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Original Research Article

# Pattern and distribution of injuries associated with road traffic accident in Haldwani (Nainital) - An autopsy based study

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ABSTRACT

**Objective:** India is one of the fastest growing economies. There is a rapid inflation of vehicles on the road that range from motorcycles to heavy vehicles which also shows an active surge in the fatal road accidents. This study is focussed to find out the pattern and distribution of injuries in fatal road traffic accident cases in Kumaon region of Uttarakhand as to plan at the time of policy making and traffic law implementation.
**Materials and Methods**: The present study was conducted in the department of Forensic Medicine & Toxicology of Government Medical College, Haldwani from January $1^{st}$ 2019 to December $31^{st}$ 2019, on total 110 cases of RTA brought to mortuary for medico-legal post mortem examination.
**Results**: Maximum number of cases sustained head and neck injuries (42 out of 110 externally) followed by extremities injury (28 out of 110). Total 38 cases out of 110 sustained head and neck injuries internally, followed by abdominal injuries (28 cases). Abrasions (30 cases) and laceration (29 cases) were commonest type of external injury noted in RTA cases followed by contusion (22 cases) and fracture (19 cases). Most common cause of death among RTA victims was head injury (40 out of 110 cases) followed by shock and haemorrhage (37 out of 110 cases).



## 1. Introduction

Road traffic accidents (RTA) are a major cause of concern all over the world.[1] Death from road traffic accidents have been characterized worldwide as a hidden epidemic which affects all sectors of society.[2] As per international classification of diseases, a traffic accident is an accident of any vehicle occurring on the public highway either originating on or terminating on or involving a vehicle partially on the highway.[3]

During 1990s road traffic accident injuries ranked ninth among the leading cause of deaths in the world. Road traffic accidents were projected to become the second leading cause of death by the year 2020 after ischemic heart disease.[4,5] Road traffic accidents are on the rise globally and India is no exception.[6] India being one of the fastest developing nations in the world with a huge population density, the road traffic accident is also increasing. As per 2018 latest data, total number of accidents in India was 4, 67,044 out of which Uttarakhand reported 1571 accidents, making it 0.32%. The accident severity of India as a whole is 32.4 whereas; accident severity of Uttarakhand is 71.3. Accident severity of Uttarakhand is more than double that of India. The year 2018 has shown marked improvement over 2017. The number of road accidents in 2018 is lower by 3.67% than that of the previous year, 2017. In contrast, the number death on account of road accidents has been increased by 11.1%.[7]

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Road traffic accidents are a major; but neglected global public health problem and it requires concentrated efforts for effective and sustainable prevention.[8] Among all the system by which people has to deal every day, road transport is the most complex and most dangerous system.[9,10] The present study was planned with the aim to describe the pattern and distribution of injuries from fatal road traffic accidents for development of strategy for prevention of mortality due to road traffic accidents and public education on road safety.

## 2. Materials and Methods

The present study is a hospital based cross-sectional study conducted in the Department of Forensic Medicine & Toxicology, GMC, Haldwani. Total 110 cases of road traffic accidents were taken over a period from January 2019 to December 2019 for this study, who were brought dead or who died after admission in hospital or were brought directly from the site of accident. The study was carried out after taking approval from the Institutional Ethical Committee of Dr. Susheela Tiwari Hospital, Haldwani. Cases were included irrespective of age, sex, residence, religion and occupation. After explaining the purpose of study, detailed history was taken from the victim's relatives and investigating officer, police inquest papers and hospital records. Case sheets and Medico Legal Certificates (MLC) of the victims were used to identify injury patterns who seek medical care in hospital. Collected data was analyzed statistically using Microsoft Excel 2010.

## 3. Results

The observations and results of the study are presented as below.

**Table 1:** Distribution of RTA cases based on site of external injury (n=110)

| Site of Injury | No. of cases | Percentage |
|---|---|---|
| Head and Neck Injuries | 42 | 38.2 |
| Chest Injuries | 18 | 16.4 |
| Abdominal Injuries | 10 | 9.1 |
| Pelvic Injuries | 12 | 10.9 |
| Extremities Injury | 28 | 25.4 |
| **Total** | 110 | 100 |

**Table 2:** Distribution of RTA cases based on site of internal injury (n=110)

| Site of internal injury | No. of cases | Percentage |
|---|---|---|
| Head and Neck Injuries | 38 | 34.5 |
| Chest Injuries | 13 | 11.8 |
| Abdominal Injuries | 28 | 25.5 |
| Pelvic Injuries | 15 | 13.6 |
| Extremities Injury | 16 | 14.6 |
| **Total** | 110 | 100 |

**Table 3:** Type of external injury in road traffic injury cases (n=110)

| Type of external injury | No. of cases | Percentage |
|---|---|---|
| Abrasion | 30 | 27.3 |
| Contusion | 22 | 20 |
| Laceration | 29 | 26.3 |
| Amputation | 04 | 3.6 |
| Fracture | 19 | 17.3 |
| Crushed Injury | 06 | 5.5 |
| **Total** | 110 | 100 |

**Table 4:** Type of internal injury in road traffic injury cases (n=110)

| Type of internal injury | No. of cases | Percentage |
|---|---|---|
| Head and Neck Injuries | 41 | 37.3 |
| Chest and Abdominal Injuries | 38 | 34.5 |
| Pelvic and Extremities Injuries | 31 | 28.2 |
| **Total** | 110 | 100 |

**Table 5:** Causes of death in road traffic accident cases (n=110)

| Cause of Death | No. of cases | Percentage |
|---|---|---|
| Head Injury | 40 | 36.4 |
| Shock and Haemorrhage | 37 | 33.6 |
| Injury to vital organs (liver, spleen, lungs, kidney) | 28 | 25.5 |
| Septicaemia | 5 | 4.6 |
| **Total** | 110 | 100 |

## 4. Discussion

In present study, out of 110 cases with road traffic accidents, site of external injury as shown in Table 1 was head and neck in 42 subjects (38.2%), extremities in 28 (25.4%) subjects, chest in 18 (16.4%) subjects, pelvis in 12 (10.9%) and abdomen was in 10 (9.1%) cases while most common site of internal injury as shown in Table 2 was head and neck (n=38; 34.5%) followed by abdominal injuries (n=28; 25.5%), extremities injury (n=16; 14.6%) and pelvic injuries (n=15; 13.6%). In 13 (11.8%) cases chest injury was also observed. A possible explanation for high head and neck injury might be that motor vehicle occupants did not use seat belts, resulting in forward jerk during a collision and higher rate of injury causing dash-board or windscreen injury while two-wheeler users were not using helmets.

Finding of our study was in concordance to study by Shakeer Kahn P et al[11] who reported head injury as commonest (68.8%) followed by knee, lower leg (32.7%) and shoulder, upper arm (23.9%). In Ranjan R et al[4] study, injuries to head and face were observed in 85% of all injuries next common injuries were observed in lower limb in 65% victim and in upper limb in 54%. Injuries to chest

were seen in 48%, to abdomen in 36% and spine and neck in 1% case. Marak F et al[12] also reported head was involved most commonly in 131 cases (93.6%), which is followed by Chest (thorax) with 25 cases (17.85%), abdomen with 10 cases (7.1%), Lower Limb (7.14%), Upper Limb (10.71%) and Spinal injury (2.85%) which is also similar to our study.

In Contrast to our study, Chourasia S et al[9] study reported that lower limbs (23.7%, n=173) and upper limbs (26.5%, n=194) received injuries in maximum number of RTAs; Head & Neck were injured in (21.8%, n=159) cases; Abdomen injured in (12%, n=88) cases, pelvis injured in (6.43%, n=47) and Chest injured in (9.17%, n=67) number of RTA cases respectively. While it was found that spinal injuries were seen in only (0.41%, n=3) deaths due to RTAs.

Fractures and penetrating injuries, amputations and avulsions lacerations are seen in most of the run over accidents. The body part which is found commonly injured is lower limb, which is followed by upper limb, head & neck. In our study as shown in Table 3, abrasions (27.3%, n=30) and contusions were found in 22 (20.0%) number of deaths each, laceration was found in 29 (26.3%) number of cases, while fractures both of long bones and flat bones was found in 19 (17.3%) number of deaths. While crushed injury was seen in 6 (5.5%) cases and amputation was seen in 4 (3.6%) RTA cases. In our study as shown in Table 4, head and neck sustained injuries sustained by maximum no of cases (37.5%), followed by chest and abdominal injuries (34.5%), pelvic and extremities injuries (28.2%). In Ranjan R et al.[4] study, abrasions were the commonest seen in 86%, followed by laceration seen in 75% and contusion seen in 58% of all cases. Incised wounds were seen in 2% cases only. The injuries were as a result of heavy blunt forces seen in hit and run cases, crush injuries due to impact of the vehicle and rough surface of roads. In study by Das DK et al.,[13] contusions & lacerations both were found in 143(78.57%) no of deaths each, graze abrasions found in 125 (68.68%) no of cases, while other types of abrasions were found in 128(70.33%) no of death cases, Fractures both of long bones and flat bones were found in 57 (31.32%) no of deaths. Study by Shakeer Kahn P et al[11] the common types of injuries were found to be laceration (73.5%), fracture (52.8%) and abrasion (50.1%) respectively.

In present study as shown in Table 5, head injury (36.4%) was the most common cause of death in road traffic accidents cases followed by shock & hemorrhage (33.6%) and Injury to vital organs (liver, spleen, lungs, kidney) (n=28; 25.5%) while 5 subject died due to septicaemia (4.6%). Finding of our study was similar to study by Chourasia S et al,[9] mechanisms of death in the majority of the cases (72.2%, n=190) was coma as a result of head injury. Second commonest cause of death was hemorrhagic shock (16.7%, n=44). Our finding were also in concordance with the Das DK et al[13] who also reported head injuries as cause of Death in maximum no of RTA cases 77 (42.31%) in this study; next comes multiple injuries to different organs of the body i.e. in 36 (19.78%) deaths then trauma to abdomen in 33 (18.13%) cases, injuries to chest in 28 (15.38%) no of cases and injuries to limbs in 8(4.40%) cases of RTA. In study by Marak F et al,[12] cranio-cerebral injuries was the most common cause of death accounting for 46.43% of the cases followed by Intracranial Haemorrhages (33.57%), Haemorrhage and Shock due to multiple injuries (17.14%) and Cervical spine injury (2.86%). In contrast to our study Ravi BK et al[14] reported shock and haemorrhage (35.89%) commonest cause of death followed by injuries to visceral organs (27.06%) and brain (19.11%).

## 5. Conclusion

Total 110 cases of RTA were studied over a period from January 2019-December 2019. After analysing whole data, a conclusion is made that the majority of cases sustained head and neck injuries. Most of the victims were motorcycle riders without helmets or four wheelers without using seat belt. It once again shows the importance of protection devices as well as to make the community aware. Studies on injuries help in predicting the vulnerability of body parts to get injured during RTAs and therefore can help in developing innovative personal protective equipment and safety measures inside the vehicles through novel engineering technology.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

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