, foot problems, difficulty rising from a chair, fear of falling).

2.2. Equipment

An armless wooden chair, a measuring tape, a weighing machine, a sphygmomanometer, a stethoscope, a stop watch, and a shoebox were used to conduct the assessments.

2.3. Assessment tools

The Long Term Care Fall Risk Assessment Form, Mini Mental State Examination, Berg Balance Scale, and Dynamic Gait Index were used as the assessment tools in this study.

2.3.1. Long Term Care Fall Risk Assessment Form

There were eight subtests to the Long Term Care Fall Risk Assessment Form¹¹: level of consciousness/mental status, history of falls in past 3 months, ambulation/elimination status, vision status, gait/balance, systolic blood pressure, medication, and predisposing diseases. If the participant's score was < 10 , he/she was classified into the low-risk group, and into the high-risk group if the score is > 10 .

2.3.2. Berg Balance Scale

The Berg Balance Scale¹² contained 14 tasks to perform that were graded from 0 (unable) to 4 (independent), with a maximum score of 56. A higher score indicated better performance. Berg et al suggested that scores < 45 indicates that a participant is impaired, with an increased risk of falls.

2.3.3. Dynamic Gait Index

The Dynamic Gait Index¹³ consisted of eight subtests. Each task was scored on a 4-point scale: 0, poor and 3, excellent. The maximum score was 24. Scores of ≤ 19 were related to increased incidence of falls in elderly people.

2.3.4. Mini Mental State Examination

The Mini Mental State Examination¹⁴ was an 11-question measure that tested five areas of cognitive function: orientation, registration, attention and calculation, recall, and language. The maximum score was 30. A score of ≤ 23 was indicative of cognitive impairment.

2.4. Data analysis

Data were analyzed using SPSS Version 16.0. (SPSS Inc., Chicago) Frequency distributions and descriptive statistics were analyzed to characterize the study sample. The association between the risk of falling and various risk factors, namely, poor vision, history of falling, postural hypotension, use of medication, chronic diseases, use of waking aids, vertigo, imbalance, fear of falling, hearing impairment, and acute medical problems was assessed using the χ^2 test, and the extent of risk was expressed using odds ratio (OR). The continuous variables, such as degree of functional disability between the high-risk and low-risk groups, were analyzed using independent samples *t* test.

3. Results

The age of participants ranged from 60 years to 95 years (mean 74.61 ± 8.465 years; 75.46 ± 8.819 years for men and 73.86 ± 8.121 years for women). Body height ranged from 114 cm to 176 cm (mean 153.11 ± 10.341 cm; 160.46 ± 7.382 cm for men and 145.69 ± 8.028 cm for women; $t = 11.341$, $p = 0.000$). Body weight ranged from 25 kg to 80 kg (mean 53.61 ± 11.391 kg; 57.03 ± 10.138 kg for men and 50.63 ± 11.641 kg for women; $t = 3.714$, $p < 0.001$) (Table 1).

Thirteen men had 24 falls and 34 women had 81 falls. Based on the total scores obtained in the Long Term Care Fall Risk Assessment, the participants were divided into high-risk and low-risk groups. If the total score was < 10 , he/she was classified as low risk for falling, and if the score was > 10 , he/she was classified as high risk for falling. Among 163 participants, 116 (71.1%) did not have any history of falls before the assessment, and 47 (28.9%) participants had at least one fall. There was a total of 105 falls.

In the high-risk group, there were 21 (34.4%) men and 40 (65.6%) women. In the low-risk group, there were 55 (54%) men and 47 (46%) women (Table 2). The various risk factors observed in this study are listed in Table 3 and Figure 1.

There was a significant difference between the high-risk and low-risk groups for functional and cognitive outcomes ($p < 0.001$): Long Term Fall Risk Assessment, high-risk group 13.26 ± 2.714 , low-risk group 4.3 ± 2.624 ($t = 20.824$); Mini Mental State Examination, high-risk group 20.2 ± 5.42 , low-risk group 24.52 ± 3.3 ($t = -6.18$); Berg Balance Scale, high-risk group 38.52 ± 9.61 , low-risk group 52.4 ± 4.36 ($t = -12.59$); Dynamic Gait Index, high-risk group 12.24 ± 5.29 , low-risk group 21.91 ± 3.09 ($t = -14.7$) (Table 4).

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