

Associated Injuries in Patients with Maxillofacial Trauma at Dhaka Dental College Hospital by Motorcycle Accident

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ABSTRACT:

Background: Facial skeleton injuries are common in emergency departments and can cause physical and psychological distress. The mandible is the most commonly fractured site, followed by the maxillae, zygomatic bone, and nasal bone. Tooth injuries are also common. Although rarely fatal, these injuries may be associated with life-threatening conditions in other parts of the body.

Objective: To assess the other bony and soft tissue injuries along with facial bone fracture

Methods: It was a cross-sectional observational study carried out in the Department of Oral and Maxillofacial Surgery, Dhaka Dental College and Hospital. Main outcome variable were age, sex, site, etiology, bony and soft tissue injury over the skin. Thirty patients with maxillofacial trauma who were attended to the Department of Oral and Maxillofacial Surgery were selected for the study. Study Period: 10 January 2019 to 15 July 2019

Results: Majority of the patients were in the 2nd to 4th decade (80%) with a male to female ratio of 6.5:1. The motorcycle accident occurred with pavement 9(30.0%) followed by 20% with truck, 5 (16.7%) with bus, 13.3% with motorcycle, 10% accident with pedestrian and 6.7% with autorickshaw. Mandible was the most commonly fractured facial bone (36.67%), followed by midface fracture (20.0%), Lefort-II (16.7%) and Lefort-III (13.3%). Closed head injury such as scalp injury were more 19 (63.3%) then linear fracture 7 (23.3%) and depressed fracture of temporal bone. A total of 23 (76.7%) patients were wearing a helmet at the time of the accident and rest of 7 (23.3%) had no helmet. The soft tissue injuries were significantly more in non-helmeted subjects ($p < 0.05$). Non-helmet subjects sustained more injuries as compared to helmeted subjects. The injuries were significantly more in non-helmet motorcyclists

Conclusion: The study found that males aged 21-40 were most commonly injured in motorcycle accidents, with motorcycle riders and rideshare businessmen being the largest groups of victims. Midface fractures were the most common facial injury and were significantly associated with helmet use. Protective gear was found to be low among motorcycle riders, particularly passengers, impacting the severity of injuries sustained.

KEY WORDS: Mandible fracture, Soft tissue injuries, Motorcycle accidents, Helmet use.

INTRODUCTION

Maxillofacial trauma can be life-threatening and complex, often occurring with head injuries and injuries to other systems. Emergency departments see 5-10% of patients with this type of injury, with head injury being the most common associated injury.¹ The causes of maxillofacial injuries vary by country, with assault being the primary cause in developed countries and road traffic accidents in developing countries. In the US, motor vehicle accidents, assaults, and athletic injuries are common causes. Men are more prone to trauma due to factors such as driving and contact sports, while children and the elderly are more likely to experience facial fractures from falls.^{2,3} The study aimed to determine the frequency of concomitant injuries in patients with maxillofacial trauma from motorcycle accidents and evaluate the role of maxillofacial surgeons in their care.

The aim of the study was to determine the frequency of concomitant injuries in patients with maxillofacial trauma from motorcycle accidents and evaluate the role of maxillofacial surgeons in their care.

MATERIAL AND METHODS

This was a cross-sectional prospective observational study conducted at the Department of Oral and Maxillofacial Surgery in Dhaka Dental College Hospital from January to July 2019. The study included 30 patients who sustained maxillofacial and head injuries from

motorcycle accidents and were admitted to the hospital. A standardized data collection sheet was used to gather information on patient history, clinical examination, and radiological findings. Data were analyzed using SPSS version 26 and presented in tables and graphs.

RESULTS

Table-1: Age distribution of the patients (n=30)

Age group (in years)	Frequency	Percent
11-20	3	10.0
21-30	16	53.3
31-40	7	23.3
41-50	2	6.7
51-60	1	3.3
Total	30	100.0
Mean±SD	31.2±11.2 (range 15-66 years)	
Gender		
Male	26	86.7
Female	4	13.3

Table 1 showed that majority of the victims were in the age group of 21 to 40 years (80.0%), with 21-30 years (53.3%) more affected among this group followed by 7(23.3%) with 31-40 years. Out of 30 patients, 86.7% were male and 13.3% were female. Male : female ratio 6.5:1.

Table-2: Distribution of mechanisms of injury of patients (n=30)

Mechanism of injury	Frequency	Percent
Motorcycle vs pavement	9	30.0
Motorcycle vs motorcycle	4	13.3
Motorcycle vs bus	5	16.7
Motorcycle vs truck	6	20.0
Motorcycle vs pedestrian	3	10.0
Motorcycle vs autorickshaw	2	6.7
Motorcycle vs other vehicle	1	3.3
Total	30	100.0

Table 2: Indicates that maximum of the motorcycle accident occurred with pavement 9(30.0%) followed by 20% with truck, 5(16.7%) with bus, 13.3% with motorcycle, 10% accident with pedestrian and 6.7% with autorickshaw.

Table-3: Distribution of fracture facial bones (n=30)

	Frequency	Percent
Mandible Fracture (Total - 11)		36.7
Symphysis fracture	2	6.7
Parasymphysis fracture	1	3.3
Parasymphysis+condyle	3	10.0
Angle of mandible	4	13.3
Body of mandible	1	3.3
Condyle fracture (isolated)	1	3.3
Zygomatoco-maxillary fracture including orbit	6	20.0
Lefort-I	3	10.0
Lefort-II	5	16.7
Lefort-III	4	13.3
Nasal bone fracture	1	3.3
Total	30	100.0

Table 3: Shows mandible was the most commonly fractured facial bone (36.7%) (n=11) at different anatomical locations. Both Zygomatoco-maxillary complex fracture and Lefort-II fracture were 20% and 16.7% respectively.

Table-4: Distribution of involvement of cranium (n=30)

Involvement of cranium	Frequency	Percent
Scalp injury	19	63.3
Linear fracture	7	23.3
Depressed fracture of frontal bone	1	3.3
Depressed fracture of temporal bone	2	6.7
Depressed fracture of parietal bone	1	3.3
Total	30	100.0

Table 4: indicates that maximum 19(63.3%) patients had scalp injury, 23.3% patients had linear fracture.

Table-5: Distribution of study subjects by helmet use and driving license (n=30)

Variables	Frequency	Percent
Helmet use		
Yes	23	76.7
No	7	23.3
Total	30	100.0
Driving license		
Yes	20	66.7
No	10	33.3
Total	30	100.0

Table 5: indicates that maximum 23(76.7%) patients used helmet and 7(23.3%) not used helmet. Of the 30 injured drivers: 33.3% had no motorcycle license.

Table-6: Distribution of study subjects by number of persons on motorbike during crash (n=30)

Number of person	Frequency	Percent
Drive alone	17	56.7
Driver and one passenger	11	36.6
Driver and two passengers	2	6.7
Total	30	100.0

Table 6: indicates that the majority 17 (56.7%) of the victims were driver alone, 36.6% victims were driver with one passenger and only 6.7% victims were driver with two passengers.

Figure 2: Classification of concomitant injuries on basis of skeletal/soft tissue injury

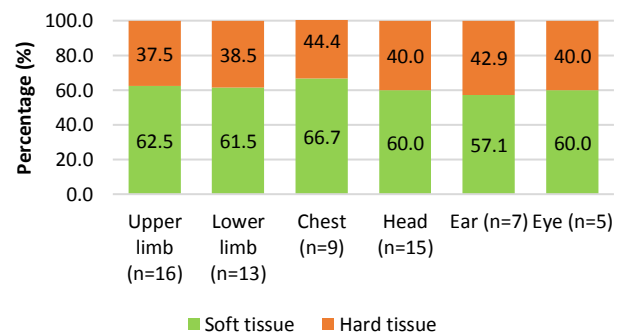


Figure 2 shows Soft tissue injuries were the most common type among the associated injuries. The upper limb (62.5%), lower limb (61.5%), chest (66.7%), head (60%), ear (57.1%) and eye 60.0%.

Table-7 Comparison of prevalence of soft tissue injury among helmeted and non-helmeted subjects (n=30)

Area	Soft tissue injury	Helmet	No helmet	p-value
		(n=23) No. (%)	(n=7) No. (%)	
Extra-oral	Abrasion	14(60.9%)	7(100.0%)	0.041*
	Laceration	9(39.1%)	6(85.7%)	0.031*
	Contusion	6(26.1%)	6(85.7%)	0.005*
	Communication	3(13.0%)	5(71.4%)	0.002*
Intra-oral	Abrasion	6(26.1%)	5(71.4%)	0.029*
	Laceration	3(13.0%)	4(57.1%)	0.015*
	Contusion	2(8.7%)	3(42.9%)	0.033*
	Communication	2(8.7%)	3(42.9%)	0.033*

Chi-square test was used to analyze data, *significant

A total of 23(76.7%) patients were wearing a helmet at the time of the accident and rest of 7(23.3%) had no helmet. Abrasions were the most common type of injury followed by lacerations, contusions and communications. Soft tissue injuries were divided into extra-oral injuries and intra-oral injuries. The soft tissue injuries were significantly more in non-helmeted subjects ($p < 0.05$). Non-helmet subjects sustained more injuries as compared to helmeted subjects. The injuries were significantly more in non-helmet motorcyclists

DISCUSSION

Maxillofacial injuries are most common in individuals aged 21 to 40 years, with the highest prevalence among those aged 21-30 years. Men account for the majority of cases. This is likely due to risky behaviors such as careless driving and engagement in sports, as well as a higher likelihood of involvement in violent incidents. Children and older individuals are less frequently affected. Several studies^{4,5} reported similar findings.

In this study, the male-to-female ratio of patients with maxillofacial and head injuries was 6.5:1. This may be due to the fact that more men ride motorcycles and the active nature of younger individuals.^{6,7} In this study, most motorcycle accidents occurred with the pavement (30.0%), followed by truck (20.0%) and bus (16.7%) accidents. Among the injured drivers, 23.3% did not have a motorcycle license, and 24.6% of the accidents involved alcohol consumption. 76.7% of patients used helmets. These findings align with Allan's study.⁸ Collisions between motorcycles and motor vehicles were the most common type of accident.⁹

Maxillofacial injuries are often associated with Road Traffic Accidents (RTAs), especially in developing countries where traffic regulations are not strictly enforced and urban transport infrastructure is inadequate. Motorcycles are a popular and affordable mode of transportation, making motorized vehicle accidents more common. The face is particularly vulnerable during motorcycle accidents, and the absence of helmets increases the risk of maxillofacial injuries. Wearing a helmet provides protection and reduces the likelihood of such injuries.⁶

In this study, some motorcycle crash victims did not wear helmets, and the effectiveness of helmets in preventing facial injuries was debated. However, the study found that helmets did not affect the occurrence of facial injuries but provided protection against head injuries. About 76.7% of MCV in this study wore helmets, which is lower than in some studies¹⁰ but higher than in others¹¹. Neglecting

safety measures is common in developing countries due to inadequate enforcement of laws regarding protective gear.

The majority of victims (56.7%) in this study were driving alone, and soft tissue injuries were the most common type of associated injuries, affecting various body parts. Among the patients, 76.7% were wearing helmets, and non-helmeted individuals experienced more injuries. Motorcycle accidents mostly occurred with pavement (30.0%), followed by truck (20%), bus (16.7%), motorcycle (13.3%), pedestrian (10%), and autorickshaw (6.7%). Pedestrians in Bangladesh are particularly vulnerable to accidents involving buses and trucks, accounting for more than 20% of accidents, likely due to limited knowledge of traffic rules and occupation of footpaths by hawkers. Similar patterns are observed in Delhi and Colombo where pedestrians and bicyclists account for a significant portion of total traffic deaths.¹²

Isolated mandible fractures are the most common facial bone fractures, with a range of 12.9% to 72.9%. In this study, fractured mandible (36.7%) was the most frequent maxillofacial injury, followed by fractured zygomatico-maxillary complex, consistent with previous studies by Malara et al.¹³ and Obuekwe et al.¹⁴ The angle and parasymphiseal regions of the mandible were the most common sites for fractures, which aligns with the study conducted by Ashok et al.¹⁵

In this study, LeFort II fractures were the most common among LeFort fractures (16.7%), followed by LeFort III (13.3%) and LeFort I (10.0%). These findings are consistent with the study conducted by Haug and Foss¹⁶. Shahim et al.¹⁷ reported a lower incidence of LeFort III fractures (4.2%) among bony injuries. The incidence of nasal bone fractures in this study was lower (3.3%) than the commonly believed frequency of nasal bone fractures, which may be due to the fact that isolated nasal fractures are often managed by other specialties.

This study observed various patterns of skull fractures in the context of head injuries, with linear fractures being the most common type followed by depressed fractures. Linear fractures are more prevalent during road traffic accidents (RTAs) because the head often experiences forceful contact with broad, resistant surfaces like roads. These findings are consistent with a study conducted by Ahmed et al.¹⁸ in Bangladesh, further supporting the prevalence of linear fractures in head injuries.

In the studied population, facial fractures in motorcyclists predominantly affect men under 30 years of age, and most of the patients were wearing helmets at the time of the crash. The zygomatic complex is the most common site of fracture on the face, followed by the mandible. Patients who wore helmets tended to receive more conservative treatments, while encephalic trauma was associated with helmet use. Young adults are more frequently involved in accidents and sustain more severe injuries. Another study reported fractures in the mandible, midfacial region, and dentoalveolar area. Among mandibular fractures, the symphyseal/parasymphiseal region was the most commonly affected (59.7%), followed by the body/angle region (32.8%) and the condyle (7.5%). Other fractures observed included LeFort I, II, and III fractures, as well as fractures of the zygomatic, palatal, orbital, and nasoethmoidal regions. Around 70.9% of patients had associated orofacial soft tissue injuries, and 45.6% had concomitant body injuries.¹⁹

CONCLUSION

The study investigated associated injuries in patients with maxillofacial trauma caused by motorcycle accidents at Dhaka Dental College Hospital. The findings revealed that the majority of the victims were in the age group of 21 to 40 years, with the highest percentage affected between 21-30 years. The male to female ratio was 6.5:1, indicating a higher prevalence of maxillofacial trauma among males. Motorcycle accidents with pavement and trucks were the most common mechanisms of injury. Mandible fractures were the most prevalent, followed by Zygomatico-maxillary complex fractures and Lefort-II fractures. Soft tissue injuries were the most common concomitant injuries, with the upper limb, lower limb, chest, head, ear, and eye being the most affected areas.

RECOMMENDATIONS:

Based on the findings and limitations of the study, the following recommendations are suggested:

- Conduct larger-scale studies involving multiple hospitals to obtain a more representative sample of patients with maxillofacial trauma caused by motorcycle accidents.
- Include long-term follow-up to assess the outcomes of treatment and rehabilitation in order to improve patient care and inform future interventions.
- Implement preventive measures and educational campaigns to raise awareness about the importance of wearing helmets and obtaining proper driving licenses to reduce the incidence and severity of maxillofacial injuries in motorcycle accidents.
- Encourage interdisciplinary collaboration among dental and medical professionals to ensure comprehensive and coordinated care for patients with maxillofacial trauma, considering both skeletal and soft tissue injuries.
- Explore the use of advanced imaging techniques and computer-assisted technologies to aid in the diagnosis, treatment planning, and outcome evaluation of maxillofacial trauma.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

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DATA AVAILABILITY STATEMENT: The data presented in this study are available on reasonable request from the corresponding author.

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