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# Traumatic Brain Injury and its Findings on Computed Tomography; A Tertiary Care Hospital Experience.

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## Abstract

**Introduction:** Traumatic brain injury (TBI), a form of acquired brain injury, occurs when a sudden trauma causes damage to the brain. TBI can result when the head suddenly and violently hits an object, or when an object pierces the skull and enters brain tissue. It remains the most common cause of death following trauma, with particularly high mortality and morbidity in low and middle-income countries (LMIC) like Bangladesh.

**Aim of the study:** The aim of the study was to evaluate the frequency of traumatic brain injury (TBI) on computed tomography in Bangabandhu Sheikh Mujib Medical College (BSMMC), Faridpur, Bangladesh.

**Methods:** It is a retrospective cross-sectional study, a total of 147 patients had head injuries who were admitted to the Department of Radiology and Imaging from January 2021 to December 2021 in Bangabandhu Sheikh Mujib Medical College (BSMMC), Faridpur, Bangladesh. Patients included in this study were those who met the inclusion criteria. Data was collected from emergency departments with consent.

**Result:** A total of 147 patients were enrolled and analyzed in this retrospective cross-sectional study. In this study, most of the 55(37.41%) patients were from the age group 1-14 years and only 12(8.16%) patients were aged above 65 years. According to the CT scan finding, 82% of patients had a scalp hematoma, 65(44.22%) patients had normal pain, almost 30% of patients had skull fractures and only 4% of patients had inflammatory changes. In this study, 94(63.95%) patients fell from height and 53(36.05%) patients had an accidental case.

**Conclusion:** In conclusion, the prevalence of percentage of non-hemorrhage contusions and extradural hematoma have almost an equivalent frequency. Males have a higher rate of intracranial hemorrhage than females. Patients who have been in road traffic accidents \have a higher risk of developing a scalp hematoma than those who have had other types of traumatic injuries.

**Keywords:** Traumatic Brain and Computed Tomography

## Introduction

Traumatic brain injury (TBI), a form of acquired brain injury, occurs when a sudden trauma causes damage to the brain. TBI can result when the head suddenly and violently hits an object, or when an object pierces the skull and enters brain tissue. It remains the most common cause of death following trauma, with particularly high mortality and morbidity in low and middle-income countries (LMIC) like Bangladesh [1]. Head injury according to WHO will surpass many diseases as the major cause of death and disability

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by the year 2020 [2]. High illness and death rates in low and middle-income countries are present to traumatic head injuries [3]. Traumatic brain injury can be defined as changed brain function, confusion, coma and change in consciousness or neuromotor deficit [4]. TBI is very much related to traumatic head injuries which occur mostly due to RTA in young people and fall history in children [5, 6]. Male are highly involved because they are mostly outdoors like driving, vehicles, and working outdoors [6-10]. Previous study found intra-cerebral hematoma (46.33%), skull fracture (62.04%), subdural hematoma (19.37%), brain swelling and edema (63.35%), midline shift (24.34%), subarachnoid hematoma (28.79%), epidural hematoma (30.36%) and neurocranium (12.04%) [11]. In Bangladesh, the annual incidence of head injury found was 814.8/1, 00,000 people with mortality rate of 23.39/100,000 population [12]. All types of injuries but basically death and disability mostly occur due to brain injuries [13]. Brain injuries involve contusions, intracranial injuries, skull fracture, bruising, hematomas, brain swelling, edema and hemorrhages [11, 14]. Patients with brain injuries usually involve symptoms of loss of consciousness, short-term memory loss, amnesia, behaviour change, irritability, vomiting and headache all after traumatic injuries but the post injuries include traffic accidents, slipping down, fall down injuries etc. [15-17]. CT scan examination may be important in some cases however in most cases it is challenging to achieve as for the troubles with radioactivity contact and bulk motions. In addition, if no intracranial abnormality is detected immediately after injury, irregular findings might seem several hours later [18].

## Materials and Methods:

It is a retrospective cross-sectional study, a total of 147 patients had head injuries who were admitted to the the Department of Radiology and Imaging from January 2021 to December 2021 in Bangabandhu Sheikh Mujib Medical College (BSMMC), Faridpur, Bangladesh. Patients included in this study were those who met the inclusion criteria. Data was collected from emergency departments with consent.

### Inclusion criteria

- Patient with traumatic brain injury
- RTA and history of fall with a scale of 13-15 GCS with symptoms of dizziness
- GCS with symptoms of nausea
- GCS with symptoms of headache
- Patients who had vomiting and altered state of consciousness

### Exclusion criteria

- Patients who died before the stage of Computed tomography
- Arriving at the hospital 24 hours after injury and drinking alcohol.

All data were presented in a suitable table or graph according to their affinity. A description of each table and graph was given to understand them clearly. Collected information is compiled, analyzed, and edited using the software SPSS (version 24.0) (IBM) Chicago, Illinois.

## Results

A total of 147 patients were enrolled and analyzed in this retrospective cross-sectional study. In this study, most of the 55(37.41%) patients were from the age group 1-14 years and only 12(8.16%) patients were aged above 65 years (Table 1). Table 2 shows the distribution of the study, 105(71.43%) patients were male and 42(28.57%) patients were female. According to the CT scan finding, 82% of patients had a scalp hematoma, 65(44.22%) patients had normal pain, almost 30% of patients had skull fractures and only 4% of patients had inflammatory changes (Table 3). Table 4 shows the cause of injuries, 94(63.95%) patients fell from height and 53(36.05%) patients had an accidental case. Figures 1 (H/O RTA), 2 (Vomiting), 3 (Headache) & 4 (FITS) show the patient's CT-scan images.

**Table 1:** Age distribution of the study population.

| Gender | Frequency | Percentage |
|---|---|---|
| Male | 105 | 71.43 |
| Female | 42 | 28.57 |
| Total | 147 | 100.00 |

**Table 2:** Gender distribution of the study population.

| Findings | Frequency | Percentage |
|---|---|---|
| Extra Dural hematoma | 7 | 4.76 |
| Non-hemorrhagic contusion | 6 | 4.08 |
| Hemorrhagic contusion | 18 | 12.24 |
| Scalp hematoma | 121 | 82.31 |
| Subarachnoid hemorrhage | 12 | 8.16 |
| Age-related cerebral atrophy | 25 | 17.01 |
| Subdural Hematoma | 20 | 13.61 |
| Inflammatory changes | 6 | 4.08 |
| Normal plain CT examination of the brain | 65 | 44.22 |
| Skull fracture | 44 | 29.93 |

**Table 3:** Findings seen in CT scan.

| Cause of injury | Frequency | Percentage |
|---|---|---|
| Fall from height | 94 | 63.95 |
| Road traffic accident | 53 | 36.05 |
| Total | 147 | 100.00 |

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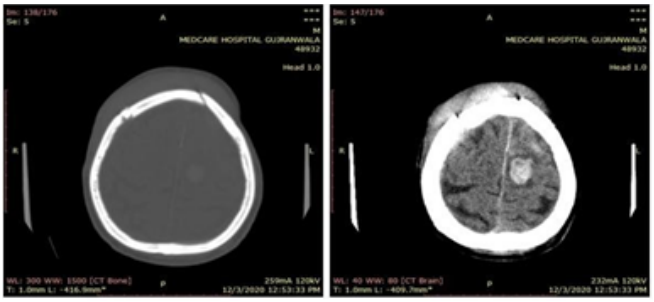

**Figure 1:** Male patient's CT Brain (75 Years), H/O RTA (Google source)

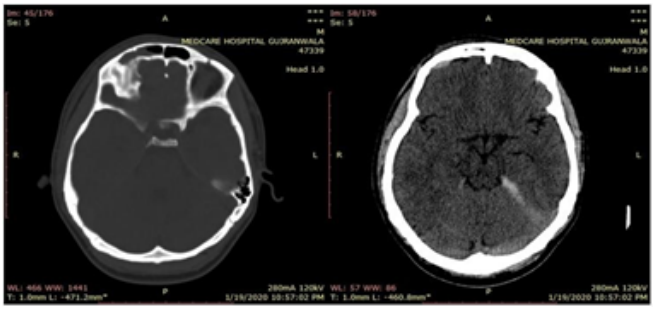

**Figure 2:** Male patient's H/O RTA (20 Year), Vomiting (Google source)


**Figure 3:** Male patient's H/O Fall, (15 Year) Unbalance, Headache (Google source)

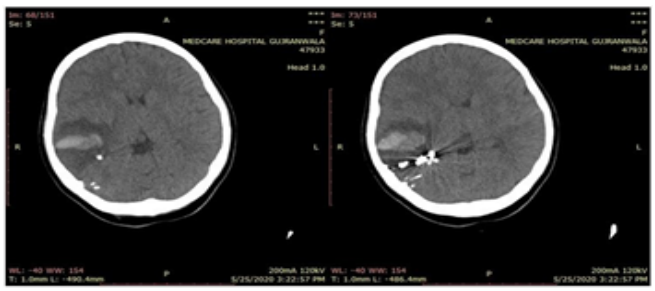

**Figure 4:** Male patient's H/O Fall (15 Year), FITS (Google source)

## Discussion

In our consequences, it is reliable throughout prior studies that showed head injury is common in RTA the majority dynamic time of years. A study reported that head injury during RTA was seen in 63% [19]. Whereas in another study it was reported that 59-69% of head injuries happen in adolescents [20]. Another research, it accomplished that behind head injury to affect results age is the solitary reason. The result was not as good as through the rising generation. In a recent study, the result shows that about 71.5% of injuries occur in males compared to females, which were about 28.5%, and mostly the incidence is present from age 1-14 years about 37%. From a Bangladeshi study, there are three leading causes found were transport injury 30.6% followed by falls 26.2% and violence 14.9% [12]. In our study, we found 53(36.05%) road accident injuries which is near to the previous study. CT-scan had become the one to find the changes that occur in the brain after trauma. Our research reports that most trauma occurs in men compared to women. It is concluded that extradural hematoma was about 4.5%, non-hemorrhagic contusion was 4%, age-related cerebral atrophy at 17%, inflammatory changes were seen at about 4%, and fracture in the skull was seen at about 30%. It was initially stated that head trauma sufferers were mostly men as compared to females because they have more outside exposures on roads and other activities that are outdoors compared to females seen in Bangladesh. In another research, the men were largely occupied with head injuries (86%) [19]. One study found that epidural hematomas were associated with skull fractures in approximately 91% of patients [21].

### Limitations of the study:

The study was conducted in a single hospital with small sample size. So, the results may not represent the whole community

## Conclusion and Recommendations

According to our research, the prevalence of percentage of non-hemorrhage contusions and extradural hematoma have almost an equivalent frequency. Males have a higher rate of intracranial hemorrhage than females. Patients who have been in road traffic accidents \have a higher risk of developing a scalp hematoma than those who have had other types of traumatic injuries. GCS reliability is insufficient since computed tomography is needed for diagnosis and confirmation of the patient's condition. According to our results, it is suggested that patients who have suffered a brain injury must undergo an acute non-contrast computed tomography to determine the best course of treatment. It is very helpful in unconscious patients who have allergies to contrast media. In order to determine the mode of injury, the patient's history should be thoroughly examined. A follow-up scan should be performed within 24-48 hours of the incident to identify the effects of bleeding. The GCS ranking system

isn't enough for accident classification. For such patients, a CT scan is prescribed as the first line of examination

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None declared.

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