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A retrospective study of traumatic brain injury within emergency department at government medical college, Jammu

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Abstract
Aim and Objective: To study a profile of traumatic brain injury within hospital emergency department at Government Medical College, Jammu.
Methods: In Jammu's Government Medical College, a retrospective research was undertaken on TBI patients. A questionnaire was administered, which was completed using medical data and International Classification of Diseases (ICD) 10 codes. June through November 2022 was the collecting period. Red Cap, the existing electronic data gathering technology, was used to submit data, which was then evaluated in Microsoft Excel. The permission of the ethics committee has been acquired.
Result: 300 cases have been discovered, with 240 (or 80%) being male and 60 (or 20%) being female. It was revealed that 29.33% of employed persons sustained head injuries, followed by 23.33% of jobless individuals. The leading causes of head injuries were falls (160; 53.33%) and motor vehicle accidents (72; 24%), followed by assault (46; 15.33%) and being hit by/or against (22; 29.6%). Patients treated within the first hour after getting specialist medical care accounted for 14.66% of all cases, of which 4.54% had a moderate GCS and 95.45% had a mild GCS.
Conclusion: The data obtained could be useful for the hospital administration in managing the necessary resources and for conducting information campaigns among the high-risk groups.

Keywords: Traumatic brain injury, emergency department, Glasgow coma scale, head injury

Introduction
Traumatic brain injuries (TBI) are a major cause of illness, death, and loss of productivity in settings with limited resources, especially among younger age groups in the second to fourth decades. The increasing urbanization, motorization, and population mobility brought forth by economic growth have altered traditional ways of living and working. The rapid motorization of India, particularly during the past two decades, has resulted in an increase in the number of injuries and fatalities caused by road traffic accidents. There are several obstacles to providing proper and effective pre-hospital and trauma treatment following an injury, such as an inadequate transport system and logistical and infrastructure issues. Numerous Indian studies have examined the epidemiology of traumatic brain injury (TBI) and addressed associated concerns, such as the necessity for public awareness campaigns and the implementation of legislation to limit the number of injuries.
Every year, approximately 50 million people suffer a traumatic brain injury (TBI) worldwide, with over 80% of cases occurring in developing nations. However, a disproportionately high increase is expected in low- and middle-income countries (LMIC), which have three times higher rates of TBI than high-income nations. Traumatic brain injury is a global public health and socioeconomic concern, needing ongoing surveillance of the incidence, prevalence, and outcomes of TBI.
The World Health Organization (WHO) estimates that low- and middle-income nations account for about 90% of worldwide injury mortality, with around 10 million individuals impacted by traumatic brain injury (TBI) annually. In addition, because TBI needs long-term care, the WHO recommends the establishment and funding of monitoring systems, as well as research aimed at measuring the effects of TBI and the development of more effective preventative measures.

Material and Method
Study population
The present retrospective study on patients was conducted in the Emergency Department (ED) at GMC Jammu for a time period of six months from June 2022 to November 2022.

Study was conducted after taking approval from the institutional ethical committee GMC Jammu. The study group comprised 300 patients.

Data Collection

On the basis of existing recommendations from the World Health Organization and American registries, a data gathering form was devised. One neurosurgery resident and one scientist skilled in data collecting and coding collected data manually from the patients' medical records. The INITIatE TBI Retrospective Registry established the collected variables; following collection, the information was uploaded into computer databases utilizing the existing electronic data collecting technology, Red Cap. The research form (questionnaire) has four modules with closed-ended questions and general patient information. The primary module provides general patient information, the date and time of injury, the kind of address, and the ICD-10 TBI type. Information about the patient's external risk factors (location, intent, type, and mechanism), traumatic brain injury at the pre-hospital level (neurological assessment, ABS, vital signs, GSC, consciousness state, diagnostic tests), traumatic brain injury at the hospital (mechanical ventilation, anti-seizure and hyperosmolar medication, surgery performed, ICP monitor/ ventriculostomy placement), and patient discharge information (date and diagnosis code of discharge, principal cause of death in case of death).

Study Variables

The unit of our analysis was the TBI patient who got care in the Emergency Department (ED) of SMGSH, GMC Jammu. All variables included in the INITIatE TBI Retrospective Registry are represented on the research form. General data, including age, sex, employment, and social status, have been collected, followed by specific variables related to TBI, including information about the patient's external risk factors (place of occurrence, intent, mechanism, alcohol and drug screening), pre-hospital diagnosis (GCS Score, ABC Status on arrival, vital signs, ACE, and confounding factors), hospital diagnosis, and patient discharge information.

Statistical analysis

Descriptive statistics for TBI patients were calculated using *t*-tests and the significance threshold "p" ($p<0.05$), necessary for testing the statistical significance. SPSS Statistics Base 20.0.0 was used to analyze data. Chi-square tests were used to determine if the distribution of injury intent and injury mechanism varied by age stratified by sex. Also, Chi-square tests were used to see if the sex, age, injury intent, and injury mechanism distribution differ by disposition. Statistical significance for the X^2 tests was set at $p<0.05$.

Results

Age distribution

During the study period, 300 patients were treated for head injury, most of them fall below <18 years 114(38%), followed by 40-60 years 88(29.34%), followed by 19-39 years 56(18.66) and only by 42 patients (14%) in < 60 years.

Table 1: Age distribution among patients

Age in years	No. of patients	% Age
<18 years	114	38
19-39 years	56	18.66
40-60 years	88	29.34
< 60 years	42	14
Total	300	100%

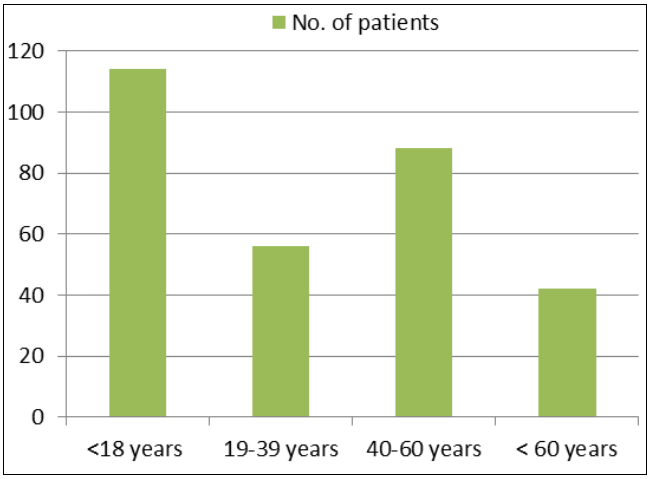

Fig 1: Age distribution among patients

Gender

Among 300 patients, 240 (80%) were male and 60 (20%) were female.

Table 2: Gender distribution among patients

Gender	No. of patients	% Age
Male	240	80
female	60	20
Total	300	100%

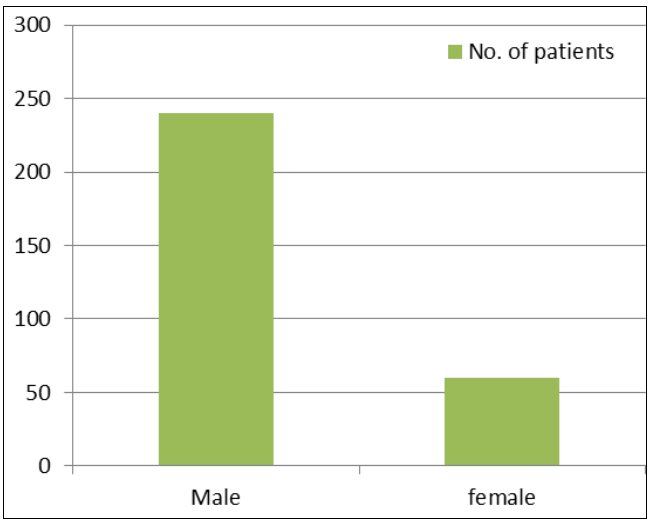

Fig 2: Gender distribution among patients

Occupation Distribution

The highest proportion of head injuries occurred among employed individuals 29.33% followed by unemployed (23.33%), businessman (21.34%), farmers (16.67) and housewife (each by 3%). Employment was unknown for 8.33% of the patients.

Table 3: Occupation distribution among patients

Occupation	No. of patients	% Age
Businessman	64	21.34
Farmer	50	16.67
Employed	88	29.33
Unemployed	70	23.33
House wives	03	1
Others	25	8.33
Total	300	100%

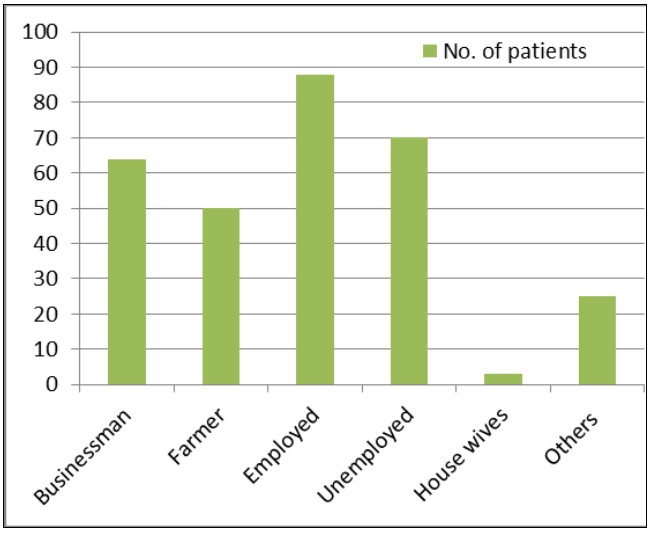

Fig 3: Occupation distribution among patients

Area

A large majority (62%) of head injuries were among patients from the urban area followed by 38%.

Table 4: Demographic characteristics of patients

Area	No. of patients	% age
Rural	114	38
Urban	186	62
Total	300	100%

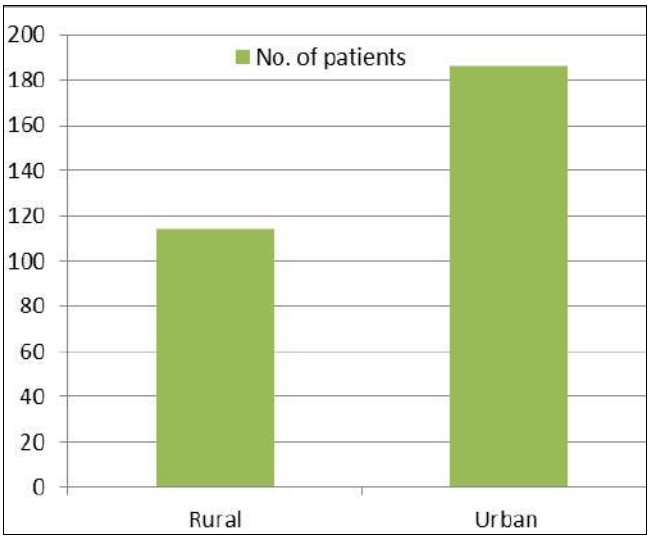

Fig 4: Demographic characteristics of patients

Mechanisms of Head Injury

The most common mechanisms of head injury were falls 160(53.33%) and road traffic injuries 72(24%), followed by assault 46(15.33%) and struck by/or against 22(29.6%). There is significant relationship between the two variables (p-value 0.32).

Table 5: Mechanism of injury and gender

Mechanism of injury	Male	Female	X^2	P-Value
Road traffic injury	58	14	3.4	0.32
Fall	122	38		
Assault	40	6		
Struck by/or against	20	2		
Total	240	60		

Place of Occurrence

The distributions by place of occurrence highlighted that most injuries occurred at home 98 (32.66%) and transport areas 79(26.33%), followed by sports and athletics area (14.66%), industrial or construction areas 35 (11.66%), farm or other places of primary production 31(10.33%) and other specified place of occurrence 13 (4.33%). There is significant relationship between the two variables (p-value 0.13).

Table 6: Place of occurrence and gender

Place of occurrence	Male	Female	X^2	P-Value
Home	70	28	6.2	0.13
Sports and athletics area	38	6		
Transport area: Public highway, street or road	65	14		
Industrial or construction area	30	5		
Farm or other place of primary production	25	6		
Other specified place of occurrence	12	1		
Total	240	60		

Intent

The majority of head injuries (89%) were mentioned as unintentional followed by assault (11%).

Table 7: Distribution of intent and gender

Intent	Male	Female	X^2	P-value
Unintentional	215	52	0.76	0.29
Assault	25	8		
Total	240	60		

Work-Related Injury

The majority of the cases were not work-related 271 (90.33%). The two variables shows significant difference (p-value 0.94).

Table 8: Work related injury and gender

Work-related injury	Male	Female	X^2	P-Value
Yes	22	7	0.001	0.94
No	218	53		
Total	240	60		

Type of addressing

A large proportion of patients asked for ambulance help 253 (88.33%, there is significant relationship between these variables, p = 0.94).

Table 9: Type of addressing and gender

Type of addressing	Male	Female	X^2	P-value
Walk-in	34	13	4.3	0.03
Ambulance	206	47		
Total	240	60		

Time of injury

The most requested periods of the day with head trauma were recorded between 8.00 - 12.00 for 71 (23.66%) patients and 16.00 - 20.00 for 70 (23.33%) patients. there is significant relationship between these variables, p = 0.94).

Table 10: Time of injury and gender

Time of injury	Male	Female	X^2	P-value
00.00 - 8.00	49	1	4.80	0.22
8.00 - 12.00	58	13		
12.00 - 16.00	41	14		
16.00 - 20.00	51	19		
20.00 - 00.00	41	13		
Total	240	60		

Characteristics of TBI Patients Health Status by the Glasgow Coma Scale at Pre-Hospital and Emergency Departments Level

GCS was used to compare the degree of consciousness of TBI patients at the injury site and emergency department.

Prehospital, 83.33% of TBI patients had a GCS between 13 and 15, suggesting a mild TBI; their condition remained stable and did not alter at the ED. The 10,66% of patients with a GCS of 9 to 12, suggesting a mild TBI, stayed stable from the field to the emergency department. 6 percent of individuals with a GCS between 3 and 8 indicate a serious TBI. Comparing GCS indicators at the pre-hospital level to those in the ED leads us to assume that they have not altered and that the parameters of health indices have not changed when summed as mild, moderate, or severe GCS.

Expresses an interest in the gender composition of the GCS In all, 240 (80%) head injuries were reported in males, with a majority of minor GCS (64.66%) and moderate GCS (9.33%), whereas all occurrences in females (1.86.6%) were mild GCS.

Table 11: Characteristics of TBI Patients health status by GCS based on gender

GSC score	Male N (%)	Female N (%)	Total N (%)	X^2	P-Value
Minor (13-15 p)	194 (64.66)	56(18.66)	250(83.33)	2.89	0.25
Moderate (9-12 p)	28(9.33)	4(1.33)	32(10.66)		
Severe (3-8 p)	18(6)	0	0		
Total	240(80)	60(20)	300(100)		

Depending on the time of seeking specialized medical help, some changes were observed

Patients treated within the first hour after getting specialist medical care accounted for 14.66% of all cases, of which 4.54% had a moderate GCS and 95.45% had a mild GCS. 18.88% had a severe GCS, 6.89% had a moderate GCS, and 86.20% had a minor GCS with medical addresses between 1 and 4 hours. After 4 hours or longer following a TBI, the cases receiving medical care had GCS scores of 8.69% severe, 6% moderate, and 78.26% mild.

We see that none of the patients who received care within the first hour had substantial improvements, with the exception of one patient whose GCS changed from 14p GCS to pre-hospital to 15p GCS to the ED. GCS changes modestly in patients referred for assistance between 1 and 4 hours after trauma, but does not alter in those sent for assistance after 4 hours.

Table 12: Characteristics of TBI patient's health status by GCS based on the addressing time

Time	GCS pre-Hospital, N (%)			Total, N/%	X^2	p-value
	severe	moderate	minor			
<1 h	-	2(4.54)	42(95.45)	44(14.66)	27.5	0.0001
1 - 4 h	8(18.18)	8(6.89)	100(86.20)	116(38.66)		
>4 h	12(8.69)	18(6)	108(78.26)	138(46)		
Total	20(6.6)	30(10)	250(83.33)	300(100)		

Discussion

This is, to the best of our knowledge, the first research in the division to pilot a Trauma Registry examining trends in TBI and documenting traumatic brain injuries among patients seen in the Emergency Department using the accessible medical data. Due to the fact that 300 patients were hospitalized within six months, our data indicate that TBI is a crucial component of trauma care. Our findings that 80% of those afflicted were males and 20% were females are similar with prior research with more observations, such as the study by Chapital AD, Harrigan RC, Davis, *et al*. entitled Traumatic Brain Injury: Outcomes from Rural and Urban Locations Over a 5-Year Period.

In the current study, the majority (38%) of patients with head injuries are less than 18 years old. followed by 40-60 years 88 (29.34%), 19-39 years 56 (18.66%), and 60 years just 42 (14%) patients.

We discovered that a considerable majority of TBI cases occurred in urban patients (62%), but Brown *et al*. found the opposite to be true, with a greater proportion of cases occurring in rural areas.

Similar to other research such as Peek-Asa, C. (2020) 76 Traumatic Brain Injury Surveillance in Three Low- and Middle-Income Countries, our data reveal that falls were the leading cause of head injuries (53.33%), followed by road traffic accidents (24%). This is consistent with the research findings; falls are the major cause of traumatic brain injury (TBI). This is consistent with the research findings; falls are the major cause of traumatic brain injury (TBI). The majority of instances (32.66%) were linked to the home environment, and men were the most impacted.

However, our research revealed that 89 percent of incidents were inadvertent, followed by 11 percent of assaults. In addition, the majority of ED visits occurred between 08:00 and 20:00, which is consistent with our findings. We discovered no significant differences between prehospital GCS markers and ED GCS indicators.

The Glasgow Coma Scale (GCS) suggests that 83.33 percent of the patients had a mild TBI; their condition stayed stable and did not alter in the ED. The 10,66% of patients with a GCS of 9 to 12, suggesting a mild TBI, stayed stable from the field to the emergency department. 6 percent of individuals with a GCS between 3 and 8 indicate a serious TBI.

Patients treated within the first hour after getting specialist medical care accounted for 14.66% of all cases, of which 4.54% had a moderate GCS and 95.45% had a mild GCS.

Conclusion

The study reveals that the incidence of traumatic brain injury (TBI) in metropolitan areas is growing each year, with the bulk of cases coming from adjacent areas, which is extremely concerning and demonstrates the urgent need to provide effective pre-hospital care and trauma services on-site in India. These patients must have access to quality

neurosurgical treatment. A computerized trauma registry is urgently required to reveal the risk factors, conditions, and sequence of events leading to accidents in India, and would be of great use in policy formulation and health management.

Conflict of Interest
Not available

Financial Support
Not available

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