



## Epidemiology of Orthopaedic Fractures and Other Traumatic Injuries among Patients Admitted in a Tertiary Care Hospital: An Observational Study

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### Abstract

**Background:** Orthopaedic fractures and traumatic injuries are a growing concern for healthcare systems worldwide. Road Traffic Accidents (RTA) are among the top five causes of illness and mortality in South East Asian nations. Trauma caused by other factors, such as accidents at work or home, falls, and assaults, significantly contribute to overall mortality and morbidity. This study aims to investigate the occurrence of traumatic injuries with associated factors and find significant orthopaedic fracture patterns. **Material & Methods:** This study was a retrospective observational study that was conducted on 208 patients who were admitted to the department of orthopaedics at Dhaka Medical College and Hospital during the study period between April 2004 and June 2007 those who fulfilled the selection criteria were enrolled in this study. All data were processed and analyzed with the help of SPSS (Statistical Package for Social Sciences) version 25. The data were expressed as frequency and percentage in tables and graphs. **Results:** During the study period total number of study patients were 208 where 131 (62.98%) patients were male, and 77(37.02%) were female. The majority, 53 (25.48%) of the patients, were aged between 31-40 years. RTAs were responsible for 92 cases (44.23%) of all traumatic orthopaedic injuries and followed by falls accounting for 42 patients (20.19%) of injuries. Majority 46(22.12%) of the patients had fractures in femur, second majority 38(18.27%) patients had fracture in tibia/fibula. The most common fracture site being the lower limbs (58 cases, 27.88 %). **Conclusion:** The study concluded that the incidence of traumatic orthopaedic injuries was higher in young male adults compared to all other study groups. The three most frequent causes of injuries were falls, RTAs, and assaults were the most prevalent form of injury. The most frequently damaged bones are the femur and tibia/fibula.

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### INTRODUCTION

Orthopaedic fractures and traumatic injuries are a serious and growing concern for healthcare systems worldwide.<sup>[1]</sup> According to the World Health Organization (WHO),

Traumatic injuries are one of the leading causes of mortality in the world, with 90% of the injuries estimated to occur in low and middle-income countries.<sup>[2]</sup> Trauma now accounts for 9% of global mortality and is a threat to health globally.<sup>[3,4]</sup> Road Traffic Accidents (RTA) are



among the top five causes of illness and mortality in South East Asian nations.<sup>[5]</sup> The majority of emerging nations, including Bangladesh, are rapidly industrializing and modernizing, which has resulted in a considerable rise in the number of cars on the road. This has caused an increase in the number of trauma cases brought on by road traffic accidents (RTAs), making it a significant health risk.<sup>[6]</sup> For instance, pedestrians are thought to be involved in 45% of traffic-related deaths in low-income countries, 29% in middle-income countries, and 18% in high-income nations.<sup>[7]</sup> In the world, trauma is the fifth most common cause of morbidity and the sixth most common cause of fatality.<sup>[8]</sup> RTA is thought to be the only cause of 1.2 million deaths and 50 million injuries annually.<sup>[9]</sup> Trauma caused by other factors, such as accidents at work or home, falls, and assaults, greatly contribute to overall mortality and morbidity. Studies have revealed that falls are the second most prevalent cause of severe orthopedic injuries, with prevalence rates of 21.8% and 35.1%.<sup>[9,10]</sup> Studies have shown that Road Traffic Accidents (RTAs) are the most frequent cause of severe orthopaedic injuries, with prevalence rates of 63.6% and 39.1%.<sup>[9,10]</sup> According to certain study, RTAs account for the majority of fractures, with prevalence rates of 29.4%, 49.3%, and 68.4%.<sup>[11,12,13]</sup> Similar evidence indicates that falls are a significant public health issue all around the world.<sup>[14,15,16]</sup> Additionally, research consistently demonstrates that orthopedic injuries primarily affect younger male people.<sup>[17,18]</sup> Orthopedic injuries make up a significant portion of traumatic injuries. Orthopedic injuries are those that harm the musculoskeletal system, which consists of the bones, ligaments, joints, tendons, muscles and

nerves.<sup>[17]</sup> The goal of this study is to investigate the occurrence of traumatic injuries with associated factors and to find the major patterns of orthopaedic fractures.

## Objective

The aim of this study is to investigate the occurrence of traumatic injuries with associated factors and to find the major patterns of orthopedic fractures.

## MATERIAL AND METHODS

This study was a retrospective observational study that was conducted on all of the patients who were admitted to the department of orthopaedics at Dhaka Medical College and Hospital during the study period between April 2004 and June 2007 those who fulfilled the selection criteria were enrolled in this study. A total of 208 Patients of all age groups of either gender with one or more fractures were included. All data were processed and analyzed with the help of SPSS (Statistical Package for Social Sciences) version 25. The data were expressed as frequency and percentage in tables and graphs.

## RESULTS

[Table 1] shows the distribution of study patients according to gender and age. 131 (62.98%) patients were male, and 77(37.02%) were female. The majority, 53 (25.48%) of the patients, were aged between 31-40 years and the second majority (20.67%) were 21-30. In the entire study group, among males, the most commonly admitted age group was 21-40 years (32.70%), and among females, the most frequently affected age group was 31-50 years (17.31%). The proportion of admitted males was

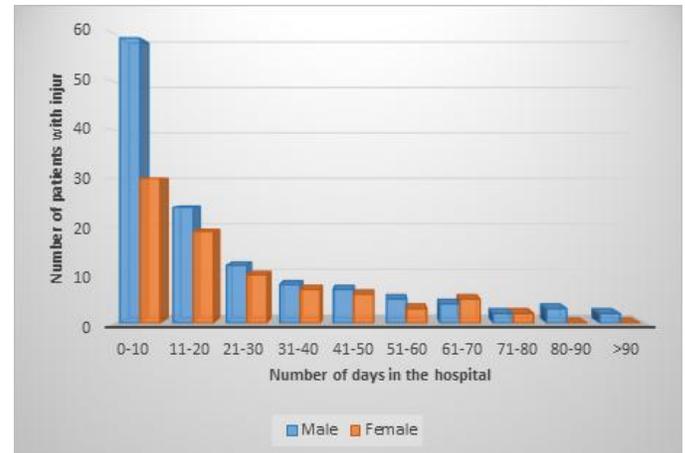
higher than that of females, with a sex ratio of 3:2. Younger males were more likely to be admitted than younger females, whereas from 60 years and older, females were more affected than males.

[Table 2] shows the distribution of different types of bones affected in the enrolled subjects. Majority 46(22.12%) of the patients had fractures in femur, second majority 38(18.27) patients had fracture in tibia/fibula and followed by 30(14.42%) in multiple bones, 20(9.62%) in humerus, 13(6.25%) in patella, 12(5.77%) in pelvic, 11(5.29%) in radius/ulna, 10(4.81%) in ankle, 9(4.33%) in clavicle/scapula, 8(3.85%) in spine.

[Table 3] revealed the types of traumatic orthopaedic injuries for admission. In total, there were 208 cases of injury, the most common fracture site being the lower limbs (59 cases, 28.37%), followed by the upper limbs (20 cases, 9.62%), head injury (21 cases, 10.10%), chest injury (11 cases, 5.29%), neck injury (5 cases, 2.40%), pelvic injury (7 cases, 3.37%), abdominal injury (6 cases, 2.88%) and spine injuries (10 cases, 4.81%). There were 20 cases (9.62%) of Cervical PIVD, 35 cases (16.83%) of Lumbar PIVD, and 12 cases (5.77%) of Cervical and lumbar PIVD.

RTAs were responsible for 92 cases (44.23%) of all traumatic orthopaedic injuries and followed by falls accounting for 42 patients (20.19%) of injuries. Additional factors included: assault in

16 cases (7.69%), sports-related injuries in 18 cases (7.5%), machine-related injuries in 12 cases (6.5%), self-skid injuries in 17 cases (8.17%), building collapsed injuries in 3 cases (1.44%), and others in 19 cases (5.1%). [Table 4]



**Figure 1:** Duration of hospital stay of the patients with traumatic orthopaedic injuries by sex

This figure shows the duration of hospital stay of the patients with traumatic orthopaedic injuries by sex. 154 (74.03%) Patients stayed in the hospital for less than a month, whereas 89 (42.79%) stayed less than ten days. 18 (8.65%) patients survived more than two months whereas only 2(0.96%) patients survived more than 90 days. Male patients stayed more days than females.

**Table 1:** Distribution study patients according to gender and age-group.

Age in years	Male		Female		Total Number of Patient	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
<10	4	1.92	2	0.96	6	2.88
11-20	12	5.77	3	1.44	15	7.21
21-30	35	16.83	8	3.85	43	20.67
31-40	33	15.87	20	9.62	53	25.48



41-50	21	10.10	16	7.69	37	17.79
51-60	14	6.73	13	6.25	27	12.98
61-70	7	3.37	8	3.85	15	7.21
71-80	3	1.44	4	1.92	7	3.37
>80	2	0.96	3	1.44	5	2.40
Total	131	62.98	77	37.02	208	100.00
Mean	36.60		45.00		39.71	

**Table 2:** Distribution of different types of bones affected in the enrolled subjects.

Types of Fracture	Frequency	Percentage
Femur	46	22.12
Tibia/Fibula	38	18.27
Multiple bones	30	14.42
Humerus	20	9.62
Patella	13	6.25
Pelvic	12	5.77
Radius/Ulna	11	5.29
Ankle	10	4.81
Clavicle/Scapula	9	4.33
Spine	8	3.85
Carpals/Meta-carpals	7	3.37
Tarsals/Meta-tarsals	3	1.44
Ribs	1	0.48
Total	208	100.00

**Table 3:** Types of traumatic orthopaedic injuries for admission

Types of Injuries	Frequency	Percentage
Lower limbs injuries	59	28.37
Upper limbs injuries	20	9.62
Head injury	21	10.10
Chest injury	11	5.29
Neck injury	5	2.40
Pelvic injury	7	3.37
Abdominal injury	6	2.88
Spine injury	10	4.81
Cervical PIVD	20	9.62
Lumbar PIVD	35	16.83
Cervical and lumbar PIVD	12	5.77
Not specified	2	0.96
Total	208	100

**Table 4:** Determinants of traumatic orthopaedic injuries

Types of Trauma	Frequency	Percentage
RTA	92	44.23
Fall	42	20.19
Assault	16	7.69
Sports-related	18	8.65
Machine	12	5.77
Building collapsed	3	1.44
Self-Skid	17	8.17
Others	8	3.85
Total	208	100.00

**Table 5:** Radiological investigation used for traumatic orthopaedic injuries

Radiological investigation	Number	Percentage
X-ray	190	91.35
X-ray and others	10	4.81
CT scan	4	1.92
MRI	2	0.96
CT scan and MRI	2	0.96
Total	208	100.00

[Table 5] explains the radiological investigation used for traumatic orthopaedic injuries. The most frequently used radiological test was an X-ray, which was performed on 190 patients (91.35%), followed by a combination of X-ray and other tests on ten patients (4.81%) and a computed tomography (CT) scan on four patients (1.92%), while magnetic resonance imaging (MRI) and a CT-scan and MRI combination were the least frequently performed tests two patients (0.96%).

## DISCUSSION

The study's objective was to assess the epidemiology of traumatic injuries and orthopaedic fractures among inpatients at the Dhaka Medical College and Hospital, Dhaka. The results of our study revealed that 62.98% of patients were male, and 37.02% were female.

The majority (46.15%) of the patients were aged between 21-40 years, where the most commonly admitted male age group was 21-40 years (32.70%), and the most frequently affected female age group was 31-50 years (17.31%). The proportion of admitted males was higher than that of females, with a sex ratio of 63:37. Younger males were more likely to be admitted than younger females, but from 60 years older females were more affected than males. The average age of patients with traumatic orthopaedic injuries who took part in our investigation was 39.71 years, according to Manwana ME et al,<sup>[19]</sup> Soleymanha et al,<sup>[20]</sup> and Saikiran Velpula et al,<sup>[21]</sup> which is comparable to the reported ages of 33.5, 34.5, and 41.14 years in their respective studies. Our investigation revealed that, with a male-to-female ratio of 63:37, the majority of patients admitted were



men, which is consistent with findings from Kual et al,<sup>[22]</sup> Manwana ME et al,<sup>[19]</sup> and Saikiran Velpula et al.<sup>21</sup>, Rohilla RK et al,<sup>[23]</sup> the male-to-female ratio was 3:1, 61:39, 7:3 and 5:1 respectively. The gender gap may be caused by the fact that men are more likely than women to engage in risky behaviour<sup>(13, 14)</sup> and outdoor activities. According to the results of the current study, young male adults between the ages of 21-40 years made up the most significant percentage of patients admitted with traumatic orthopaedic injuries (46.15%); This result is consistent with other research by Verma V et al,<sup>[9]</sup> and Thomas V et al,<sup>[12]</sup> Huda N et al,<sup>[18]</sup> which revealed that the majority of RTA casualties were in the younger age categories. Labinjo et al.<sup>[24]</sup> also found that the young are most frequently affected by trauma. The average age and the disproportionately higher admission rates for younger persons could cause productivity losses and negatively affect the economy. The current study also revealed that women over 60 were more susceptible to traumatic orthopaedic injuries than men. According to Taylor and Young,<sup>[25]</sup> and Collinge et al,<sup>[26]</sup> who observed an increased incidence or prevalence of osteoporotic fractures in older females, this finding may result from a higher rate of osteoporosis in older females compared to men. Road traffic accidents accounted for 43.19% of the significant fractures in this analysis, making them the most frequent cause of these injuries. This may be due to an increase in transportation options, poor roads, and ignoring or disobeying traffic signals. There is a need for trauma prevention through the implementation of stringent traffic laws and the provision of better roads. This result is almost identical to that which Rohilla RK et al.<sup>[23]</sup> Solaberu et al,<sup>[27]</sup> and Boina Supraja et al.<sup>[28]</sup>

described. Our study also demonstrated that falls were the second most frequent determinant of traumatic orthopaedic injuries, with a prevalence of 20.19%, after RTAs. Similarly, Fasih T et al,<sup>[29]</sup> observed that falls were the second most prevalent determinant of traumatic injuries after RTAs. However, Soleymanha et al,<sup>[20]</sup> found that falls were the most common cause of traumatic orthopaedic injuries (prevalence: 38.3%). Falling from a height at work, sleeping on a roof in a remote region, falling from stairs or a bed, and falling to the ground were among the accidents. This highlights the requirement for safe working environments for manual and industrial laborers as well as the necessity of designing safer homes with appropriate boundary walls and roofs. We revealed that assault (7.69%) was the third factor determining traumatic orthopaedic injuries. In 5.4% of the cases, violence was reported by Huda N et al.<sup>[18]</sup> In a different study, Ghani et al,<sup>[30]</sup> found that 3% of instances involved assault. There may be a behavioral difference in this area compared to other regions that accounts for the increased prevalence of assault. In this study, fractures of long bones of lower-limbs accounted for 27.88% of all fractures. Similar findings were reported by Boina Supraja et al,<sup>[28]</sup> where the lower limb fractures were 33.72%. These findings are not similar to those reported by Ebong in ibadan where upper-limb fractures were more common than the lower limb fractures.<sup>[31]</sup> Rastogi et al,<sup>[32]</sup> in their study reported upper limb injuries in 29.7% cases and lower limb injuries in 28.2% cases. Shiva Prakash et al.<sup>33</sup> reported lower limb injuries in 56.51% of cases and upper limb injuries in 29.87% of cases. Lower limbs injuries (28.37%), head injury (10.10%), chest injury (5.29%), pelvic injury

(3.37%), abdominal injury (2.88%), pelvic injury (3.37%), cervical PIVD (9.62%) and lumbar PIVD (16.83%) were the common associated injuries in our study. Rastogi et al,<sup>[32]</sup> reported head injury (57.2%), abdominal injury (31%), chest injury (24.2%), and pelvic injury (7%).<sup>17</sup> Shiva Prakash et al,<sup>[33]</sup> reported head injury (18.31%), abdominal injury (3.02%), chest injury (1.99%), and pelvic injury (0.96%). In our study, the majority, 22.12%, of the patients had fractures in the femur. The second majority, 18.27%, patients had a fracture in the tibia/fibula and followed by 14.42% in multiple bones, 9.62% in the humerus, 13(6.25%) in the patella, 12(5.77%) in the pelvic, 5.29% in radius/ulna. Boina Supraja et al,<sup>[28]</sup> similarly reported in their study that the majority, 22.48% of the patients had fractures in the femur, 11.24% of patients in the tibia/fibula, 18.61% in the multiple bones, 10.06% in the humerus, and 6.59% in pelvic and 5.43% in radius/ulna. Our study showed that the vast majority of patients

stayed in hospital for less than a month, with 42.79% staying for up to ten days. Similar to our findings, Taylor and Young showed that the average length of stay for patients was primarily related to the type of injury sustained, and that the majority of patients stayed in the hospital for a relatively short period of time.<sup>[25]</sup>

## CONCLUSIONS

The study concluded that the incidence of traumatic orthopaedic injuries was higher in young male adults compared to all other study groups. Younger males were more likely to be injured than younger females; nevertheless, from the age of 60 and older, females were more affected than males. The three most frequent causes of injuries were falls, RTAs, and assaults were the most prevalent form of injury. The most frequently damaged bones are the femur (22.1%), tibia/fibula (18.27%).

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