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An epidemiological study of fatal head injury cases in a sub urban region of Chennai: A prospective study of 350 autopsy cases

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ABSTRACT

It is a prospective study of 350 fatal head injury cases brought during the study period extending from Jan'2016 to Dec'2017 admitted and treated in our tertiary health care center. The incidence of fatal head injury is growing with increasing number of high speed vehicle, more mobility of the public and urbanization. In short, it is the single most common cause of morbidity and mortality in emergency wards. Maximum cases were seen in the age range of 21-30yrs, 89 cases (25.42%). Maximum cases were seen amongst males, 281 cases, 80%. The commonest causes of fatal head injuries are Road Traffic Accident (RTA) cases. Other important causes of fatal head injuries are fall from height, assault & railway accidents. External head injuries were mainly seen on frontal and parietal regions. Amongst the scalp injuries lacerations were very common seen in 149 cases, 35.90%. Skull bone fractures were frequently seen in fatal head injury cases. Presence of skull bone fractures are associated more frequently with fatal complications. Though linear fractures are common in general we observed the comminuted fractures as the commonest type of skull fractures in fatal head injury cases, seen in 77 cases, (57.03%). Depressed fractures were less common in fatal cases. Involvement of cranial fssa was seen in 113 cases. Linear type of fractures both transverse and horizontal type was more common seen in 71 coases amongst the 113 cases of cranial fossa involvement i.e. 62.83%. Involvement of middle cranial fossa was high seen in 47 cases of the 113 cases i.e. (41.59%). Presence of comminuted skull bone fractures is associated with higher rate of mortality.

1. Introduction

Traumatic head Injury may be defined as, "a morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/or the contents- of skull, produced by mechanical forces".[1] Even though the term "head injury" most often denotes an injury to the brain, head injuries may also include the bones, muscles, blood vessels, skin, and including the face. The extent and degree of injury to the skull and its contents is not necessarily proportional to the amount of force applied. Head injury is a leading cause of mortality, morbidity, disability, and socioeconomic losses in India. Approximately 1.5–2 million persons are injured, and 1 million die every year in India due to fatal head injuries.[2] Its fatality and final outcome depend on different mechanisms including types and amounts of head injuries and their anatomical locations. The analysis of prognosis in head injury is crucial depending up on the specialized care team involved in their management. The present study examines the pattern of head injury with reference to fatality and it is observed that when there was involvement of multiple fractures of the skull the survival period was relatively shorter.

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Table 1: According to age & sex

Age Group (In years)	Male	Female	Total
0-10	9	4	13 (3.71%)
11-20	20	5	25 (7.14%)
21-30	80	9	89 (25.42%)
31-40	61	14	75 (21.42%)
41-50	61	13	74 (21.14%)
51-60	18	12	30 (8.85%)
61-70	23	10	33 (9.42%)
Above 70	9	2	11 (3.14%)
Total	281	69	350 (100%)

Table 2: Cases distribution according to cause injury

Cause	Male	Female	Total
RTA	246 (70.28%)	36 (10.28%)	282 (80.57%)
Fall from height	20 (5.71%)	11 (3.14%)	31 (8.85%)
Assault	10 (2.85%)	5 (1.42%)	15 (4.28%)
Railway Accidents	17 (4.85%)	5 (1.42%)	22 (6.28%)
Total	293 (83.71%)	57 (16.28%)	350 (100%)

Table 3: Patterns of scalp injuries

Site	Abrasions	Contusions	Lacerations	Total
Frontal	48 (11.56%)	35 (8.43%)	45 (10.84%)	128 (30.84%)
Rt. Parietal	16 (3.85%)	19 (4.57%)	23 (5.54%)	58 (13.97%)
Lt. Parietal	15 (3.61%)	17 (4.09%)	23 (5.54%)	55 (13.25%)
Rt. Temporal	20 (4.81%)	20 (4.81%)	19 (4.57%)	59 (14.21%)
Lt. Temporal	20 (4.81%)	25 (6.02%)	20 (4.81%)	65 (15.66%)
Occipital	17 (4.09%)	14 (3.37%)	19 (4.57%)	50 (12.04%)
Total	136 (32.77)	130 (31.32%)	149 (35.90%)	415 (100%)

N.B:- n=415, percentage calculation is based on total number of scalp injuries

Table 4: Patterns of skull fractures

Fracture Type	Frontal	Parietal	Temporal	Total
Linear	21 (15.55%)	14 (4%)	13 (9.62%)	48 (35.55%)
Depressed	5 (3.70%)	3 (2.22%)	2 (1.48%)	10 (7.40%)
Comminuted	12 (8.88%)	22 (16.29%)	43 (31.85%)	77 (57.03%)
Total	38 (28.14%)	39 (28.88%)	58 (42.96%)	135 (100%)

N.B.:-n=135, we exclude those cases showing no skull fracture

Table 5: Patterns of cranial fossa fracture

Fracture	Ant. Cranial Fossa	Middle Cranial Fossa	Post. Cranial Fossa	Total
Linear	17 (15.04%)	30 (26.54%)	24 (21.23%)	71 (62.83%)
Comminuted	12 (10.61%)	17 (15.04%)	13 (11.50%)	42 (37.16)
Total	29 (25.66%)	47 (41.59%)	37 (32.74%)	113 (100%)

Table 6: Patterns of intracranial injuries

Type of Injury	No of Cases	%
Extra-Dural hemorrhage	48	20.77
Sub-Dural hemorrhage	59	25.54
Sub-Arachnoid hemorrhage	64	27.70
Intracerebral hemorrhage	12	5.19
Contusions	36	15.58
Lacerations	12	5.19
Total	231	100

Table 7: Cases distribution according to survival period

Survival Period	No of cases	%
Brought dead	128	36.57
1 – 6 hours	58	16.57
6 – 24 hours	62	17.71
1 – 3 days	52	14.85
3 days – 1 week	27	7.71
More than 1week	23	6.57

2. Materials & Methods

The present study was conducted on the dead bodies brought in the mortuary of the Department of Forensic Medicine, Government Chengalpet Medical College, Chengalpet, Tamil Nadu during the study period extending from Jan'2016 to Dec'2017. We selected only fatal head injury cases due to mechanical violence. However, we included severe facial injury cases too as these cases were associated with head injury. But, the present study doesn't involve crushed head injury or survived cases, referred or LAMA cases brought in the hospital. All relevant information like name, age, sex, religion, occupation, marital status, injuries were collected from police papers, hospital case sheets, history taking from relatives. This information was tabulated along with our autopsy findings for study and comparison with the works of other authors.

3. Results & Discussion

There were 350 cases of fatal head injuries whose post-mortem examinations were conducted at our tertiary health care centre during the study period. Maximum cases were seen in the age range of 21-30yrs, 89 cases (25.42%). In the 0-10years age category there were 13 cases of fatal head injury, 9 boys and 4 girls. In the above 70 years age category there were 11cases, 9males and 2females out of which 5cases were from road traffic accidents. Majority of the victims were males (281 cases, 80%). The numbers of female victims were 69 only (19.71%) as shown in Table 1. RTA contributes the maximum number of cases, 80.57% (Table 2). Other important causes of fatal head injuries are fall from height, railway accidents and assaults in descending order.

There were 415 total external injuries seen on the scalp as shown in Table 3. So far external injuries are concerned, lacerations were seen most common, 149 lacerations (35.90%). Overall 136 abrasions were seen on different parts of the head which is about 32.77% of all injuries on the head region Abrasions were more common on frontal region including the forehead region, 48 abrasions which is about 11.56% of all injuries on head. Contusions are also more common on frontal region, 35 contusions which is about 8.43% of all injuries. Altogether there were 135 different types of skull bone fractures out of which linear and comminuted fractures were more common in fatal head injury cases (Table 4). Altogether there were 48 linear fractures which were about 35.55% of all fractures seen. Linear fractures were most commonly seen on the frontal bone which was followed by parietal and temporal bones in descending order. There were 10 depressed fractures altogether out of which 5 were on the frontal, 3 on the parietal and 2 on the temporal regions. In 113 cases there was involvement of cranial fossa. Linear type of fractures both transverse and horizontal type was more common seen in 71 cases amongst the 113 cases of cranial fossa involvement i.e. 62.83%. Involvement of middle cranial fossa was high seen in 47 cases of the 113 cases i.e. (41.59%) as shown in Table 5. Bad prognosis is associated with comminuted type of skull fractures.

For convenience and easy comparison with the works of previous studies we divide the intracranial injuries as shown in Table 6. Out of the total 350 fatal head injury cases we found visible intracranial injuries in 231 cases. Extra-Dural hemorrhage was seen in 48 cases, 20.77%. The most common intracranial hemorrhage was sub-arachnoid hemorrhage which was seen in 64 cases, 27.7%. The brain matter contusions and lacerations were seen in 36 and 12 cases respectively (Table 6). There were as many as 128 brought in dead cases (36.57%) out of the 350 fatal head injury cases. If we take together then majority of death occurred within 24 hours of the incident as shown in Table 7. In one case of sub arachnoid hemorrhage death was delayed about 4 months 9 days and later died due to late complications. So far the gender is concerned, males outnumbered females with male to female ratio of 4:1. If we consider age wise then incidence was higher in the age group 21-30 yrs, 89 cases (25.42%). Male dominance & age wise pattern is more or less similar with the works of other authors[3–6] with similar explanation that younger age group males are more mobile and engaged in outdoor activities. In our study Road Traffic Accidents were the commonest causes of fatal head injuries seen in 282cases, 80.57%. The motor-cyclists were the commonest group of victims, comprising 31.90% cases, followed by Light Motor Vehicle users comprising 21.40% cases which were closely followed by pedestrians constituted 15.21% of the cases. Head injury is also quite common in fall from height (seen in 31 cases, 8.85%) and assault (seen in 15 cases, 4.28%). Present study is in accordance with the study done by Chen CL et al.[7] which showed 70% road traffic

accident, 15.3 % fall from height and assault 8.7% and the result of Kremer C et al.[8] also match with this study. In the present study, in cases due to assaults, depressed and comminuted types of skull fractures were common. External head injuries were mainly seen on frontal and parietal regions. Amongst the scalp injuries lacerations were very common seen in 149 cases, 35.90%. Study conducted by Tyagi et al.[9] Pathak A et al.[10] and Anand Menon, Nagesh K R reported scalp injuries to be present in 76%, while Gupta S et al. reported 89% of scalp laceration. Our finding was consistent with the works of Lalit et al.[6] We observed the comminuted fractures as the commonest type of skull fractures in fatal head injury cases, seen in 77 cases, (57.03%). This finding is not in agreement with the works of Pathak A et al.[10] Menon A, Nagesh K R.[11–13] Depressed fractures were less common in fatal cases. Incidence of skull bone fractures was high in fatal head injury cases. The present study is also in agreement with the works of other authors.[3,14,15] In our study subarachnoid hemorrhage was the most common type of intracranial hemorrhages seen in 64 cases, 27.7% which was very closely followed by sub-dural hemorrhages with 59 cases, 25.54%. However, some authors[6,16,17] has reported that sub-dural hemorrhage as the most common intracranial hemorrhage in their studies. But our finding regarding intracranial hemorrhage is consistent with the works of Chandra J et. Al.[4] and Sreekanth S et al.[18] who have reported subarachnoid hemorrhage as the commonest intracranial hemorrhage. In the present study we observed that short duration of survival was commonly associated with larger collection of extradural or subdural hemorrhage specially when there was concomitant presence of comminuted skull fractures. In majority of the brought in dead cases there were fractures of skull bones. Cases with fractures of the skull tend to have more complications and are more often fatal than those without fracture. In this regard our observation was consistent with the works of Banerjee KK et al.[19] and Lalwani S et al.[20]

4. Conclusion

In the present study we examined 350 cases of fatal head injury by taking different parameters. Most of the cases were due to road traffic c accidents and males are more prone to get Head injury. Other important causes of fatal head injuries are fall from height, railway accidents and assaults in descending order. No age group is immune to fatal head injury however young adult age groups are more prone. In fatal cases we see association with multiple fractures of the skull bones. To reduce the morbidity and mortality it's high time for the concerned authority to take appropriate actions.

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6. Conflict of Interest

None.

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