

ORIGINAL ARTICLE

INCIDENCE OF TIBIAL DIAPHYSEAL FRACTURES AMONG PATIENTS PRESENTING WITH MOTORCYCLE ACCIDENTS

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Background: To determine the frequency of tibial diaphyseal fractures among patients presenting with motorcycle accidents. It was a cross-Sectional Study, conducted at Department of Orthopaedic Surgery, Jinnah Postgraduate Medical Centre (JPMC), Karachi between May to December, 2020. **Methods:** All patients irrespective of gender, between ages 18–60 years who suffered from a motorcycle injury with a single bone involvement were eligible for the study. All patients who refused to take part in the study, had head injury, or had multiple fractures were excluded from the study. The data included patient's age, sex, associated bones involved and types of injury. The fractures were classified according to whether it was open or closed. **Results:** A total of 174 patients were included in the study with a mean±SD age of 43.7±12.4. Tibial diaphyseal fracture was found to be in 111 (63.8%) patients as shown. Duration of fracture, gender, side of fracture, type of fracture was done with respect to Tibial diaphyseal fracture among patients. Insignificant difference was noted in age group ($p=0.346$), duration of fracture ($p=0.087$), gender ($p=0.672$), and type of fracture ($p=0.063$) whereas significant difference was found in side of fracture ($p=0.0001$). **Conclusion:** We highlighted the importance of tibial diaphyseal fractures in middle aged men who use motorcycles as a means of transport in Karachi, Sindh which is a frequent finding among these patients. Efforts should be made at both the community and government levels to increase awareness regarding traffic rules and consequences of reckless driving.

Keywords: Tibial diaphyseal; Fracture; Motorcycle accident; Road traffic accident

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INTRODUCTION

Road traffic accidents (RTC) are known to be one of the main health challenges, substantially placing a huge burden on the health sector, globally. Approximately, more than 1.7 million people die each year as a result of road traffic accidents.¹ More than 50 million people are disabled due to complications from RTCs.² The World Bank and the World health organisation (WHO) has indicated that the disability and death caused by road traffic injuries have increased to several times as compared to past few years.^{3,4} The leading cause of injuries and death on the road globally are Motorcycle accidents in young individuals from the age of 15–44.⁵ The majority of these motorcycle accidents happen in developing countries like Pakistan. Vehicles such as motorcycles are commonly used for easy transportation to work in populated areas. The rise in the use of motorcycles in urban cities are due to heavy traffic, rising fuel costs and low cost of motorcycles due to increasing inflation.⁶ Even though the incidence of having a motorcycle accident is high, it is still preferred as a cheaper and quick transport option for work and leisure. Individuals driving their motorcycles are at a high

risk for fatal or severe injuries on the road.⁷ Motorcycle injuries in Pakistan for instance are ranked as the 5th cause of death and disability due to the injuries are ranked as the 2nd most common cause.⁸

In adults, tibial shaft fractures are seen as the most common diaphyseal fractures and are associated with road traffic accidents.⁹ Around 50% of these fractures happen with motor vehicle accidents and 24% of these fractures are usually present as open injuries.¹⁰ More research is required on individuals with motorcycle accidents presenting to the ER with tibial shaft fractures. The main aim of our study was to find local statistics of tibial diaphyseal among patients presenting with motorcycle accidents.

MATERIAL AND METHODS

A cross-sectional study was conducted at the Department of Orthopaedic Surgery, Jinnah Postgraduate Medical Centre (JPMC), Karachi between May to December 2020. Prior to the study, ethical approval was obtained from the Institutional Review Board (IRB) of JPMC. A non-probability convenience sampling technique was employed to recruit participants in the study. Sample size was calculated using select statistics

software which is an online sample size calculator. Based on the prevalence of tibial diaphyseal fracture of 67.15%, the confidence level of 95%, and the margin of error of 7%, the calculated sample size was 174.¹¹ All patients irrespective of gender, between ages 18–60 years who suffered from a motorcycle injury with a single bone involvement were eligible for the study. All patients who refused to take part in the study, had head injury, or had multiple fractures were excluded from the study. Informed verbal and written consent was obtained from all the patients for their participation in the study. Clinical history of patients was obtained along with physical examination. The data included patient's age, sex, associated bones involved and types of injury. The fractures were classified according to whether it was open or closed. For open fractures, further categorization into Type I, II, 3A, 3B and 3C was done as per Gustillo and Anderson classification. Closed fractures were classified according to AD classification. The findings of variables as mentioned above were entered in predesigned *pro forma*. Confounding variables and biases were controlled by strictly following inclusion criteria. Data was compiled and analyzed using a statistical package for social sciences (SPSS) version 26. Mean and standard deviations were calculated for the quantitative variables like age and duration of

injury. Frequencies and percentages were calculated for the qualitative variables like gender, side of fracture, tibial diaphyseal fracture, site of diaphysis, type of fracture and classification of closed and open fracture. Chi square test was applied taking *p* value <0.05 as statistically significant.

RESULTS

A total of 174 patients were included in the study with a mean±SD age of 43.7±12.4. There were 141 (81%) male patients. Over a hundred patients (60.9%) had fractures on the right side while about 68 (39.1%) had left sided fractures. Seventy-five (43.1%) patients had open fractures while 99 (56.9%) had closed fractures. For further classification of closed and open fracture see table-1. As shown in figure 1, tibial diaphyseal fracture was found to be in 111 (63.8%) patients as shown. Stratification of age group, duration of fracture, gender, side of fracture, type of fracture was done with respect to Tibial diaphyseal fracture among patients as shown in table 2. Insignificant difference was noted in age group (*p*=0.346), duration of fracture (*p*=0.087), gender (*p*=0.672), and type of fracture (*p*=0.063) whereas significant difference was found in side of fracture (*p*=0.0001).

Table-1: Sociodemographic and clinical characteristics of fractures of participants

Variable	n (%)	Mean	SD
Age		43.7	12.4
Duration of Fracture (in days)		21.3	7.9
Gender			
Male	141 (81%)		
Female	33 (19%)		
Location of Fracture			
Right	106 (60.9%)		
Left	68 (39.1%)		
Site of Diaphysis			
Upper	73 (42%)		
Middle	56 (32.2%)		
Lower	45 (25.9%)		
Type of Fracture			
Open	75 (43.1%)		
Closed	99 (56.9%)		
Classification of Open Fracture			
Type I	24 (32%)		
Type II	15 (20%)		
Type III A	19 (25.4%)		
Type III B	11 (14.6%)		
Type III C	6 (8%)		
Classification of Closed Fracture			
Type A1	7 (7.10%)		
Type A2	16 (16.2%)		
Type A3	5 (5%)		
Type B1	11 (11.10%)		
Type B2	13 (13.1%)		
Type B3	9 (9.1%)		
Type C1	16 (16.2%)		
Type C2	12 (12.1%)		
Type C3	10 (10.1%)		

Table-2: Association of clinical parameters and occurrence of tibial diaphyseal fractures

Variable	Tibial Diaphyseal Fracture		p-value
	Yes	No	
Age Group [In Years]			
18 – 40	45 (25.9%)	21 (12.1%)	0.346
>40	66 (37.9%)	42 (24.1%)	
Duration [In Days]			
3 – 18	59 (33.9%)	25 (14.4%)	0.087
>18	52 (29.9%)	38 (21.8%)	
Gender			
Male	91 (52.3%)	50 (28.7%)	0.672
Female	20 (11.5%)	13 (7.5%)	
Side Of Injury			
Right	51 (29.3%)	55 (31.6%)	0.0001
Left	60 (34.5%)	8 (4.6%)	
Type Of Fracture			
Open	42 (24.1%)	33 (19.0%)	0.063
Closed	69 (39.7%)	30 (17.2%)	

DISCUSSION

Road traffic accidents are prevalent in the metropolitan city of Sindh - Karachi. The majority of the road traffic accidents occur in individuals using a motorbike as a means of transport. With the introduction of bykea, Uber, and Food Panda delivery services, in addition to the surge in petroleum prices, the trend of motor vehicle accidents is on the rise. Therefore, it is very crucial to learn and understand the epidemiology of the injuries caused as a result of these accidents. In this study we assessed the incidence of tibial diaphyseal fractures and the clinical characteristics of patients who have suffered an accident in a motorcycle. The majority of the patients were young men therefore, it was extremely important for them to recover without any functional deficits. The current study findings were similar to a study published by Amin MQ, *et al*¹² who also reported a mean age of 33.28±21.02 years, indicating that the younger population is at high risk of such accidents.

As in our society, mostly men ride the motorcycles and females only travel in the back seat of the motorcycle therefore, the majority of the patients were male. Joshi D *et al* studied 56 cases of tibial fractures in India in which 52 were male and only four were female.¹³ Another study by Ali A *et al* conducted in Karachi, Pakistan, also noted 88.39% male patients and 14.6% female patients with tibial fractures.¹³ Right sided fractures were more common in our study as compared to left sided fractures. This was in accordance with previous literature.¹⁴ Ali Djahangiri *et al* operated 96 tibial fractures in which 72.91% fractures were closed and 27.09% fractures were open type.¹⁵ In present study, tibial diaphyseal fracture was highly prevalent among the participants which was in accordance with published literature.

In our set up, a range of motion exercises at the knee and ankle were started as soon as pain allowed while weight bearing was allowed according

to fracture configuration. Early weight bearing was allowed in case of transverse and short oblique fractures while for oblique and comminuted fractures weight bearing was delayed until bridging callus was seen on radiograph.

Pain and mobility of patients was assessed according to the Sikorski and Barrington pain and mobility scale and were graded on each follow up visit.^{16,17} It showed early and considerable relief in pain and early mobilization. Most patients required occasional or no analgesia and were able to walk both indoor and outdoor with walking aid and later on without it.

Like any other study, our study also had limitations. The sample population represented only a single institutional experience; however, despite being a single centered study we ensured that the sample was diversified so the findings can be generalized. Further large scale and multi centre studies are recommended.

CONCLUSION

We highlighted the importance of tibial diaphyseal fractures in middle aged men who use motorcycles as a means of transport in Karachi, Sindh which is a frequent finding among these patients. Efforts should be made at both the community and government levels to increase awareness regarding traffic rules and consequences of reckless driving.

AUTHORS' CONTRIBUTION

PA: Principal investigator, manuscript writing, study proposal, data analysis, proof reading. MS: Data analysis, manuscript writings. KM: Literature review, proof reading. RK, EM, KM, DM, AR, ZZ, NS: Data collection and literature search

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