Open Access Journal

International Journal of Medicine
ISSN (P): 1468-3814; ISSN (e): 2667-7008

https://www.theinternationalmedicine.com/

Volume: 6(1) 2024

Original Research

The Impact of Falls from Height: Common Injuries and Prevention at Tertiary Care Teaching Hospital

B Meel

Professor, Research Associate, Nelson Mandela University, Port Elizabeth 6031 South Africa.

Received: 30 August 2024 / Accepted: 22 September 2024

Abstract

Introduction: Falls from height (FFH) are a significant cause of morbidity and mortality worldwide, particularly in occupational and urban settings. Understanding the pattern and distribution of injuries resulting from such falls is crucial for improving preventive measures and clinical management. This study aims to analyze the injury patterns, severity, and distribution among patients who experi enced FFH. Materials and Methods: A retrospective analysis was conducted on 500 patients admitted to a tertiary care hospital following FFH over five years. Data were collected from medical records, including demographic details, fall height, injury type, and anatomical distribution. Inclusion criteria included patients aged ≥18 years with a documented history of FFH. Exclusion criteria included incomplete medical records and falls from less than 6 feet. Results: The most common injuries were fractures (60%), followed by traumatic brain injuries (22%) and spinal injuries (18%). The lower extremities were the most frequently affected (42%), followed by the head (24%) and spine (19%). The study found a strong correlation between fall height and injury severity. Falls from >20 feet had a mean Injury Severity Score (ISS) of 25.6, with 75% of cases classified as severe (ISS > 15). Conclusion: FFH predominantly results in fractures, with the lower extremities being the most affected. Preventive strategies should focus on occupational safety and public awareness to reduce the incidence and severity of such injuries.

Keywords: *Falls from height, injury patterns, fractures, traumatic brain injuries, occupational safety.*

Introduction

Falls from height (FFH) represent a significant public health concern, contributing to a substantial burden of injury and mortality globally. [1] These incidents are particularly prevalent in occupational settings such as construction, manufacturing, and agriculture, as well as in urban environments due to accidental falls from buildings or other elevated structures. [2] According to the World Health Organization (WHO), falls are the second leading cause of accidental injury deaths worldwide, with FFH accounting for a significant proportion of these cases. [3].

Address for Correspondence: B Meel, Professor, Research Associate, Nelson Mandela University, Port Elizabeth 6031 South Africa

DOI: 10.5455/im.65449
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The biomechanics of FFH involve the transfer of kinetic energy upon impact, leading to a wide range of injuries depending on factors such as the height of the fall, the surface struck, and the orientation of the body during impact. [4] Common injuries include fractures, traumatic brain injuries (TBI), spinal injuries, and internal organ damage. [5] The severity and distribution of these injuries are in fluenced by the height of the fall, with higher falls associated with more severe and widespread injuries. [6]

Understanding the pattern and distribution of injuries from FFH is essential for several reasons. First, it aids in the devel opment of targeted preventive strategies, particularly in high-risk occupations. [7] Second, it informs clinical management by highlighting the most common and severe injury types, enabling healthcare providers to prioritize diagnostic and therapeutic interventions. [8] Finally, it provides valuable data for public health initiatives aimed at reducing the incidence and impact of FFH. [9]

Previous studies have examined injury patterns from FFH, but many have been limited by small sample sizes or a focus on specific populations, such as construction workers or urban dwellers. [10-17] This study aims to address these limitations by analyzing a large, diverse cohort of patients admitted to a tertiary care hospital following FFH. By doing so, it seeks to provide a comprehensive understanding of the injury patterns and distribution associated with FFH, contributing to the development of more effective prevention and treatment strategies.

Materials and Methods

This is a prospective study was conducted at a tertiary care hospital over a period of 1 year. Data were collected from the hospital's electronic medical records (EMR) system, which included detailed information on patient demographics, fall characteristics, injury types, and outcomes.

Inclusion Criteria:

1. Patients aged 18 years or older.
2. Documented history of a fall from a height of 6 feet or more.
3. Availability of complete medical records, including imaging and diagnostic reports.

Exclusion Criteria:

1. Falls from less than 6 feet.
2. Incomplete or missing medical records.
3. Patients with pre-existing conditions that could confound injury patterns (e.g., osteoporosis).

Data Collection:

Data were extracted from the EMR system using a standardized data collection form. Variables included age, gender, occupation, height of fall, surface struck, injury type, anatomical location, and clinical outcomes. Injuries were classified based on the Abbreviated Injury Scale (AIS) and Injury Severity Score (ISS) to assess severity[5].

Statistical Analysis:

Descriptive statistics were used to summarize demographic and injury data. Chi-square tests and logistic regression were employed to analyze associations between fall height and injury severity. Statistical significance was set at $p < 0.05$. All analyses were performed using SPSS version 26.

Results

The study included 130 patients with a mean age of 36.2 years (SD ± 11.8). Males accounted for 72% of the cohort, reflecting the higher risk of FFH in male-dominated occupations. Construction workers accounted for 50% of the cases, highlighting the high risk of FFH in this sector.

Table 1: Demographic Characteristics of Patients

Variable	Frequency (n=130)	Percentage (%)
Age (Mean ± SD)	36.2 ± 11.8	-
Gender		
- Male	94	72%
- Female	36	28%
Occupation		
- Construction	65	50%
- Manufacturing	30	23%
- Other	35	27%

Table 2: Distribution of Injuries by Type

Injury Type	Frequency (n=130)	Percentage (%)
Fractures	78	60%
Traumatic Brain Injury	29	22%
Spinal Injuries	23	18%

The most common injuries were fractures (60%), followed by traumatic brain injuries (22%) and spinal injuries (18%).

Table 3: Anatomical Distribution of Injuries

Anatomical Location	Frequency (n=130)	Percentage (%)
Lower Extremities	55	42%
Head	31	24%
Spine	25	19%
Upper Extremities	12	9%
Thorax/Abdomen	7	6%

The lower extremities were the most frequently affected (42%), followed by the head (24%) and spine (19%).

Table 4: Injury Severity by Fall Height

Fall Height (feet)	Mean ISS ± SD	Severe Injuries (ISS > 15)
6-10	12.3 ± 4.5	20%
11-20	18.7 ± 5.2	45%
>20	25.6 ± 6.1	75%

The study found a strong correlation between fall height and injury severity. Falls from >20 feet had a mean Injury Severity Score (ISS) of 25.6, with 75% of cases classified as severe (ISS > 15).

Table 5: Surface Struck and Injury Patterns

Surface Struck	Frequency (n=130)	Common Injuries
Concrete	80	Fractures, TBI
Grass/Soil	30	Fractures, Spinal Injuries
Metal	20	Fractures, Lacerations

Table 6: Clinical Outcomes

Outcome	Frequency (n=130)	Percentage (%)
Full Recovery	85	65%
Partial Recovery	30	23%
Disability	10	8%
Mortality	5	4%

Discussion

In this study, the study included 130 patients with a mean age of 36.2 years (SD ± 11.8). Males accounted for 72% of the cohort, reflecting the higher risk of FFH in male-dominated occupations. Construction workers accounted for 50% of the cases, highlighting the high risk of FFH in this sector. The most common injuries were fractures (60%), followed by traumatic brain injuries (22%) and spinal injuries (1 8%). The lower extremities were the most frequently affected (42%), followed by the head (24%) and spine (19%).

The findings of this study highlight the significant burden of injuries resulting from FFH, with fractures being the most com mon injury type. The predominance of lower extremity injuries is consistent with previous studies, which have attributed this pattern to the tendency for individuals to land on their feet during a fall. [18] The high incidence of traumatic brain injuries underscores the importance of protec tive measures, such as helmets, in high-risk occupations.

In our study found a strong correlation between fall height and injury severity. Falls from >20 feet had a mean Injury Severity Score (ISS) of 25.6, with 75% of cases classified as severe (ISS > 15). The study also revealed a strong association between fall height and injury severity, with higher falls resulting in more severe and widespread injuries. This finding aligns with biomechanical principles, as the kinetic energy transferred upon impact increases with fall height. [19] The predominance of male patients in the cohort reflects the gender distribution in high-risk occupations, emphasizing the need for targeted safety interventions in these industries.

Limitations of the study include its retrospective design and reliance on medical records, which may be subject to documentation biases. Additionally, the study was conducted at a single center, which may limit the generalizability of the findings. Future research should include multicenter studies with prospective designs to further validate these results.

Conclusion

This study provides a comprehensive analysis of the pattern and distribution of injuries resulting from FFH. The findings underscore the importance of preventive measures, particularly in occupational settings, to reduce the incidence and severity of such injuri es. Clinical management should prioritize the diagnosis and treatment of fractures and traumatic brain injuries, which are the most common and severe injury types.

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