A STUDY ON HEAD INJURIES ADMITTED IN NARAYANA MEDICAL COLLEGE AND GENERAL HOSPITAL, NELLORE.

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ABSTRACT

Head injury has been recognized since ages.[1] Head injury is a major public health problem and has already attained epidemic proportions in India[4]. Injuries to the head are particularly important because of the brain's vital role in sustaining the life of the individual[5]. Falls and motor vehicle accidents are the primary cause of craniocerebral damage, while sports, assaults and gunshot wounds also contribute significantly to these types of injuries. Cranio-cerebral injuries results in significant social and financial burden and family issues as it commonly involve males in the age group of 20-40 years who are in the prime financial support of the family and also in sexually active age.

KEYWORDS: Head injury, social and financial burden, major public health problem.

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INTRODUCTION

Head injury has been recognized since ages[1]. Falls and motor vehicle accidents are the primary cause of Cranio-cerebral damage, while sports, assaults and gunshot wounds also contribute significantly to these types of injuries. It is one of the leading causes of death and disability worldwide, including the developing world.[7] Of all the regional injuries, cranio-cerebral injuries are most important in Forensic practice, as the incidence and severity of head injuries are increasing with burgeoning industrialization and more rapid methods of transportation[1]. A sound practical understanding of the neuropathology of trauma is essential to the forensic pathologist like any other aspect of his subject, as head injuries provide the major contribution to death in assaults, falls and transportation accidents.[3]

DEFINITION

Head injury as defined by the national advisory neurological diseases and stroke council, "is 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". To be complete however it should be taken into account that the impact responsible for the injury, need not be applied directly to the head[2].

EPIDEMIOLOGY

The National Crime Report Bureau in its report in 2009 states that road accidents in the country have increased by 1.4% during 2009 compared to 2008. The casualties in road accidents in the country have increased by 7.3% during 2009 as compared to 2008. Their proportion in total deaths due to unnatural causes has increased from 37.1% in 2008 to 37.9% in 2009. While trucks and two-wheelers were responsible for over 40% of deaths, peak traffic during the afternoon and evening rush hours is the most dangerous time to be on the roads. In a dubious distinction for the country, the World Health Organization has revealed in its first global report on road safety that more people die in road accidents in India than anywhere else in the world, including the more populous China[12].

After vehicular accidents, head injury due to fall is the second most common cause of cranio-cerebral trauma leading to death[14]. Falls are extremely common and responsible for many serious and fatal injuries every year[15].

An assault leading to scalp injuries is mostly homicidal in nature, and is generally produced by blunt weapons and occasionally by cutting instruments[4]. A cranio-cerebral injury due to blunt trauma causes more homicidal deaths as compared with blunt trauma injury to other areas of the body[17].Cranio-cerebral injuries are the most common cause of death in case of road traffic accidents, fall from height, assault, etc. Therefore, this problem needs serious attention for the prevention of unnatural deaths, which requires a worldwide epidemiological, medico-legal and clinical study on such victims. The present study was therefore conducted to ascertain age, sex wise distribution, causes of head injury, intracranial hemorrhages, and outcome in head injury cases admitted in Narayana Medical College, Nellore.

OBJECTIVES

1. Pattern of road traffic accidents
2. Pattern of falls
3. Pattern of assaults
4. Pattern of scalp injuries
5. Pattern of skull fractures
6. Pattern of intracranial haemorrhages
7. Pattern of brain injuries
8. To correlate of pattern of external head injuries and skull fractures and intracranial haemorrhages and brain injuries
9. Distribution of victims according to nature of hurt

Mechanism of Head injuries in various patterns

1. Vehicle occupants in road accidents

Surface injuries comprise mainly irregular abrasions and lacerations caused by direct contact with internal surfaces, intruding structures or the road surface following ejection. Skull fractures nature and site are determined by the point of impact, but typically involve a transverse 'hinge' fracture across the central part of the base, with or without an area of comminuting at one or both ends. Gross destructive injuries of the skull usually imply a run over injury following ejection. Brain injuries usually occur in association with skull fractures, although they can occur in their absence. The injuries range from patchy subarachnoid bleeding, through surface contusion, to gross laceration or even complete extrusion[27].

2. In motorcycle occupants in road accidents

The exposure and speed that characterize motorcycle travel make drivers and their passengers particularly vulnerable to injury if they are involved in an accident. While some injuries may occur while the rider is still seated on the machine, more will occur when he or she is thrown from it onto the road surface, against some solid structure or against another vehicle. There is also the distinct possibility of being run over by other traffic.

Not even the strongest head wear can guarantee protection against head injury. The majorities of skull fractures are localized or hinge fractures of the base but occasionally they are ring fractures, presumably caused by upward forces acting through the spine or by impact to the top of the head during secondary impact[27].

3. In pedal cyclists in road accidents

Most researches show that head injuries are the commonest cause of death in cyclists, particularly if no other vehicle is involved; there is more likely to be additional injury to the chest and abdomen if there has been a collision with a car or a heavy goods vehicle[27].

4. In pedestrian in road accidents

The mechanism and extent of injury sustained in pedestrian accidents will vary according to the nature of the vehicle, its speed and the site of contact. The age and size of the victim are also very important. Children incur injury patterns that are different from those found in adults, while the elderly sustain more numerous and more severe injuries for any given impact (MacLaughlin et al.1987)[27].Pedestrians are the common road users in India. With increasing traffic on roads has led to major fatalities of pedestrians[28].

5. Due to falls

Falls are extremely common, the severity not necessarily being directly related to the distance that the person falls. During fall, the potential energy due to height is converted into kinetic energy under the influence of gravity. Fall from height, which result in injuries associated with rapid vertical deceleration; represent a unique form of blunt trauma[27].Jumping from a height is a mode of suicide where the circumstances rather than the autopsy findings determine the motivation[3]. Many people die after falling from a standing position, yet others sometimes survive a fall of many meters. Falls from a standing position can occur if a person is drunk, from an assault, during illness (such as fit or faint) and for many other reasons. Death can follow from a head injury, especially onto the back of the head. An occipital scalp laceration or a fracture of the skull is not necessary for cerebral damage (often frontal contrecoup) to occur. There may also be a subdural or less often an extradural haemorrhage, the latter more common from a fall on to the side of the head[3].A simple fall can result in a body impact some distance from the foot of the building, which is not evidence of a push or of a deliberate jump.

In a typical case of primary impact with feet (about 60%), there may be fractures of the bones of feet, femur, pelvis, vertebral column, ring or comminuted fractures of the base of the skull and injuries to the brainstem and inferior surface of the brain.In primary head impact open comminuted or depressed skull fractures with brain lacerations and partial or complete extrusion of brain may occur (about 10%).Occasionally severe internal injuries may occur in the absence of any significant external injury, if the body lands upon a relatively soft surface, such as a grass patch[18].

6. Due to assaults

Severe blows to the head with blunt instruments are known to cause fatal depressed skull fractures with associated fracture lacerations of the brain, cerebral contusions beneath the location of the blow, and, occasionally, intracerebral hemorrhage[29].Assault leading to scalp injuries is mostly homicidal in nature, & is generally produced by blunt weapons, like lathi, stone, wooden pestle (musal) and occasionally by a cutting instrument such as gandasa, khurpi, axe or sword[4].The head is the commonest receiving site in assaults. In order to inflict more damage, people use iron bar, wood, machete, as well as firearms[30].

METHODOLOGY OF STUDY

The present study was conducted in Narayana medical college and general hospital, Nellore. After getting approval from the Institutional Ethical Committee the study was undertaken. The study includes data over a period of 3 years (2 years retrospective and 1 year prospective). The various parameters include age, sex, causes of head injury, pattern of head injuries, skull fractures, brain injuries, intracranial hemorrhages, and outcome. In accident cases type of accident, incident victim, and type of vehicle involved in road traffic accident are noted. Computed Tomography findings and Magnetic Resonance Imaging findings are also included in this study. This study includes 338 cases (118 prospective cases and 220 retrospective cases) of head injury cases admitted in Narayana Medical College, Nellore during the year 2011-2014. In retrospective analysis data were collected from the medical records. Brief history was taken from patients and their relatives and findings were noted by observing the patients and from the medical records in case of prospective analysis. Cause of death was confirmed by autopsy findings in prospective cases of fatal head injuries admitted in Narayana medical college, Nellore. And these autopsies were conducted in Government medical college, Nellore.

Table 1: Incident victim in RTA

Incident victim	No of cases	%
Bicycle rider	1	0.39%
Motorcycle occupant	42	16.41%
Motorcycle rider	142	55.47%
Motor vehicle Driver	9	3.52%
Motor vehicle occupant	20	7.81%
Pedestrian	42	16.41%
Grand Total	**256**	**100.00%**

Chart 1: Incident victim in RTA

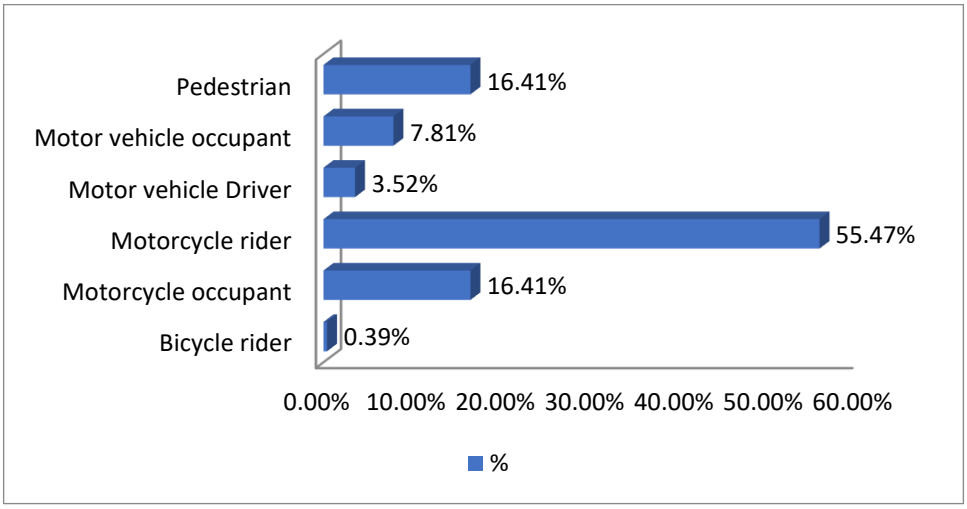

Table 2: Victim vehicle in RTA

Victim Vehicle	No of cases	%
Bicycle	1	0.47%
Four-Wheeler	2	0.93%
Heavy Vehicle	12	5.61%
Three-Wheeler	15	7.01%
Two-Wheeler	184	85.98%
Grand Total	**214**	**100.00%**

Table 3: Offending vehicles in RTA

Other Vehicles involved	No of cases	%
Four Wheeler	28	21.88%
Heavy Vehicle	38	29.69%
Three Wheeler	21	16.41%
Two Wheeler	38	29.69%
Unknown Vehicle	3	2.34%
Grand Total	**128**	**100.00%**

Table 4: Pedestrian hit by vehicles

	Pedestrian hit by vehicles	
Vehicles	**No of cases**	**%**
Four Wheeler	11	26.19%
Heavy Vehicle	8	19.05%
Three Wheeler	5	11.90%
Two Wheeler	15	35.71%
Unknown Vehicle	3	7.14%
Grand Total	**42**	**100.00%**

Table 5: Mechanism of RTA

Mechanism of RTA	No of cases	%
Collision	39	15.23%
Fall from vehicle	10	3.91%
Hit on animal	3	1.17%
Hit by vehicle	93	36.33%
Hit on stationary object	7	2.73%
Motor vehicle fall	1	0.39%
Skid and fall from bike	103	40.23%
Grand Total	**256**	**100.00%**

Table:6 Height of fall

Height of fall	No of cases	%
Ground level fall	11	18.33%
Fall from height	49	81.67%
Grand Total	**60**	**100.00%**

Chart 2: Height of fall

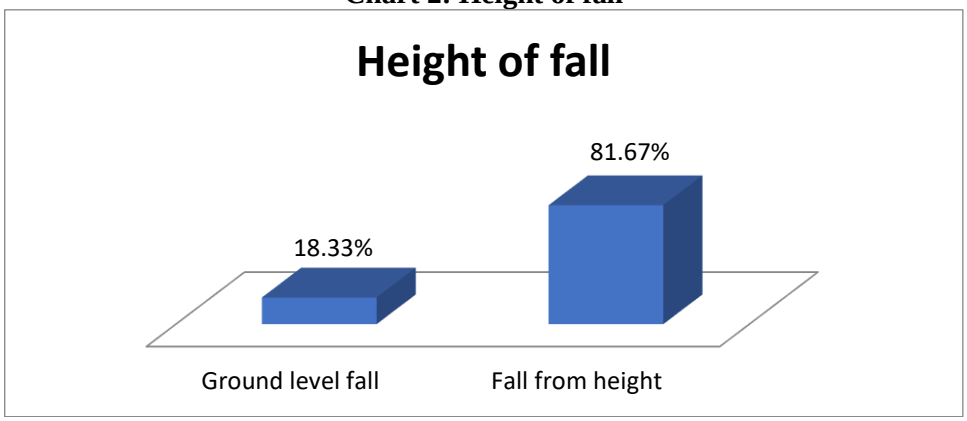

Table7: Place of falls

Place of falls incident	Fall From Height	Ground Level Fall
Bathroom	0	1
Fields(from tree)	10	0
Home	34	8
Railway track	0	1
Road (from stationary heavy vehicle)	1	0
Street	0	1
Workplace	4	0
Grand Total	**49**	**11**

Chart 3: Place of falls

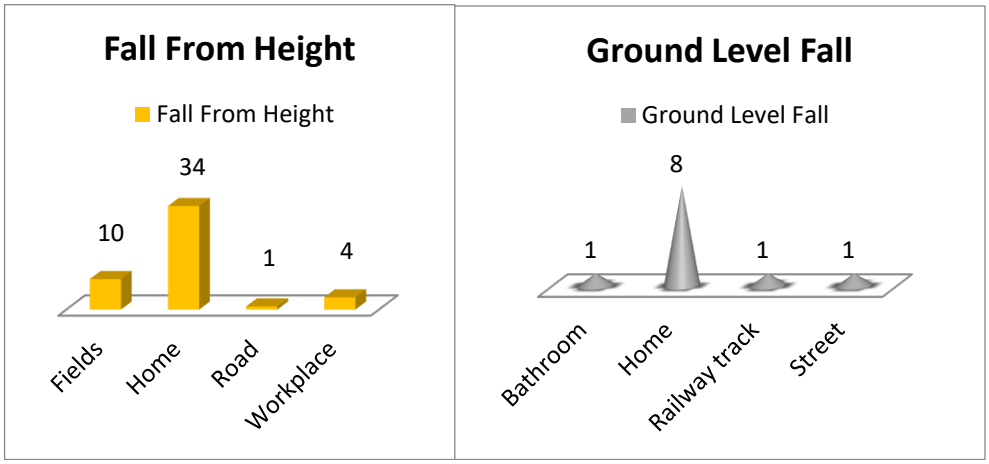

Table 8: Type of weapons involved in assault

Type of weapon	No of cases	%
Blunt weapon	17	85.00%
Sharp edged Weapon	3	15.00%
Grand Total	**20**	**100.00%**

Chart 4: Type of weapons involved in assault

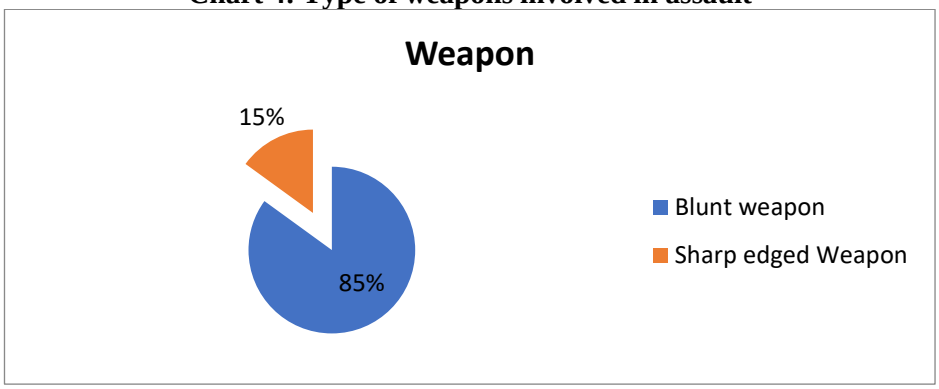

Table 9: Place of assault

Place	Home	Street	Bar	Field	Highway	School	Total
No of assault	4	11	2	1	1	1	20

Table10: Type of scalp injury

	Cause of injury					
Type of scalp injury	**Assault**	**Fall From Height**	**Ground Level Fall**	**Object fall on head**	**Road Traffic Accident**	**Grand Total**
Abrasion	6	12	2	0	139	159
Contusion	19	33	3	1	188	244
Laceration	19	16	3	1	149	188

Table 5: Type of scalp injury

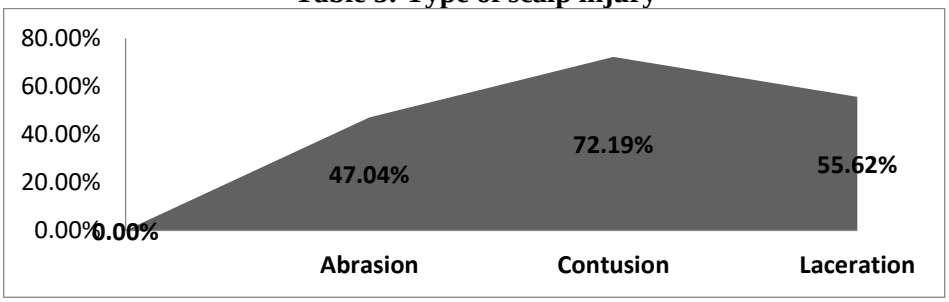

Table 11: Site of skull vault fractures

	Cause of injury					
Site of skull vault fractures	**Assault**	**Fall From Height**	**Ground Level Fall**	**Object fall on head**	**Road Traffic Accident**	**Grand Total**
Frontal	3	3	0	0	34	40
Fronto-Parietal	0	0	0	0	4	4
Fronto-Temporal	0	4	0	0	8	12
Fronto-Temporo-Occipital	0	0	0	0	1	1
Fronto-Temporo-Parietal	1	1	0	0	1	3
Occipital	2	5	0	0	7	14
Parietal	0	0	0	1	4	5
Parieto-Occipital	0	0	0	0	1	1
Temporal	2	6	3	0	17	28

Temporo-Occipital	0	0	0	0	1	1
Temporo-Parietal	0	1	0	0	5	6
Totalskull vault fractures	**8**	**20**	**3**	**1**	**83**	**115**
Noskull vault fractures	12	29	8	1	173	223
Grand Total	**20**	**49**	**11**	**2**	**256**	**338**

Table 13: Site of base of skull fracture

	Cause of injury					
Site of base of skull fractures	**Assault**	**Fall From Height**	**Ground Level Fall**	**Object fall on head**	**Road Traffic Accident**	**Grand Total**
Anterior & Middle & Posterior cranial fossa	0	0	0	0	2	2
Anterior & Middle cranial fossa	1	5	0	0	9	15
Anterior cranial fossa	2	3	0	0	37	42
Middle & Posterior cranial fossa	0	0	0	0	1	1
Middle cranial fossa	2	7	3	0	24	36
Posterior cranial fossa	0	1	0	0	0	1
Total cases of skull base fracture	**5**	**16**	**3**	**0**	**73**	**97**
Noskull base fracture	15	33	8	2	183	241
Grand Total	**20**	**49**	**11**	**2**	**256**	**338**

Table 12: Type of skull fracture

	Cause of injury					
Type of skull fracture	**Assault**	**Fall From Height**	**Ground Level Fall**	**Object fall on head**	**Road Traffic Accident**	**Grand Total**
Comminuted	0	1	0	0	6	7
Depressed	0	1	0	0	4	5
Depressed Comminuted	1	0	0	0	0	1
Depressed Comminuted Hairline	0	0	0	0	1	1
Depressed Compound	0	0	0	0	1	1
Diastatic	0	0	0	0	1	1
Linear	9	16	3	1	84	113
Linear Comminuted	0	2	0	0	2	4
Linear Depressed	0	1	0	0	2	3
Noskull fracture	10	28	8	1	155	202
Grand Total	**20**	**49**	**11**	**2**	**256**	**338**

Chart 6: Intracranial hemorrhages

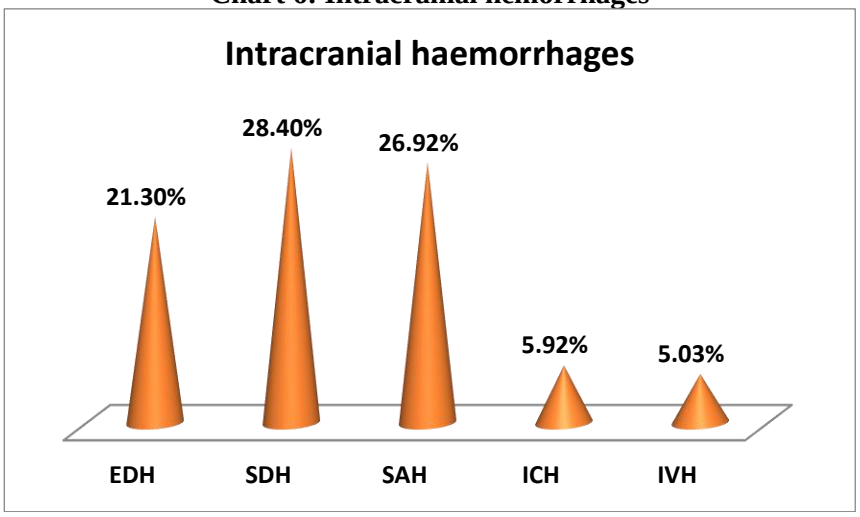

Table 13: Intracranial hemorrhages.

Intracranial haemorrhages	No of cases	%
EDH+SDH+SAH	9	2.66%
EDH+SDH	19	5.62%
SDH+SAH	47	13.91%
EDH+SAH	19	5.62%
SAH+ICH	12	3.55%
SAH+ICH+IVH	4	1.18%
ICH+IVH	4	1.18%
EDH	72	21.30%
SDH	96	28.40%
SAH	91	26.92%
ICH	20	5.92%
IVH	17	5.03%
EDH alone	40	11.83%
SDH alone	35	10.35%
SAH alone	28	8.28%
ICH alone	5	1.48%
IVH alone	3	0.89%

Table 14: Site of brain contusion

Site of brain contusion	No of cases	%
Cerebral	145	42.90%
Cerebellar	2	0.59%
Brainstem	12	3.55%

Chart 7: Site of brain contusion

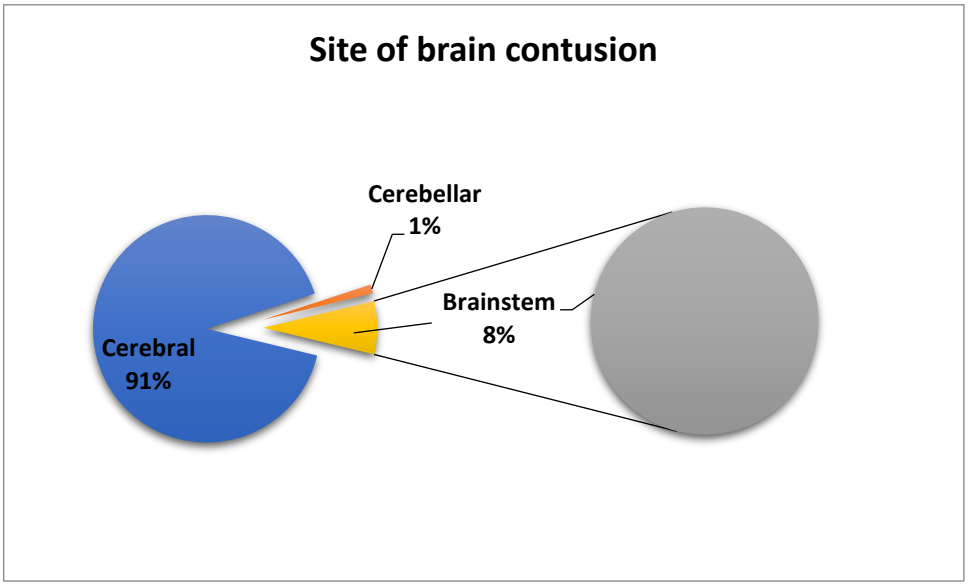

Table 15: Diffuse cerebral oedema

Diffuse cerebral oedema	No of cases	%
Diffuse cerebral oedema associated with brain contusion	73	21.60%
Diffuse cerebral oedema without brain contusion	53	15.68%
Total no of cases with diffuse cerebral oedema	**126**	**37.28%**

Chart 8: Diffuse cerebral oedema

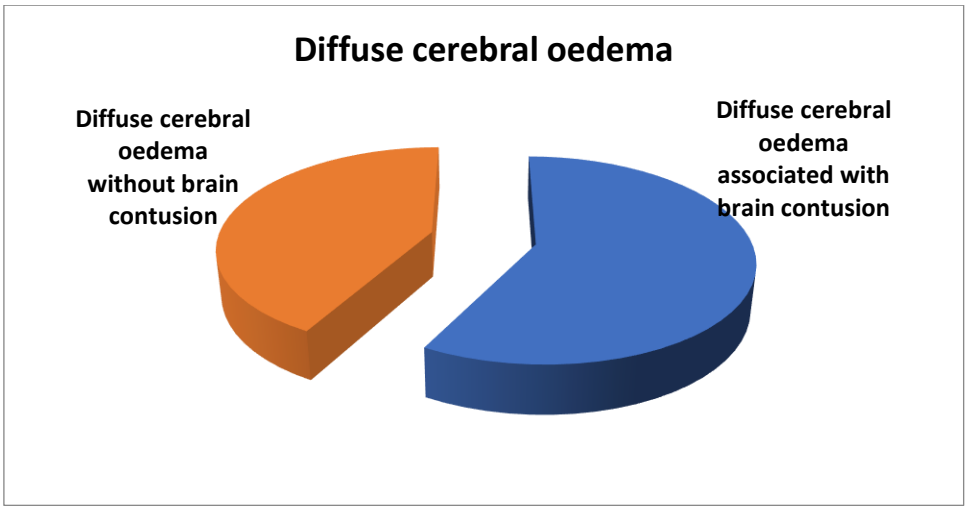

Table 16: Correlation between external scalp injuries and skull fractures and intracranial hemorrhages and brain injuries

Correlation between external scalp injuries and skull fractures and intracranial hemorrhages	No of cases	%
External scalp injuries without skull fracture	164	48.52%
Skull fractures without sign of external scalp injury	20	5.92%
External scalp injury with skull fractures	116	34.32%
No external scalp injury or skull fractures	38	11.24%
Skull fractures with EDH	52	15.38%
Skull fractures without EDH	84	24.85%
EDH without Skull fracture	20	5.92%
No skull fractures or EDH	182	53.85%
EDH without external scalp injury or skull fractures	6	1.77%
SDH without external scalp injury or skull fractures	10	2.96%
SAH without external scalp injury or skull fractures	11	3.25%
Brain injuries without external scalp injury or skull fractures	27	7.99%
Total cases	**338**	**100%**

Table 17: Pattern of head injuries in death cases

Injuries present in dead cases	Assault	Fall From Height	Ground Level Fall	Object fall on head	Road Traffic Accident	Grand Total	%
Head injuries with damage to vital centers of brain	0	1	0	0	0	1	0.30%
Head injuries with damage to vital centers of brain and intracranial hemorrhage and brain injuries	0	0	0	0	2	2	0.59%
Head injuries with damage to vital centers of brain and Polytrauma	0	1	0	0	0	1	0.30%
Head injuries with brain injuries and Polytrauma	0	0	0	0	1	1	0.30%
Head injuries with intracranial hemorrhage and brain injuries	0	2	0	0	9	11	3.25%
Head injuries with intracranial hemorrhage and brain injuries and ischemic brain damage	0	0	0	0	1	1	0.30%

Head injuries with intracranial hemorrhage and C4,5 level spinal cord compression	0	1	0	0	0	1	0.30%
Head injuries with intracranial hemorrhage and compression of the brain	0	0	0	0	1	1	0.30%
Head injuries with intracranial hemorrhages and brain injuries and Polytrauma	0	1	0	0	2	3	0.89%
No deaths (alive)	20	43	11	2	240	316	93.49%
Grand Total	**20**	**49**	**11**	**2**	**256**	**338**	**100%**

Table 18: Autopsy findings

Autopsy findings in deceased	**No of cases**	**%**
Scalp injuries	6	85.71%
Skull fractures	2	28.57%
Intracranial hemorrhage	6	85.71%
Extradural hemorrhage	2	28.57%
Subdural hemorrhage	5	71.43%
Subarachnoid hemorrhage	3	42.86%
Intraventricularhemorrhage	2	28.57%
Brain contusion	2	28.57%
Cerebral oedema	2	28.57%
Total no of cases	**7**	**100.00%**

CONCLUSION

In the present study among total 338 head injury cases road traffic accidents constitute majority (256(75.74%)), followed by 60(17.75%) cases of head injuries due to fall. Of these head injuries due to falls, fall from height were 49(14.50%) and ground level fall were 11(3.25%). There were 20(5.92%) assault cases, and only 2(0.59%) cases of heavy blunt object fall on head. There were a total of victims of 256(75.74%) of vehicular accidents. Most of the incident victims were motorcycle riders (142(55.47%)). Pedestrians and motorcycle occupants were equally involved in 42(16.41%) cases. Motor vehicle occupants were injured in 20(7.81%) cases, followed by motor vehicle driver in 9(3.52%) cases. Bicycle rider injured in only 1(0.39%) case. Most of the offending vehicles (vehicles other than victim vehicles) involved were heavy vehicles and two wheelers, each of them involved in 38(29.69%) cases. Next common offending vehicles were four wheelers in 28(21.88%) cases, followed by three wheelers in 21(16.41%) cases. In 3(2.34%) cases of vehicular accidents, the vehicle was not known or unidentified. Pedestrians hit by two wheelers were more common in 15(35.71%) cases, followed by four wheelers in 11(26.19%) cases. Pedestrians hit by heavy vehicles in 8(19.05%) cases, and by three wheelers in 5(11.90%) cases. Pedestrians hit by unknown vehicles in 3(7.14%) cases. Skid and fall from bike was the most common mechanism among victims (184(85.98%)) of two Wheeler occurred in 103(40.23%) cases. Next common was hit by vehicle occurred in 93(36.33%) cases. Collision was the mechanism of accident in 39(15.23%) cases.Head injuries due to falls present in 60(17.75%) cases. Among head injury cases due to falls, fall from height was more common involving 49(81.67%) cases, followed by ground level fall in 11(18.33%) cases. Among 49 falls from height, majority (34(69.39%)) occurred in home followed by 10(20.41%) occurred in fields. And 4(8.16%) were building construction workers occurred in workplace. And only 1(2.04%) case fall from height occurred while standing in top of a stationary heavy vehicle in road. Among 11 ground level falls, home is the most common place in 9(81.82%) cases. 1(2.04%) ground level fall occurred in street and 1(2.04%) occurred while crossing railway tracks. head injuries due to assault present in 20(5.92%) cases. Head injuries due to assault by blunt weapon were more common present in 17(85%) cases, followed by sharp weapon in 3(15%) cases.Among 20 assaults, majority of them occurred in streets (11(55%)) followed by home (4(20%)) and bar (2(10%)). School, field, highway constitute each 1(5%) case.The commonest type of scalp injury is contusion 244(72.19%) followed by laceration 188(55.62%) and abrasion 159(47.04%). In cases of road traffic accidents, the commonest type of

scalp injury is contusion 188(73.44%) followed by laceration 149(58.2%) and abrasion 139(54.3%). In cases of fall from height, the commonest type of scalp injury is contusion 33(67.35%) followed by laceration 16(32.65%) and abrasion 12(24.49%). In cases of ground level falls the type of scalp injury is contusion 3(27.27%) and laceration 3(27.27%) followed by abrasion 2(18.18%). In cases of assaults the type of scalp injury is contusion 19(95%) and laceration 19(95%) followed by abrasion 6(30%). In 2 cases of heavy blunt object fall on head the type of scalp injury is laceration in 1(50%) and no scalp injury in 1(50%). It was observed that frontal region was the commonest region involved in vault fractures in 60(17.75%) cases followed by temporal region in 50(14.79%) cases. In cases of road traffic accidents, vault fractures were commonly present at frontal region in 48(18.75%) cases followed by temporal region in 33(12.89%) cases. In cases of fall from height vault fractures were commonly present at temporal region in 12(24.49%) cases followed by frontal region in 8(16.33%) cases. In cases of ground level falls 3(27.27%) had skull vault fracture at temporal region. In cases of assault vault fracture was common in frontal region in 4(20%) cases. In cases of heavy blunt object fall on head, 1(50%) case had skull vault fracture at parietal region. In 338 cases of head injuries 97(28.7%) cases had base of skull fracture. Anterior cranial fossa was the commonest region of base of skull fractures in 59(17.46%) cases followed by middle cranial fossa in 54(15.98%) and posterior cranial fossa involved only in 4(1.18%) cases. Base of skull fracture was absent in 241(71.3%) cases. among intracranial hemorrhages, subdural hemorrhage was the commonest, present in 96(28.40%) cases followed by subarachnoid hemorrhage in 91(26.92%) cases. Next common was extradural hemorrhage in 72(21.30%) cases. Intracerebral hemorrhagewere present in 20(5.92%) cases and intraventricular hemorrhages were present in only 17(5.03%) cases. Among 338 cases of head injuries brain injuries were present in 208(61.54%) cases, of these brain contusions were present in 154(45.56%) cases. Brain contusion was present in 114(44.53%) cases of road traffic accidents, 27(55.10%) cases of fall from height, 1(9.09%) case of ground level falls, 6(30%) cases of assaults and 1(50%) case of heavy object fall on head. Cerebral contusions were the most common present in 145(42.9%) cases of head injuries. Cerebellar contusions were present in 2(0.59%) cases and brainstem contusions were present in 12(3.55%) cases. Diffuse cerebral oedema was present in 126(37.28%) cases. Both brain contusion and diffuse cerebral oedema was present in 73(21.60%) cases. Diffuse cerebral oedema without brain contusion was present in 53(15.68%) cases. In the present study external head injuries without skull fracture was present in 175(51.77%) cases. Skull fractures without external head injury were present in 13 (3.85%) cases. Both external head injury and skull fractures were present in 123(36.39%) cases. Both external head injury and skull fractures were absent in 27(7.99%) cases. Extradural hemorrhages without skull fracture were present in 20(5.92%) cases; extradural hemorrhages with skull fracture were present in 52(15.38%) cases. Skull fractures without extradural hemorrhage present in 84(24.85%) cases. In 22 cases of death majority (11(50%)) had head injuries with intracranial hemorrhage and brain injuries. 4(18.18%) cases had damage to vital centers of brain (brainstem contusion). 5(22.73%) cases had both brain and lung injuries. Cause of death was confirmed by autopsy findings in 7 prospective cases of fatal head injuries admitted in Narayana medical college, Nellore and these autopsies were conducted at Government medical college, Nellore. Autopsy was performed over the bodies of 7 deceased, 4 died due to RTA and 3 died of fall from height. The commonest finding in autopsy of fatal head injuries was intracranial hemorrhages in 6(85.71%) cases. Among them subdural hemorrhage was the commonest finding in 5 (71.43%) cases followed by subarachnoid hemorrhagein 3 (42.86%) cases. Both blunt head and thoracic internal injuries present in 1(14.28%) case of head injury.

RECOMMENDATIONS

1. 7.75% victims of motorcycle riders were below 18 years of age. Implementation of rules to prevent drive by children below 18 years.
2. 16.41% victims of RTA were pedestrians. This can be prevented by constructing foot paths and make their usage compulsory.
3. Fall from height and ground level falls were common in home and more so in old people due to age related disability and slippery surfaces in home. So falls can be preventing by adequate support and care of old peoples in home, and by making proper construction in home with big sidewalls in terrace and without slippery surfaces in steps and bathrooms.
4. Next common place of fall from height were fields where the farmers climbing the trees. Adequate safety measures, care and proper training prevent the farmers from sustaining injuries due to fall from tree

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