Original Article

Head Injuries in Fatal Road Traffic Accidents in Northern Districts of Bangladesh

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Abstract

Objective: *To analyze the autopsy findings in the cases of fatal head injuries due to road traffic accidents.*

Study Design *: Retrospective study*

Place and duration of study: *This study was conducted at the Rangpur Medical College morgue among victims of road traffic accidents (RTA) during the period of July 2014 to June 2016. It was conducted to ascertain the patterns of fatal head injuries due to road traffic accidents as documented during autopsies performed at Rangpur Medical College during (July 2014 to June 2016) the two years.*

Material & Methods: *Road traffic accident are the major causes of death worldwide. Head injuries is the single most common cause of mortality in road traffic accidents; head injuries being the most vulnerable part of the body. Total74 victims were taken from the road traffic accidents and died due to head injury. Aim of the study to find out the patterns of head injuries, their age and site distribution of different type of fractures.*

Results: *The cases were seen more in the male victims (87.84%) as compared to female (12.16%). Present study showed that the place of occurrence of road traffic accident was more in the urban areas (77.03%) as compared to rural areas (22.97%). No one of the three-wheeler riders was wearing helmets at the time of accidents. We observed subdural hemorrhage (SDH) in 63.83% followed by sub arachnoid hemorrhage (SAH) in 27.66% intracranial hemorrhage (ICH) 6.38% and least was extradural hemorrhage (EDH) 2.13% in two-wheeler riders. while in three-wheeler riders SDH in 51.85% followed by SAH in 29.63% ICH in 11.11% and least was EDH in 7.41% in cases where skull fracture occurred. Most of the accident occurred at night.*

Conclusion: *Head injury is one of the important causes of death in road traffic accidents. Most of the deaths occur on spot before any life support can be given to these subjects. The pattern of skull fractures observed in this study was quite comparable to other studies. It indicates that road traffic accidents lead to similar kinds of fatal head injuries throughout the world.*

Key Words:
Head injury, Road traffic accident

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Introduction:

Bangladesh being of fastest developing nations in the world with a huge population density the road traffic density is also increasing in Bangladesh. Road traffic injuries accent for 2.1% of global mortality.

Head injury has been defined as 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.[1] Head injury is the major contributing factor in all trauma cases causing mortality[2] and is the commonest

cause of mortality and morbidity following two-wheeler crashes.[3]

The World Health Organization (WHO) puts road traffic accident (RTA) as the sixth leading cause of death in South East Asia. About 1.2 million people are killed and 50 million people are injured due to road traffic accidents each year worldwide.[4] In 2002 road traffic accident ranked 9th amongst the leading causes of disease burden accounting for 26% of overall global disabilities. If increased motorization continues to follow the same trends, Road traffic accidents will rank as third leading cause of disease burden globally.[5] According to a report released by World Health Organization (WHO) on April 7th 2004, road traffic accident kills at last 5000 and injure 12000 persons in Bangladesh every year.

There has been significant growth in number of motor vehicles now a days. Due to lack of protection around the motor cycles, they come into direct contact with hitting objects, thus motor vehicles are the least safe form of transportation. Motorcycle accidents that involve passengers without wearing helmets, which result in severe injuries. However, helmet regulation in Bangladesh is not uniform and poorly enforced. Head injury may lead to skull fractures, various extents of brain parenchymal injuries and traumatic vascular injuries. The later includes formation of epidural and subdural hematomas and intracerebral hemorrhages. Death due to head injury depends upon various factors including intensity of impact of head, degree of deceleration, pattern of skull bones fractured degree and sites of parenchymal and vascular injuries, times spent from the time of injury to the specialized health care at hospital and how efficiently life support measures were given.[6]

WHO defined the accident as an unexpected, unplanned occurrence that may involve injury.[3] Head injury has been defined as 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.

Adults age between 15 and 44 years accounts for 59 percent of global road traffic deaths, 77 percent of road death are males.[8,9]

Traumatic brain injury results principally from vehicular accident, falls, acts of violence and sports injuries and is twice likely to occur in men than women. In term of abnormalities develop progressively after brain trauma which suggests that the resulting injury is a dynamic process of events rather than a single event.[10]

The types of brain trauma are straight forward and these include damage from skull fracture. Focal brain damage is a result of contusions, hemorrhage, and hematoma or tissue tears. Diffuse brain damage may be the result diffuse axonal injury, ischemia injury, or the complications if brain edema.

Observations and Results:

A total of 74 cases of deaths due to motor vehicles accident were autopsiedat the Rangpur Medical College respective of sex, age, groups, treated and untreated and duration of survival for a period of 24 months from July 2014 to June 2016.

A total number of 74 cases of two-wheeler riders or three-wheelerriders road traffic accidents were reseeded. There were 45 (60.1%) two-wheeler riders and 29 (39.9%) was three-wheeler riders.

Table-I

	Male (%)	Female (%)	Total
Two-wheeler rider	41(87.23)	4(12.77)	45(63.51)
Three-wheeler rider	24(88.89)	5 (11.11)	29(36.49)
Total	65	9	74

The cases were seen more in the male victims (87.84%) as compared to female (12.16%).

According to the age group:

Age in years	Two-wheeler Riders %	Three-wheeler rider %
0-0	0(0.0)	0(0.0)
10-19	2(4.26)	1(3.70)
20-29	20(42.56)	12(44.44)
30-39	13(27.66)	07(14.93)
40-49	7(14.90)	4(14.41)
50-59	1(6.38)	2(7.41)
60-69	2(4.26)	3(3.70)
> 70	0(0.0)	0(0.0)
Total(n=74)	45	29

Two-wheeler road traffic accidents are more in the third decades(20 cases) & fourth decades (13 cases) constituting 42.56% and 27.66% of total 74 victims.

The time was divided into 4 periods of 6 hours intervals in this aspect of study most of accidents have occurred during 6pm to 12 midnight three-wheeler riders (65.52%) &two-wheeler riders (43.75%) and least during 12 midnight to 6am for three-wheeler riders (3.45%) &two-wheeler riders (16.67%).

Table-II

According to time of injury-

Time Interval	Two-wheeler riders %	Three-wheeler rider %
6am – 12noon	05(8.62)	02(12.5)
12noon – 6pm	13(22.41)	06(37.5)
6pm – 12 midnight	38(65.52)	07(43.75)
12 midnight – 6 am	02(3.45)	01(16.67)
Total	58	16

Present study showed that the place of occurrence of road traffic accident was more in the urban areas (77.03%) as compared to rural areas (22.97%).

Among the total 74 road traffic cases involving riders, the evidence of helmets used was recorded in 35 (47.429%) of the victims while 12 (16.21%) died not used it. No one of the three-wheeler riders was wearing helmets at the time of accidents.

This study shows basal plus linear fracture of vertex constituted 11 cases (23.40%) out of 47 two-wheeler riders and 3 cases out of 27 cases (11.11%) of three-wheeler riders. Linear fracture of vertex only comprised 14.90% cases in two-wheeler riders and 22.22% cases in three-wheeler riders followed by fractures of the base only in 19.15% in two-wheeler riders and 18.52% in three-wheeler rider. Depressed fractures of vertexwere found 17.02% in two-wheeler riders and 7.41% in three-wheeler riders.

Table-III

Skull fractures in RTA involving two wheelerriders &three wheeler riders-

Types of skull fractures	Two wheeler Riders %	Three wheeler Riders %
Linear fracture of vertex	7(14.90)	6(22.22)
Comminuted fracture of vertex	4(8.51)	2(7.41)
Depressed fracture of vertex	8(17.02)	2(7.41)
Basal fracture	9(19.15)	5(18.52)
Basal fracture + Linear fracture of vertex	11(23.40)	3(11.11)
Crush fracture of skull	5(10.64)	6(14.81)
Not fracture	1(6.38)	5(18.52)
Total	45	29

Comminuted fracture was the last common in both two-wheeler riders and three-wheeler riders. No fracture of skull was found in 5 cases out of 29 three-wheeler riders.

We observed subdural hemorrhage (SDH) in 63.83% followed by sub arachnoid hemorrhage (SAH) in 27.66% intracranial hemorrhage (ICH) 6.38% and least was extradural hemorrhage (EDH) 2.13% in two-wheeler riders.

In this study while in three-wheeler riders SDH in 51.85% followed by SAH in 29.63% ICH in 11.11% and least was EDH in 7.41% in cases where skull fracture occurred.

	EDH(%)	SDH(%)	SAH(%)	ICH%)
Two-wheeler rider skull fracture with	1(2.13)	30(63.83)	13(27.66)	3(6.38)
Three-wheeler rider skull fracture with	2(7.41)	14(51.88)	8(29.63)	3(11.11)

Discussion:

In this study, two-wheeler riders included 45(63.51%) and three-wheeler riders comprised 29(36.49%) of 74 cases. Male preponderance was noted, as most of the motorcyclists were males accounting for 65(87.84%) and females accounting for similar to the findings of Kumar et al. Males belonging to 88.22% and females 11.77% and in the study of sigh YN et al male belong to 86.96% and females belong to 13.04%.[3]

Highest incidence of RTA was observed among the age group of third decade 42.26% followed by fourth decades 44.44% showing 63.51% of two-wheelerriders and 39.19% of three-wheeler riders. Findings found in the studies by Kumar A et al. show that the younger active groups 21-30 years followed by 31-40 yrs highest number of fatalists (54.24%) was in the 21-40 years were predominantly involved as these age group are found using the roads frequently and are generally rash drivers.[3]

Another study by Ahmed M et al. showed highest incidence of RTA was observed among the age group 31-40 years (28%). Highest number of victims were pedestrian (68%) followed by passenger (27%) of public and personal transports and driver (5%).[1]

The maximum members of accident were reported between 06:00pm to 12:00 midnight followed by 12:00 noon to 06:00pm which is probably due to heavy and unequal distribution of the traffic at these closing hours of the people and rider is generally exhausted after day's work.

R. Ravikumar et al. demonstrated peak timing of occurrence of RTA 6:00 pm to 12:00 midnight. Another study of Ding et al reported most of the head injuries occurred between 04:00 pm to 11:00 pm peaking at 9:00 pm.[7]

In is observed that incidence was more in the urban areas this reveals the common outdoor working time of the urban regions. Ahmed M. et. al reported most accidents in Bangladesh take place in the highways and caused by buses. Aggressive driving, impatience, lack of attention and drinking, Alcohol (in case of drivers) prior to driving are responsible for this.[1]

Helmet use was infrequent among motor cyclists in this study 12 (25.53%) Riders among 47 riders have not been wearing a helmet at the time of accident. None of the three-wheeler riders have been wearing helmet. Failure to wear a helmet resulted in a significantly higher incidence of head injury and death among both riders. Three wheeler vechicles cashes found in Nupur Pruthi et al and Sharma BR et al, study in Mumtaz B et al where frequency of helmet users is 56.6% and that of non-users in 43.3%.[5]

In case of head injury, various patterns of skull fracture were found. In this study skull fractures were present in 66 (89.19%) cases compared to 69.63% of cases in the study by Kumar A et al and Sing B et al.

Another study Ahmed M et al[1] was conducted at Dhaka Medical College (DMC) morgue victims of road traffic accident (RTA) during the period July 2002 – July 2003. Fatal 100 postmortem cases were studied among them 64% head injury various pattern of skull fracture were found.

The type of skull fractures found was linear (fissured) fracture of vertex, basal fracture, mixed basal and linear fracture of vertex, comminuted fracture of vertex, depressed fracture of vertex, crush fracture of skull. Fissured fracture was the most commonly observed fracture (57%) in the study of Menon A et al and Shiva Kumar BC et al.[8]

Conclusion:

Bangladesh also registered a significant increase, 19.58%, in road accidents in 2018 compared to 2017 compared to 3.472 deaths in 2017, there were 4.317 deaths in 2018 last year's massive nationwide road safety movement, the country has continued to with was a large number of road traffic accidents, with total fatalities reaching 5,229 in 2019.

Head injury is one of the important causes of death in road traffic accidents. Most of the deaths occur on spot before any life support can be given to these subjects the pattern of skull fractures observed in this study was quite comparable to other studies. It indicates that road traffic accidents lead to similar kinds of fatal head injuries throughout the world.

The frequencies of such injuries are more frequent in developing world due to the large of traffic safety regulations. Large prospective studies are required to make recommendations for improving the vehicle safety, road safety measures and focusing on implementations of traffic legislations covering all aspects of road traffic accidents. These studies will also provide guidelines for establishing possible emergency first aid providing medical and rescue facilities.

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