

# Prevalence, Predictors and Prevention of Falls in Geriatric Patients

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## Abstract

Falls are all too common in the geriatric population, and they have devastating consequences. They are the leading cause of injury and death by injury in adults over the age of 65 years. Rates are higher in women. The prevalence of falls in India above the age of 60 years reported to range from 14% to 53%. One study assessed the prevalence of falls among older adults and its proportion was found to be 24.98%. Aging increases joint stiffness, decreased muscle strength, impaired neurologic feedback. The majority of fallers had experienced a fall in the morning, greater numbers had occurred indoors especially in bathrooms. The presence of slippery flooring inappropriate tiling inadequate lightening the absence of grab bar was the possible risk factors in the bathroom. The sedentary group fell more frequently than the exercising group due to lack of stability. Impaired strength is a strong predictor of falls in most studies. A growing body of evidence indicates that the elderly respond to exercise training that this response continues at very old ages and extremes of fragility. Predisposing to falls are musculo-skeletal problems, visual defect, neurological illness, syncope vestibular causes, hypertension, postural hypotension and dementia. Drug-induced falls were commonly associated with sedatives and hypnotics. Home measures to prevent fall. Handrails for both sides of stairways, nonslip treads for bare-wood steps, a raised toilet seat or one with armrest, grab bars for the shower or tub. Place night lights in your bedroom, bathroom, and hallways. Place a lamp within reach of your bed for middle-of-the- night needs. Make clear paths to light switches that aren't near room entrances. Consider trading traditional switches for glow-in- the-dark or illuminated switches. Turn on the lights before going up or downstairs. 12. Store flashlights in easy-to-find places in case of power outages.

**Keywords:** Geriatric falls • Prevention of elderly falls • Geriatric fall prevention

## Introduction

Aging is an irreversible normal phenomenon that takes place at a molecular level, reflecting not only physically but also functionally and psychosocially. Falls are one of the major problems in the elderly and are considered one of the "Geriatric Giants". Recurrent falls are an important cause of morbidity and mortality in the elderly and are a marker of poor physical and cognitive status. Evaluation of the morbidity profile among elderly people, and the impact of chronic conditions on functional disability and psychological well-being are an essential part of comprehensive assessment of the elderly. It will have implications for providing health care for the elderly population and its costs.

## Literature Review

### Prevalence

India is the second most populated country in the world, with over 1.21 billion people, and according to the population census in India 2011, the percentage of older adults above the age of 60% is 8.6% of the total population and this population is likely to increase to 198 million in 2030 [1]. Falls are too common in the geriatric population, and they have devastating consequences. They are the leading cause of injury and death by injury in adults over the age of 65 years. Fall rates are higher in women. According

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to the World Health Organization (WHO) global report on falls prevention, people aged 65 years and above fall about 28% to 35% in each year and this proportion increases as age and frailty level increase [2]. The prevalence of falls in India above the age of 60 years reported to range 42.2%, in a Community based Cross sectional study was conducted in urban area of Kolar Taluk, Karnataka for a period of 3 months [3].

### Predictors

Aging increases joint stiffness, decreased muscle strength, impaired neurologic feedback. Majority of fallers had experienced a fall in the morning, greater numbers had occurred indoors especially in bathrooms. The presence of slippery flooring inappropriate tiling in adequate lightening the absence of grab bar were the possible risk factors in the bathroom [4,5].

The common risk factors associated with fall was found to be Aging (more than 80), Gender (female), Visual impairment, Previous history of fall, musculo skeletal problems, neurological illness, syncope vestibular causes, hypertension, postural hypotension, depression, gait problems and dementia [6,7]. The sedentary group fell more frequently than exercising group due to lack of stability [8]. Impaired strength is strong predictor of falls in most studies; a growing body of evidence indicates that the elderly respond to exercise training that this response continues at very old ages and extremes of fragility [8]. So people who exercise can have a lesser incidence of fall. Drug induced falls were commonly associated with sedatives and hypnotics.

The review found the study conducted by Sirohi et al., among 456 elderly, shows the prevalence of falls among elderly in a rural area of Haryana was 36.6% (32.1-40 at 95% CI) were else a community prevalence study conducted by Yeong et al. in Malaysia showed the prevalence of fall among the elderly was 4.07%, this study found out that elderly who lived alone had more than two-fold increase in the risk for falls (OR=2.60, P=0.042) [9,10].

### Prevention

A systematic assessment of individual risk is desirable and a pro-active,

multi-factorial approach to injury prevention is essential. In community-dwelling adults, use of multifactorial assessments and interventions has led to a decrease in fall rates by 25% to 40% [11,12]. Depending on the results of this risk assessment, appropriate multifactorial interventions for preventing ambulatory falls may include any or all of the following :

1. Exercise/physical therapy programs aimed at improving balance, gait, and strength
2. Withdrawing or minimizing psycho-active medications
3. Management of orthostatic hypotension
4. Management of foot problems
5. Changes in footwear
6. Modification of home environment
7. Patient and caregiver education
8. Vitamin D supplementation in patients with vitamin D deficiency or high risk of fall
9. Expedited cataract surgery (selected patients)
10. Dual chamber cardiac pacing (selected patients).

Actions to be taken for patients at high risk for falls:

1. Ask about history of falls and patient's assessment of his/her functional ability.
2. Review medications and medical history.
3. Perform gait assessment; Physical examination (especially neurologic, cardiac); Assessment of orthostatic vital signs; Visual acuity examination; Cognitive evaluation; Examination of feet and footwear; Home safety evaluation
4. To reduce the risk of fall-related fractures, patients should be screened for osteoporosis at the appropriate age and the relevant medications should be prescribed if necessary

### Fall prevention in hospital

Physicians and other health care team members including nurses should assess that in hospitals, nurses should perform fall prevention for every patient using standardized tools. Tools for assessing risk for falls include: the Morse Fall Scale, the Hendrich II Fall Risk Model, the Briggs Risk Assessment Form, and the Conley Risk Assessment Tool, among others. Kaiser Permanente uses the Schmid Fall Assessment Tool. It involves evaluation of the patient's mobility, mentation, toileting, fall history, and use of psychoactive medications. A score of three or more indicates an increased risk for falls requiring the following interventions [13]:

1. Appropriate reorientation strategies
2. Access to patient's hearing aids or glasses
3. Call bell
4. Access to patient's personal items
5. Use of patient's walking aids
6. Frequent comfort rounds
7. Patient and family education about fall risk
8. Early and frequent mobilization
9. Nonslip footwear
10. Elimination of barriers to transfer or ambulation
11. Minimization of use of restraints
12. Use of bed alarm when necessary

### Home measures to prevent fall

At each hospital visit patient and their family members should be constantly impose these following steps to be taken at their home [14].

1. Hand rails for both sides of stairways, nonslip treads for bare-wood steps, a raised toilet seat or one with armrest, grab bars for the shower or tub.
2. Place night lights in the bedroom, bathroom and hallways.
3. Place a lamp within reach of the bed for middle-of-the-night needs.
4. Make clear paths to light switches that aren't near room entrances. Consider trading traditional switches for glow-in-the-dark or illuminated switches.
5. Turn on the lights before going up or down stairs.
6. Store flashlights in easy-to-find places in case of power outages

### Fall prediction systems

These capture the multifactorial nature of falls for reliable fall risk estimation. These include environmental, physiological, and psychological risk factors. Fall prediction systems mainly focus on physiological risk factors such as gait, mobility, and vision. Fall prediction systems focus on information fusion from both wearable (watches, shoes, belts, etc.) and ambient sensors for reliable estimation of fall risk [15].

Primary prevention of fall related injuries involves reducing the occurrence of falls. Secondary prevention of fall-related injuries involves preventing injuries when falls occur.

### Hip protectors

Falls are most commonly associated with hip fractures. Most hip fractures are caused by falling directly on the hip, and biomechanical studies have demonstrated that a pad that shunts the energy away from the point of impact is highly effective in reducing the force of a fall on the proximal femur. Hip Protectors are plastic shields or foam pads fitted in pockets within specially designed underwear that reduce the impact of a fall. They do not reduce the risk of falling, but aim to reduce the impact of a fall. The pads are recommended for prevention of hip fractures for persons at high risk of falls or those living in an institution [16]. A 1993 clinical study in a Copenhagen nursing home demonstrated that hip protectors reduced the risk for hip fracture by approximately 50% [17].

### Limitations

- Scarcity of the research in EMR countries on the subject of falls in elderly.
- A lack of interventional studies.
- Lack of a comprehensive fall prediction system.
- Dearth of user-friendly interfaces and feedback techniques to actively engage and empower patients towards effective techniques to prevent falls.
- No efficient web interfaces to help clinicians visualize health data and assess fall risk.

### Conclusion and Future Works

Future work should focus on robust determination of the accuracy of fall prediction for older adults. Fall prediction is a complex multifactorial problem that involves interaction between physiological, environmental and behavioral risk factors. New technologies are needed that can reliably identify external fall risk factors such as environmental hazards and deliver targeted educational interventions for preventing falls. Significant advances in these research areas will eliminate several barriers that exist for the

widespread adoption of IoT (Internet of things) - enabled fall prediction and prevention systems by health care providers, patients, and clinicians.

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