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Pattern and Distribution of Injuries in Victims of Fatal Road Traffic Accident Cases of Bikers in Haryana a Retrospective Study

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ABSTRACT

Expansion in road network, motorization, and urbanization in the state of Haryana has been accompanied by a rise in road accidents leading to road traffic injuries. Road traffic injuries are one of the leading causes of death in the world. The present study aims at evaluation of pattern and distribution of injuries among bikers thereby planning successful measures to minimize fatalities. The present retrospective study was conducted in the Department of Forensic Medicine and Toxicology, Pt. B. D. Sharma PGIMS Rohtak, Haryana. During one year study period a total of 1557 cases of medico-legal autopsies were conducted out of which 654 cases were of fatal road traffic accidents. This study included 53 cases of bikers victims of fatal road traffic accident, brought for medico-legal post-mortem examination details of which had been recorded regarding the pattern and distribution of injuries. Highest number of fatalities occurred in the age group of 21-30 years followed by the age group 31-40 years. Male victims outnumbered female resulting in male to female ratio of 52:1. Abrasions, contusions and lacerations were the most common type of injuries. The most of deaths were caused by head injury and more than one-sixth of the deaths were due to pelvic and extremities injuries.

Keywords: *Bikers, Road Traffic Accident, Victim, Pattern of Injuries.*

INTRODUCTION

The term accident has been defined "as an occurrence in the sequence of events, which usually produces unintended injury, death or property damage."[1] Accidents today are among the leading cause of death. In some countries road traffic accidents are number one cause of deaths; especially in many parts of the world particularly the more highly industrialized nations. The alarming increase in morbidity and mortality owing to road traffic accidents over the past few decades is a matter of great concern globally. Road accidents have become a serious health hazard throughout the world by killing and crippling thousands of persons each year. A middle aged male is more likely to die from injuries received in traffic accident than from any other cause and motor vehicle accidents are single leading cause of death. By 2020, death and disability resulting from road traffic accidents in comparison to other diseases will rise from 9th to 3rd spot and developing nations will account for 90 percent of world traffic fatalities. Worldwide the number of people killed in road traffic crashes each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million[2].

India is a signatory to Brasilia Declaration and is committed to reduce the number of road accidents and fatalities by 50 per cent by 2020.

However, with one of the highest motorization growth rate in the world accompanied by rapid expansion in road network and urbanization over the years, our country is faced with serious impacts on road safety levels. The total number of road accidents increased by 2.5 per cent from 4,89,400 in 2014 to 5,01,423 in 2015. The total

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number of persons killed in road accidents increased by 4.6 per cent from 1,39,671 in 2014 to 1,46,133 in 2015. Road accident injuries have also increased by 1.4 per cent from 4,93,474 in 2014 to 5,00,279 in 2015. The severity of road accidents, measured in terms of number of persons killed per 100 accidents has increased from 28.5 in 2014 to 29.1 in 2015[3].

Motorized two wheelers account for a significant number of premature death and disability cases in developing countries like India[4]. Two Wheelers accounted for a highest share in total road accidents and next to it was the share of the group of Cars, Jeeps &Taxis in 2015 as reported by the States/UTs. Share of two wheelers in total road accidents has increased continuously from 26.3 per cent in 2013 to 27.3 per cent in 2014 and 28.8 per cent in 2015. Motorcyclists constitute a large number among vehicle population, responsible for more road traffic accidents and thereby injuries.[3]

Bike users involved in crashes are likely to die or be severely injured due to high frequency of head, chest and leg injuries. We carried out a retrospective study to determine crash characteristics and injury distribution and patterns among the autopsy cases brought to mortuary Rohtak Haryana in year 2015.

MATERIAL METHOD

The study is conducted in the mortuary, PGIMS, Rohtak, Haryana. A total of 53 motorcyclists death was studied for the pattern of injuries using a standard proforma. The detailed analysis of these cases was based on the inquest report, medical records and evaluation of autopsy reports. The data thus collected was analysed statistically. Only bike operators were involved not the pillion rider and collision with any object, surface or any animal or fall from vehicle was considered in it. Pedestrians and bicyclers, who died as a result of hit with motorcycle, were not included in this study

OBSERVATIONS

Table 1: Categories of Bike crashes

Category of crash	Number of cases			Percentage
	Male	Female	Total	
Slipped after crashes with breakers	15	Nil	15	28.31%
Crashes with four wheeler	37	1	38	71.69%
Total	52	1	53	100%

Table 1 Shows the category of bike crashes. It shows that 28.30% bike were crashed because of slipping and 71.69% were crashes with four wheelers. The table also depicts the sex wise distribution of bikers involved in fatal bike accidents. It shows that out of 53 bike riders 52 were male and 1 was female.

Table 2 Shows the age wise distribution of fatal cases of bike accidents. It shows that highest number of cases (45.28%) were of age group 21-30 years and second highest (22.64%) were of age group 31-40years . In age group >70years and 0-10 years the affected cases were nil.

Table 2: Age wise distribution of fatal Bike accident cases

Sl. No.	Age in years	No of bike accident fatal cases	Percentage
1.	0-10	Nil	Nil

Conted…

2.	11-20	5	9.43
3.	21-30	24	45.28
4.	31-40	12	22.64
5.	41-50	5	9.43
6.	51-60	4	7.55
7.	61-70	3	5.67
8.	>70	Nil	Nil
9.	Total	53	100

Table 3: Region wise distribution of fatal injuries over the body

Region of body involved	Number of cases	Percentage
Only Head injury	7	13.20
Head and face injury	38	71.69
Neck injury	2	3.77

Conted…

Only Chest injury	1	1.88
Chest injury	29	54.72
Only Abdominal injury	Nil	Nil
Abdominal injury	22	41.51
Only upper extremity	Nil	Nil
upper extremity	9	16.98
Only lower extremity	2	3.77
lower extremity with pelvic girdle	28	52.83

Table 3 Shows the distribution of fatal injuries over different body regions of bikers. The table shows that the only region affected without other body region injury are head (13.20%), chest (1.88%)and lower extremity (3.77%). The region involved in highest number is head and face (71.69%) and the second highest is chest region (54.72%). The lower extremity with pelvic girdle is also affected in 52.83% cases and abdomen region injury present in 41.51% cases.

Table 4 shows the pattern of head injuries. It shows that intracranial hematomas were present in 67.92% cases and fracture of skull is present in 39.62% of cases. The laceration of brain is present in 16.98% of cases. Abrasion, contusion and laceration of scalp is present in 60.37% of cases. Table also shows the pattern of injuries over the chest. The table shows that the abrasion, contusion and laceration present in 37.74% cases. The fracture of rib present in 28.30% and fracture of clavicle present in 24.53%. The contusion or laceration of pericardium or lungs is present in 33.96% cases.

Table 4: Pattern of Head Injury and Chest Injuries

Head injury cases = 38				**Chest injury = 29**		
	Fracture of Skull	Cranial hematoma (EDH or SDH or SAH or ALL)	Laceration of brain	Fracture Ribs	Fracture clavicle	Contusion or laceration of pericardium or lungs
	21 (39.62%)	36 (67.92%)	9 (16.98%)	15 (28.30%)	13 (24.53%)	18 (33.96%)
Abrasion or Contusion or laceration of scalp.	32 (60.37%)			20 (37.74%)		

Table 5: Pattern of abdominal and pelvic Injury

Abdominal injury = 22					
Abrasion or Contusion or laceration of abdominal wall	**Liver injury**	**Spleen injury**	**Kidney injury**	**Mesentery injury**	**Pelvis Fracture**
12(22.64%)	6(11.32%)	3(5.66%)	5(9.43%)	7(13.21%)	5(9.43%)

Table 5 Shows the pattern of injuries over the abdomen. The table shows that the abrasion, contusion and laceration is present in 22.64% cases. The fracture of pelvic bone present in 9.43%. The liver injury is present in 11.32% cases, spleen injury in 5.66% cases, kidney injury present in 9.43% and mesentery is injured in 13.21% cases.

Table 6: Pattern of extremities Injury:

Extremities Injury = 32					
Abrasion or Contusion or laceration	**Fracture of upper extremity bones = 9**		**Fracture of lower extremity bones = 23**		**Crush injury**
	Fracture of Forearm bones	**Fracture of Humerus bone**	**Fracture of leg bones**	**Fracture of Thigh bones**	
28 (52.83%)	8 (15.09%)	1 (1.89%)	9 (16.98%)	14 (26.42%)	2 (3.77%)

DISCUSSION

This study includes 53 fatal cases of two wheeler accidents. Out of 53 fatal crashes (28.30%)15 bikes were crashed because of slipping and (71.69%) 38 bikes were crashed with four wheelers. Out of 53 bike riders 52 were male and 1 was female. The maximum cases (45.28%) of deaths were of age group 21-30 years followed by age group 31-40 years (22.64%). In age group >70 years and 0-10 years the cases were nil.

As far as distribution of injuries over the body of victims of bike accident was concerned injuries to head/face occurred in most of the cases (71.69%) followed by the chest injuries (54.72%), the lower extremity with pelvic girdle injury was present in 52.83% cases and abdomen region injury was present in 41.51% cases . Similar results were observed by Hajek S[5] who recorded 73% head injuries, 62% chest injuries, 30% abdomen injuries, 26% spinal injuries, 52% pelvic injuries, 26% upper extremity injuries and 51% lower extremity injuries. Similar results were also observed by Nilambar Jha et al study[6].

A fracture of the skull with associated brain injury was the most common cause of death but multiple injuries constitute a typical feature of fatal bike accidents[7]. This was also observed in our study that the head injury was most common cause of death and multiple injuries were present over the different regions of the body only isolated region affected without other body region were head in (13.20%) 7cases, chest in (1.88%) 1 cases and lower extremity in (3.77%) 2 cases. Hossack DW[8] showed head/chest injuries to be the major cause of deaths. Our study shows that Abrasion, contusion and laceration of scalp was present in 60.37% of cases, intracranial hematomas were present in 67.92% cases and fracture of skull was present in 39.62% of cases. The laceration of brain was present in 16.98% of cases. Similar results were observed by Schmitz M et al[9] they detected that deaths occurred due to injuries of the head (62%), consequence of bleeding (13%) and because of contusion of medulla oblongata (10.8%) Menon A et al[10] showed 88.88% skull fractures as cause of deaths occurring in fatal accidents.

High incidence of head injuries can be due to reception of maximum force because of restricted movement of the head. In the trunk, the predominance of injuries in chest can be explained by the fragile nature of bony cage sometimes even damaging the internal organs, while the abdomen is protected by its elasticity and rebound nature. The rolling nature of trunk during accidents makes it more susceptible to injuries.

Our study shows that the abrasion, contusion and laceration in chest region present in 37.74% cases. The fracture of rib was present in 28.30% cases and fracture of clavicle was present in 24.53% cases. The contusion or laceration of pericardium or lungs was present in 33.96% cases consistent with KY Tham et al study[11]. High incidence of lung injuries can be explained by their anatomical position and more surface area covering antero-posteriorly, medially and laterally, while heart was injured only in few cases because of its anatomical position and the protection offered by lungs, layers of heart and blood.

It was also observed in our study that the abrasion, contusion and laceration in the abdominal region of the body was present in 22.64% cases. The fracture of pelvic bone was present in 9.43% of cases. The liver injury was present in 11.32% cases, spleen injury was in 5.66% cases, kidney injury was present in 9.43% and mesentery was injured in 13.21% cases.

Banerjee et al[12] showed that majority of victims had involvement of both chest and abdomen (29%) in the road side accidental injuries.

Our study shows that the abrasion, contusion and laceration of upper and lower extremity region was present in 52.83% cases. The fracture of forearm bone was present in 15.09% of cases. The fracture of humerus was present in 1.89% cases. The fracture of leg bones was present in 16.98% cases. The fracture of femur bone present in 26.42% cases. The crush injury was present in 3.77% cases.

In this study, upper and lower limbs suffered maximum with abrasions, contusion as the predominant injuries (52.83%). In upper limbs, humerus fractured in 1 case followed by ulna and radius in 8 cases. In lower limbs, femur was fractured in 14 cases followed by tibia and fibula in 9 cases. Lower limb long bones were comparatively at high risk than upper limb long bones, consistent with Nilambar Jha et al's study[6]. Higher risk of injuries to the lower limbs can be attributed to landing on the lower limbs receiving the first impact, weight of the bike and dragging at the time of accident.

CONCLUSION

Bike users involved in crashes were died due to high frequency of head, chest and leg injuries. Abrasions, contusions were the common injuries observed throughout the body. Skull fracture was the most common fracture. Intracranial haemorrhages were observed more frequently among brain injuries. Lungs, liver suffered more than other organs in their cavities. Limbs suffered maximum injuries second to head injuries when compared to other regions of the body. Cause of death in majority of cases was due to head injury associated with fracture of skull or intracranial haemorrhages or brain injury.

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Conflict-of-Interest Statement: There is no conflict of interest as it was a retrospective study based on the already available record.

Statement of Informed consent: This study is based on the available record so there is no matter of consent.

Statement of Human and Animal Rights: No human right and animal right is violated in this case.

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