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Analysis of Demographic and Causal Factors of Maxillofacial Injuries in Polytrauma Patients: A Study from a Tertiary Care Hospital of Bangladesh

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Abstract

Background: Maxillofacial trauma is highly prevalent and has a complex etiology that varies globally due to social, environmental, and cultural factors. The present study was aimed to analyze the demographic characteristics and causes of the maxillofacial injuriesin polytrauma patients from a tertiary care hospital of Bangladesh.

Materials and methods: This cross-sectional observational study was carried out in Chittagong Medical College Hospital, Chattogram, upon purposively selected 102 patients for six-month period from May 2021. Data were collected by a pre-tested structured case record form. Chi-square tests were used to perform intergroup and categorical comparisons as appropriate. p value < 0.05 was considered to represent a statistically significant difference.

Results: The age of the respondents ranged from 4-68 years with the mean ± SD was 27.1 ±13.5 years. The age group 20-29 years accounted for the largest subgroup in both sexes. Road traffic accidents were the most common form of etiology for trauma (43.1%) followed by accidental falls (31.4%). Single maxillofacial fracture wasobserved in 58.8% of the cases while multiple fractures were observed in 41.2%of the patients. Males (46.3%) in this study were significantly (p=0.032) more likely to sustain multiple maxillofacial fractures compared to females (20.0%).

Conclusion: Reducing the frequency and severity of this type of injuries in Bangladesh requires increasing public awareness, enhancing trauma management, directing preventive initiatives, and shaping public health policy.

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Introduction

Trauma fulfills the disease classification criteria for a global pandemic. Thisis a recurrent and significant cause of morbidity and mortality over time and across continents despite efforts to control its impact. Undoubtedly, the major burden of injury is increasingly occurring in the developing as well as developed world.[1] Polytrauma is a severe form of traumatic injury, involving more than two body regions with considerable physiologic disturbances thattraverse every specialty in surgery. It is a major cause of illness and fatalities globally.[2] Oral and maxillofacial injuries, ranging from simple to solve, common nasal fractures to gross facial communition, are commonly associated with other injuries. It was reported that nearlya quarter of patients with severe injuries, also experience maxillofacial trauma. Concomitant injuries occurred in up to 65% of patients with maxillofacial fractures.[3,4] The upper limbs were the most often injured areas, followed by the lower limbs.[5] These injuries vary inseverity, from soft tissue or teeth injuries to life threatening conditions like major arterial bleeding.[6]

Significant advancements in trauma care reduced mortality during prime time. Severe maxillofacial injuries in a patient with polytrauma, however, is challenging as early management of such patient becomes complicated because of the region's close proximity to the airway, brain and cervical spine.[4] Maxillofacial injuries, due to its close anatomical proximity to eyes and Central Nervous System (CNS) makes these areas susceptible to damage which in turn may lead to serious dysfunction and death.[7–10] Age of the patient, concomitant head injuries, airway obstruction,a pattern of facial bone fracture and increased bleeding are some of the variables of increasing death rates after maxillofacial trauma. Injuries of the multiple parts

of the bodyare often allied with oral and maxillofacial injuries in severely injured trauma patients which may cause serious functional, psychological, physical and cosmetic disabilities.[11]

The epidemiology of oral and maxillofacial injuries varies from one geographical region to another and even within the same region depending on the many risk factors such as demographic, socioeconomic, cultural, personal behaviour, mental status and environmental factors.[12] Al-Hassani et al. observed that, 20% of maxillofacial injury patients underwent surgery and had a median ICU stay of five days and a hospital stay of seven days. Patients with maxillofacial injury only, had a lower mortality rate of 0.3% in contrast to polytrauma patients having 15% mortality rate. However their in-hospital mortality rate was reported as 8.3%. Multivariable regression analysis of their study revealed that face AIS, Injury Severity Score and Glasgow Coma Scale (GCS) were mortality predictors with age-adjusted odd ratio of 2.48, 1.15 and 0.82, respectively.[13]

Very few data is available on the demography and causes of maxillofacial injuries in polytrauma patients in Bangladesh. From a cases series analysis of 435 cases of mandibular injury reported that, RTAs represented as the major causative factor for maxillofacial injuries, with young adult males as they are main victims.[14]

So, this study was carried out to assess the demographic profile of polytrauma patients alongside maxillofacial injuries in a tertiary health care centre in Chattogram, Bangladesh. Considering the various factors such as social, cultural, economic and environmental factors influencing the type of trauma, this study would be an eye opener in preventing such traumas and would help in formulating better management protocols.

Materials and methods

This cross sectional study with some analytical components was conducted in the Department of Oral & Maxillofacial Surgery of Chittagong Medical College, Chattogram, Bangladesh. After approval was taken from Ethical Review Committee of Chittagong Medical College, data were collected from the Departments of Oral & maxillofacial surgery, Casualty, ENT, Orthopedics and Neurosurgery of Chittagong Medical College Hospital (CMCH) Chattogram. Subjects were patients having maxillofacial injuries with concomitant other injuries who attended or were admitted in CMCH all through the study period of six months, from May 2021 to October 2021. Patients with maxillofacial injuries with concomitant other injuries due to isolated events were excluded from the study.

Study participants were selected by purposive sampling. Upon arrival after stabilizing the patient, detailed history, examination as well as radiological explorations (X-ray, 3D CT scan) of face was carried out. Any investigation according to associated injuries was done. To collect data a pretested structured case record form was used. Data were analyzed by SPSS (Statistical Package for Social Science) version-23 software program. Continuous variable was reported as mean ± Standard Deviation (SD) while categorical variables were as count and percentage. Chi-square tests were used to perform intergroup and categorical comparisons as appropriate. p value < 0.05 was considered to represent a statistically significant difference.

Results

The age of the respondents ranged from 4-68 years with the mean age of 27.1 ±13.5 years. A male preponderance was observed (80.4%) in this study wherethe male to female ratio was 4.1:1. Majority of the maxillofacial trauma patients were of the 20-29 years age group (31.4%) followed by 10-19 years age group (24.5%).About 28.4% of the respondents were self-employed as farmer. Majority of the participants (50%) had no formal education and belonged to low socioeconomic class (57.8%) (Table I).

Table I Distribution of the respondents by demographic characteristics [n=102]

Characteristics	Categories	Number	Percentage
Gender	Male	82	80.4
	Female	20	19.6
Age (In Years)	<10	6	5.9
	10-19	26	24.5
	20-29	32	31.4
	30-39	16	15.7
	40-49	10	9.8
	50-59	10	9.8
	≥60	2	2.0

Characteristics	Categories	Number	Percentage
Education	Illiterate	4	3.9
	No formal education	51	50.0
	Primary	27	26.5
	Secondary	14	13.7
	Higher secondary	4	3.9
	Graduate	2	2.0
Occupation	Student	25	24.5
	Housewife	12	11.8
	Service	20	19.6
	Self employed	29	28.4
	Driver/helper	6	5.9
	Others	10	9.8
Socio-economic class	Lower	61	57.8
	Upper-lower	21	20.6
	Lower-middle	16	15.7
	Upper-middle	6	5.9

Road Traffic Accidents (RTA) were the most frequent (43.1%) source of maxillofacial fractures and thesewere more prevalent in males (46.3%) than in females (30.0%). Accidental falls were the next common cause (31.4%) overall, but they were notably more frequent among females (60.0%) compared to males (24.4%). The difference in fracture causes between genders is statistically significant (p = 0.018).

Table II Etiology of maxillofacial fractures by gender of thepolytrauma patients

Etiology	Total	Male	Female	p-value
Road traffic accidents	44 (43.1%)	38 (46.3)	6 (30.0)	0.018
Physical assault	20 (19.6%)	18 (22.0)	2 (10.0)	
Accidental falls	32 (31.4%)	20 (24.4)	12 (60.0)	
Other accidents	6 (5.9%)	6 (7.3)	0 (0)	
Total	102 (100.0%)	82 (100.0%)	20 (100.0%)	

*p value <0.05 is significant.

Males of this study were significantly more likely to sustain multiple maxillofacial fractures compared to females (46.3% versus 20.0%, p=0.032). Single fractures were more frequent in female patients (80.0%) than the male patients (53.7%) (Table III).

Table III Number of Maxillofacial fractures per polytrauma patient by gender

Number of Maxillofacial fracture	Total	Male	Female	p-value
Single fracture	60 (58.8%)	44 (53.7%)	16 (80.0)	0.032
Multiple fractures	42 (41.2%)	38 (46.3)	4 (20.0)	
Total	102 (100.0%)	82 (100.0%)	20 (100.0%)	

*p value <0.05 is significant.

Discussion

Department of Oral & Maxillofacial Surgery of CMCH is the only public referral center in the southeastern part of the Bangladesh. So, patients having maxillofacial injuries allied with polytrauma from this region of the country are referred to this institute for multidisciplinary management. This study was carried out to determine the demographic profile and causal factors of maxillofacial injuries in polytrauma patients admitted and managed in this hospital.

Maxillofacial injuries can occur at any age. In current study, the highest occurrence of maxillofacial trauma was observed in the second and third decades of life. Heightened risk of this age cluster to maxillofacial injuries may stem from their taking part in sports and physical activities combined with psychosocial issues that foster risk-taking tendencies, thus increasing their likelihood to injuries compared to the pediatric andgeriatric population.[2,15] The highest number of trauma occurred in the age group of 20–29 years constituting 41.3% of all trauma cases in the study of Abhinav et al.[16] The male-to-female ratio in this study was found as 4.1:1, which is lower compared to other studies.[12,16] However, a clear predominance ofmale patients was detected in this study, correlating with the reports published earlier.[2,14,17] This can be related to the fact that young malesare exposed more to contact sports, alcohol use and travel. In Malaysia maxillofacial fractures were prevalent among males (82.2%) and up to 30 years of age (63.1%).[18]

As generally in the public hospital people from a lower socioeconomic condition take their services, it can be presumed that majority are from poorer section of the society. In the present study about half of the participants (50%) had no formal education and belonged tolow socio-economic class (57.8%). Regarding occupation, majority of the participants were self-employed bein farmer and small business (28.4%) followed by students (24.5%) and service holder (11.8%).There is significant difference in the causes of maxillofacial injuries in developed and developing nations. Studies have made known that RTAs is the most familiar cause for maxillofacial trauma in developing countries while interpersonal violent behavior is the key cause in developed countries.[12,19,20] Analogous findings has been

noticed in the current study too, where RTA appears to be the most common etiological factor (43.1%) followed by accidental falls and assault. These etiological diversities are a sign of variations in the socioeconomic factors, development of national infrastructure (Specifically roadways, road safety regulations and statutes) and detrimental habits, such as alcohol consumption or criminal activities. Bangladesh, a developing country, is featured with elevated occurrence of RTAs being backed by deteriorating road conditions, scarce road safety awareness, disregard for speed limits and unawareness to wearingseat belts or helmets. This is compatible with the findings from other countries such as India, Malaysia, Saudi Arabia.[13,16,18,21]

Worldwide among researchers, maxillofacial injuries remain a topic of ongoing discussion because of functional and aesthetic distortions affecting the victims. The pattern and causes of maxillofacial injuries vary from one geographical area to another, depending on the socioeconomic status, geographic condition and cultural characteristics.[12,22] In this regard present study results, though a very small initiative, will be useful to the government agencies and health care professionals involved in planning future preventive and curative programs of maxillofacial injuries.

Limitations

Due to time constrain thesample size was relatively small. Purposive sampling method might limit the generalizability of the findings. Referral bias may have been present because the study was carried out in a tertiary level hospital, where many patients were referred from other facilities rather than being first-time attended patients.

Conclusion

This study offers important insights into the demographic and causative aspects linked to maxillofacial injuries in polytrauma patients. It was revealed that younger group of patients were prone to maxillofacial injuries. Traffic accidents and physical assault were the foremost causes of injury in men but falls were a more frequent source of these injuries in women. The results highlight the need for enhanced trauma care protocols to address the complex nature of these injuries, with tailored preventative measures based on gender-specific risk factors to reduce mortality, morbidity and associated sequel. To generalize these results and create all-encompassing intervention strategies, more studies involving bigger and more diverse groups are required.

Recommendations

Awareness programs regarding road safety guidelines and the appropriate use of protective headgear should be put into action. Nevertheless multicenter study with larger sample size is needed to determine the true burden and pattern of maxillofacial injuries in Bangladesh.

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Contribution of author

AD-Conception, design, acquisition of data, interpretation of data, drafting and final approval.

APC-Conception, design, drafting, critical revision and final approval.

MAK-Conception, interpretation of data, drafting and final approval.

TZ-Design, data analysis, manuscript writing, critical revision and final approval.

Disclosure

All the authors declared no competing interests.

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