

Pattern of craniocerebral injuries in fatal two wheeler accidents

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Abstract

Background: Road Traffic accident is an endemic disease which affects mainly young people. Head and neck injuries are the main cause of severe injury, disability and death among motorcycle users. The present study aimed at the pattern of craniocerebral injuries due to road traffic accidents involving motorized two wheelers to provide a feed-back for controlling such injuries. **Material and Methods:** Total 95 cases of both sex and all age groups having craniocerebral injuries due to road traffic accidents involving motorized two wheelers were included in the study. A complete medico-legal autopsy was conducted on each of these, postmortem findings were recorded meticulously and results were analyzed carefully. **Results:** Among craniocerebral injuries scalp and membrane injuries/haemorrhages were more common as compared to skull fractures and brain injuries. Contusion (38.95%) followed by laceration (21.11%) was most common type of injury over the scalp. Linear fractures (54.74%) were most common among skull fractures. Subdural haemorrhage (80%) followed by subarachnoid haemorrhage (70.53%) was most common type of intracranial haemorrhage. Contusion (44.42%) was most common type of brain injury followed by oedema. **Conclusion:** For reducing fatalities among victims of two wheeler road traffic accidents, it is essential to study the pattern of injuries in two wheeler accidents. It is time to recognize this public health problem as preventable cause of loss of healthy life.

Key Words: Craniocerebral injury, two wheelers, accidents, deaths.

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INTRODUCTION

Road traffic accidents (RTA) are world's most serious health problem¹. Traffic accident is an endemic disease which affects mainly young people. 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. Two-wheelers occupants are the most unprotected road users killed in road accidents and have to share scarce road space with motorized vehicles of different engine power and speed resulting in serious conflicts within traffic flows². Lack of

safe driving concepts is another factor that increases the vulnerability of the motorcyclists in road traffic accidents. Head and neck injuries are the main cause of severe injury, disability and death among motorcycle users³. Since the head contains brain, a very important vital organ, trauma to this region challenges the individual because of its anatomical position, size, and movements in all directions. Craniocerebral injury is defined by the National Advisory of Neurological Disease and Stroke Council as 'a morbid state resulting from gross or subtle structural changes in the scalp, skull, and/or the contents of the skull produced by mechanical forces'⁴. In the wake of this we have realized and decided to study the pattern of craniocerebral injuries due to road traffic accidents involving motorized two wheelers to provide a feed-back for controlling such injuries.

MATERIAL AND METHODS

This autopsy based cross-sectional study was conducted over a period of two years from 1st Oct 2012 to 30th Sept 2014 in the Department of Forensic Medicine and Toxicology, Government Medical College Latur, Maharashtra, India.

This study includes 95 autopsy cases having cause of death as craniocerebral injury occurred in road traffic accidents involving motorized two wheelers (MTW). Meticulous autopsy examination was carried out in all cases. All organs were examined thoroughly and findings noted down.

RESULTS

During the study period, total 1706 autopsies were conducted in the department. Out of these, 95 cases were of craniocerebral injuries in RTAs involving MTW comprised of 5.57%. The peak incidence was observed between age group 31-40 years i.e. 28 (29.47%). Out of 95 cases, 78 (82.10%) were males and 17 (17.90%) were females with male to female ratio of 4.5:1.

In the present study (Table 1) it was observed that, scalp injury was present in 92 (96.84%), skull fractures were present in 63 (66.32%), membrane injury in 90 (94.74%) and brain injury in 56 (58.95%) victims.

Table 1: Showing distribution of craniocerebral injuries. (n=95)

Injuries	Total	Percentage (%)
Scalp	92	96.84
Skull	63	66.32
Membrane	90	94.74
Brain	56	58.95

In the present study (Table 2) it was observed that, most common type of scalp injury was contusion present in 37 victims (38.95%) and least common was crush injury present in 4 victims (4.21%).

Table 2: Distribution of scalp injuries (n=95)

Nature of Injury	No. of Cases	Percentage (%)
Contusion	37	38.95
Laceration	21	22.11
Abrasion	19	20.00
Crush	04	04.21
Old healed scar	05	05.26
Surgical Sutured Scar	19	20.00

In the present study (Table 3) it was observed that, most common type of skull fracture was linear / fissured fracture (52; 54.74%) followed by depressed fracture (15; 15.79%) and least common was sutural fracture (4; 4.21%). Most of the fractures were present on frontal bone. Middle cranial fossa alone was most common site of fracture.

Table 3: Types of skull fractures (n=95)

Type of Skull Fracture	Total	Percentage (%)
Linear	52	54.74
Comminuted	07	07.37
Depressed	15	15.79
Sutural	04	04.21

In the present study (Table 4) it was observed that, subdural haemorrhage (SDH) (76; 80%) was most

common type of haemorrhage, followed by subarachnoid haemorrhage (SAH) (67; 70.53%) and least common was epidural haemorrhage (EDH) (2; 2.11%).

Table 4: Showing intracranial haemorrhages. (n=95)

Injuries	Total	Percentage (%)
Epidural Haemorrhage (EDH)	02	02.11
Subdural Haemorrhage (SDH)	76	80.00
Subarachnoid Haemorrhage (SAH)	67	70.53
Brain Haemorrhage (ICH)	10	10.53

In the present study (Table 5), most common type of brain injury was contusion seen in 42 (44.21%) cases, followed by oedema seen in 26 (27.37%) cases and least common was laceration seen in 2 (2.11%) cases.

Table 5: Showing type of brain injury. (n=95)

Type of Injury	No. of Cases	Percentage (%)
Contusion	42	44.21
Laceration	02	02.11
Crush Injury	04	04.21
Oedema	26	27.37

DISCUSSION

Accidents are world's most serious health problem. The motorized transportation media like vehicles, trains, aero planes etc with fast moving vehicular traffic, vast urbanization and changing social patterns have contributed to increase in the incidence of trauma to human body. It is the need of the time to have data to implement preventive measures. A total of 95 deaths were due to craniocerebral injury involving motorized two wheelers (MTW) consisting to 5.57% of all deaths. Sharma BR *et al*⁵, Behera C *et al*⁶, Jha S *et al*⁷, Surendar J and Shiva RD⁸ and Reddy A *et al*⁹ observed similar burden of deaths due to craniocerebral injuries in RTAs involving MTW. In the present study, maximum deaths were observed between age group 31-40 years (29.47%) followed by 21-30 years (28.42%). This shows that maximum deaths were between 21-40 years (47.37%). This finding is consistent with Sharma BR *et al*⁵, Behera C *et al*⁶, Jha S *et al*⁷, Surendar J and Shiva RD⁸ and Reddy A *et al*⁹. Contrary to present study findings Sirathanout J and Kasantikul V¹⁰ observed that most of the deaths were from age group below 21 yrs. Out of total 95 cases, maximum were males i.e. 78 (82.10%). This is in consistence with most of the other studies. This may be due to the effect that males are prime bread earners of the family and they are more commonly exposed to outdoor activities travelling between the home and place of work while woman remains mainly indoor involved in house hold work. The most common type of scalp injury was contusion present in 37 victims (38.95%) followed by laceration present in 21 victims (22.11%) and least common was crush injury present in 4 victims (4.21%).

This observation is consistent with Sharma BR *et al*⁵, Shivkumar BC *et al*¹¹, Pothireddy S and Karukutla N¹² and Kakeri SR *et al*.¹³ The predominance of contusions and lacerations in scalp can be explained by the heavy blunt force, loose areolar space available for blood accumulation beneath scalp, minimal musculature of the scalp and the velocity of victim at the time of fall on the ground. The most common type of skull fracture was linear / fissured fracture followed by depressed fracture and least common was sutural fracture. This is consistent with Reddy A *et al*⁹, Shivkumar BC *et al*¹¹, Pothireddy S and Karukutla N¹² and Kakeri SR *et al*.¹³ Skull fractures observed in this study can be explained by restricted movement of the head receiving maximum force, more striking surface area of skull in all directions, least protection offered by the minimal scalp musculature when compared to limbs and other parts of the body. It was observed that SDH was most common type of Haemorrhage followed by SAH and least common was EDH. This is consistent with Sharma BR *et al*⁵, Surender J and Shiva RD⁸ and Reddy A *et al*.⁹ The development of acceleration and deceleration forces may produce intracranial pressure gradients responsible for intracranial haemorrhages. This is not consistent with Chandra J *et al*.¹⁴ They observed SAH as more common. In the present study, the most common type of brain injury was contusion followed by oedema and least common was laceration. This is in consistence with Shivkumar BC *et al*¹¹, Pothireddy S and Karukutla N¹² and Shobhana SS and Jagadeesh N.¹⁵ Contusions were more common because of effusion of blood in different layers of brain due to the rupture of blood vessels by blunt trauma. An impacting force to the head can produce distortion of skull, development of shear strain in brain tissue which can produce a contusion.

CONCLUSION

Cranio-cerebral injuries are the major and significant contributory factor in causation of the fatalities on the road resulting from accidents. These accidents are responsible for loss of life, disability and undefined impact on socioeconomic resources (due to loss of productive population). It is time to recognize this public health problem as preventable cause of loss of healthy life. Thus investments are needed to better define the specific characteristics of the problem in uniform manner so that corrective measures could be tested and implemented in accordingly.

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