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The Pattern of Mandibular Fractures in Bangladesh: A 3-Year Cross-Sectional Retrospective Study on 260 Patients

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ABSTRACT

Background and aim: The purpose of this retrospective study was to review patterns of mandibular fractures and associated maxillofacial fractures in a tertiary hospital in Bangladesh.

Materials and methods: We conducted this retrospective, descriptive, and cross-sectional study at the inpatient Department of Oral and Maxillofacial Surgery of Dhaka Dental College and Hospital, Bangladesh. The patients were clinically and radiographically diagnosed with mandibular fractures from January 2016 to December 2018. Data were scrutinized by utilizing SPSS statistics software for Windows (Version 22.0).

Results: The study sample included 221 males (84.88%) and 39 females (15.12%), with the male to female ratio of 5.67: 1. Patients' peak frequency was found in the age group of 21-30 (31.31%) years. Road traffic accidents (RTAs; 81.54%) were the predominant cause of mandibular trauma. Bilateral/multiple (48.46%) mandibular fractures were more common than unilateral fractures (30.38%). The body (11.15%) was the most common unilateral fractured site in the mandible, followed by the parasymphysis (8.08%). The most common combination of fracture sites was parasymphysis with angle (9.24%). Mandibular fractures concomitantly occurred with the upper face or mid-face fracture (21%). The most common concomitant fracture was the Le Fort/maxillary (8.46%) fracture.

Conclusion: The majority of the patients were young men. The most common cause of mandibular fractures was RTAs. The most common unilateral fractured site was the mandible body, while the most frequent combination of fractures was parasymphysis with angle. In the present study, Le Fort/maxillary fracture mostly occurred concomitantly with the mandibular fractures.

1. Introduction

Facial injuries are very much common among other injuries of the body. The mandibular fracture incidence is more frequent than any other facial bone because of its' prominent and protruding position on the face.^[1] The mandible is the second most common fractured bone among other facial bones. As reported in previous studies, the frequency of mandibular fractures ranged from 15.5% to 59% of all facial fractures.^[2-4] The frequency of mandibular fractures varies widely due to various influencing factors, for example, age, sex, environment, socio-economic status of the patient, and the etiology of injury.^[5] The major causes of a mandibular fracture include road traffic accidents, physical assault, accidental falls, and sports-related injuries.^[6] Road traffic accidents (RTAs) are the predominant cause of mandibular trauma in developing nations, while interpersonal violence is a major cause in developed countries.^[1] The mandibular trauma occurs in young men mostly. The age group of the 3rd decade is predominantly injured, as concludes in most of the studies world widely.^[1, 5-12] The mandibular fracture incidence

may occur alone or concomitant with other facial bones. The probable ratio of the mandible to zygomatic to maxillary bone fractures in patients having maxillofacial trauma is 9:4:1.^[13] The mandibular fracture sites are the body, followed by the condyle, angle, and parasymphysis.^[11] The parasymphysis is also the dominant site for the mandibular fracture, as reported by other authors.^[6, 7, 13] Natu et al. showed that the condylar region was the most common site in the mandibular fracture.^[8] The mandibular angle fracture was predominant in Australia.^[1] The most common combination of mandibular fractures is parasymphysis with condyle, followed by parasymphysis and angle.^[13] Mandibular trauma also occurs concomitantly with a maxillary or zygomatic complex fracture.^[11, 13] Patients with mandibular fractures complain of pain, swelling, difficulty chewing and speaking, and facial disfigurement. There are psychological effects and financial burdens over the patient as a consequence of mandibular trauma.^[14]

There are very few inclusive studies to evaluate the mandibular fracture's importance in Bangladesh and South Asian nations. The present study was

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aimed to assess the mandibular fracture pattern in a tertiary health center in Bangladesh. The early diagnosis and treatment of the mandibular fractures can be improved by evaluating the pattern of trauma. It may result in reducing the consequential complications related to mandibular fractures.

2. Materials and methods

The present study is retrospective, descriptive, and cross-sectional, conducted at the Department of Oral and Maxillofacial Surgery of Dhaka Dental College & Hospital, Bangladesh. The data were taken from the departmental medical records during the period from January 2016 to December 2018. Patients with mandibular fractures, diagnosed by clinical examination and radiographs (Fig. 1), attended the inpatient department, included in the present study. Clinical evaluation was done by surgeons and post-graduate trainees of the department. Consultant radiologists of our health center did the radiographic interpretation.



Fig. 1a. Orthopantomogram (OPG) shows the combination of left body & right condylar fracture in the mandible.



Fig. 1b. OPG shows unilateral left parasymphiseal fracture in the mandible.



Fig. 1c. OPG shows the combination of right body & left angle fracture in the mandible.



Fig. 1d. Three dimensions computed tomography (3D-CT) shows mandibular symphyseal fracture in a pan facial trauma patient.



Fig. 1e. 3D-CT shows a combination of symphyseal & right condylar fracture, associated with left maxillary fracture.

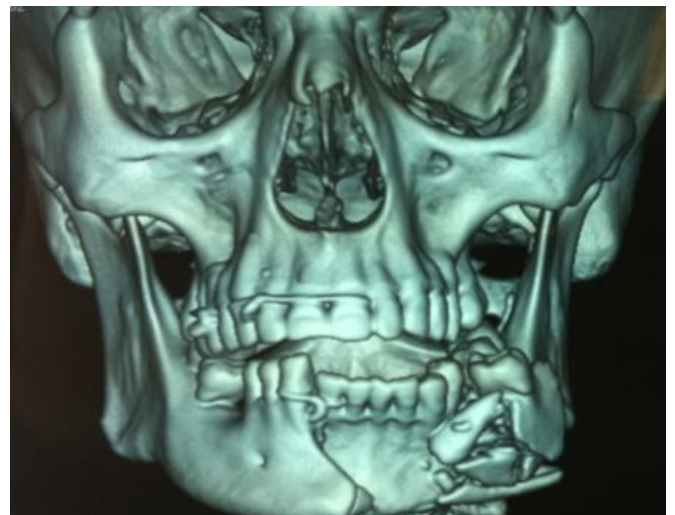


Fig. 1f. 3D-CT shows a comminuted fracture in the left side of the mandibular body.

Patients with incomplete records and pathological fractures were excluded from our study. A total of 260 patients was included in our study sample. Patient's records, including age, gender, etiology, and fracture site (unilateral, bilateral/multiple), were reviewed for study purpose. Data were analyzed using SPSS (Version 22) windows software program. Chi-square test was applied to find out the level of significance ($P < 0.05$ is significant statistically). The values were reported as frequencies and percentages.

3. Results

A total of 260 patients were reviewed for the study purpose. Our results showed male ($n = 221$, 84.88%) predominance over females ($n = 39$, 15.12%) with a male to female ratio of 5.67: 1 (Table 1). The patient's age ranged from 4 to 82 years. The predominant affected age group was 21-30 ($n = 84$, 31.31%) years, followed by 11-20 ($n = 67$, 25.53%) years. The frequency of affected patients was gradually increasing up to the 3rd decade and then falling gradually from the 4th decade (Fig. 2).

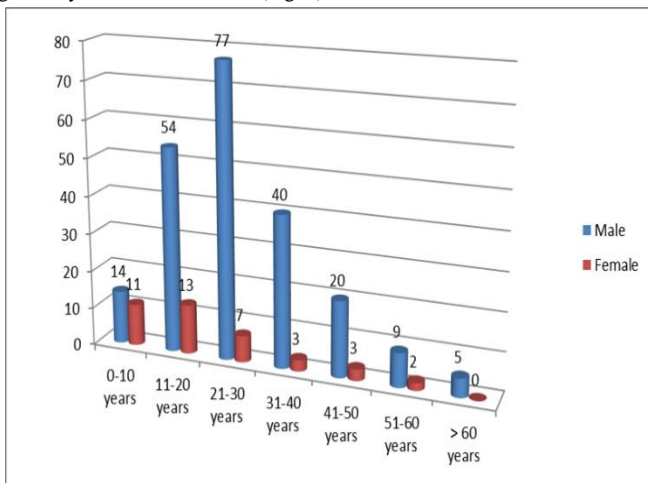


Fig. 2. Number of the patient according to age range ($n = 260$).

Pediatric (age range 0-18 years) mandibular fractures accounted for 28.85% ($n = 75$) patients. The mean age was 27.73 ± 15.08 (SD) years. The relation between the age group of patients and gender showed statistical significance ($P < 0.05$). The etiologies of trauma are detailed in Table 2. Road traffic accidents ($n = 212$, 81.54%) were the most frequent cause of mandibular fractures in the present study, followed by physical assault ($n = 24$, 9.23%) and accidental falls ($n = 19$, 7.31%). The statistical analysis showed significance regarding the relationship between etiology and gender ($P < 0.05$).

Bilateral or multiple ($n = 126$, 48.46%) mandible fractures were more common than unilateral fractures ($n = 79$, 30.8%). The most common site of the unilateral mandibular fracture was the body ($n = 29$, 11.15%), followed by parasymphysis ($n = 21$, 8.08%), angle ($n = 12$, 4.62%), condyle ($n = 07$, 2.69%), ramus ($n = 02$, 0.77%), and comminuted fractures ($n = 05$, 1.92%). The results are shown in Table 3.

Table 4 demonstrates the combination of mandibular fractures. Our analysis showed that 126 (48.46%) patients had bilateral/multiple fracture sites in the mandible. The most common combinations among the study samples were parasymphysis & angle ($n = 21$, 9.24%), followed by body & angle ($n = 21$, 8.08%), parasymphysis & condyle ($n = 17$, 6.54%), parasymphysis & body ($n = 13$, 5%), bilateral parasymphysis ($n = 09$, 3.46%), bilateral body ($n = 07$, 2.69%).

We found 18 different combinations of fractures in the mandible (Table 4). A total of 55 (21.16%) mandibular fracture cases was associated with upper and/or mid-face (maxillary) fractures. Patients had 8.46% ($n = 22$) concomitant mid-face (maxillary) fractures, followed by zygomaticomaxillary complex ($n = 19$, 7.32%) and pan facial ($n = 14$, 5.38%) fractures (Table 5).

Table 1. Age & gender distribution among the study sample.

Age group	Male	Female	Total patients	Percentage	Mean \pm SD	P-value
0 – 10	14	11	25	8.51	27.73 \pm 15.08	$P < 0.05$ (Significant)
11 – 20	54	13	67	25.53		
21 – 30	77	07	84	31.31		
31 – 40	40	03	43	15.19		
41 – 50	20	03	23	9.73		
51 – 60	09	02	11	6.99		
>60	07	00	07	2.13		
Total	221(84.88)	39(15.12)	260	100		

Values in parenthesis are percentage (%). SD = Standard deviation.

Table 2. Etiology of trauma among the study sample.

Etiology of trauma	Accidental falls	Assault	Road Traffic Accidents (RTAs)	Others	Total	P-value
Male	15(5.77)	16(6.15)	185(71.15)	05(1.92)	221(83.28)	0.035 ^S
Female	04(1.54)	08(3.08)	27(10.38)	00(00)	39(16.72)	
Total	19(7.31)	24(9.23)	212(81.54)	05(1.92)	260(100)	

Values in parenthesis are percentages. S = Significant.

Table 3. Distribution of mandibular fracture (Unilateral) according to the anatomic site (n=79).

Unilateral fracture site	Number	Percentage
Condyle	07	2.69%
Coronoid	00	0%
Ramus	02	0.77%
Angle	12	4.62%
Body	29	11.15%
Parasymphysis	21	8.08%
Symphysis	03	1.15%
Dentoalveolar	00	0%
Comminuted	05	1.92%
Total	79	30.38%

Table 4. Mandibular fracture pattern combinations (n= 126).

Multiple/Bilateral fracture site	Number of cases	Percentage
Bilateral condyle	03	1.15%
Parasymphysis + condyle	17	6.54%
Parasymphysis + Angle	24	9.24%
Body + Angle	21	8.08%
Parasymphysis + Body	13	5%
Bilateral parasymphysis	09	3.46%
Bilateral body	07	2.69%
Bilateral angle	03	1.16%
Angle + Condyle	05	1.92%
Symphysis + Condyle	05	1.92%
Bilateral condyle + Parasymphysis	04	1.54%
Any fracture + Dentoalveolar fracture	04	1.54%
Body + Condyle	06	2.32%
Parasymphysis + Angle + Condyle	01	0.38%

Condyle + Angle + Body	01	0.38%
Body + Ramus	01	0.38%
Bilateral angle + Parasymphysis	01	0.38%
Condyle + Coronoid + Body	01	0.38%
Total	126	48.46%

Table 5. Distribution of mandibular fracture associated with upper/midface fractures (n= 55).

Associated fractures	Number of cases	Percentage
Mandible + Zygomaticomaxillary complex	19	7.32%
Mandible + Midface/Maxillary	22	8.46%
Panfacial	14	5.38%
Total	55	21.16%

4. Discussion

Epidemiological studies regarding etiologies, occurrence, and pattern of the mandibular fracture may vary in geographical location, socio-economic status of patient, civilizing trait, and era.^[13] The highest frequency of mandibular fractures was observed in the present study in the 21-30 years (31.31%) age group. Our result is consistent with the studies of different countries such as Bangladesh,^[6] India^[8, 10, 16] Pakistan,^[11] Nepal,^[9] Thailand^[7] Canada,^[5] USA,^[22] but the contrast with a study of the Jordanian people.^[15] The majority of affected patients were male (84.88%), with a male to a female ratio of 5.67:1. The mean age of our study sample was 27.73 ± 15.08 (SD) years. Our findings coincide with previously published reports.^[1, 5-7, 13, 16] Young men are more energetic and more dynamic than older aged people, making them more susceptible to maxillofacial trauma. Besides, men contribute to more outside activities than women.

Our study demonstrates that RTAs (81.54%) were the predominant cause of mandibular trauma, followed by physical assault (9.23%) and accidental falls (7.31%). The result is consistent with previously published reports of developing countries.^[6, 7, 9, 11, 13, 16] However, the leading causes of mandibular trauma in developed countries differ from our findings, where interpersonal violence is found to be predominant.^[5, 12] The frequency of mandibular trauma significantly decreased in developed countries due to strict obligations of road traffic rules, although the frequency of RTAs was increased by alcohol and drug abuse.^[11] In Bangladesh, RTAs are the predominant cause of mandibular fractures, most likely due to reckless high-speed driving, vehicular overload, disobey traffic rules, lack of footpaths, and failed fitness of vehicles. The most common unilateral fracture in the mandible was the body (11.15%), followed by parasymphysis (8.08%), angle (4.62%), and condyle (2.69%). The mandibular body has a larger surface area than other anatomic sites, which may be the most likely cause of trauma. The findings coincide with previously conducted studies.^[11, 17, 18] Several studies conducted in different countries show the variability in the predominance of unilateral mandibular fracture patterns such as parasymphysis,^[7-10, 13, 16] angle,^[12] condyle.^[14, 19] In the present

study, the most common combination of fractures was parasymphysis with angle (9.24%), followed by the body with angle (8.08%), and parasymphysis with subcondyle (6.54%). The result is consistent with the findings of Dongas and Hall.^[11] Our result is contrary to the analysis of Natu et al.^[8] and Rashid et al.^[13] who reported the most common combination of parasymphysis with condyle fracture. Ogundare et al.^[12] found the most frequent combination of the body with angle fracture. Our analysis revealed the mandibular fracture association with the upper face and midface fracture (21.15%). The most frequent concomitant fracture was Le Fort/maxillary (8.46%) fracture, followed by zygomaticomaxillary complex (7.32%) and pan facial (5.38%) fracture. Our analysis is very much similar to the study of Udeabor et al. results.^[18] Data regarding the mandibular fracture sites in these patients (n= 55, 21.15%) were not found in the record books. It is one of the limitations of this retrospective study. Drivers should be aware of the traffic rules and speed limit in highway driving. A protective helmet must wear during motorbike driving. Parents must be careful about the consequences of accidental falls in pediatric patients to reduce maxillofacial trauma incidence.

5. Conclusion

Young men were mostly affected by mandibular fractures. The most common cause was RTAs, followed by physical assault, and the incidence of body fracture was the commonest among other unilateral mandibular fractures. The most common combination of fractures was parasymphysis with angle. In the present study, Le Fort/maxillary fracture mostly occurred concomitantly with the mandibular fractures. The mandible has significance from an esthetic and functional point of view. Timely diagnosis and proper management must be required to prevent consequential complications regarding mandibular fractures. The government should need strict enforcement of road traffic rules to prevent road traffic accidents.

Conflict of Interest

The authors declared that there is no conflict of interest.

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