

A STUDY ON ADMITTED PATIENTS WITH TRAUMATIC BRAIN INJURY IN RELATION TO CAUSAL FACTORS

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Abstract:

Bangladesh had large number of population who suffered from Neurotrauma especially Traumatic brain injury (TBI). The cross sectional study was done over 520 study subjects in a Medical Hospital to observe the severity of the situation. Road Traffic accidents (RTA) or Motor vehicle accidents (MVA) were found leading cause for T131. Fall and assault followed RTA. RTA claim on average 4000 lives and injured other 5000 a year. According to Dhaka Medical College 80% patients had TBI who attend the Neurosurgery Department. In current study 267 (51.3%) patients had RTA and 160 (30.8%) patients had history of fall whereas 93 (17.9%) had history of different forms of assault. RTA was highest among 11-40 yrs with more intensity among 21-30 yrs. Falls were highest among 11-20 yrs and assault was highest among 31-40 yrs of age. Among the respondents 85.6% patients were male and 14.4% were female, 58.3% were married and 88.7% were Muslim. The majority of the patients were student 130 (25%), day laborer 69 (13.3%), garment worker/ factory worker 51 (9.8%). The mean income of the respondents was 10,000.51 Taka. The most of the patients lived in Pucca house and 77.9% had history of daily traveling. At the time of accident 276 (53.1%) did not use transport during present injury, 154 (26.7%) used transport and 90 (20.2%) were pedestrian. From study subjects 94 had severe TBI, 133 had moderate TBI, 293 had mild TBI. In RTA among 267 respondents 142 had mild TBI (GCS score= 13-15), 81 had moderate TBI (GCS score= 9-12) and 44 had severe TBI (GCS score= 3-8). Similarly, among respondents of fall 41 had severe TBI, assault patients had 9 severe TBI cases. Mild TBI was observed among 87 fall patients and 64 assault patients. TBIs were common in early hours of the day. Among 160 respondents of fall 55.7% had history of accidental fall which included fall on hard surface, slippery surface. From others 25.7% had fall from height and 18.6% had fall during carrying heavy weight. Majority of the participants of assault respondents (52.7%) had forceful blow over head by blunt weapon, 30.1% had blow with sharp weapon and 17.2% had gun shot injury. All TBI patients suffered from multiple injuries.

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Introduction:

Neurotrauma comprises brain and spinal cord injury which is worldwide a critical public health problem.¹ Traumatic brain injury (TBI) causes number of deaths and permanent disabilities and requires long term care to recover from the illness. The condition put on a enormous economic burden to individuals, family, society. Traumatic brain injury (TBI) is a nondegenerative, noncongenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairments of cognitive,

physical, and psychosocial functions with an associated diminished or altered state of consciousness.²

Often, the term 'Traumatic brain injury (TBI)' is used synonymously with 'Head injury'. Road traffic accidents (RTA) is the leading cause of the TBI which was the 9th leading cause of death in 2004 and will be 5th leading cause of death in 2030 worldwide.³ Other types of injuries include fall, assaults etc. According to the percent distribution of top 10 causes of mortality (all ages) in the National Institute of Traumatology, Orthopedics and Rehabilitation (Year 2009) among RTA constitute the 3rd leading cause of death in male and 2nd leading cause in females. In other study, head injury in male constitutes the 4th leading cause of death and 5th among females. Among top 10 mortality rates in medical colleges are head injury hold the 8th position among male and in both sexes it was the 9 leading cause among both sexes.⁴ In case of road traffic accidents the pedestrians usually hit by a car, rarely run over and run under.

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Direct collision is rare than sideward collision is frequent. The motorcycle accidents cause the hitting of the head on the road. Wearing a helmet reduces 50% reduction of severe head injury.⁵ Between 70 - 80 % of RTAs (Road Traffic Accidents) occur on highways and rural roads. Up to 70% of road accidents are pedestrian alone. Trucks and buses are major contributor to road traffic accident fatalities.⁷ In Bangladesh, there is no available estimated data on TBI. In the year 2005-2006 total patient attended in Neurosurgery Department, DMCH 10,629: out of them 80% patients had TBI. About 78% head injury were found in Dhaka Medical College (DMC) morgue among 100 postmortem cases of Road Traffic Accident (RTA) victims over a period of one year.⁸ The severity of TBI is measured by Glasgow coma scale (GCS coma scale) within 48hrs of injury which range from mild to severe. According to the GCS score severity of head injury are differentiated: i. Mild TBI (GCS score 3-8), ii. Moderate TBI (GCS score 9-12), iii. Severe TBI (GCS score 13-15). The mortality rate is high in severe TBI and low for moderate TBI.² The overall objective of this study is to find out the severity of the traumatic brain injury as well as find out the different causes of head injury with associated other multiple injuries.

Materials and methods:

Cross sectional study design was conducted to observe the severity of the injury. It also used to determine the different causes of TBI along with other associated injuries. The duration of the study period was of three months (July, 2008- December, 2008). Data collection period was from August, 2008- October, 2008. The study population included all the patients meeting the inclusion criteria attending during the time of data collection period in the Department of Neurosurgery in Dhaka Medical College. The inclusion criteria included all age groups of patients irrespective of sex or consciousness. In case of unconscious patients data collected from patient attendants or from attending physicians. The estimated daily admissions of the patients with Head injury were about 30 in numbers in the Department of Neurosurgery of DMCH. For the 12 weeks time period the total number patients were over thousand. Sample was taken purposively according to the inclusion criteria. A sample of 520 was drawn purposively. Data collected by semi structured questionnaire by face to face interview. Data analyzed by statistical software SPSS 11.5. The ethical committee of North South

University had given the permission to continue the Study and collected data from the respondents after taking informed consent. Confidentiality of the data was also maintained.

Results:

Out of 520 respondents the mean age of the respondents was 23.8 years (± 15.47). The highest numbers of injured patients were from 11-40 yrs covering 67% of respondents. Minimum and maximum ages of the patient were 5 years and 78 years. The lowest numbers of patients were from 71-80 yrs. Among the 520 participants 445 were male (85.6%) and 75 were female (14.4%) and 88.7% respondents were Muslim. Majority patients were married (58.3%). The Family incomes in majority of the respondents were >5,000-10,000 Taka i.e. 35.2%. The mean income of the respondents was 10,000.51 Taka The majority of the respondents live in "Pucca" house i.e. 51.7%. The other 48.3% live in the "Kaccha" house.

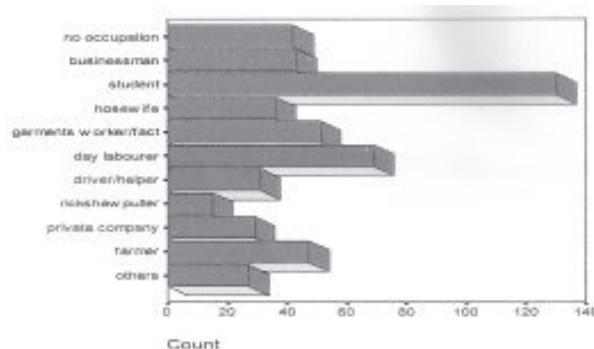


Fig.-1: Distribution of occupation of the respondents

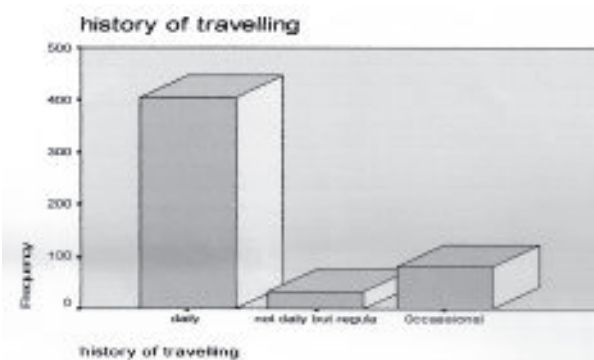


Fig.-2: Distribution of History of traveling of the respondents.

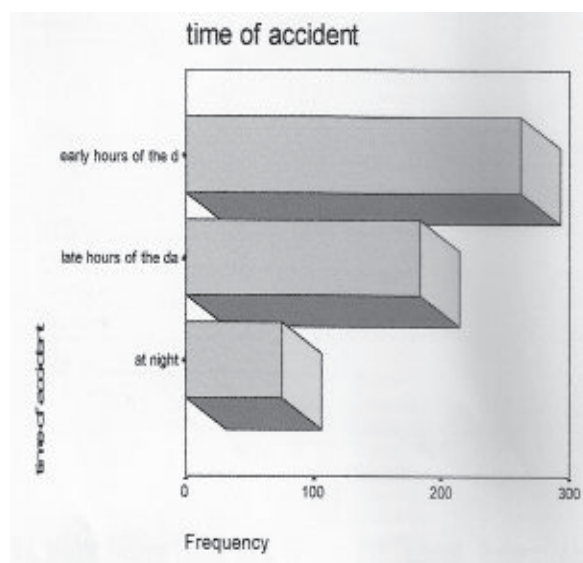


Fig.-3: Distribution of time during injury of the respondents.

The most of the patients (77.9%) had history of daily traveling whereas 15.6% had history of occasional traveling, 6.5% travel regular but not daily (Figure 1.2).

Cause of present injury: RTA was the major cause of present injury among 267 (51.3%) patients and 160 (30.8%).

In present study 50.4% respondents had injury in the early part of the day, 35.2% had injury at later part of the day and 14.4% had injury at night (Figure 1.3). patients had history of fall whereas 93 (17.9%) had history of different forms of assault (Figure 1.4).

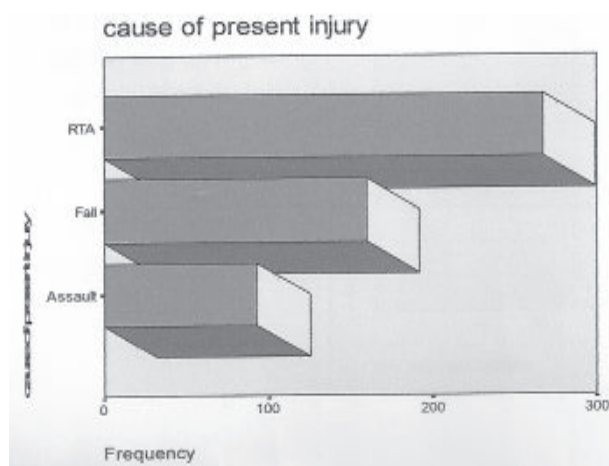


Fig.-4: Distribution of cause of present injury.

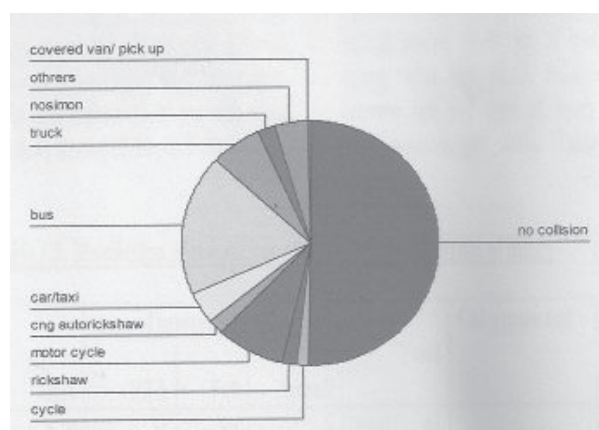


Fig.-5: Distribution of collision/ struck by transport of the respondents

RTA related factors: During RTA, 97 (18.7%) collided with Bus, 45(8.7%) collided with motor cycle, 34(6.5%) collided with Truck. Among 90 Pedestrians 21 (23.3%) standing on the road side, 36(40.0%) and 33 (36.7%) collided with other transport.

Assault related factors: Among 520 participants 93 respondents had history of assault whereas, 49 (52.7%) had

Fall related factors: Among 160 respondents of fall patients 89 (55.7%) had accidental fall, 41 (25.7%) had fall from height and 30 (18.6%) had fall during carrying heavy weight. Frequency of fall from height is highest from 20-30 ft (Table 1.1) forceful blow with blunt weapon, 28 (30.1%) blow with sharp weapon and 16 (17.2%) had gun shot injury.

Level of consciousness:

Among 520 respondents 293 (56.3%) had mild head injury which was 13-15 in Glasgow coma scale, 94 (18.1%) had sever head injury which was 3-8 in Glasgow coma scale. **Only** 133 (25.6%) respondents moderate head injury which was 9-12 in Glasgow coma scale.

Comparison among different variables:

i. Comparison of age with different types of injury: There were different types of present injury in different ages. RTA was highest 11-40 yrs with more intensity among 21-30 yrs. Falls were RTA and fall are common in early hours of the day whereas assault is common at night. Chi square value was found 157.34. There was positive relationship highest among 11-20 yrs and assault was highest among 31-40 yrs of age. Chi square value was 43.55. Relationship between age and type of injury was found positive. ($p = .003$). (Table 1.2) found in between cause of present injury with time of injury ($p = 0.000$). (Table 1.3)

Table-I
Distribution of comparison of age with different types of injury cause of resent inju
Chi square test

Age in years	Cause of present injury			Total	Chi square test
	RTA	Fall	Assault		
0-10	32	24	6	62	x ² = 43.55 p = 0.003
11-20	51	46	20	117	
21-30	69	44	21	134	
31-40	51	19	27	97	
41-50	23	4	5	32	
51-60	18	6	0	24	
71-80	0	4	0	4	
Total	267	160	93	520	

Table-II
Distribution of comparison of types of injury with time of injury

Cause of resent injury	Time of accident			Total	Chi square test
	Early hours of day	Late hours of day	At night		
RTA	135	112	20	267	x ² = 157.34 p = 0.000
Fall	112	42	6	160	
Assault	15	29	49	93	
Total	262	183	75	520	

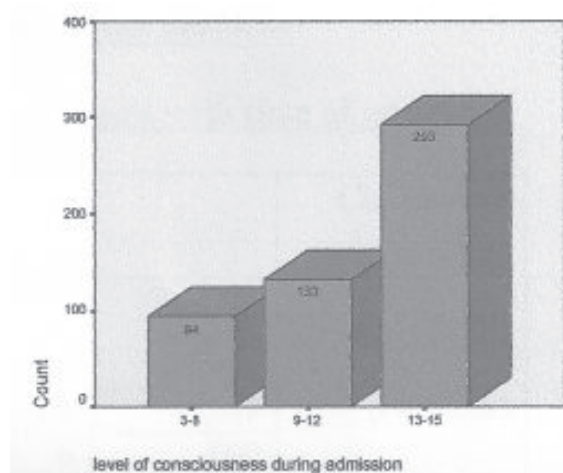


Fig.-6: *Distribution of level of consciousness of the respondents*

ii. Comparison of Present type of injury with time of the accident:

iii Comparison of Present type of injury with level of consciousness: Among 520 respondents total 94 had severe TBI, 133 had moderate TBI, 293 had mild TBI. In RTA among 267 respondents 142 had mild TBI (GCS score= 13-15), 81 had moderate TBI (GCS score= 9-12) and 44 had severe TBI (GCS score= 3-8). Similarly, among respondents of fall 41 had severe TBI, assault patients had 9 severe TBI cases. Mild TBI was observed among 87 fall patients and 64 assault patients. Chi square score was 17.11. There were positive associations among types of injury with level of consciousness ($p=.002$). (Figure 1.7)

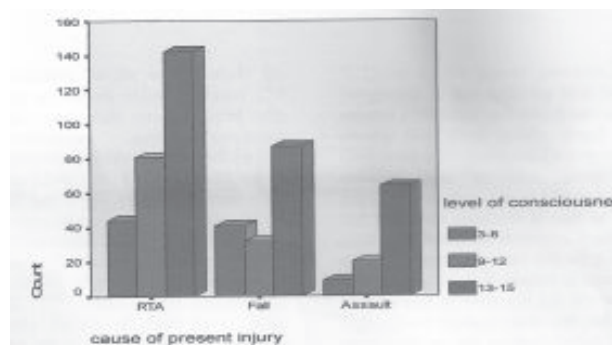


Fig.-7: Distribution of comparison of types of injury with level of consciousness

iv. Comparison of different types of injuries: There were several common types of injury in all cases ophthalmic and ENT injuries were highest among respondents. Fractured bones were less in all respondents. Assault respondents had less bone fracture. Thoracic and facial injuries were also common among respondents

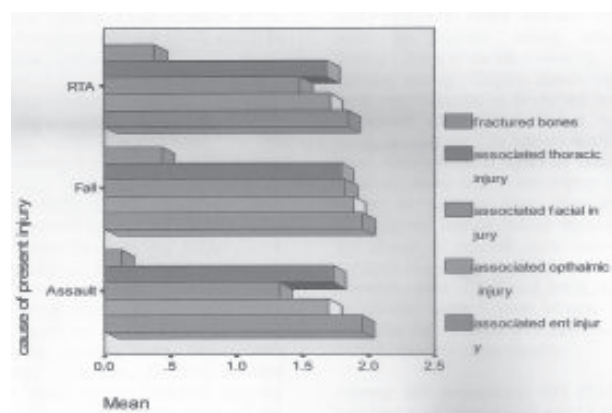


Fig.-8: Distribution of comparison of different types of injuries

Discussion:

In the current study the mean ages of the respondents were 23.8 years. The result was consistent with epidemiological studies conducted internationally. The mean age of the TBI were 15-40 yrs. Usually, incidence of TBI below 40 years and was more common in males. 3⁹ The findings of the study revealed 85.6¹/o of the respondents were male. Mortality is highest among 15-24 yrs. Students are affected more of TBI. 10-12 Most of the patients had family income of 5000-10000 Taka. Most of the lower and lower middle income patients attend the Govt. Hospital. Again injuries were

common in Lower middle income countries. to-13 Bangladesh is also suffering from large number population and who lives under poverty line. They usually attend the Govt. setting for treatment. Fatality were common also in these group of population as they use Public vehicles and had more accidents as well as can spent less money for treatment. Again it need long term treatment following TBI which many of them unable to bear as well as cost of treatment are also very high. Direct medical costs and indirect costs such as lost productivity of TBI totaled an estimated \$60 billion in the United States in 2000. TBI usually occurred in early hours of the day. Most of the injury occurred in the early hours of day, in the current study which was 50.4% of the respondents. RTA and falls were found common in these time period as might be people exposed to risk factors at the time and also that was the time of work and they were in hurry. Around 34% accidents occurred in the time between 06:00 and 12:00, and 21 between 12:00 and 14:30.¹³

RTA or Motor vehicle accidents were the main leading cause of the TBI. Among 520 respondents 51.3% respondents had RTA. The faulty design of roads and highways, inadequate driving skills, negligence of the drivers also increase the number of mortality and morbidity from the RTA. MVA were highest cause of mortality and morbidity both in developed and developing countries. 14-16 In RTA 49.8% had struck by or collided to different vehicles. Among them 97 (18.7%) collided with Bus, 45(8.7%) collided with motor cycle, 34(6.5%) collided with Truck. In children most of the collision were by vehicles. 14 TBI were common among daily travelers as they were most exposed to risk factors like vehicle use, exposed to speedy vehicles etc.

Falls are the second leading cause in the current study. Falls were highest among 11-20 yrs. Though the majority of study revealed older more than 60 yrs had falls. 14,17 Other study revealed falls were highest among 41-60 years 9 In current study most falls among day laborer who fall from different levels of height during work and children and these were all accidental. Falls were highest from >20-30 ft. Falls were common of construction worker as there were no adequate safety measure and no facility to wear helmets and safety belts. Falls from height were common among 21-40 years.⁹

Assault was highest among 31-40 yrs of age. Forceful blow with blunt weapons were highest in current study.

Though many part of the world Gun shot injury were the highest among causing fatality. 18 Most of the blow were by fighting among villagers. Sports injury were very common in developed world commonly who played Basket balls, skiing, skating etc. ⁵ In current study no case found of sports injury as because most of them had minor injury and might be released from Emergency Department. Shaken babies were also not found in current study whereas common in many part of the world and common cause of inflicted brain injury in children under 5 years of age. ¹ It might be due to social structure even in extreme poverty in the country.

Among 520 respondents 293 (56.3%) had mild head injury which was 13-15 in Glasgow coma scale, 94 (18.1%) had sever head injury which was 3-8 in Glasgow coma scale. Only 133 (25.6%) respondents moderate head injury which was 9-12 in Glasgow coma scale. In Singapore 528 severe TBI patients with a median GCS of 7 and head CT evidence of TBI were admitted to the NICU over a five-year period from January 1999 to December 2003.⁹

There were several common types of injuries among respondents. In all cases ophthalmic, ENT, facial injuries were common. Fractured bones were less in all respondents. Assault respondents had less bone fracture than RTA or falls as they had blunt trauma more. Thoracic injuries were also common among respondents as there were number of CONCLUSION:

Traumatic Brain injury is one of the fatal injury causing mortality and disability among affected. They cause early death of the exposed. Like any other countries Bangladesh is also suffering from large number of Neurotrauma patients including traumatic brain injury. There was no exact number of that injury. In Bangladesh according to police statistics, RTA claim on average 4000 lives and injured other 5000 a year. About 78% head injury were found in Dhaka Medical College (DMC) morgue among 100 postmortem cases of Road Traffic Accident (RTA) victims over a period of one year. WHO estimates actual fatalities could well be 20.038 each year (WHO, 2009). The estimated death rate of RTA is 12.7/ 100,000 population. According to Dhaka Medical College 80% patients had TBI who attend the Neurosurgery Department.

In current study 520 subjects were selected purposively among them 267 (51.3%) patients had RTA and 160 (30.8%) patients had history of fall whereas 93 (17.9%) had history of different forms of

assault. RTA was highest among 11-40 yrs with more intensity among 21-30 yrs. Falls were highest among 11-20 yrs and assault was highest among 31-40 yrs of age. Among the respondents 85.6% patients were male and 14.4% were female, 58.3% were married and 88.7% were Muslim. The majority of the patients were student 130 (25%), day laborer 69 (13.3%), garment worker/ factory worker 51 (9.8%). The mean income of the respondents was 10,000.51 Taka. The unconscious patients most of the patients lived in Pucca house and 77.9% had history of daily traveling. At the time of accident 276 (53.1 %) did not use transport during present injury, 154 (26.7%) used transport and 90 (20.2%) were pedestrian.

Among 520 respondents total 94 had severe TBI, 133 had moderate TBI, 293 had mild TBI. In RTA among 267 respondents 142 had mild TBI (GCS score= 13-15), 81 had moderate TBI (GCS score= 9-12) and 44 had severe TBI (GCS score= 3-8). Similarly, among respondents of fall 41 had severe TBI, assault patients had 9 severe TBI cases. Mild TBI was observed among 87 fall patients and 64 assault patients.

RTA was highest in early hours of the day and found lowest at night whereas assault was highest at night gradually increase as the day progress. Falls were also highest in early hours of the day. Most of them collided with Truck and Bus 18.7% and 8.7% respectively. 40.0% Pedestrians were hit by other vehicles when walking at the road rather than crossing the roads. They had multiple Injuries including facial injury, ophthalmic, ENT injuries, fractured bones, thoracic injuries.

Among 160 respondents of fall 55.7% had history of accidental fall which included fall on hard surface, slippery surface. From others 25.7% had fall from height and 18.6% had fall during carrying heavy weight. 21% fall from >20-30 ft which was from second floor or top of second floor, 12.2% fall from >50-60 ft. height. Falls also occurred at early hours of the day. Majority of the participants (52.7%) had forceful blow over head by blunt weapon, 30.1% had blow with sharp weapon and 17.2% had gun shot injury. Majority of the participants of assault respondents (52.7%) had forceful blow over head by blunt weapon, 30.1% had blow with sharp weapon and 17.2% had gun shot injury. They also had multiple Injuries including facial injury, ophthalmic, ENT injuries, fractured bones, thoracic injuries.

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