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Original Research Article

Study of Motorcycle Fatalities In Mumbai: A Two Year Retrospective Analysis

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Article Info

Key words

Fatal,
Motorcycle,
Moped,
Road traffic accidents,
Helmet,
Pattern of injuries.

Abstract

Background- Motorcycle is a very common mode of transport in developing countries like India and it mainly caters to travel needs of working class. Though popular it comes with its own risks owing to lack of protection as compared to other road users. The risk is so high that motorcycle related fatalities account for about 33% of deaths among all road users.

Material & method- The study was conducted retrospectively between January 2015 to December 2016 at a tertiary health care centre in Mumbai and a total of 110 cases of fatal motorcycle crashes were studied which constituted 35.4% of the total 310 cases of all fatal road traffic accidents.

Observations- Fatalities were seen mostly in males (89.09%) with the majority (60%) falling in the working age group of 21-40 years. Geared vehicles were involved in 80.9% cases of fatal crashes. Helmets were worn by 72.6% victims among drivers and none by the pillions. Heavy motor vehicles were the offending agents in 39.09% followed by light motor vehicles in 18.18% cases. 32.7% of deaths occurred before arrival in hospital and further 37% deaths occurred within first 24 hours of admission. Head on collision accounted for 41.81% fatalities. Head injury was the cause of death in majority of cases 49(44.54%), followed by 21(19.09%) fatalities due to Hemorrhage and Shock.

Conclusion- Educating & sensitizing motorcycle riders regarding the use of safety measures like helmet usage, avoiding alcohol consumption at the time of riding and driving at slow speeds along with strict enforcement of traffic laws with heavy fines will be of great help in preventing such fatalities.

1. Introduction

A road traffic accident is defined as any vehicle accident occurring on a public road or highway

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and includes vehicle accidents where the place of occurrence is unspecified.¹ Motorcycle is a very common mode of transport in developing countries like India and it mainly caters to travel needs of working class. It is also popular mode as it is available at cheap price and is cost efficient in terms of operation and maintenance. Though popular it comes with its own risks owing to lack of protection as compared to other road users.

The risk is so high that motorcycle related fatalities account for about 33% of deaths among all road users. In India total 52500 & 48746 no of persons died in the year 2016 & 2017 respectively riding on two wheelers, which constituted 33% of total deaths amongst all road users.² Compared with passengers on other types of vehicles, motorcyclists are 35 times more likely to die in a road traffic accident per distance travelled.³

The problem is more pronounced in developing countries owing to many factors such as rapid motorization, using motorcycles for commercial transport, and failure of motorcyclists to wear protective helmets; the burden of motorcycle accidents is aggravated by the habit of reckless driving with tendency to over speed by some motorcycle riders, as well as a significant number of drivers lacking proper certification and valid licensing. Poor traffic regulations and law enforcement and the abuse of recreational drugs and alcohol are also major contributing factors to motorcycle accidents.^{4,5}

This study was carried out retrospectively to analyze the epidemiology and injury patterns in cases of fatal motorcycle crashes in the city of Mumbai.

2. Materials and methods

Sample:

This is a retrospective study with a study sample consisting of 110 cases of fatal motorcycle accidents brought for medicolegal autopsy at Lokmanya Tilak Municipal Medical College & General Hospital, Mumbai over a period of two years from January 2016 to December 2017. Cases satisfying the following definition of RTA and RTC were selected: RTA - A collision involving at least one vehicle in motion on a public road that results

in at least one person being injured or killed. RTC – A collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle.

3. Data Collection:

History as regards the circumstances of the accidents, demographic data, the site and cause of impact was obtained from police inquest papers. Injury pattern and cause of death and noted from the autopsy report. All cases were analysed with respect to age, time of accident, offending vehicles or objects, mechanism of accident, pattern and distribution of injuries, fatal injuries, and cause of death and history of alcohol consumption. The information gathered was entered in a standardized proforma and analysed further to obtain results.

4. Observations & Discussion

A total of 310 cases of fatal road traffic accidents were observed during the study period of which motorcycle fatalities were 110 (35.4%) as shown in [table no. 1](#).

Table 1: Age & Sex wise distribution of road traffic accident victims.

Age in years	Male	Female	Total (%)
0-10	1	0	1 (0.90%)
11-20	9	2	11(10%)
21-30	38	5	43(39.09%)
31-40	20	3	23(20.90%)
41-50	15	1	16(14.54%)
51-60	12	0	12(10.90%)
Above 60	3	1	4(3.63%)
Total	98(89.09%)	12(10.90%)	110 (100%)

A very high percentage of victims were males as motorcycles are often driven by them, moreover, females tends to be very cautious while driving and follow traffic rules more often than men. Victims in both sexes were mainly seen in the age group of 20-40 years. Risk taking behavior, urgency to reach work or home place, driving under influence of alcohol is common amongst males in leading to increased chances of motor accidents. Similar observations were noted in various national and international studies.^{6,8,9,10,13}

Considering the type of two wheelers, motorcycle fatalities were very high 89(80.9%) amongst geared vehicles as it is the mainstay of commuting for young males, whereas mopeds was involved in 21(19.09%) cases (Refer to [table no. 2](#)). All female driver victims were riding mopeds in the present study. Though the use of mopeds is increasing among both sexes in city areas every year, its engine is less powerful resulting in low speeds compared to the motorcycles, hence the chances of fatal accident are reduced to a great extent.

Helmets and helmet use laws have been shown to be effective in reducing head injuries and deaths from motorcycle crashes. Traffic rules in Mumbai makes the use of helmet compulsory, hence a good number of victims 61 (72.6% among 84 drivers) were seen wearing helmet. None of the pillion riders (26) were wearing the helmet as the helmet rule is compulsory only for the drivers in Mumbai.

Table 2: Type of offending vehicle

Type of offending vehicle	No of cases
Heavy motor vehicles*	43(39.09%)
Light motor vehicles**	20(18.18%)
Two wheelers	8(7.27%)
Three wheelers	2(1.81%)
Skidding	12(10.90%)
Dash***	6(5.45%)
Unknown	19(17.27%)
Total	110

* Truck, bus, tempo, tanker etc **car, jeep etc,

***Dash to stationary vehicle, divider, electric pole.

Heavy & light motor vehicles were the offenders in 57% cases followed by skidding in 10.9% cases. In 19 cases (17.27%) the offending vehicle or the exact manner of accident could not be ascertained. Impact with trucks, bus, jeep, tankers etc is highly fatal owing to their weight and speed. Other Indian studies^{1,6,12} are in concurrence with the common offending vehicles being four wheelers. Maximum fatalities (38.18%) were seen between 6 pm and 12 am, followed by 30.9% cases

between 12pm to 6pm. More number of accidents during evening hours could be attributed to tiredness after long hours of work and rush to reach back home.

Table 3: Time of accident

Time of accident in hours	No of cases
00:00-06:00	11(10%)
06:00-12:00	23(20.90%)
12:00-18:00	34(30.90%)
18:00-00:00	42(38.18%)
Total	110 (100%)

Patel¹⁹ recorded maximum cases (40%) between 18:00 to 00:00 hours, followed by 21% cases between 12:00 to 18:00 hours. Biswas et al²⁰ observed majority (30.9%) of cases occurring in the evening followed by 28.1% cases in afternoon (Refer to [table no. 3](#)). Amish Jain et al¹⁴ too noted maximum cases between 6pm to 10pm. In contrast, Deepak Sharma et al¹⁷ recorded majority of accidents between 12 noon to 6 PM, comprising (56%) of cases, followed by between 6 AM to 12 noon (27%).

Table 4: Survival period of the victim.

Survival period	No of victims
Death on spot/on the way to hospital	36(32.72%)
1-12 hours	27(24.54%)
12-24 hours	14(12.72%)
24-48 hours	13(11.81%)
48-72 days	7(6.36%)
More than 72 hours	13(11.81%)
Total	110(100%)

Survival period of the victims suggests a high percentage (32.7%) of deaths occurring before arrival in hospital and 37% deaths occurring within first 24 hours of admission (Refer to [table no. 4](#)). Harnam Singh et al¹⁰ noted that 39.5% victims had succumbed within 1 hour & 2/3rd (67.8%) by 12 hours. B.R. Sharma et al¹¹ in their study related to helmet safety adequacy noted that a very high number of deceased (75%) not wearing helmet succumbed to their injuries within one hour of accident. Similarly, Amish Jain et al¹⁴ in their study on motorcycle fatalities in Mangalore observed that 45 out of total 75 deaths occurred on the spot. The

high incidence of early deaths in motorcycle crashes can be attributed to the large extent of injuries in motorcyclists as there is no adequate protection and lack of effective ambulatory services due to high traffic in metropolitan cities like Mumbai.

Table 5: Manner of collision

Manner of collision	No of cases
Head on*	46(41.81%)
Hit from behind	15(13.63%)
Side impact	18(16.36%)
Skid	12(10.90%)
Unknown	19(17.27%)
Total	110 (100%)

* Head on including 6 cases of dash to stationary vehicle (4), divider (1) & electric pole (1)

Observing the manner of collision in the present study, Head on impact was most fatal (41.81%) followed by side impact (16.36%), impact from behind in 13.63% cases and skidding in 10.9% cases. In 19 cases (17.27%), the manner of collision was unknown (Refer to [table no. 5](#)). Zhao Hui et al¹⁴ in their study regarding motorcycle crashes in China noted that Impact injury was the main fatal cause, accounting for 72% of motorcyclist deaths, followed by tumbling injury (26%) and run-over (2%). K.Prasannan et al¹⁶ noted front on collision in 46.70% of cases, impact from behind accounted for 11.10% and Skid and fall comprised of 10.40% cases. In contrast, in a study done in Delhi by C Behera et al⁶ most of the fatalities occurred due to impact of another vehicle from behind (40.42%), followed by fall of the rider due to loss of balance of vehicle due to various reasons (29.78 %).

In the present study, Head injury was the cause of death in majority of cases 49(44.54%), followed by 21(19.09%) fatalities due to Hemorrhage and Shock, Blunt trauma to chest and abdomen comprised of 17.2% cases, Cervical spine injury in 03 (2.72%) cases, injury to vital organs in 21(19.09%) cases and in 8 (7.27%) cases death was attributed to septicemia (Refer to [table no. 6](#)). Our observations are consistent with studies done by C Behera et al⁶, Mau-Roung Lin⁷, Nattapong Wittayarungruengsri et al⁸, Francis Faduyile et al¹²,

Zhao Hui et al¹⁴, K.Prasannan et al¹⁶ & Deepak Sharma et al¹⁷.

Table 6: Cause of death

Cause of death	Total
Head injury	49(44.54%)
Spine injury	03(2.72%)
Blunt trauma chest	11(10%)
Blunt trauma abdomen	8(7.27%)
Hemorrhage and shock	21(19.09%)
Injury to vital organs	10(9.09%)
Septicemia	8(7.27%)
Total	110(100%)

In contrast to other studies, Harnam Singh et al¹⁰, in their study on motorcycle fatalities observed Shock and hemorrhage as the most common cause of death (36.9%) followed by intracranial hemorrhages (19.6%) and severe brain injury (14.0%).

History suggestive of alcohol consumption was present in 21(25%) cases among 84 drivers. However, chemical analysis for alcohol consumption was found positive only in 12(14.2%) cases amongst drivers and 3 cases of pillion. None of the female driver or pillion was found drunk in our study.

5. Conclusion

In Metropolitan cities like Mumbai, owing to the rapid development, motorcycle use has been drastically increased and has become a very important means of transport due to its easy availability and ease of movement in heavy traffic.

For any measures to be effective on motorcycle traffic injuries the risk factors and target groups should be searched for and their magnitude of effect and preventability assessed. Young men in the age group 20-40 years must be the target groups for safety promotion work. Educating & sensitizing motorcycle riders regarding the use of safety measures like helmet usage, avoiding alcohol consumption at the time of riding and driving at slow speeds along with strict enforcement of traffic

laws with heavy fines will be of great help in preventing such fatalities.

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