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## **Fatality by thoraco-abdominal injuries in cases of accidental deaths in two-wheeler riders: A 100 cases study**

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### **Abstract**

Geographically, Rohtak district is located in Haryana State and is well connected with the New Delhi, national capital of India due to which mobility of vehicles is quite high in the region. On account of high vehicle movement, the chances of Road Traffic Accident (RTA) are high, which leads to high mortality and morbidity, however, this is preventable upto great extent. This study was done to know the fatality and incidence of injuries to the chest and abdomen regions of two-wheeler riders caused by RTA. The majority of fatal injuries were noted in the region of the head followed by the abdomen and chest regions the study includes the victims of all age groups who died in RTA. Heavy motor and two-wheeler vehicles were involved in the majority of the cases followed by two-wheelers only.

**Keywords:** road traffic accident (RTA), two-wheelers riders, thoracic injuries, abdominal injuries

### **Introduction**

The term accident has been defined as an “occurrence in a sequence of events which usually produces unintended injury, death or property damage”. Here we are talking about road traffic accidents (RTA), which is a major epidemic of non-communicable disease in the present century because of modernization and hasty life. Global data shows that 5.1 million deaths in 2000 were occurred due to injuries which were accounted for 10% of the deaths due to all causes. Out of this, a quarter of injury-related deaths occurred in the South-East Asian region [1]. India is the world's fifth-largest economy by nominal GDP and the third-largest by purchasing power parity (PPP) [2]. India is undergoing a major economic and demographic transition coupled with increasing urbanization and motorization. Since the majority of its population comes under the lower and middle class, their main mode of transport is motorized two-wheelers which are being economical. RTA is a chief cause of mechanical trauma, which results in morbidity, disability, and even mortality. Roadside accidents accounted for about 45% of total unnatural deaths in India in the year 2010 [3]. India is having one of the highest fatality rate in RTA, about 20 times more than that reported in developed countries [4]. Among the body parts, the abdomen is the third most common region injured in civilian trauma [5]. Blunt abdominal trauma (BAT) is the main cause of death in people under 35 years of age worldwide and it is one of the leading causes of mortality among trauma victims [6]. In India, the most common cause of blunt abdominal trauma is due to RTA [7].

### **Materials and Methods**

An autopsy-based, cross-sectional study was conducted in correlation with the relevant clinical records and the reports from investigating agencies. This study was conducted in the Department of Forensic Medicine, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak. A total 100 cases of accidental deaths of two-wheeler riders/pillion-riders were included in the study. The study group comprised of cases of accidental deaths of two-wheeler riders/pillion-riders brought for autopsy the mortuary of the department. The cases in which there was no suspicion regarding the accidental manner of death were included in the study and cases where the circumstances regarding the manner of the accident were not clear or appeared to be suspicious were excluded from the study.

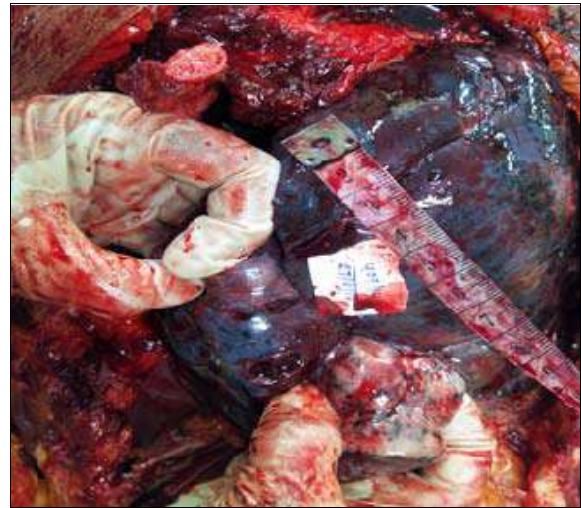
The demographic profile of the victims was recorded on the proforma formulated for the study and the particulars related to the victim and contributory factors, if any, were noted. During the autopsy, a thorough external and internal examination of the body was done and a detailed description of all the injuries was noted in each case to determine the pattern and distribution of the injuries sustained in two-wheeler accidents and to know the fatal injuries sustained to them. The data were compiled with a focus on the analysis of injuries in the thoraco abdominal region with special reference to the nature of the wounds and organs most commonly affected in RTA and epidemiological factors about victims, vehicles, and sites of impacts etc.

**Results**

**Table 1:** Showing distribution of the cases according to the sites of injuries

Site of injury	Number	Percent
Head injuries	86	86.0%
Face	64	64.0%
Neck	4	4.0%
Chest (front & back)	55	55.0%
Abdomen & Pelvis	46	46.0%
Upper Limbs	85	85.0%
Lower Limbs	72	72.0%
Total number of injuries	426	
Mean number of Injuries per case	4.26	

The above table shows that multiple body parts were involved in almost every case. Head was involved in 86% of cases, followed by extremities (upper extremities in 85% and lower extremities in 72%), face (64.0%), chest (Figure 1 & 2) in 55.0% cases, abdomen & pelvis (Figure 3 & 4) in 46.0% cases and Neck in 4% cases. In cases of head injuries, injury to the scalp region was seen in 85 (85.0%) cases, skull in 52 (52.0%) cases, and brain in 20 (20.0%) of the cases.



**Fig 2:** (Lung Laceration)



**Fig 3:** (Liver Laceration)



**Fig 1:** (Chest-wall Injury)



**Fig 4:** (Spleen Laceration)

**Table 2:** Showing cause of death in the victims

Cause of Death in Victims	Frequency	Percent
Head Injury	46	46.0
Head & Thorax injury	11	11.0
Head & lower extremity injury	9	9.0
Abdominal Injuries	9	9.0
Head, Abdominal & lower extremity Injuries	5	5.0
Head & Abdominal Injuries	3	3.0
Thoraco-abdominal Injuries	3	3.0
Multiple Injuries	3	3.0
Thorax & lower extremity Injuries	2	2.0
Lower extremity injury	2	2.0
Head & Neck Injury	1	1.0
Head, Thorax & lower extremity Injury	1	1.0
Head & Pelvic Injuries	1	1.0
Thorax Injuries	1	1.0
Thoraco-abdominal & lower limb injuries	1	1.0
Abdominal & lower extremity Injuries	1	1.0
Pelvic & lower extremity Injuries	1	1.0
Total	100	100.0

The above table shows that head injury alone was the major cause of death in 46.0% of the victims followed by combined head and thoracic region (11.0%), abdominal injuries and combined head and lower extremities (9.0%

each), combined head, abdominal and lower extremities (5.0%), combined head and abdominal injuries and thoraco-abdominal injuries and multiple injuries (3.0% each).

**Table 3:** Showing distribution of cases according to Fatal Injury

Fatal injury	Number of cases	Percentage
Head Injury	65	65
Head Injury and Lung Laceration	6	6
Head Injury and Liver Laceration	5	5
Head Injury and Spleen Laceration	3	3
Head Injury and Liver & Spleen Laceration	1	1
Head Injury and Pelvic Injury	1	1
Lung, Liver and Spleen Laceration	1	1
Lung and Liver Laceration	3	3
Lung Laceration	2	2
Liver Laceration	3	3
Spleen Laceration	3	3
Liver and Kidney Laceration	1	1
Liver Laceration and Abdominal Aorta rupture	1	1
Small Intestine Rupture	1	1
Lower Extremity Injury	3	3
Multiple Injuries	1	1
Total	100	100

This table shows that head injury was the most common fatal injury comprising 65% of the total cases followed by combined head injury and lung laceration comprising 6% of the cases; combined head injury and liver laceration comprising 5% of cases; combined head injury and laceration of spleen, combined lung and liver laceration, liver laceration, spleen laceration, and lower extremity injury, each comprising 3%; lung laceration comprising 2%.

### Discussion

In our study, multiple body parts were involved in almost every case. Head was involved in 86% of cases, followed by extremities (upper 85% and lower 72%), face (64.0%), chest (front & back) in 55.0% cases, abdomen & pelvis in 46.0% cases and Neck in 4% cases. Our observations go hand in hand with Jha N *et al.* who observed that head injuries were the commonest (34.1%), followed by lower limbs (13.7%) and face (10.7%)<sup>[8]</sup>. Khajuria *et al.* reported that limb injuries (31%) were commonest, followed by the head

(28%), thorax (18%), abdomen (17%), pelvis (3%), and spine (0.8%)<sup>[9]</sup>.

External thoracic injuries were observed in 55% of the cases and external abdominal injuries were involved in 46% of the cases. Similar findings were observed by Jha N *et al.*<sup>[8]</sup> and Suresh Kumar *et al.*<sup>[10]</sup> Bony cage injuries were observed in 71% of the victims; fractures of the ribs were observed in 63.3% of the victims; 19.7% of the cases had clavicle fractures, and 8.4% cases of each had sternal and vertebrae fractures. Suresh Kumar *et al.* also observed the similar findings<sup>[10]</sup>.

In the current study, the most common abdominal solid organs injured were the liver (15%), spleen (8%), and kidney (1%). But, Suresh Kumar *et al.*<sup>[10]</sup> and Bakkannavar *et al.*<sup>[11]</sup> observed that the most common solid abdominal organ involved were the kidneys (48%) and (23%), respectively, followed by the liver (39.7%). Ravindra *et al.*<sup>[12]</sup> and Maurice *et al.*<sup>[13]</sup> contradicted the above statements; they found that the most commonly injured organ was the

spleen in both the studies (52.9% and 50% respectively). The abdomen is vulnerable to injury since there is minimal bony protection for underlying organs. Lungs were the most commonly involved organs (12%) in the thoracic region. Suresh Kumar *et al.*<sup>[10]</sup> and Bakkannavar *et al.*<sup>[11]</sup> had also observed the similar findings that lungs were the most common organ injured, 61.3% and 61% in the thoracic region, respectively. The lungs occupy most of the rib cage and thus are probably more vulnerable to injury when compared to the heart.

The most common cause of death in RTA was head injury 46%, a second common cause of death was head & thoracic injuries 11%, followed by abdominal injuries and combined head and lower extremities (9.0% each), combined head, abdominal and lower extremities (5.0%), combined head and abdominal injuries and thoracoabdominal injuries and multiple injuries (3.0% each). Ravindra *et al.*<sup>[12]</sup> study and Meera *et al.*<sup>[14]</sup> also observed that shock was the major culprit responsible for death of the victims in 62.7% and 44% respectively.

### Conclusion and Suggestion

This study shows that majority of the victims died due to thoraco-abdominal injuries after head injury in two wheelers accidents. There are no protective measures for thoraco-abdominal region in cases two-wheelers riders. Accidents and morbidity and mortality after accidents could be prevented by abiding traffic rules, improving the conditions of roads, lighting over the sides of roads and good health-infrastructure to the victims of road traffic accidents etc.

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