Original Article

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Comparison of Physical Assault and Other Mechanisms of Injury among Trauma Patients Attending the Emergency Department of a Tertiary Hospital in a Low-and Middle-Income Country

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ABSTRACT

Background : *Injury management and trauma registry are undeveloped in many Low- and Middle-Income Countries (LMICs). The objectives of the study were to assess the injury pattern and compare physical assault with other mechanisms of injury in this region.*

Materials and methods : *A cross sectional study was conducted among trauma patients attending in the Emergency Department (ED) of the largest tertiary referral centre in the South-Eastern Bangladesh from 1-15 September, 2019. Patients' demography, time of arrival in the ED, time of injury, occupation, residence, mechanism, type, mode and site of injury, and outcome were analysed and compared between physical assault and other mechanisms of injury.*

Results : *Among a total of 839 patients, males were 2.42 times more than females. Age ranged from 3 months to 100 years, median 27 years. Majority (52.7%) of the patients belonged to ages between 20 and 40 years. The most common mechanisms of injury were physical assault (230, 27.4%), Road-Traffic Accident (RTA) (196, 23.4%) and falls (146, 17.4%). Physical assault was the commonest mechanism (39.2%) in female and among all age groups except in more than 70 years of old. More physical assaults occurred at night than other mechanism ($p<0.01$). There was significant difference in site of injury between physical assault and other mechanisms ($p<0.01$). 62% injuries were blunt in nature. There were 7 (0.8%) mortalities.*

Conclusion : *This study highlights physical assault as the most common mechanism of injury especially among young adults and females. Period of occurrence, sites and nature of injury were different from other mechanisms.*

Key words :
Emergency department; Female; Injury, Physical assault; RTA; Trauma.

Introduction

Injuries account for 9% of global mortality and they claim more lives than HIV/AIDS, tuberculosis and malaria together.[1] For every death from injury, there are hundreds of Emergency Department (ED) visits and dozens of hospital admissions. Although, injury related mortality and morbidity are declining in Higher-Income Countries (HICs), the decline is much slower or flat in most Low-and Middle-Income Countries (LMICs).[2] Moreover, due to lack of vital registration data and population-based injury studies in these countries, injury estimates for LMICs are often not accurate. Even then, it has been estimated that more than 90% injury related mortality and DALY lost occur in the LMICs.[2] To reduce injury related morbidity and mortality it is important to identify risk factors and apply appropriate strategy to prevent them. There are also regional variations in injury pattern and causes.

Interpersonal violence is an important cause of mortality and morbidity worldwide. Violence accounts for 2.5% of global deaths and it is the fourth leading cause of death among people aged 15-44 years.[2] However, there are important gaps in data that undermine violence prevention efforts. The aim of the study was to ascertain the injury pattern attending in the ED in one of the largest tertiary level government referral hospital in Bangladesh and to describe the state of the problem of physical assault in this region.

Materials and methods

This was a cross sectional observational study carried out between 1st to 15th September 2019 in the ED of Chittagong Medical College Hospital (CMCH), which is a tertiary level government academic hospital in Bangladesh. Chattogram (Former Chittagong) is situated at the south-east part of the country and is the

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IAHS Medical Journal
Volume 05 Issue 01 June 2022; 32-37

second largest city in the country. CMCH is the largest referral centre for about one fifth of the population of the country (161.4 million) and receives a large number of different types of injury patients every day from all the south eastern districts of Bangladesh.[3] The general objective of the study was to compare physical assaults with other mechanism of injuries in this region and the specific objectives were to find out the age and sex related injury patterns and their mechanisms, mode and mechanisms of injury, time of most injury during a day and the most common time of hospital arrival, site of injury and outcome.

A pretested case record form was used to collect data from ED round the clock during the study period. Injury patients of all ages and gender presenting to ED were included in the study after obtaining informed consent. Patients who attended the outpatient department instead of ED and who refused to take part in the study were excluded. Patients' demography, time of arrival in the ED, time of injury, occupation, residence, mechanism, type, mode and site of injury, and outcome were recorded.

Statistical analyses were performed using both Microsoft Excel 2019 and SPSS version 22 and cross checked to correct errors. Categorical variables were described as frequency and percentage and compared using Chi-square test. Continuous variables were expressed as mean or median ± standard deviation and comparison was done by independent sample t test or Mann Whitney U test. Relation of distance from hospital with delay in arrival in ED was analysed using Pearson's test. Age differences among different mechanisms of injury were analysed using Kruskal Wallis test. p value < 0.05 was considered to be significant. Confidentiality was maintained using unique identifiers and by password protected data entry with restricted users. This study was approved by the Principal of Chittagong Medical College and the director of CMCH.

Results

During this period, a total of 839 patients attended the ED. Among them, 594 were male and 245 were female (Ratio 2.4:1). Age ranged from 3 months to 100 years, mean 29 ± 15.1 years, median 27 years, IQR 19-35 years. In both sexes, majority of the patients belonged to "20-30 years" (Male-32.0%, female-30.6%), followed by 30-40 years age group (Male-21.0%, female-21.2%) (Fig. 1). 52.7% (442) of the patients belonged to ages between 20 and 40 years. Children and adolescents (Age 0-20 years) constituted about one fourth of the patients (215, 25.6%).

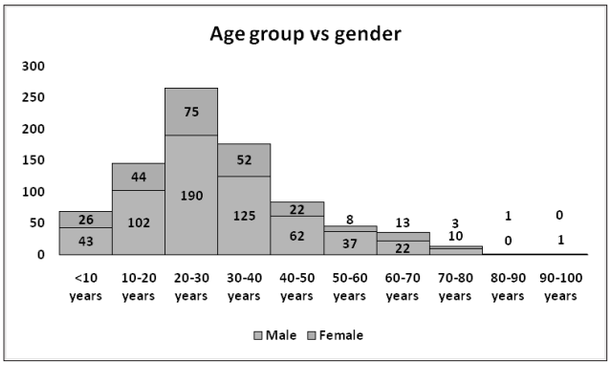

Figure 1 Distribution of gender among age groups

57.0% patients were from urban areas and 43.1% from rural areas. There was no significant difference between sexes with regards to residence (p 0.6). Distance from hospital ranged from 0.1 to 165.8 km (Median 10 km, IQR 5.5-30.1 km). Time lapse for arrival in ED from onset of injury ranged from 10 minutes to 18 days (Median 150 minutes, IQR 72-360 minutes). There was no significant difference in median time lapse between urban and rural patients (150 vs 155 minutes, respectively, p 0.9) and between genders (p 0.9). There was also no significant correlation of time lapse for presentation with distance from hospital (p 0.5). Majority (337, 40.2%) of the ED attendances were during evening shift (2.30-10 pm), followed by morning shift (8am -2.30 pm) (315, 37.5%) and night shift (10 pm-8 am) (187, 22.3%). 479 (57.1%) patients presented within 3 hours of trauma.

Physical assault (230, 27.4%) was the commonest mechanism of injury followed by Road-Traffic Accident (RTA) (196, 23.4%) and falls (146, 17.4%). In female, physical assault was the commonest mechanism (39.2%) and in males, RTA was the commonest mechanism (28.8%) (Table I). Among the patients of physical assault, 41.7% were female and among other injuries 24.5% were female (p<0.01). Among the patients who had physical assaults, 28 (12.2%) were children (Less than 18 years). There were no significant differences in median ages among different mechanisms of injury (p 0.10).

Table I Mechanism of injury between males and females

Mechanism of injury	Female No (%)	Male No (%)	Female: Male	Total No (%)
Physical assault	96 (39.2)	134 (22.6)	0.7:1	230 (27.4)
RTA	25 (10.2)	171 (28.8)	0.2:1	196 (23.4)
Fall	53 (21.6)	93 (15.7)	0.6:1	146 (17.4)
Household injury	39 (15.9)	88 (14.8)	0.4:1	127 (15.1)
Occupational injury	9 (3.7)	66 (11.1)	0.1:1	75 (8.9)
Burn	10 (4.1)	20 (3.4)	0.5:1	30 (3.6)

IAHS Medical Journal
Volume 05 Issue 01 June 2022; 32-37

NAI	4 (1.6)	10 (1.7)	0.4:1	14 (1.7)
Other accidental injury	5 (2.0)	9 (1.5)	0.6:1	14 (1.7)
Landslide	4 (1.6)	0 (0.0)	4.0:0	4 (0.5)
Animal attack	0 (0.0)	2 (0.3)	0.0:2	2 (0.2)
Sports injury	0 (0.0)	1 (0.2)	0.0:1	1 (0.1)
Total	245 (100.0)	594 (100.0)	0.4:1	839 (100.0)

(RTA-Road Traffic Accident, NAI-Non-Accidental Injury).

Physical assault was the commonest mechanism of injury in all age groups except patients who were more than 70 years of age (Fig. 2). 32.2% of physical assaults occurred among "20-30 years" age group which was followed by "30-40 years" (20%) and "10-20 years" (13.9%). RTA was commonest in "20-30 years" age group (29.1%) followed by "30-40 years" (21.9%) and "10-20 years" (18.4%). Majority (40.4%) of the falls happened in "20-30 years" age group followed by "30-40 years" (21.9%) and "10-20 years" (16.4%).

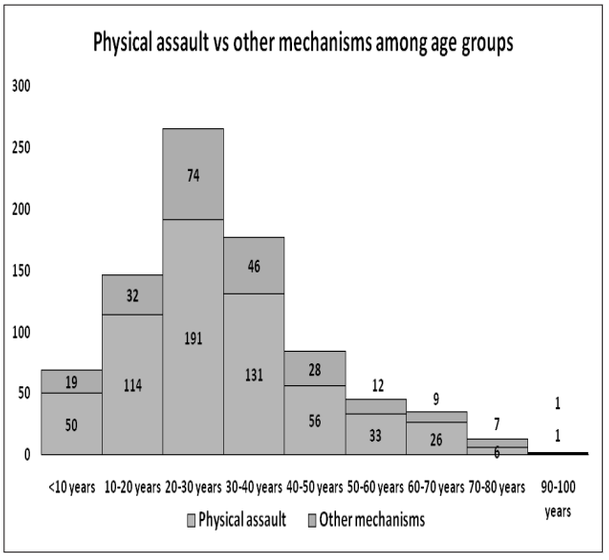

Figure 2 Distribution of mechanism of injury (Physical assault vs other mechanisms) among age groups

Majority of the injury occurred during day-time (6 am to 6 pm) (564, 67.2%) and 32.8% (275) occurred during night. The second quarter of the day (12 pm to 6 pm) was the most vulnerable period for injury during which time 35.5% injuries occurred, followed by "6 am to 12 pm" (260, 31.0%), "6 pm to 12 am" (202, 24.1%) and "12 am to 6 am" (79,9.4%). While other injuries followed a similar pattern of highest occurrence between 6 am to 6 pm, the occurrence of physical assault increased with the passage of every quarter of the day (Fig. 3). 40.4% (93) physical assaults and 29.9% other injuries occurred at night (p<0.01).

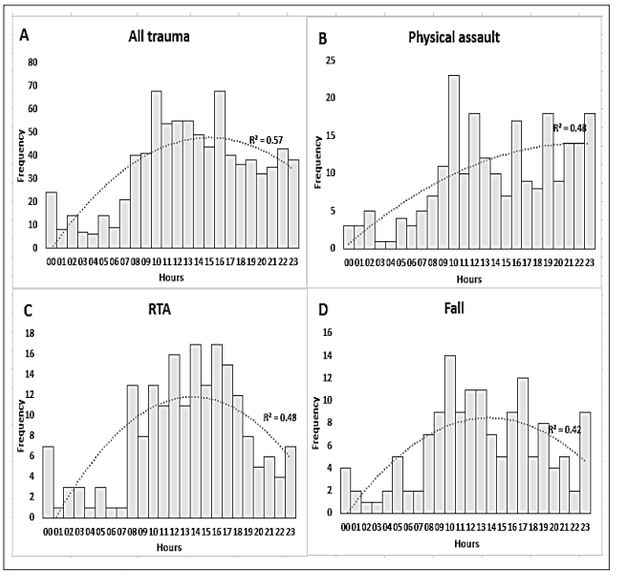

Figure 3 Hourly distribution of A) All injury (N=839) B) Physical assault (n=230) C) RTA (196) and D) Fall (n=146)

Physical assault was the mechanism of injury in about one fourth of the patients in all occupations other than garment workers, drivers, and rickshaw pullers (Table II). Among the patients who had RTAs, 46.94% were service holders, followed by students (13.8%), housewives (10.7%) and others (28.6%). Among patients with falls, 50% were service holders, and 8.9% each was day laborer and students, and 32.2% were of other occupations.

Table II Occupation among patients with physical assault and other mechanism of injury

Occupation	Physical assault	Other causes	Total
Service holder	116 (50.4)	271 (47.0)	387 (46.1)
Student	25 (10.9)	66 (11.5)	91 (10.8)
Housewife	22 (9.6)	59 (10.2)	81 (9.7)
Day labourer	15 (6.5)	48 (8.3)	63 (7.5)
Small businessman	13 (5.7)	39 (6.8)	52 (6.2)
Garment worker	4 (1.7)	19 (3.3)	23 (2.7)
Driver	4 (1.7)	17 (3.0)	21 (2.5)
Mechanic	4 (1.7)	9 (1.6)	13 (1.5)
Rickshaw puller	1 (0.4)	10 (1.7)	11 (1.3)
Farmer	2 (0.9)	7 (1.2)	9 (1.1)
Others	11 (4.8)	31 (5.4)	42 (5.0)
Not recorded	13 (5.7)	33 (5.7)	46 (5.5)
Total	230 (100.0)	576 (100.0)	839 (100.0)

Upper limb (243, 29.0%) was the commonest site of injury in all patients followed by multiple site (203, 24.2%) and head, neck and face region (175, 20.9%) (Table III). This pattern was similar in both sexes. However, in patients with physical assault and RTA,

IAHS Medical Journal
Volume 05 Issue 01 June 2022; 32-37

multiple site involvement was the commonest (38.3% and 35.7%, respectively). There was significant difference in site of injury between physical assault and other mechanisms (p<0.01). Majority of the injuries were blunt in nature (520, 62.0%), followed by sharp (217, 25.9%), multiple (67, 8.0%), burn (30, 3.6%), hanging (2, 0.2%), sexual assault (2, 0.2%) and drowning (1, 0.1%). Sharp wound was present in 17.4% of the patients of physical assault and 29.1% of patients of other injuries (p<0.01).

Table III Site of injury in different mechanisms of injury

Site of injury	Physical assault n (%)	RTA n (%)	Fall n (%)	Other mechanisms n (%)	Total n (%)
Upper limb	44 (19.1)	37 (18.9)	37 (25.3)	125 (46.8)	243 (29.0)
Multiple sites	88 (38.3)	70 (35.7)	21 (14.4)	24 (9.0)	203 (24.2)
Head, neck and face	60 (26.1)	31 (15.8)	39 (26.7)	45 (16.9)	175 (20.9)
Lower limb	13 (5.7)	49 (25.0)	39 (26.7)	60 (22.5)	161 (19.2)
Abdomen	10 (4.3)	1 (0.5)	2 (1.4)	5 (1.9)	18 (2.1)
Chest	6 (2.6)	2 (1.0)	5 (3.4)	5 (1.9)	18 (2.1)
Back	6 (2.6)	5 (2.6)	2 (1.4)	3 (1.1)	16 (1.9)
No external injury	3 (1.3)	1 (0.5)	1 (0.7)	0 (0.0)	5 (0.6)
Total	230 (100.0)	196 (100.0)	146 (100.0)	267 (100.0)	839 (100.0)

Among the patients who attended the ED, 741 (88.3%) were admitted in different wards of the hospital, 91 (10.9%) were discharged from ED after treatment and 7 patients (0.8%) died in the ED. Among the mortalities, there were 3 RTAs, 2 burns, 1 fall and 1 drowning. All the cases had multiple injuries. Among the admitted patients, 10 (1.2%) were seriously injured and were transferred to the wards without any official delay. However, their outcome and outcome of all other admitted patients were not evaluated in this cross-sectional study.

Discussion

Globally, injuries and violence are among the most prominent public health problems and are responsible for approximately 6% of all years lived with disability.[1] The pattern and magnitude varies among countries and among regions in countries.[4-11] This study shows that, unlike many other reports, physical assault was the commonest cause of presentation in the ED for injuries during the study period. It affected almost all age groups, occupations, body regions. It involved both urban and rural people of both sexes.

The occurrence of most injuries in males and among "20-40 years" age group are consistent with other studies.[2] This is attributed to more males are usually outdoor for work, especially in the LMICs.[5] The presentation of 57% of injury patients within the golden hour (3 hours) is consistent with the fact that majority of the patients were from urban areas and it implies that this region has a good transport system. This percentage is much more than a report from North India who found that only 7.9% of their patients presented with the golden hour.[5] Polytrauma was the commonest injury pattern in some reports mostly attributed to more RTAs than other injuries.[5] This study found that upper limb injuries were the commonest site. Blunt mode of injury was predominant in the study population which indicates to the unplanned violence due to arrogant behavior and accidents by less mechanized or slow-moving vehicles. These types of injuries can be minimized by behavioral counseling and proper enforcement of traffic law and order.

In this study, 41.7% of the patients who suffered physical assault were female. This was the highest female to male ratio with respect to mechanism of injury other than land slide in which all four patients were female. Physical assault was also the commonest mechanism of injury in female (39.2%). One in every 3 women worldwide have experienced physical and/or sexual violence and prevalence of intimate partner violence is highest (37.7%) in the South East Asian region.[12,13] These data indicate that there are social instabilities in this area. Likewise, one in every 2 children worldwide suffer some form of violence every year.[14] It has been suggested that adults who experienced 4 or more childhood adversities are 7 times more likely to be involved in interpersonal violence and are 30 times more likely to attempt suicide.[14] Bangladesh is among the top five countries in the world after Ghana, West bank and Gaza, Togo, Central African Republic and Syria with regards to percentage of children aged 1–14 years who had experienced any violent discipline.[14] On the other hand, some developed countries reduced child abuse by 54-62% within a 20 year period.[2]

RTA was the second commonest cause of injury in this study and the most common mechanism in males (28.8%). 71.4% of RTA occurred in male in this study. Globally, 73% of all road traffic fatalities are males.[15] About 2% of global mortality occurs due to RTA and 24% of all injury deaths are due to RTA[2,15] RTA is also the leading cause of death worldwide among those aged 15–29 years.[1] RTA is predicted to be the 7th leading cause of death worldwide by 2030.[1] Deaths and injuries from RTAs cost about 2% of Gross Domestic Product (GDP) in HICs and about 5% of GDP in some LMICs.[16]

IAHS Medical Journal
Volume 05 Issue 01 June 2022; 32-37

Falls were the third most common cause of injury in this study. 80% of the global fall related deaths occur in the LMICs and it is predicted that falls will be the 17th leading cause of global deaths by 2030.[1,17] Household injuries were also high indicating a substandard life style. Injury is the leading cause of death among children aged 1-17 years in Bangladesh.[18] Although, there was only one case of drowning, it is an important cause of mortality especially in children in the tropical countries.[18] Drowning causes about 7% of global deaths from injury.[1] An earlier study showed that some drowning prevention programs were very cost effective and reduced mortality from drowning in children. These programs have the prospects to be implemented in the national level.[18,19]

One important observation during the study was that ED in this hospital is not a self-sufficient department unlike many EDs in the HICs. Rather, it serves more as a receiving hub of emergency patients who are immediately refereed to the respective wards if admission is needed. Application of Advanced Trauma Life Support (ATLS) is at the rudimentary stage and is inappropriately followed. All these factors cause delay in the management of emergency patients. This scenario is applicable to many LMICs. It was obvious that although, 57% of the patients presented within the golden hour of trauma in this study, there were delays in the commencement of definitive treatments in the respective wards. To improve the outcome from injuries, the EDS in the LMICs needs further improvement and this is an area which deserves more attention from the governments and global agencies.

Limitations

This study has some limitations. Since this was a cross sectional study there were no follow ups. As the study was conducted in the ED, final outcome, especially mortality could not be analyzed in the admitted patients. Moreover, the results might not reflect the injury pattern in the community as it was performed in a tertiary hospital. It had a short study period, however, the number of patients were substantial for analysis.

Conclusion

Injury was a major cause of ED attendance and physical assault was the most common mechanism of injury followed by RTA. Young adults, who constitute the key portion of the economy of a society, were most vulnerable. Females were more prone to physical assaults and it was prevalent among all age groups and among most occupations. More physical assaults occurred at night than other injuries.

Recommendations

One important recommendation from this study is that social reform is necessary to reduce violence especially violence against women and children. Awareness program to road safety should be strengthened. This study reemphasizes the need for trauma registry and improvement of trauma care in the LMICs.

Disclosure

All the authors declared no competing interest.

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IAHS Medical Journal
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