



Descriptive Pattern of Fractures among Motor Bike Riders Presenting in Jinnah Postgraduate Medical Centre, Karachi

Uzair Yaqoob^{1*}, Zara Nadeem¹, Muniba Mehmood¹, Daniya Batool¹,
Tooba Irshad¹, Sara Shaukat Ali¹, Hina Irshad¹, Manisha Aijaz¹,
Syed Zohaib Maroof¹, Ramsha Jafri¹, Samrah Ibrahim¹, Ramsha Mehmood¹
and Shaheryar Hasan¹

¹Sindh Medical College, Dow University of Health Sciences, Pakistan.

Authors' contributions

This article was prepared in collaboration between all authors. Authors UY and ZN did conception and design, acquisition of data, analysis and interpretation of data. Authors MM, DB, TI, SSA, HI and MA drafted the article and did critical revision of the article. Authors SZM, RJ, SI, RM and SH gave final approval of the version to be published. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2016/28748

Editor(s):

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Complete Peer review History: <http://www.sciencedomain.org/review-history/16360>

Original Research Article

Received 2nd August 2016
Accepted 7th September 2016
Published 27th September 2016

ABSTRACT

Objective: To determine the frequency of fractures among motor bike accidents presented in emergency department of Jinnah Postgraduate Medical Centre, Karachi.

Methodology: A Cross-sectional study was conducted in Emergency department (ER) of Jinnah Postgraduate Medical Centre (JPMC) of Karachi. A validated questionnaire was used and study was carried out from February 2015 to October 2015. The interviews were carried out by trained data collectors. All motorcycle riders of any age presented in ER are included in this study. The study did not include those patients who had injuries other than fractures. Frequency and percentages were reported for categorical variables while mean and standard deviation for

*Corresponding author: E-mail: ozair_91393@hotmail.com;

continuous variables. Data was analyzed using SPSS version 20 with 95% confidence interval, margin of error was taken as 5% and P-value 0.05 was considered significant.

Results: Among the study sample of 366 patients, mean age was 29.86 ± 11.41 . Most of those (61.2%) were in the age group of ≤ 30 years and single (53.8%). The greatest number of motor bike accidents (66.4%) were seen on working days. Distal portion of the lower limb (Tibia/Fibula) was most frequently involved in these accidents (40.43%). Among all fractures, 83.1% fractures were at single sites and 86.9% had close fractures. Maximum accidents occurred (48.4%) were in the areas with poor light and 74.6% of these incidents were on the main roads. During riding, 9% were smoking and 18.6% using their mobile phone. Positive association was found between occurrence of multiple fractures and speed, mirror status and inspection interval of motor bikes ($p < 0.05$).

Conclusion: Motor bike riders are very prone to road traffic accidents (RTA) leading to fractures and soft tissue injuries. Distal portion of the limb is the most common site involved. Preventive measures are important in avoiding these accidents.

Keywords: Road traffic accidents; fractures; motorbike rider; emergency department.

1. INTRODUCTION

RTA are estimated to cause death of about 1.25 million each year [1]. They are the leading cause of death among young people, aged 15-29 years. [1] Most vulnerable road users are pedestrians, cyclists and motorcyclists [1].

In Alberta motorcyclists are more than 3.5 times more likely to get injured or die than any other motor vehicle [2]. In Srilanka 16.7% of all RTA are motorbike accidents [3]. In Karachi RTA is the 3rd most common cause of death among males [4]. In 2010 number of motorbikes in Karachi was 1 million. By 2030 "The Karachi transportation and improvement project" by City District Government of Karachi estimated that the number of bike riders will increase by 3.6 million, so will the burden of injuries faced by motorbike accidents [5]. This great number of casualties from motorbike accidents results due to non-maintenance of old bikes, poor check and balance in the system for driving license issue, improper conditions of the roads and many other environmental factors. In Zagreb, Croatia from 1999 to 2000 more fatal urban road traffic accidents occurred during night hours and at exceeding speed limit and during bad visibility [6]. Factors such as categories of road users, pavement conditions, place of accident, age and time of day have a statistically significant effect on two-wheeler injuries, whereas other factors (gender, road type; that is, straight or curvy) do not [7]. In Northern Lao majority of the RTA patients were young males 68%, motorcyclists 76% and without license 85% and without insurance 95% [8]. In Norway riders younger than 19 years, including especially youths (16-17 years) are subgroups of motorcyclists with particularly high accident risks [9].

Studies from tertiary health care setups in Karachi has pointed out that fracture is the one prevailing and debilitating type of injury faced by motorbike riders [10]. In Makurdi, Nigeria, during the period of 1st October 2006 to 30th September 2007 a total of 429 motorbike accidents occur out of which 55.5% were lower limb injuries including fracture as the commonest of all 73.4% and closed fractures were commoner than open fractures [11]. In Karbala, Iraq, during 7th November 2010 to 17th November 2011 following motorbike accidents a total of 63.8% soft tissue injuries around foot and ankle were found [12]. The total number of fractures was 190 out of which 39.5% were of shaft of tibia and fibula, followed by ankle and foot fractures 34.7%, 59.5% were closed fracture and 40.5% were open fractures [12]. In Karachi Civil hospital during period of 1st January 2011 to 31st December 2011 1280 patients of RTA were admitted out of which 43.42% were tibial shaft fractures and 63.69% have open tibia fractures [13].

This study will demonstrate the frequency of fractures among the motorbike accidents presented in the Emergency department of JPMC, Karachi, Pakistan. This study consist of risk factors responsible for motorbike accidents e.g. Road condition, street lights, weather conditions, victim engaged in activity other than riding, overall motorbike condition that will help in evaluation of factors responsible for such injuries and might help in taking safety steps to prevent these injuries.

2. MATERIALS AND METHODS

2.1 Study Design

Cross-sectional study.

2.2 Setting

Jinnah Post Graduate Medical Centre.

2.3 Duration

Eight months from February 2015 to October 2015.

2.4 Sample Size

Sample size was calculated using WHO software for sample size determination in health studies. For the above mentioned objective i.e. to demonstrate the frequency of fractures among the motor bike accidents presented in the emergency department of JPMC, the sample size came out to be 366 at confidence interval of 95% having bound of error of 5% [10].

2.5 Sample Selection

2.5.1 Inclusion criteria

All motorcycle riders of any age presented in ER and outpatient department of Jinnah Postgraduate Medical College after taking informed consent from the patient himself or attendant are included in this study.

2.5.2 Exclusion criteria

The study only included subjects who suffered a fracture and not those with soft tissue injuries and skin lacerations. Fatal accidents were also excluded.

2.5.3 Study variables

Dependent variables: Common type of fractures.

Independent variables: Age, gender, occupation, patient's education, occupation, Day, time and area of accident, site and pattern of fracture, Road lights, condition of roads, weather condition, traffic intensity, Driving license, was smoking, using cell phone, performing stunts, talking to passengers and number of passengers carrying, Condition of vehicle, maintenance of vehicle, state of vehicle, speed of vehicle.

2.5.4 Data collection procedure

A validated questionnaire was used. The information collected consisted of Socio-demographics (such as Age, gender, ethnicity,

education status of parents/guardian and family income), Accident related factors (such as day, time and area of accident, duration of riding, site and pattern of fracture involved), Environmental Factors (such as type, condition and illumination of roads, weather and traffic intensity), personal factors (license, was smoking, using cell phone and/or performing stunts at the time of accident) and vehicular factors (such as state, inspection and speed of vehicle, has rear view mirrors, working headlights/indicators. The Performa was filled by principal investigator. The interviews were carried out in ER of JPMC during the OPD hours. Privacy was maintained and interviews were conducted in a separate room. Participant was assured of confidentiality. He/She was assured that no information regarding the interviews and tests' results will be shared to any one and that this information will be used only for research purpose only and his identity will not be disclosed at any point in time. Questionnaires were given an identification number. Data was entered twice and then cleaned for any missing variables. Data collection process was supervised by principal investigator.

2.6 Structured Questionnaire

Structured questionnaire including all relevant questions of the objectives of the study has been developed and adapted from previous studies.

2.7 Data Analysis Plan

Data entered in Excel 2010 software then imputed in software of SPSS version 20 for analysis. Frequency and percentages were reported for categorical variables (Age, marital status, education and family income, Day, time and area of accident, duration of riding, site and pattern of fracture involved, Type, condition, illumination of roads, weather and traffic intensity, driving license, smoking, using cell phone and/or performing stunts at the time of accident, state, inspection and speed of vehicle, has rear view mirrors, working headlights/indicators while mean and standard deviation for continuous variables (age and income).

3. RESULTS

Table 1 shows that among the study sample of 366 patients, mean age was 29.86 ± 11.41 most of the victims (61.2%) were in the age group of <30 years (Mean age is $29.86 \pm SD 11.416$) and 46.2% were married. Majority (79.7%) had

studied up till intermediate education level while 8.5% of them were illiterate. Overall 64.2% of these victims had their family income less than Rs 20,000 per month.

Table 2 shows the greatest numbers of motor bike accidents (66.4%) were seen on working days, but considering there are 2 weekend days and 5 working days, chance of these accidents are more on weekend days. Distal portion of the lower limb (Tibia/Fibula/ Tibia+fibula) was most frequently involved in these accidents. 62 patients (16.9%) presented with fractures at multiple sites, 48 patients (13.1%) had open fractures.

Table 3 shows that among the accidents that occurred 48.4% were in the areas with poor light. 74.6% of these incidents were on the main roads or highways. In 34.7% of the total cases the road conditions were unsatisfactory and 44% of those roads had heavy traffic. 62.7% of the times the weather was sunny.

Table 1. Socio-demographic factors

Socio-demographic factors		
	Frequency	Percentage
Age (29.86±11.41)		
≤30	224	61.2
>30	142	38.8
Marital status		
Single	197	53.8
Married	169	46.2
Education		
Illiterate	31	8.5
Upto intermediate	255	79.7
Graduate/masters/ post graduate	80	21.9
Family income (23490.44±21295.971)		
<Rs 20,000	235	64.2
>Rs 20,000	131	35.8

Table 4 shows that 219 patients (59.8%) had their driving license, 33 patients (9%) were smoking during the ride and 68 patients (18.6%) were using their mobile phones. 52.2% of the patients had no passengers sitting with them on the bike. The ones who had, (18.9 % of the riders) were talking to them. 5.7% of the victims were trying to perform a stunt before the accident took place.

Table 5 shows that 73.5% of the victims had no side mirrors attached to their bikes, 56% of those had working indicators and 89.1% had working

headlights. Most of the time (88.5%) vehicle was in a moving state before the accident. It was estimated that almost half of the victims involved in motor bike injuries used to go for inspection of their vehicles monthly.

Table 2. Accident-related factors

Accident-related factors		
	Frequency	Percentage
Day of accident		
Working days	243	66.4
Weekend	123	33.6
Fracture site		
Femur	47	12.8
Tibia/Fibula/ Tibia+Fibula	148	40.43
Other Parts of Lower Limb	75	20.5
Humerus	24	6.6
Radius/Ulna/ Radius+ulna	29	7.9
Other parts of upper limb	30	8.2
Others	13	3.6
Fracture involvement		
Single site	304	83.1
Multiple site	62	16.9
Fracture pattern		
Open	48	13.1
Close	318	86.9

Table 3. Environmental factors

Environmental factors		
	Frequency	Percentage
Road lights		
Yes	189	51.6
No	177	48.4
Type of road		
Street	55	15
Service road	38	10.4
Main road/highway	273	74.6
Weather		
Drizzly/rainy/cloudy	66	18.0
Foggy	71	19.4
Sunny	229	62.6
Condition of road		
Satisfactory	239	65.3
Unsatisfactory	127	34.7
Traffic		
Heavy	161	44
Light	205	56

Fig. 1 shows that 219 patients (59.8%) had their driving license, 33 patients (9%) were smoking during the ride and 68 patients (18.6%) were using their mobile phones. 52.2 % of the patients had no passengers sitting with them on the bike.

The ones who had, (18.9% of the riders) were talking to them. 5.7% of the victims were trying to perform a stunt before the accident took place.

Table 4. Personal factors

Personal factors		
	Frequency	Percentage
Driving license		
Yes	219	59.8
No	147	40.2
Smoking during accident		
Yes	33	9
No	333	91
Mobile use during accident		
Yes	68	18.6
No	298	81.4
Talking to passenger during accident		
Yes	69	18.9
No	297	81.1
Performing stunt during accident		
Yes	21	5.7
No	345	94.3
Passengers		
0	191	52.2
1	115	31.4
>1	60	16.4

Table 5. Vehicular factors

Vehicular factors		
	Frequency	Percentage
Mirror status		
Yes	97	26.5
No	269	73.5
Indicator status		
Yes	205	56
No	161	44
Headlight status		
Yes	326	89.1
No	40	10.9
State of vehicle		
Stationary	42	11.5
Moving	324	88.5
Inspection interval		
Weekly	30	8.2
Monthly	178	48.6
Half yearly	104	28.4
Yearly	54	14.8

Fig. 2 shows that 73.5% of the victims had no side mirrors attached to their bikes, 56% of those had working indicators and 89.1% had working headlights. Most of the time (88.5%) vehicle was in a moving state before the accident. It was estimated that almost half of the victims involved in motor bike injuries used to go for inspection of their vehicles monthly.

All variables were associated with high incidence of fractures among bike riders. But some strong variables were found to be speed, mirror status and inspection interval. Positive association was found between occurrence of multiple fractures and speed of bike riders ($p=0.033$). Out of total 366 fractures, 92 fractures occurred when speed was greater than 50 km/hour and of them 21 were multiple fractures. Also positive association was found between mirror status and occurrence of multiple fractures in patients ($p=0.003$). 77.41% of patients with multiple fractures were had poor mirror status. Only 8% of total patients had weekly assessment of their bikes. Majority had monthly assessment of their bikes ($n=178$), 104 had half-yearly assessment while 54 had yearly assessment. Of those who had multiple fractures, 85.4% denied weekly assessment of their bikes ($p=0.051$).

Table 6 Association of fractures with various variables.

Table 6. Association of fractures with various variables

Association of fractures with various variables	
Speed of bike riders	$p = 0.033$
Mirror status of bike riders	$p = 0.003$
Inspection interval of bikes	$p = 0.051$

4. DISCUSSION

In our study we found that in motorbike accidents close fracture of distal portion of lower limbs are among the most common type of fractures. Through our research we concluded that there are certain risk factors associated with motorbike accidents which if prevented can lead to a decrease in morbidity and mortality related to motorbike accidents.

According to research in Germany most of the motorbike accidents occurred in the 25 to 30 year old age group [14]. This finding is also present in our study as the most common age is 30 years or less. In a study in Mexico it was reported that most of the motorbike accidents occur during the daylight, on a week-day, under adverse weather conditions [15]. In our study we find out that most of the accidents occur on main roads and highways that have unsatisfactory condition, having poor lights. From our study we also concluded that adverse weather condition is also a contributory factor of motorbike accidents.

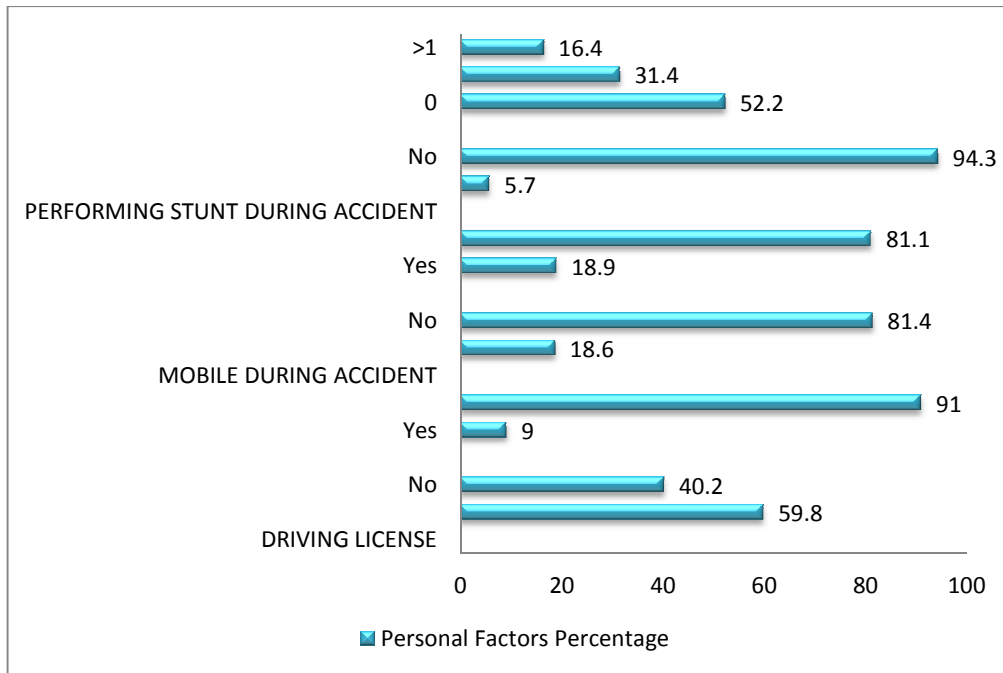


Fig. 1. Personal factors percentage

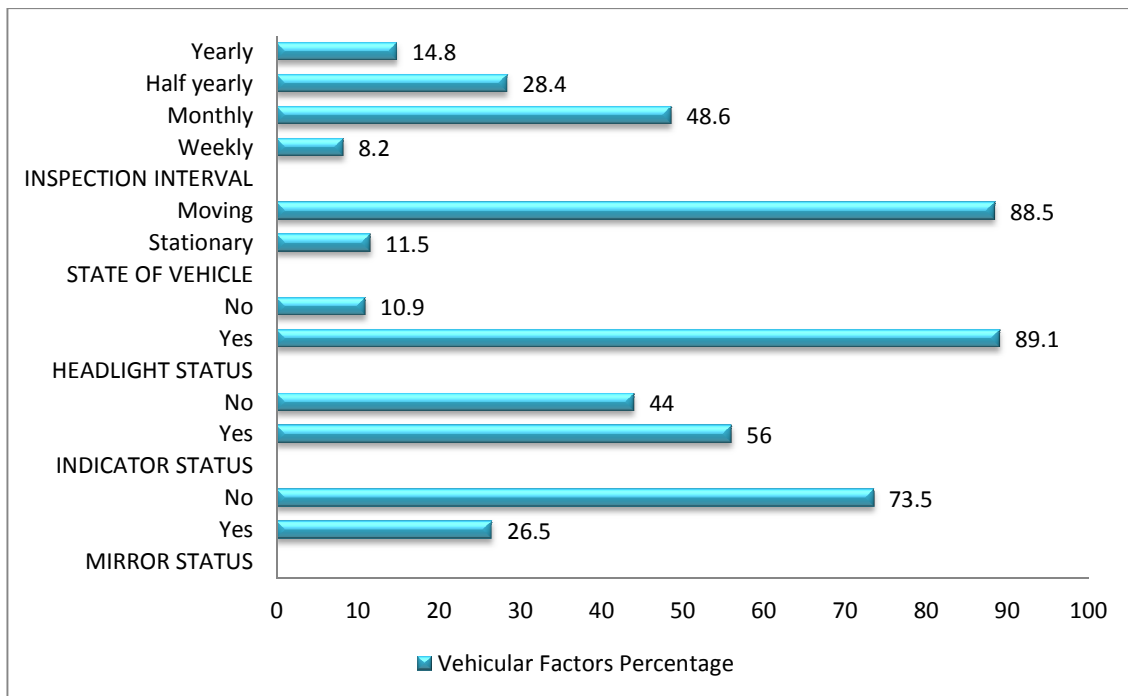


Fig. 2. Vehicular factors percentage

Through our study we found out that the chance of these accidents are more on the week days. A study in North Vietnam showed that about 17.2% of motorbike accident patients were using mobile

phones during riding [16]. Our study has generated similar result. In previous researches conducted in karachi it was stated that smoking increases the risk of accidents 3.8 times [17].

In our study we found out that smoking is an important risk factor of motorbike accidents as 33 % of the patients were smoking during the ride. Similarly usage of mobile phone was also found in 18.6% of victims. A study in Ethiopia demonstrated that principle body part affected in motorbike accidents is lower limb (47.4%) [18]. Through this research we concluded that distal portion of the lower limb is the most frequent part of the body involved in road traffic accidents. Our study shows that overall condition of the bike has a huge impact on the incidence of these accidents. Most of the riders did not have side mirrors on their bikes and some of those didn't even have working headlights.

The risk factors that are discussed in our study can be used to prevent motorbike accidents that can decrease the social and economic burden. The disabling injuries can be prevented by reconditioning the roads, improving the condition of road lights, educating the riders, compelling the riders to follow the rules and ask the riders to the safety measures like wearing helmet. Further studies can be done on follow-up patients to estimate the approximate rate of disabling injuries caused by motorbike accidents.

The exact number of motorbike accident victims could not be calculated as our study was limited to riders only. In addition, only ER of 1 tertiary care hospital was included due to which exact prevalence of motorbike accidents cannot be estimated. The fatal motorbike accidents are not included in the study which if studied can lead to an estimation of factors that are responsible for motorbike crashes and can be used to decrease mortality.

5. CONCLUSION

Motor bike riders are very commonly involved in road traffic accidents leading to severe bony and soft tissue injuries. Lower limb especially tibia bone is the most frequently involved region which might be due to its increased exposure during riding. There are many modifiable factors, some are bad light, improperly built roads, heavy traffic and unacceptable vehicle conditions that might be a great contributor to these unfortunate events in Karachi.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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DOI: 10.1186/s13104-015-1094-z

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Peer-review history:
The peer review history for this paper can be accessed here:
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