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DISCUSSION

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DISCUSSION

[N.B. A numeral in front of an author's name refers to the number in the bibliography section. Most such numerals have been superscripted however.]
Head remains one of the most vulnerable part of the body. Other than disease, trauma is the main factor afflicting it. Though a lot has been studied about the traumatic nature of injury to the head, continued research is required in understanding more about primary and secondary effects of trauma to the head. This study is such an effort to study involvement of the head.

AGE DISTRIBUTION

In present study the age of the victims varied from 1-80 years. The peak incidence was observed in the age group 31-40 years comprising 23.6% of the cases. It was also observed that 22.1% belonged to the age group 21-30 years. Thus 55.7% of cases comprised of age group of 21-40 years in the study. Individuals in the age group 0 to 10 years were the least affected 4.8% followed by older people i.e. 60 years and above in 5.7% of total cases.

This is in accordance with studies done by Tyagi[4], Sinha and Sengupta[10], Banerjee[36], Konrad[26], Salgado[5]. Larsen[7] observed that the most common age group is 26-30 years. Some of the above authors have studied much more cases than ours but still the commonest age group remains the same.

The study conducted by Dikshit[2] found the common age group was 21-40 years (46%). But Crofisten[11] pointed that accidents in day time had median age of 43 years where as median age in night incidence is 28 years.

Individuals in the second and seventh decade were the least affected in present study and the lowest age was 3 years and highest age was 80 years. This finding was also consistent with the above mentioned authors. Tripude[35] also pointed that the least affected age group was more than 61 years. Tripude[35] found that commonest age group was 21-30 age group (39%) and next common

was 31-40 (18%). Wick[41] said that 80.7% were men, with a mean age of 28.8 years and 27.9% of total cases belonged to age group 25-30 years.
Larsen[7] pointed that median age group of the male victims was 21 years and of women victims was 19 years. Corfitsen[11] said accidents in day time had median age of 43 years where as the median age in night incidence is 28 years. Andy Harris[15] pointed that fatalities rates was highest among males in 17-25 age group. Satiyasekaran[16] also found that 47% of injured person were in age group of 16-30 years. VV Pillay[17] found the most common age group 21-30 years. In our study the lowest age of victim was 3 years and had got injury while playing on the road.

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, while persons in extremes of the age usually remain indoors whereas childrens are confined to the outskirts of the residential premises only.

SEX DISTRIBUTION

In the present study males comprised a majority and constituted 98 (94.2%) compared to females who were only 6 (5.7%). The male to female ratio in the study was 16.3:1 (Male=98, Female=6). Male to female ratio in the most commonly affected age group 31-40 years was 13.5:1.

Tyagi[4] reported 5 times male involvement compared to females. Sinha and Sengupta[10] reported 80% male and 20% female incidence. Banerjee[36] reported 86% male and 14% female incidence. Johnson[22] reported the incidence to be 89% males and 11% females in Illinois, USA, Dikshit[2] reported 71.74% male victims in total cases.

A male preponderance is in consistence with the study reported by Cardoso[8], and Seow[25]. There were two studies done on pediatric cases only in which also a male preponderance was noted.

Salgado[5] study showed male had 84.5% and females had 15.5% of total cases, Similar was the study of Larsen[7] in which there were 93% male and female were 7%, Andy Harris[15] also said male were more than female, Sathiyasekaran[16] said 82.5% male constituted total study, VV Pillay[17], Kelsch[30] were of same opinion.

The reason for the male majority is that men everywhere are more up and about and exposed to outdoor activities, traveling between the home and place of work to earn bread for the family, while women remain mainly indoors at the home involved in household work.

TIME OF INCIDENCE

In the present study most of the incidents irrespective of the cause, occurred between 9PM to 12 mid night comprising 28.8% of total cases. Though a large percentage of cases 41% occurred between 6PM to 12 mid night. The least number of incidents occurred between 3AM to 6AM comprising 3% of the total cases. While in nine cases the time of incidence was not known.
Sinha and Sengupta[10] reported the incidence between 6AM and 6PM to be 35.3%. Li Guohua[23] reported that the percentage of patients with head injury was virtually the same for night time crashes as for day time crashes (52% versus 51%). Larsen7 pointed that most fatal accidents occurred in summer and autumn, with a peak seen on Fridays of the week along with peak period of the day being 16:00-19:00 hours and 21:00-1:00 hour in night. Corfitsen[11] pointed that there is a peak incidence between midnight and 06:00 hours due to fatigue and intoxication with alcohol VV Pillay[17] observed that most accidents occurred in between 8 PM to 12 AM and least between 12 AM to 4 AM. Wick[41] found that accidents were most common in weekend of summer.

The reason for the peak incidence of accidents at these hours is multifold and includes tired people, a hurry to reach home from the place of work, rush hour traffic, rash driving, inadequate traffic control and understaffing, fatigue of driver, poor visibility due to lack of street lights and also intoxication.

THE PERIOD OF SURVIVAL

In the present study survival of a victim after sustaining injury varied from spot death to about 19 days. Twenty two victims had died on the spot. Most of victims (22%) died within 6 hours of incidence and 5% of victims survived more than 7 days.

78% percent victims survived for a variable time period after the incident. 23 survived up to 6 hours. Relating these to the total number who survived for a variable time period those in the first group comprised 12 (0-1 hour) and those in the second group 11 (1-6 hours). Tyagi[4] and Fimate[19] reported that 53% and 63% victims, died within 24 hours of the injury respectively in accordance with 61 (58.61%) cases of present study who died within 24 hours of the injury.
Dikshit[2] found that most of the victims died on the spot comprising of 36.31% and total 72.5% of victim within 24 hours. He also observed that the maximum survival period was 2 weeks.

Larsen[7] pointed that person with brain injuries who had higher AIS score had less period of survival. Sathyiyasekaran[16] said that twenty were brought dead. Wick[41] stated that average stay of accident victim in hospital was 35.4 days.

Out of 104 victims, 22 (21.15%) died on the spot. The remaining 82 (78.84%) were admitted in the hospital. Only 8(7.6%) cases were subjected to operative procedure.

The period of survival has not shown an increase despite the advancement of medical faculties, due to the waste of time during the time of incidence and bringing of the victim to casualty. Also with the increase in the average speed of traffic movement the severity of head injuries is more.

SCALP INJURIES

In the present study, there were 99 individuals with injuries namely abrasions, contusion and lacerations. Crush injuries were present in 4 cases. There were 5 cases with no scalp injury at all. The commonest type of injury was contusion. Contusions were present in 70 (70.7%) victims out of 99.
Lacerations were present in 60 (60.6%) and the least common scalp injury namely, abrasions in 54 (54.5%) victims only. Contusions only were present in as many as 9 (10%) individuals.

Study conducted in Delhi in the year 1986 by Tyagi[4] reported scalp injuries to be present in 76%, while Banerjee[36] reported 77.7%. These findings are consistent with our study.

In the present study contusion was the most common 74% followed by laceration 63%, which are consistent with study undertaken by Dikshit[2], who found contusion to be more common than laceration.

The commonest region to be involved by any injury was the frontal region, having 98 injuries. This was followed by temporal 64, parietal 48 and occipital 20 region in that order. These findings are consistent with study conducted by Gaurav[34].

SKULL FRACTURES

In present study skull fracture was seen in 78 (75%) individuals out of total 104 cases. The combination of both vault and skull base fracture was commonest 35 (44.8%) cases as compared to skull vault alone and base alone fractures seen 31(39.74%) and 4(5.1%) victims respectively.

These figures were consistent with the findings of Tyagi[4] and Fimate[19] who reported the incidence to be 83.3% and 82.3% respectively.

Dikshit[2] found fracture of skull in 79.87% of total cases. Most common was temporal consisting 58.67% followed by occipital base 57.75%.

Ian Hill[3] said there is 2:1 ratio of single to double mandibular fracture. Salgado[5] found skull fracture were prominent in all categories of vehicle users and pedestrians. Larsen[7] reported that brain injuries were most common with skull fractures.
Fujiwara[12] revealed an inbending in the frontal and occipital regions of skull and outbending of the parietal and temporal regions immediately after impact, followed by a reverse deformation.

Sathiyasekaran[16] said head and face are most vulnerable and constitute 37.9% of total fracture sites. Liko[27] reported that two patients died due to infection complicating open depressed fracture.

Tripude[35] found fracture of vault was present in 62.9% cases and base in 35.7% and both in 14.8% of cases.

In present study there were 70 cases having 116 fracture sites involving vault of skull. There were four crush injuries. Eight had craniotomy in the vault. It was observed that temporal region was the commonest region involved in the vault of skull having 52 (44.8%) fractures. Parietal region had 44 (37.9%) and frontal 20 (17.2%) fractures. The unilateral involvement was more common than bilateral. The unilateral bilateral ratio of skull vault fracture was 7.9:1.

Dikshit[2] observed that fracture of temporal was most common 58.67% followed by occipital bone 57.75%. Tripude[35] found frontoparietal region was the commonest site to be involved in the vault and among basal fractures, middle cranial fossa was found in 25.9% cases. Anterior and posterior cranial fossa were less commonly involved.

In present study there were 74 victims with 53 fracture sites of the base of skull, linear or fissured fractures numbered 41 (77%) and comminuted fractures 12 (23%). Middle cranial fossa was the commonest fossa involved, having a total of 27 fractures out of 53 (51%) followed by posterior cranial fossa having 17 out of 53 (32%) and anterior cranial fossa with 9 out of 53 (16%) fractures. These findings were consistent with study of Gaurav[34].

INTRACRANIAL INJURIES

In the present study there were 104 victims with one or other form of intracranial injury. 4 had crushing injury of the head. Among the intracranial injuries, subarachnoid haemorrhage was the commonest, present in 90 (86.5%) cases. Next common was subdural haemorrhage in 79 (75.9%) cases, followed by intracerebral haemorrhage and damage in 35 (33.6%) cases. Contusions of the brain parenchyma were present in 70 (67.3%) cases. Laceration were present in 6 (5.4%) cases. Intraventricular haemorrhage was seen in 19 (18.2%) cases followed only after extradural haemorrhage 18 (17.3%).

Tyagi[4] reported the incidence of subarachnoid haemorrhage as 81% while that of subdural haemorrhage as 69.3%. Fimate[19] reported the incidence of contusions as 19.2%.

Dikshit[2] observed the commonest variety of intracranial haemorrhage was subarachnoid haemorrhage (66.9%) followed by subdural (58.2%), intracerebral haemorrhage (22.5%), extradural haemorrhage (14.2%), and brain stem haemorrhage in (10.8%). He also found that laceration were commonest (24.8%) followed by contusion (23.6%) which are consistent with the present study.
Salgado[5] emphasized about the higher incidence of the brain injuries than any other visceral organs in all type of road users. Motto[6] said most common cause of death was fracture of skull with haemorrhage and laceration of brain.

Liko[27] reported the subdural to be commonest (67%) followed by extra dural in 20% of cases.

Tripude[35] found extradural in 20.37%, subdural in 14.8%, subarachanoid 7.4%, intracerebral .37%, combination 12.96% of all haemorrhages in the total cases. These findings are not consistent with our present study.

CIRCLE OF WILLIS

In present study there were 2 (1.9%) cases in which the Circle of Willis was damaged. Of these one had rupture of left anterior communicating artery alongwith left anterior cerebral artery. There was no associated fracture in this case. In the other case, there was rupture of left anterior communicating artery, middle cerebral artery, left anterior artery, left posterior communicating artery associated with fracture of left frontal and left temporal bone alongwith communicated fracture of left anterior cranial fossa.

Gross[13] observed that the basal subarachnoid haemorrhages was connected with the fracture of transverse process of atlas in eleven and atlanto-occipital dislocation in three, associated with the rupture of vertebral artery, relating them to traction and stretching of arteries caused by violent vertebral dislocation.
Susan[14] also reported a significant incomplete arterial rupture with an occluding luminal thrombosis in basilar artery resulting in the infarct of left half of the pons and cerebellum.

Bostrom[20] reported the rupture of posterior inferior cerebellar artery from the blunt basal head trauma causing the bleeding. The transverse impact at the level of the skull base in two cases lead to the rupture of artery.

Sasaoka[32] reported rupture of peripheral anterior cerebral artery after closed head injury and concealed that frontal haemorrhage was a predictive finding for the type of delayed haemorrhage due to traumatic aneurysm in distal anterior cerebral artery.

Shajpaul[40] reported massive subarachnoid hemorrhage in posterior fossa and remnants of a berry aneurysm near the intradural origin of left vertebral artery. 11 mm proximal to the posterior inferior cerebellar artery, though rare, but it was a first case of a posterior circulation aneurysm rupture as a result of head trauma. Yasko[48] reported 2 cases, in which mechanism of the traumatic rupture of basilar artery is thought to be overstretching due to hyper extension of head and intoxication, drowsiness or both may have inferred with decedents ability to protect themselves.

Bernard[50] said that the vessels of Circle of Willis are remote from the skull surface and lie deeply protected under the buffer provided by the mass of the brain. So the incidence of traumatic rupture of Circle of Willis in case of fatal accidents is less common which is consistent with our study.

VICTIMS AND OFFENDING VEHICLES

There was a total of 104 victims of vehicular accidents. Most of the victims were pedestrians, 72 (69.2%) while most of the offending vehicles were bus, in 26 (25%) cases. There were 9 (8.6%) victims traveling on a bicycle. Among victims on motorized vehicles 23 (22.1%) most were traveling on scooters, as many as 15 (14.2%) cases. Of these 11 were drivers and 4 passengers (pillion riders). Of the scooter drivers, 8 were helmeted and the rest 7 not. Buses were the most common known offending vehicle involved in 26 (25%) cases followed by trucks and car in 14 (13.46%) cases each. In 35 (33.65%) cases of vehicular accidents, the vehicle was not known or unidentified, all 35 of these were cases of Hit and Run accidents. TSRs were offending vehicles in 4 (3.8%) cases while two wheelers had caused the death 10 persons.

Karikorkola[1] pointed towards the cause of accident and divided them into immediate and basic cause. The causes causing fatalities were human factors which accounted for 79:7% condition of vehicle for 10.7% and traffic condition for 9.6% of the cases.

Dikshit[2] found that most common victims were pedestrians constituting 50% of total cases followed by motorcyclists constituting 18.28% of total cases. Among the offending vehicles he found that trucks were responsible for accidents in 28.09% cases followed by cars in 22.99% of cases and bus in 17.14% of cases.
Salgado[5] said 51.4% of total cases were pedestrians. Motoo[6] observed that 83% were pedestrians and 3% were pedal cyclists. These findings are consistent with our present study.

Andy Harris[15] said that drivers of motor vehicles accounted 37% of total victims. Passengers in motor in 26.3% drivers of motor cycle 10.1%, pedestrians 19% and pedal cyclist 5%. Sathiyasekaran[16] said a total of 29.2% of victims were cyclist and 28.1% were pedestrian and were found to be most venerable group.

It can thus be deduced that HTVs remain the main offending vehicles in this area of Delhi (and hence of the country as well) causing accidents, and also that most of the accidents occur between pedestrians and HTVs mainly trucks and buses 40(38.46%) cases.

The reason for the heavy vehicle were that the condition of vehicle was not in good condition. The drivers of the offending vehicles were lacking in traffic sense due to lack in training and standardization in the licence process. More over there is also increase in the incidence of alcohol intoxication among them.