

Patterns of Head Injury at Tertiary Care Hospital

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Abstract

Background: The incidences of head injuries are growing with increasing number of high speed motor vehicle, more movement of the public and mechanization in industry. Head injury is most common causes of mortality in road traffic accidents and fall from Height. This is because of this special anatomical location of the Head in our body. This study is being taken into account to explore and evaluate pattern of Head injuries in victims reporting to the tertiary health care Hospital.

Methods: This study was a prospective analysis of head injury reporting to Accident & Emergency Department, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, India, a tertiary care Hospital during the period between 2011 to 2013.

Results: Most common cause of Head Injury victims reporting to the tertiary care hospital was Road Traffic Accident. Male victims were commonly getting Head injury due to Road Traffic Accident followed by Occupational Head injury, while Female victims were getting Head injury due to fall from Height followed by Road Traffic Accident. Common age group involved in Head injury was of 21-40 years, winter season (October to February) recorded maximum number of cases. It was clearly reflected that in Head injury, commonest lesion was scalp laceration followed by fractures to the skull (commonest in intra-cranial lesions). However, in the most cases, the skull fractures were found at multiple sites. Sub Dural Haemorrhage was commonest intra cranial hemorrhage followed by Sub Arachnoid haemorrhage in the case sustaining the Head Injury.

Conclusion: Road traffic accidents are most common cause involved in Head injury and the males are more prone to get head injury. By establishing good pre-hospital care and provision of efficient and well organized trauma services at Road side can minimize or prevent mortality aroused from road traffic accidents and fall from Height.

Keywords: Head Injury, Skull fracture, Road traffic accidents, Fall from Height and Tertiary Care Hospital

INTRODUCTION

The incidence of head injury is growing with greater mechanization in industry and an increase in high-velocity transport. The injuries could be caused by a penetrating or blunt force either by direct violence or indirectly, such as a fall at the feet or buttocks. There is no clear relation to the severity of injury to skull bones and the extent of cerebral disorder.

Head Injury has been defined as, “morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/ or the contents of the skull, produced by mechanical forces.”¹ It has also been defined as physical damage to the scalp, skull or brain produced by an external force.²

However, such force or impact, responsible for the injury, needs not to be applied directly to the head. Depending upon whether the dura-matter was torn or not, head injury may be termed as open or close type.³ The extent and degree of injury to the skull and its contents is not necessarily proportional to the quantum of force applied to the head. According to Munro⁴ “any type of cranio-cerebral injury can be caused by any kind of blow on any sort of head.”

Severe head injury, with or without peripheral trauma, is the commonest cause of death and/or disability up to the age of 45 years in developed countries.⁵ This necessitated an in-depth analysis on the pattern of head Injury in road traffic accidents and other factors influencing the Pattern of head injuries.

Head injury is a major public health problem and has already attained epidemic proportions in India. As a result cranio-cerebral trauma places a huge financial and psychological burden upon the society. In India, the problem has become more acute over the last two decades, mainly due to increased vehicular traffic and poor maintenance on the road. The numbers of head injury cases are expected to increase further, due to urbanization, increase vehicular load and high speed bikes. The analysis of prognosis in head injury is crucial depending up on the specialized care team involved in their management.

MATERIALS & METHODS

This study was a prospective analysis of included 500 patients of head injury reporting at the Emergency Department, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, India, during the period between 2011 to 2013. All the patients of head injury who were reported to Accident & Emergency Department were followed during their stay at the hospital from admission to discharge or death. Information was obtained regarding: Nature of head injury (Scalp, Skull, Intracranial), Mode of injury (Fall From Height, Road Traffic Accident, Assault, Occupational).

Head injury cases brought dead, i.e. death on the spot or died on the way to the hospital, Absconded or L.A.M.A cases from Hospital were not considered (Exclusion criteria).

RESULTS

Distributions of different types of mode involved in head injury are shown in Table 1. Majority of victims are of Road Traffic Accident 298 (59.60%) cases followed by Fall From Height 101 (20.20%) cases. Assault 21 (4.20%) and Occupational Head injury 79 (15.80%) cases, whereas other like gunshot etc comprised of 1 (0.20%) cases. According to the Table 1 suffering from head injury to male victims were commonly due to Road Traffic Accident 250 (65.27%) cases followed by Occupational Head injury 78 (20.37%) cases, FFH and Assault were 36 & 18 cases (9.40% & 4.70%) respectively. Suffering from head injury to Female victims were commonly due to FFH 65 (55.56%) cases followed by Road Traffic Accident 48 (41.03%) cases, Assault and Occupational Head injury were 3 & 1 cases (2.56% & 0.85%) respectively.

Table 2 shows age and sex distribution in head injury cases. The peak incidence was observed in the age group 21-30 years comprising 45% of the cases. It was also observed that 21% belonged to the age group 31-40 years. Thus 66% of cases comprised of age group of 21-40 years in

the study. Individuals in the age group 0-10 years were the least affected i.e. in 4.2% of total cases. Out of 500 cases 383 (76.6%) were males while 117 (23.4%) were females. Thus a male: female ratio of 3.27:1 was observed.

Table 1: Circumstance of head injury

Cause of injury	Male	%	Female	%	No. of cases	%
RTA	250	65.27	48	41.03	298	59.60
FFH	36	9.40	65	55.56	101	20.20
Assault	18	4.70	3	2.56	21	4.20
Occupational	78	20.37	1	0.85	79	15.80
Other	1	0.26	0	0.00	1	0.20
Total	383	100.00	117	100.00	500	100.00

Table 2: Age-wise & sex-wise distribution of head injury

Age	Male	%	Female	%	Total	%
0-10	15	3.92	6	5.13	21	4.2
11-20	55	14.36	6	5.13	61	12.2
21-30	176	45.95	49	41.88	225	45
31-40	84	21.93	21	17.95	105	21
41-50	18	4.70	13	11.11	31	6.2
>50	35	9.14	22	18.80	57	11.4
Total	383	100.00	117	100.00	500	100

Effect of seasonal variation leading head injury in relation to number of victims is displayed in Table 3. Winter season (Oct. to Feb.) recorded maximum number 234 cases (46.8%). followed by summer season (March to Jun.) 137 cases (27.4%). in rainy season there were 129 cases (25.8%).

Table 3: Seasonal variations in head injury cases

Season	Cases	%
Summer (Mar to June)	137	27.4
Rainy (Jul to Sep)	129	25.8
Winter (Oct to Feb)	234	46.8
Total	500	100

In the Table 4, it is clearly reflected that in Head injury commonest lesion was Scalp laceration i.e. 251 cases (50.2%), followed by fractures of skull 83 cases (16.6%) which is commonest in intra-cranial lesions. SDH (61 cases) was commonest intra-cranial hemorrhage followed by SAH (52 cases).

Table 4: Frequency of different lesions in head injury

Lesions	Cases	%
Scalp-laceration	251	50.2
Skull fracture	83	16.6
Contusion	44	8.8
SDH	61	12.2
SAH	52	10.4
EDH	36	7.2

As per the study the Table 5 showed that most commonly involvement of multiple bones if skull fracture in head injury cases. Individually temporal bone was involved in skull fracture i.e 22 cases (26.51%) followed by frontal bone which was 21 cases (25.30%). 24 cases were having involvement of more than one bone (28.92%)

Table 5: Pattern of skull fracture

Bone involved	Cases	%
Frontal	21	25.30
Temporal	22	26.51
Parietal	12	14.46
Occipital	4	4.82
Multiple bone	24	28.92
Total case	83	100.00

In this study from Table 6, it is concluded that there was survival of Head injury victim was 94.4% (472 cases) in A tertiary Care Hospital. while 5.6% (28 cases) expired in Hospital due to fatality of Head Injury.

Table 6: Mortality pattern

Outcome	Cases	%
Live	472	94.4
Expired	28	5.6
Total	500	100

DISCUSSION

With exploding population, increasing numbers of automobile vehicle, encroachment of roads, tendency of violating traffic rules and traffic systems have greatly contributed rapid increase in head injury due to the road traffic accident. Head injury is also quite common in assault and Fall from Height injuries and vulnerability of the head is the reason that the fatal injuries are inflicted with intention to kill a person. This results in the double loss for the country. Firstly, expenditure is incurred for the treatment of these victims and secondly being in the most productive age group; it results in huge productive man-days loss. An increased incidence of head injury has the direct repercussions on increased fatalities.

Road traffic accident was the most common mode of head injury in the adult age group. The overall increase in vehicular traffic to the roads is responsible for automobile accidents being the most common mode of fatal injury. In Road Traffic Accidents, head injury is the most common cause of mortality followed by Thoraco-abdominal and the musculo-skeletal injuries in that order.⁵⁻⁷ In our study, we found out the vice - versa i.e. in head injury the most common cause was Road Traffic accidents followed by fall from height. This is in accordance with the study done by

Chen CL et al⁹ which showed 70% road traffic accident, 15.3 % fall from height and assault 8.7% and the result of Kremer C et al¹⁰ also match with this study. The male: Female ratio getting the head injuries was 3.27: 1. In Road Traffic Accidents male: Female victims ratio was 5:1 in the present study, which is in conformity with other workers^{5,11-14,15} who have reported the range from 1.7: 1 to 8: 1. However, the proportional changes of male: Female to 0.5:1 in fall from Height victims. The male predominance in our study also fits well with the reporting of another research of a similar nature.^{16-18,19,22} This gender bias could be because males work outdoors and therefore, they are more commonly exposed to road traffic accidents, assault and occupational injuries.

The maximum number of victims (45%) belonging to the age group of 21 to 30 years followed by 21% belong to the age group of 31 to 40 years is comparable to the results reported by other Indian workers as Jamebaseer M Farooqui et.al¹⁵ found the highest numbers of deaths (39.79%) were recorded in the 20-39 years age group due in head injury victims. However, Akang et al²³ and Lai et al,²⁴ observed that the peak age of such victims was in the fourth decade, with the mean at 33 years. Tripude et al²⁵ also pointed that commonest age group was 21-30 (39%) and next common was 31-40 (18%). The reason for the above is that young adults are the prime bread earners of the family and remain outdoors during most of the day. Furthermore, young persons are by nature indulge in more violence activity's persons. Persons in extremes of the age usually remain indoors whereas children are confined to the outskirts of the residential premises only.

In this study we found that winter season (Nov. to Feb.) recorded maximum number of 234 cases (46.8%) followed by summer season (March to Jun.) 137 cases (27.4%). The Rainy season recorded the least 129 (25.8%) cases. This is in accordance with Sinha et al²⁶ and Dhatarwal et al²⁷ that found maximum fatality in winter season as during winter, there is longer hours of night, poor visibility to vehicle drivers in the darkness and early hours of the day due to foggy weather conditions and slow reaction time due to extreme cold affecting both drivers and road users. This is not in accordance with Eken et al²⁸ that had reported that 70% of the accidents have occurred in rainy season. The reason for this is that in rainy season. there are poor slippery roads and poor visibility leading to accidents.

Scalp laceration observed in 50.2% cases, Skull fractures, at one or multiple sites, observed in 16.6 % of the victims. In the present study, there were 251 individuals with injuries to the scalp. There were 249 cases with no scalp injury at all. The commonest type of injury was laceration and heamatoma. Study conducted in Delhi by Tyagi et al²⁹ reported scalp injuries to be present in 76%, while Gupta et al³⁰ reported 89% of scalp laceration. These findings are consistent with this study.

Cases of head injury with fractures of the skull tend to have more complications and are more often fatal than those without fracture.^{7,8} The bones involved in order of frequency, in the study were: Frontal (25.30%), Temporal (26.51%), Parietal (14.46%) and Occipital (4.82%). However, in the most common cases, i.e. 24 cases (28.92%) the fractures were found at multiple sites. Akang et al²³ in their study reported: Frontal (12%), Temporal (9%) and Parietal (9%). Chandra et al⁹ reported: Temporal (59%), Occipital (58%) Parietal (50%) and Frontal (49%). Both series, however, have reported the skull fractures at multiple sites as the most common. The commonest intracranial haemorrhage being subdural in our study, followed by subarachnoid is in conformation to the observations made by Akang et al.²³ The findings differ with the observations of Chandra et al¹¹ who have reported subarachnoid haemorrhage as the commonest.

CONCLUSION

The study showed that most head injury victims, brought to a tertiary care hospital, were due to road traffic accidents and males are more prone to get Head injury. So it warrants the urgency to establish good pre-hospital care and provision of efficient and prompt trauma services at Road side to prevent mortality aroused from RTA. RTA remains the most common cause for Head injury and demands good neurosurgical care for such patients. By the compiling the records of these traumas at national level or international level can underline risk factors involved in these accidents, will be extremely helpful in the policy building and making the decisions for health promotion and health building at national or international level.

REFERENCES

- Vij K. Text Book of Forensic Medicine and Toxicology. 2nd ed. India: Churchill Livingstone; 2002: 521.
- Irgebriksen T, Mortensen K, Romner B. The epidemiology of hospital referred head injury in Northern Norway. *Neuroepidemiology*. 1998;17: 139-146.
- Reddy KSN. The Essentials of Forensic Medicine and Toxicology. 16th ed. India : K Sugnadevi publications;1997:199.
- Munro D. Cranio-cerebral injuries. In: Gordon I, Shapiro HA, Berson SD. editors. Forensic Medicine A Guide to Principles. 3rd ed. Oxford University Press: Churchill Livingstone, 1998:252.
- Baethmann A, Lehr D, Wirth A. Prospective analysis of patient management in severe head injury. *Acta Neurochirurgica*. 1998;715:107-10.
- Sharma BR, Harish D, Sharma V, Vij K. Road Traffic accidents - A Demographic and Topographic analysis. *Med Sci Law*. 2001;41:266-74.
- Banerjee KK, Aggarwal BBL, Kohli A. Study of thoraco- abdominal injuries in Fatal Road Traffic Accidents in North East Delhi. *Jour For Med Toxicology*. 1997;14:40-43.
- Lalwani S, Agnihotri AK, Talreja A, Murti OP. Patterns of injuries in fatal fall from height - A retrospective review. *Jour For Med Toxicol*. 1999;16(2):38-46.
- Chen CL, Howng SL. [The incidence and mortality rates of head injuries in Kaohsiung City, Taiwan (1991-1992)]. *Gaoxiong yi xue ke xue za zhi. The Kaohsiung journal of medical sciences*. 1995;11(9):537-545.
- Kremer C, Sauvageau A. Discrimination of falls and blows in blunt head trauma: assessment of predictability through combined criteria. *J Forensic Sci*. 2009;54(4):923-926.
- Chandra J, Dogra TD, Dikshit PC. Pattern of Cranio-intra cranial injuries in fatal vehicular accidents in Delhi 1966 -76. *Med Sci Law*. 1979;19:187-94.
- Maheshwari J, Mohan D. Road traffic accidents in Delhi: A hospital based study. *J Traffic Med*. 1989;17:21-24.
- Lai YC, Chen FG, Goh MH, Koh KF. Predictors of long term outcome in severe head injury. *Annals Acad Med Singapore*. 1998;27(3):326-31.
- Aurora SB. Road fatalities among women rise alarmingly. The Indian Express. (Chandigarh News line). 2000;Nov12:1.
- Farooqui J M , Chavan K D , Bangal R S , Syed MMA, Thacker PJ, Alam S, et al. Pattern of injury in fatal road traffic accidents in a rural area of western Maharashtra, India. *Australas Med J*. 2013;6(9):476-482.
- Kochar A, Sharma GK, Mutari A, Rehan HS. Road traffic accidents and alcohol: A prospective study. *International Journal of Medical Toxicology & Legal Medicine*. 2002;5: 22-24.
- Jha N, Srinivas DK, Roy G, Jagdish S. Epidemiological study of road traffic cases: A study from south India. *Indian Journal of Community Medicine*. 2004; 29: 20-24.
- Azmani W, Rusli MA, Ismail AA, Hashim M. Factors and road accidents during festive seasons in Kelantan. *NCD Malaysia*. 2005; 4: 24-27.
- Menon A, Pai VK, Rajeev A. Pattern of fatal head injuries due to vehicular accidents in Mangalore. *Journal Forensic & Legal Medicine*. 2008; 15: 75-77.
- Bansal YS, Dikshit PC. Pattern of chest injuries in fatal vehicular accidents in central Delhi. *International Journal of Medical Toxicology & Legal Medicine*. 2001; 4: 21-26.
- Henriksson E, Ostrom M, Erikson A. Preventability of vehicle-related fatalities. *Accident Analysis Prevention*. 2001; 33: 467-475.
- Toro K, Hubay M, Sotonyi P, Keller E. Fatal traffic injuries among pedestrians, bicyclist and motor vehicle occupants. *Forensic Science International*. 2005; 151: 151-156.
- Akang EEU, Kuti MA, Osunkoya AO, Komolafe EO, Malomo AO, Shokunbi MT, et al. Pattern of fatal Head Injuries in Ibadan- A 10 year Review. *Med Sci Law*. 2002; 42: 162-166.
- Adeloye A, Al-Kuoka N, Sembatya-Lule GC. Pattern of acute head injuries in Kuwait. *East Afri Med Jr*. 1996; 73: 235-238.
- Tripude BH, Naik RS, Anjankar AJ, Khajuria BK. A study of the pattern of Cranio cerebral injuries in road traffic accidents. *Journal of Indian Academy of Forensic Medicine*. 1998;20(1): 9-12.
- Sinha US, Kaul A, Kapoor AK, Pathak YK , Sharma S, Singh A, et al. An epidemiological study of fatal road traffic accidents in Allahabad region. *Indian Internet Journal of Forensic Medicine & Toxicology*. 2005; 3(1).
- Dhatarwal SK, Singh H. Pattern and distribution of injuries in fatal road traffic accidents in Rohtak (Haryana). *Journal of Indian Academy of Forensic Medicine*. 2004; 26 (1): 20-23.
- Eke N, Etebu EN, Nwosu SO. Road traffic Accidents mortalities in Port Harcourt, Nigeria. *Anil Agarwal's Internet Journal of Forensic Medicine and Toxicology*. 2000;1:1-6.
- Tyagi AK, Sharma GK, Kumar B. Craniocerebral damage by blunt force impact. *Journal of Indian Academy of Forensic Medicine*. 1986; 1: 24-39.
- Gupta S, Roychowdhury UB, Deb PK, Moitra R, Chhetri D. Demographic study of fatal Cranio-cerebral road traffic injuries in North Bengal region. *Indmedica*. 2007 ; 7(1): 01-03.

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