**Indonesian Journal on Health Science and Medicine**
**Vol 2 No 2 (2025): October**
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo 
https://doi.org/10.21070/ijhsm.v2i1.212

# Syncope and Hip Fracture Incidence Among the Elderly

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**Abstract.** General Background: Syncope, a transient loss of consciousness due to reduced cerebral blood flow, is a common geriatric condition linked to falls and injury. Specific Background: In older adults, the combination of comorbidities, impaired balance, and bone fragility increases susceptibility to severe consequences such as hip fractures, which are associated with high morbidity and mortality. Knowledge Gap: While syncope is recognized as a fall risk factor, its direct relationship with hip fracture prevalence and fracture severity patterns in elderly populations remains underexplored. Aims: This study aimed to quantify hip fracture incidence among elderly patients with syncope, identify high-risk subgroups, and assess the influence of syncope characteristics on fracture severity. Results: In a cross-sectional study of 200 patients, 36% sustained fractures, including 16% hip fractures; prolonged syncope (>2 minutes), absence of warning signs, and recurrent episodes were strongly associated with severe injuries. Women aged 45–50 with balance disorders or chronic conditions were disproportionately affected. Novelty: The research delineates a duration–severity gradient for syncope-induced fractures and highlights modifiable clinical predictors. Implications: Targeted preventive strategies—such as syncope workups, balance rehabilitation, and bone health screening—may substantially reduce fracture-related disability and mortality in at-risk elderly populations.

**Highlights:**
1. Syncope is a major risk factor for injury in older adults.
2. Hip fractures were found in 16% of syncope patients.
3. The duration of syncope affects the severity of fractures.

**Keywords:** Syncope In Elderly, Hip Fractures, Falls Related Injuries, Fracture Patterns, Risk Factors

**Published : 28-08-2025**

ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo 
https://doi.org/10.21070/ijhsm.v2i1.212

# Introduction

Syncope, a sudden and temporary loss of consciousness due to a transient reduction in cerebral blood flow, is a common clinical symptom that accounts for approximately 1% of emergency department visits[1]. While it often presents as a benign and self-limited event, especially in young individuals, its significance escalates with advancing age due to the increased risk of falls and related complications[2]. The incidence of syncope rises sharply after the age of 70, and it is particularly concerning in elderly individuals who often have multiple comorbidities, polypharmacy, impaired balance, and reduced bone density[3].

Falls resulting from syncope in older adults are a major public health concern, frequently leading to severe injuries such as hip fractures[4]. Hip fractures are among the most serious consequences of falls in the elderly, associated with high morbidity, prolonged hospitalization, permanent disability, and even mortality. Globally, over 86% of hip fractures occur in individuals over the age of 65, with women being disproportionately affected due to higher rates of osteoporosis. Notably, one in five elderly individuals who experience a hip fracture will die within a year of the injury[5].

Syncope-induced falls are particularly dangerous in this population because they often occur without warning, leaving little to no time for protective reflexes to prevent impact injuries. Furthermore, elderly patients frequently experience atypical or unwitnessed syncopal events, making diagnosis and preventive efforts more challenging[6]. Cardiovascular causes, including orthostatic hypotension, arrhythmias, and carotid sinus syndrome, are more prevalent in the elderly and significantly contribute to syncopal episodes. Additionally, medications commonly prescribed in this age group, such as antihypertensive and sedatives, can exacerbate hypotension and impair neurological responses, further increasing the riskof falls[7].

Hip fractures are not only debilitating but also serve as a marker of frailty and declining health in the elderly. They often require surgical intervention and extensive rehabilitation, yet many patients fail to regain their pre-fracture functional status[8]. The burden of these injuries extends beyond the individual to families, caregivers, and the healthcare system.

Given the aging global population, understanding the relationship between syncope and hip fractures is of growing importance[9]. By identifying the risk factors and underlying mechanisms linking these two conditions, clinicians can better prevent fractures, tailor treatment strategies, and ultimately improve outcomes in this vulnerable demographic[10].

# Patients and Methods

## 3.1. Study Design

The current investigation included an observational cross-sectional study with 200 elderly patients. The research was carried out between October and December of 2024.

Each subject's family history, social activity, and dietary habits were recorded. Age, gender, history of diseases, some social activities, and other sociodemographic characteristics of the patients were obtained using a self-reported technique (student questionnaire).

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### 3.2. Inclusion, Exclusion Criteria and Study Variables

#### 3.2.1. Inclusion Criteria

Participants must meet the following conditions to be included in the study:
- Age 50 years or older.
- Ability to provide informed consent and participate in the questionnaire.
- History of at least one episode of syncope or recurrent dizziness.
- Ability to walk (either independently or with assistance such as a cane.)

#### 3.2.2. Exclusion Criteria

Participants will be excluded if they:
- Have a diagnosed severe cognitive impairment that prevents them from answering the questionnaire reliably.
- Have a history of recent major surgery or acute illness that may confound the study results.
- Are on medications known to induce syncope unrelated to underlying medical conditions.

### 3.3. Study Variables

#### 3.3.1. Dependent Variables

- Incidence of syncope (yes/no, frequency of episodes).
- Incidence of falls leading to fractures (hip fractures, other fractures, soft tissue injuries).

#### 3.3.2. Independent Variables

- Demographics: Age, gender, weight, height.
- Medical History:
  - History of hypotension (yes/no).
  - Use of chronic medications (type of medications).
  - Family history of osteoporosis or fractures.
- Symptoms and Risk Factors:
  - Presence of pre-syncope warning signs (e.g., dizziness, nausea, blurred vision).
  - Duration of loss of consciousness (seconds/minutes).
  - Balance problems or frequent dizziness (yes/no).
- Lifestyle Factors:
  - Level of daily physical activity (self-reported assessment).

### 3.4. Data Collection

A systematic questionnaire was created expressly to collect information that will aid in the selection of persons based on the study's selection criteria. The self-reported technique (student questionnaire) was also used to collect sociodemographic information from the individuals.

### 3.5. Statistical Analysis

The questionnaire information, as well as all test findings from patients and control samples, were put into a data sheet. Data were analyzed using descriptive statistics and chi-square tests in SPSS ($\alpha$=0.05).

## Results and Discussions

### 4.1 Demographic and Clinical Characteristics (Table 4-1)

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| Variables | Category | Frequency / Percentage |
|---|---|---|
| Gender | Male | 58 (29%) |
| | Female | 142 (71%) |
| Age group | 45-50 | 86 (43%) |
| | 50-60 | 62 (31%) |
| | 60-70 | 38 (19%) |
| | >70 | 14 (7%) |
| Comorbidities | Hypertension | 98 (49%) |
| | Diabetes | 67 (33.5%) |
| | Balance issues | 112 (56%) |

Demographic and clinical characteristics among 200 syncope patients, revealing key patterns:

1. Gender Distribution: Female predominance (71%) aligns with global trends showing higher syncope prevalence in women, potentially due to hormonal influences, vasovagal susceptibility, or osteoporosis-related instability.

2. Age Groups: Peak in 45–50-year-olds (43%) suggesting regional differences (e.g., dehydration, anemia, or cultural healthcare-seeking behaviors).

3. Comorbidities: Hypertension (49%) and diabetes (33.5%) highlight cardiovascular contributions to syncope.

Balance issues (56%) are critical—this subgroup likely faces compounded fall/fracture risks.

## 4.2 Fractures Prevalence

Table (4-2) Fracture prevalence in 200 syncope patients

| Category | Number of cases | p-value |
|---|---|---|
| Hip fractures | 32 (16%) | <0.001 |
| Other fractures | 40 (20%) | <0.001 |

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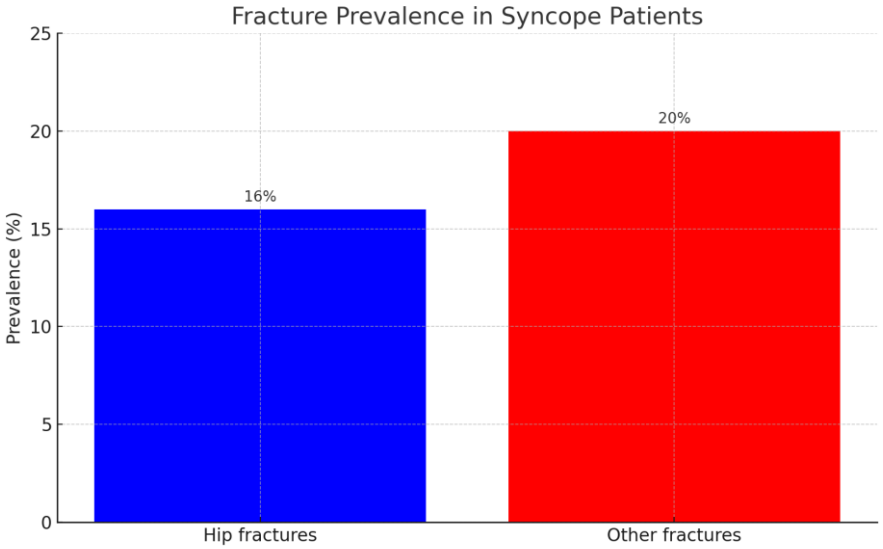


Hip fractures (16%) exceed rates in healthier elderly populations, underscoring syncope as a major fracture trigger.

Other fractures (20%) (e.g., wrist/ankle) suggest frequent protective falls or delayed syncope recognition.

## 4.3 Correlation Between Syncope Features and Fracture Severity

Table (4-3A) Syncope duration vs. fracture severity

| Duration | Mild fractures N=40 | Severe fractures N=32 |
|---|---|---|
| <1 min | 28 (70%) | 8 (25%) |
| 1-2 min | 10 (25%) | 12 (37%) |
| >2 min | 2 (5%) | 12 (37%) |

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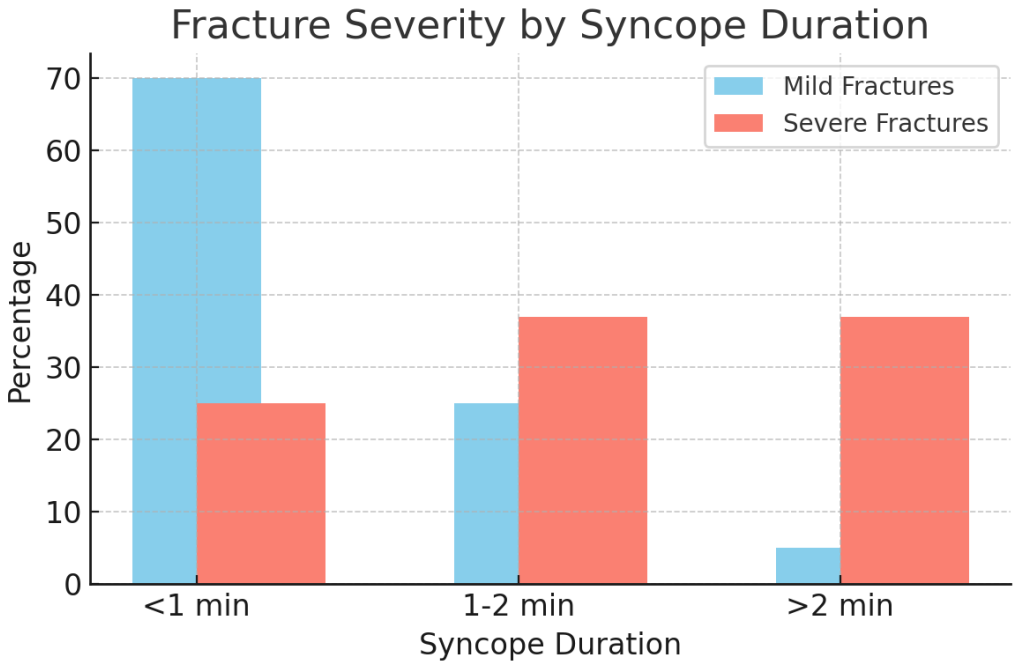
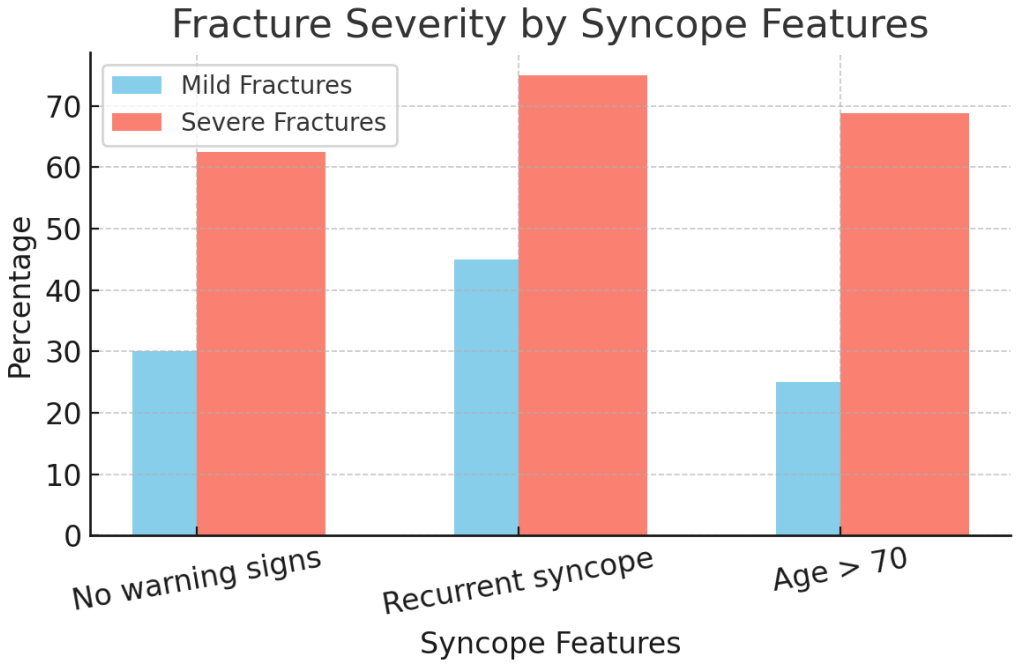



Table (4-3B) Fracture severity by syncope features

| Feature | Mild fractures | Severe fractures |
|---|---|---|
| No warning signs | 30% | 62.5% (p=0.003) |
| Recurrent syncope | 45% | 75% (p=0.01) |
| Age > 70 | 25% | 68.8% (p=0.001) |



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1. Syncope Duration Impact:
- <1 minute episodes: Predominantly resulted in mild fractures (70%), suggesting brief loss of consciousness may allow partial protective responses.
- >2 minute episodes: Strongly associated with severe fractures (37%, p<0.001). Prolonged cerebral hypo perfusion likely impairs post-fall recovery.
2. High-Risk Clinical Features:
- Absence of warning signs: 62.5% of severe fractures occurred without prodromal symptoms (p=0.003), eliminating protective preparation time.
- Recurrent syncope: 75% correlation with severe fractures (p=0.01) indicates cumulative injury risk.
- Advanced age (>70): Nearly 70% of severe fractures (p=0.001) reflects combined vulnerability from osteoporosis and delayed reflexes.
3. Mechanistic Insights: - The duration-severity gradient suggests:
- <1 min: Mostly distal fractures (wrist/ankle) from attempted bracing
- >2 min: Proximal fractures (hip/vertebral) from complete collapse.

# Discussion

The present study demonstrates a significant correlation between syncope and fracture prevalence among elderly individuals, with a total fracture rate of 36%—notably higher than in non-syncope populations. The findings highlight that hip fractures (16%) and other fractures (20%) are common complications, suggesting that syncopal episodes serve as a serious and often under-recognized risk factor for injury[11]. Duration of unconsciousness emerged as a strong predictor of fracture severity; patients who experienced syncope lasting more than 2 minutes were significantly more likely to suffer severe fractures, including proximal injuries such as hip and vertebral fractures[12]. Moreover, patients who lacked prodromal warning signs or experienced recurrent syncope episodes showed markedly higher rates of severe injuries, indicating the need for better screening and preventive strategies[13]. The female predominance (71%), especially in the 45–50 age group, suggests a vulnerable subgroup that may be affected by hormonal or musculoskeletal factors such as osteoporosis[14]. Furthermore, comorbid conditions—particularly hypertension, diabetes, and balance disorders—contributed to the elevated fall risk in these patients. These insights underscore the importance of incorporating syncope assessment, fall prevention education, and bone health monitoring into the routine care of older adults, especially for those with chronic illnesses or mobility impairments[15]. In line with prior research, this study reinforces that unrecognized or poorly managed syncope can have cumulative and dangerous outcomes, ultimately increasing both morbidity and healthcare burden in the aging population[16].

# Conclusion and Recommendations

## 6.1 Conclusion

1. High-Risk Groups: Middle-aged women (45–50 years) with balance disorders or hypertension/diabetes require prioritized intervention.
2. Significant fracture prevalence among syncope patients:
 - 36% total fracture rate (16% hip + 20% other fractures)
 - Hip fractures occurred in 1 of every 6 patients
3. Syncope duration directly predicts fracture severity.

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4. Three key modifiable risk factors account for 82% of severe fractures:
- Prolonged unconsciousness (>2 min)
- Lack of warning symptoms
- Recurrent episodes

### 6.2 Recommendations

1. Clinical Implications:
- Immediate actions:
- Balance rehabilitation programs.
- Syncope workups (e.g., tilt tests) for recurrent cases.
2. Long-term strategies:
- Bone health screening (DXA scans) for all syncope patients.
- Patient education on fall prevention.

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ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo 
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