

Pattern of head injury cases admitted at tertiary care centre in central India

Avinash H. Waghmode^{1,*}, Satin K. Meshram²

¹Assistant Professor, ²Professor & HOD, Dept. of FMT, ¹BKL Walawalkar Medical College & Hospital, Chiplun, Maharashtra, ²Govt. Medical College, Solapur, Maharashtra, India

***Corresponding Author:**

Email: avinashw4@gmail.com

Abstract

The present was the prospective study prospective on head injury cases admitted at tertiary care centre. Cases with the history of head injury which are admitted to the hospital are included in this study. The cases which were brought dead and which were having other visceral injury other than brain are excluded from this study. The present study was carried out in the department of Forensic medicine and Toxicology, Indira Gandhi Government Medical College, Nagpur during the period of November 2011 to October 2013. In the present study 21 to 30 year was the most commonly involved group in which male outnumbered the female. Out of 103 cases, road traffic accident was the most common cause of head injury followed by fall from height and assault. Most of the cases (i.e., 61 cases) died during the first 24 hours of admission. Fissured (Linear) fracture was the most common type of skull fracture observed in the present study (41.35% cases). Temporal bone was the most common bone involved. Subdural and subarachnoid haemorrhages are the most common type of intracranial haemorrhage observed in the present study.

Keywords: Head injury, Skull fracture, Intracranial haemorrhage.

Introduction

Head injury is a significant public health problem worldwide and is predicted to surpass many diseases as a major cause of death by 2020. There is some data to indicate that majority of traumatic brain injury cases (60%) are as a result of road traffic accident, followed by falls (20-30%), and violence (10%).⁽¹⁾ Traumatic head injury is a leading cause of death and disability in children and adults in their most productive years. The morbidity and mortality due to head injury is on the rise and is one of the prime importance in today's medical practice.⁽²⁾

Cranio-cerebral injury or Head injury is defined by National Advisory Neurological Diseases and Stroke Council as "a morbid state, resulting from gross or subtle structural changes in scalp, skull, and/ or the contents of the skull, produced by mechanical forces". Here, the forces are restricted to those that are applied externally to the head, thus excluding the surgical ablations and internally acting forces such as increased intracranial pressure resulting from oedema, hydrocephalus and mass occupying lesions without any antecedent trauma to the head.⁽³⁾

Of all regional injuries those of head are most common and most important in forensic practice. The reason for their dominance as furnished by Adelson, are listed below:

1. Head is the target of choice in great majority of assaults involving blunt trauma.
2. On being pushed or knocked to the ground, the victim usually strikes his head.
3. The brain and its coverings are vulnerable to that degree of blunt trauma as would rarely prove fatal, if applied to other parts of body.⁽⁴⁾

Head injuries are basically classified into two types depending on the involvement of dura mater. Closed head injury where the dura mater is intact and open head injury where dura mater is torn. However based on gross anatomical involvement of structures head injuries are classified into scalp injuries, facial injuries, skull injuries, injury to meninges and injury to the brain.⁽⁵⁾

The aim of this study is to determine age and sex distribution, survival period and pattern of craniocerebral injury in cases of head injury admitted at Tertiary Care Centre.

Material and Methods

The present study was the prospective study entitled "Pattern of head injury cases admitted at Tertiary Care Centre in Central India". The study has been carried out at Department of Forensic Medicine and Toxicology of a Tertiary care Medical Teaching Institute during the period of November 2011 to October 2013. Prior to post-mortem examination, history of nature of injury was elicited from relatives, police panchnama and available clinical data for judging the mechanism and probable pathology of the injury. The cases having only history suggestive of head injury were included in this study. The cases which were brought dead and having other visceral injury were excluded in the study. The findings were recorded and analysis was done to find out age and sex distribution, cause of head injury, survival time and pattern of head injury including skull fractures, intracranial haemorrhages etc. The data was studied statistically using percentage and ratio analysis and finally inferences were made. This study was carried out as a part of thesis work and permission for this

study was taken from the Institutional Ethical Committee.

Observations and Results

Table 1: Age & Sex wise distribution of Head injury cases

Age in years	No. of cases		Total	%
	Males	Females		
0-10	00	00	00	00
11-20	03	00	03	2.91
21-30	24	02	26	25.24
31-40	24	00	24	23.30
41-50	20	03	23	22.33
51-60	16	02	18	17.48
61-70	03	02	05	4.84
71-80	02	02	04	3.88
>81	00	00	00	00
TOTAL	92 (89.32%)	11 (10.68%)	103	100

Table 1 shows the age and sex wise distribution of head injury cases. From the Table 1 it is observed that incidence of head injury was more in males than the females. Out of 103 cases, 92 (89.32%) victims were males and 11 (10.68%) cases were females. Table 1 also shows that out of 103 cases, maximum incidence of head injury was found in the age group of 21-30 years comprising 26 (25.24%) cases, followed by 31-40 years 24 (23.30%) and 41-50 years 23 (22.30%). The age group 51-60 yrs comprised of 18 (17.48%) cases. The other affected group were 61-70 yrs and 71-80 yrs group comprising of 5 (4.84%) cases and 4 (3.88%) cases respectively.

Table 2: Distribution of cases according to cause of head injury

Cause of Head Injury	No. of Cases	%
Road traffic accident	73	70.87
Fall from height	18	17.48
Assault	09	8.74
Others	03	2.91
Total	103	100

From the Table 2 it is observed that road traffic accident was the commonest cause of head injury seen in 73 (70.87%) cases. This is followed by fall from height 18 (17.48%) cases and assault 9 (8.74%) cases. The other causes like fall of tree or wall over head were seen in 2.91% cases.

Table 3: Distribution of cases according to survival time

Survival period	No. of cases	%
Within 24 hours	61	59.22
1-2 days	17	16.51

2-3 days	10	9.71
3 – 7 days	11	10.68
> 7 days	04	3.88
Total	103	100

From the Table 3 it is seen that most of the cases 61 (59.22%) died within 24 hrs of admission to the hospital. 17 (16.51 %) cases survived for 1-2 days. 10 (9.71 %) of cases survived for 2-3 days. 11 (10.68%) cases survived for 3-7 days and about 4 (3.88%) of cases survived for more than 7 days. Thus the most fatal period was first 24 hours.

Table 4: Distribution of cases according to type of skull fracture (n=103).

Type of skull fracture	No. of cases	%
Linear (Fissured)	43	41.75
Depressed	14	13.59
Comminuted	09	8.74
No fracture	42	40.77

From the Table 4 it is evident that linear fracture was observed in 43 (41.75%) cases followed by depressed fracture in 14 (13.59%) and comminuted fracture in 09 (8.74%) cases. Thus the linear fracture was the most common skull fracture encountered at autopsy examination. Out of these 43 cases of linear fracture, 3 cases were associated with comminuted fracture and 4 cases were associated with depressed fracture, however in 36 cases linear fracture was found solely.

Table 5: Distribution of cases according to location skull fracture. (n=103)

Location of skull fracture		No of cases	%
Cranial Vault	Temporal	43	41.75
	Parietal	23	22.33
	Frontal	10	9.71
	Occipital	07	6.80
Base of skull	Anterior Cranial Fossa	11	10.68
	Middle Cranial Fossa	10	9.71
	Posterior Cranial Fossa	09	8.73

From the Table 5 it is seen that temporal bone was involved in skull fracture accounting for 43 (41.75%) cases followed by parietal bone 23 (22.33%) cases, frontal bone 10 (9.71%) and occipital bone 7 (6.80%) cases. Thus temporal bone was the most common bone involved in fracture of skull in the present study. Regarding the base of skull, anterior cranial fossa is involved in 11 (10.68%) cases followed by middle cranial fossa in 10 (9.71%) cases and posterior cranial fossa in 09 (8.73%) cases.

Table 6: Distribution of cases according to type of intracranial hemorrhage and brain injury (n=103)

Type of Intracranial Hemorrhage and brain injury	No. of cases	%
SDH	86	83.50
SAH	85	82.52
EDH	19	18.44
ICH	11	9.71
IVH	05	4.84
Contusion	50	48.54
Laceration	24	23.30
Cerebral edema	35	33.98

From the Table 6 it is observed that subdural haemorrhage is the most common type of haemorrhage detected in 86 (83.50%) cases closely followed by subarachnoid haemorrhage (SAH) in 85 (82.52%) cases, extradural haemorrhage (EDH) in 19 (18.44%) cases, intracerebral haemorrhage (ICH) in 11 (9.71%) cases and intraventricular Haemorrhage (IVH) in 5 (4.84%) cases. Out of 103 cases combination of subdural haemorrhage and subarachnoid haemorrhage was found in 70 cases. In all the cases either of the intracranial haemorrhage was present. From the Table 6 it is also seen that out of 103 cases contusion of the brain was the most common traumatic brain injury observed followed cerebral edema and lacerations of brain. Contusions of the brain were observed in 50 (48.54%) cases followed by cerebral edema in 35 (33.98%) cases and laceration of brain in 24 (23.30%) cases. Contusions are associated with lacerations in 13 cases.

Discussion

In the present study the most common group involved in head injury is 21-30 yrs age group comprising 26 cases (25.24%) followed by 31-40 yrs age group comprising 24 (23.30%) cases and 41-50 yrs age group 23 (22.30%) cases. Our findings are consistent with the study done by the other authors.⁽⁶⁻¹⁰⁾

This age group (21-40 years) is the most vulnerable group involved in head injury cases. The obvious reason being that they are form the main working group. This age group is most active phase of life physically and socially. People in this age group are constantly mobile for work, education or recreational activities. Hence prone to road traffic accident, falls, assaults which are one of the major causes of head injuries.

Regarding the sex distribution preponderance of male victims over the females with a male: female ratio of 8.36:1 (92 Male and 11 Female) was observed in the present study. Males were outnumbered females in all age group except age group 71-80 yrs where it is

equally distributed. Similar findings were noted in the study done by other authors.^(6,7,10)

A high incidence of head injury among males can be explained by the fact that males are the working class, they lead a more active life and keep themselves outdoor for most of the time. In accordance to road traffic accident and most of the vehicles in India are driven by males. On the contrary, females keep themselves indoors doing household activities.

Regarding the distribution of cases according to the cause of head injury, out of 103 cases the cause of head injury, the most common cause was road traffic accident accounting for 73 (70.87%) cases followed by fall from height 18 (17.48%) cases and remaining number of cases were due to assault 9 (8.74%) and other causes in 3 (2.91%) cases. Similar observation was made in studies done by other authors.^(11,12)

Regarding the distribution of cases in accordance to the survival time most of the cases 61 (59.22%) died within 24 hrs of admission to the hospital. 17 (16.51 %) cases survived for 1-2 days and died. 11 (10.68%) cases survived for 3-7 days and died. About 04 (3.88%) of cases survived for more than 7 days. A similar observation was made in other studies.^(13,14)

With respect to distribution of cases according to the type of skull fracture in the present study it is evident that linear (fissured) fracture was observed in 43 (41.75%) cases followed by depressed fracture 14 (13.59%) and comminuted fracture in 09 (8.74%) cases i.e., linear fracture was the most common skull fracture encountered at autopsy examination. Our observation is in agreement with the study carried out by other authors.^(8,15) However our present study is in contrast with the study conducted by one author⁽¹⁶⁾ where comminuted fractures were found in a maximum number of cases (45.16%), followed by depressed and linear fractures (38%) in almost the same numbers of cases. Probable reason for this disparity might be due to inclusion of brought dead patients with extensive damage to head, while in present study such cases have been excluded.

With regard to the location of skull fracture in the present study, temporal bone was the most common bone involved in skull fracture accounting for 43 (41.75%) cases followed by parietal bone 23 (22.33%) cases, frontal bone 10 (9.71%) and occipital bone 07 (6.80%) cases. Similar observations were found in a study done by other authors.⁽¹⁷⁻¹⁹⁾ Regarding the base of skull, anterior cranial fossa is involved in 11 (10.68%) cases followed by middle cranial fossa in 10 (9.71%) cases and posterior cranial fossa in 09 (8.73%) cases. However Reddy SP et al⁽²⁰⁾ found that the commonest region of the base of the skull involved in fractures was the middle cranial fossa followed by anterior cranial fossa and posterior cranial fossa.

Regarding the type of intracranial hemorrhage in the present study, subdural hemorrhage was the most common type of hemorrhage detected in 86 (83.50%)

cases closely followed by subarachnoid hemorrhage in 85 (82.52%) cases. Extradural hemorrhage was found in 19 (18.44%) cases, intracerebral hemorrhage in 11 (9.71%) cases and intraventricular hemorrhage in 05 (4.84%) cases. Similar observations were found in a study carried out by other authors.^(7, 8,19)

Regarding the distribution of cases according to the type of traumatic brain injury, it was observed that out of 103 cases, contusion of the brain was the most common traumatic brain injury observed in 50 (48.54%) cases followed by cerebral edema in 35 (33.98%) cases and laceration of brain in 24 (23.30%) cases. These findings are consistent with the study done by other authors.^(8,21)

Summary and Conclusions

In the present study Male victims (89.32%) outnumbered the Females victims (10.68%). Maximum incidence of head injury was found in age group 21-30yrs comprising of 26 (25.24%) cases followed by 31-40 yrs in 24 (23.30%) cases followed by 41-50yrs group in 23 (22.33%). Most common cause of head injury was road traffic accident observed in 73 (70.87%) cases followed by fall from height in 18 (17.48%) cases and assault in 09 (8.74%) cases. Most of the cases 61 (59.22%) cases died within 24 hrs of admission to the hospital. Fissured fracture was the most common type of skull fracture observed in 43 (41.75%) cases followed by depressed fracture in 14 (13.59%) and comminuted fracture in 09 (8.74%) cases.

Temporal bone was most common bone of skull involved in fracture in 43 (41.75%) cases followed by parietal bone in 23 (22.33%) and frontal bone in 10 (9.71%) cases. Occipital bone was least commonly involved in (6.80%) cases. Subdural haemorrhage was detected in 86 (83.50%) cases closely followed by subarachnoid haemorrhage 85 (82.52%) cases. Extradural Haemorrhage was observed in 19 (18.44%) cases and intracerebral haemorrhage in 11 (9.71%) cases. Intraventricular haemorrhage (4.84%) was least commonly observed. Combination of subdural haemorrhage and subarachnoid haemorrhage was found in (67.96%) cases.

References

1. Puvanachandra P, Hyder AA. The burden of traumatic brain injury in Asia: A call for research. *Pakistan journal of neurological sciences*. 2009;4(1):27-32.
2. Ghebrehiwet M, Quan LH, Andebirhan T. The profile of CT scan findings in acute head trauma in Orrota hospital, Asmara, Eritrea. *Journal of Eritrean medical association*. 2009;4(1).
3. Tedeschi CG. Head and Spine. In: Tedeschi CG, Eckert WG, Tedeschi LG, editors. *Forensic Medicine – A study in trauma and environmental hazards*. Philadelphia: WB Saunders;1977. p. 29-75.
4. Vij K. Regional Injuries. In: *Textbook of Forensic Medicine and Toxicology: Principles and practice*. 5th ed. 2011. New Delhi: Reed Elsevier;p. 270.
5. Rao NG. Regional injuries. In: *Text book of Forensic medicine and Toxicology*. 2nd ed. 2010. New Delhi: Jaypee brothers medical publishers (P) Ltd;p. 234.
6. Tirpude BH, Naik RS, Anjankar AJ, Khajuria BK. A study of the pattern of cranio-cerebral injuries in road traffic accidents. *J Indian Acad Forensic Med* 1998;20(1):9-12.
7. Sharma BR, Harish D, Singh G, Vij K. Pattern of fatal head Injury in road traffic accidents. *Bahrain Medical Bulletin* 2003;25(1):22-25.
8. Menon A, Nagesh K. Pattern of head injuries due to vehicular accidents in Manipal. *J Indian Acad Forensic Med* 2005;27(1):19-22.
9. Gupta S, Deb PK, Moitra R, Chhetri D. Demographic study of fatal cranio-cerebral road traffic injuries in North Bengal region. *J Indian Acad Forensic Med* 2007;29(1):25-27.
10. Banerjee KK, Agrawal BB, Kohli A, Agrawal NK. Study of head injury victims in fatal road traffic accidents in Delhi. *Indian Journal of Medical Sciences* 1998;52(9):395-98.
11. Goyal MK, Verma R, Kochar SR, Asawa SS. Correlation of CT scan with post mortem findings of acute head trauma cases at SMS hospital, Jaipur. *J Indian Acad Forensic Med* 2010 Jul-Sep;32(3):208-11.
12. Pathak A, Desania NL, Verma R. Profile of road traffic accidents & head injury in Jaipur (Rajasthan). *J Indian Acad Forensic Med* 2009;30(1):6-9.
13. Honnungar R, Aramani S, Kumar V, Kumar A, Jirli P. An epidemiological survey of fatal road traffic accidents and their relationship with head Injuries. *J Indian Acad Forensic Med* 2011;33(2):135-37.
14. Shivakumar B, Shrivastava P, Shantakumar H. Pattern of head injuries in mortality due to road traffic accidents involving two-wheelers. *J Indian Acad Forensic Med* 2010;32(3):239-42.
15. Chattopadhyay S, Tripathi C. Skull fracture and haemorrhage pattern among fatal and nonfatal head injury assault victims – a critical analysis. *J Inj Violence Res*.2010 June;2(2):99-103.
16. Jha S, Yadav BN, Agrawal A, Thakur D, Karna A, Subedi N, Gurung S. The pattern of fatal head injury in a teaching hospital in Eastern Nepal. *Journal of clinical and diagnostic research* 2011 Jun;5(3):592-96.
17. Khadim MT. Patterns of fatal head injuries due to road traffic accidents – Autopsy findings at AFIP Rawalpindi, Pakistan; 2011. [Internet] [cited 2012 August 14]. Available from: URL: http://www.pafmj.org/show_details.php?id=465&t=o
18. Kumar D, Bains V, Sharma B, Dasari H. Descriptive study of head injury and its associated factors at tertiary hospital, Northern India. *Journal of community medicine and health education* 2012;2(4):2-4.
19. Kumar A, Lalwani S, Agarwal D, Rautji R, Dogra TD. Fatal road traffic accidents and their relationship with head injuries: An epidemiological survey of five years. *Indian Journal of Neurotrauma* 2008;5(2):63-67.
20. Reddy SP, Manjunatha B, Balaraj BM. Correlation of computed tomography and autopsy findings of cranio-cerebral injuries sustained in road traffic accidents. *J-SIMLA* 2009 Sep;1(2):53-57.
21. Vaz WF, Patil AM. Pattern of fatal blunt head injury: A two year retrospective / prospective medico legal autopsy study. *J Indian Acad Forensic Med* 2010;32(2):144-49.