

# Prevalence and the Pattern of Mandibular Fractures in Northeast Chennai

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## ABSTRACT

**Introduction:** Trauma is considered to be the leading cause of mortality and morbidity in the first 40 years of human life worldwide. Study aimed to define current etiology and predictable patterns of the mandibular fracture based on patient demographics and mechanism of injury.

**Material and methods:** A retrospective analysis of medical records of 196 patients with mandibular fractures treated in our institution was reviewed between the time periods from January 2015 to December 2018. Data were identified and analysed on age, sex, etiology of trauma, anatomical site, alcohol abuse, distribution of number of cases based on years and number of sites involved.

**Results:** Among 403 patients with maxillofacial trauma 196 patients had mandibular fracture. Maximum incidence of mandibular fracture was observed among the age group of 20 to 30 years (48%). Male to female ratio (11:1) showed male predominance. Predominant etiological factor was road traffic accidents (RTAs) of 79% followed by assaults (10%), accidental falls (10%) and sports injuries (1%). Alcohol influence was noted in 47% cases with mandibular fracture. Parasymphysis site showed highest incidence among anatomical sites (36%) followed by condyle (28%), angle (16%), symphysis (13%), body (12%), ramus (2%) and coronoid (1%).

**Conclusion:** Our study evidences the importance of maxillofacial surgeon's role in trauma care unit. Outcome of our study showed that RTAs are the most common etiology for mandibular fracture in our northeast Chennai. It also highlights that the socioeconomic reasons like inadequate enforcement of road safety regulations, speed limits, reluctance to use helmets are the main reasons for the road traffic accidents.

**Keywords:** Mandibular Fractures

and sports injuries.

Chennai is one of the metropolitan cities in India and urbanization has induced multiple contributing factors for the increase incidence of maxillofacial trauma. Analysing the records of the trauma patients will help in recognizing prevalence of mandible fractures and the main etiology for trauma of mandible and current pattern of fractures. These data analysis can be used to find out the lack of enforcement of legislation on road safety regulations and the importance of traffic rules implementation. In this study we tried to define current etiology and predictable patterns of the mandibular fracture based on patient demographics and mechanism of injury among northeast Chennai.

## MATERIAL AND METHODS

We retrospectively analysed the patient records during the periods from 2015 to 2018, 403 patients with maxillofacial trauma were treated in SRM Medical College and Hospital, Chennai by Department of Oral & Maxillofacial Surgery. We analysed and reviewed the data about patient age, sex, etiology of trauma, anatomical location, drug or alcohol abuse at the time of trauma and the year wise changes in the number of cases. Out of 403 patients 196 patients were treated for mandibular fracture.

The etiology of injuries was classified as RTAs, assault, accidental falls and sports injury. Anatomically mandibular fractures were divided into seven regions as symphysis, parasymphysis, body, angle, ramus, coronoid and condyle. Overall fractures were classified as single, bilateral and combination with other facial bones. Treatment method of Open reduction and internal fixation (ORIF) was divided into two, ORIF with post-operative maxillomandibular fixation (MMF) and ORIF without post-operative MMF. Total maxillofacial trauma cases and mandibular fracture cases were separated according to years. The

## INTRODUCTION

According to WHO statistics, around 1 million people die as a result of trauma and nearly 15 to 20 million people are injured in road traffic accidents (RTAs) annually.<sup>1</sup> The incidence and pattern of maxillofacial fractures vary from country to country depending on prevailing geographical, social, cultural, and environmental factors.<sup>2</sup> Analysing the literature over the past few decades, the data suggest that the etiology of maxillofacial trauma is changing along with the pattern of fracture evolved. In developing countries, the leading causes for maxillofacial trauma are RTAs, assault and fall. Among maxillofacial injuries nasal bone fractures are the commonest one and mandibular fractures considered to be the second commonest facial bone fracture.<sup>3</sup> Etiologies for mandible fracture are road traffic accidents, assaults, fall

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data was analysed using the statistical software, “Epi info version 7.0”.

**RESULTS**

Among 196 patients 180 were male and 16 were female patients. Age distribution was divided into eight age group category, 0 to 10 (2.6%), 10 to 20 (10.7%), 20 to 30 (48%), 30 to 40 (24%), 40 to 50 (7.6%), 50 to 60(5.1%), 60 to 70 (1%), 70 to 80 (1%) [Table 1]. The most common age group affected with trauma was 20 to 30 years and patients above 60 years are found to be in the least vulnerable age group. Pediatric age group of 0 to 10 years found to be the second lest group of patients affected with trauma. Regarding the etiology of mandibular fracture 154 patients had trauma due to road traffic accidents (79%), followed by assault (10%), accidental fall (10%) and sports injury (1%) [Chart 1]. Among RTAs collision of two wheeler against two wheeler was found to be the most common leading cause for mandibular trauma (53%) [Chart 2]. Influence of alcohol found to be an important contributing factor for mandibular fracture with 47%. Most common site of mandible fracture occurred are parasymphysis region (36%) followed with

condyle (28%), angle (16%), symphysis (13%), body (12%) and ramus region (2%). The least affected site was coronoid process [Table2]. Considering the number of sites involved, bilateral mandible fracture was common than single fracture. Among treatment method, ORIF without post-operative MMF was the superior option chosen for mandibular fracture. All pediatric age group patients were treated with closed reduction using circummandibular wiring [Table 3]. When analysing the distribution of number of trauma cases over four years of study period maximum cases were recorded in the year of 2015 and the cases were less in 2018 [Chart 3].

Age category	No.of Cases	%
0 to 10	5	2.6
10 to 20	21	10.7
20 to 30	94	48
30 to 40	47	24
40 to 50	15	7.6
50 to 60	10	5.1
60 to 70	2	1
70 to 80	2	1
Total	196	100

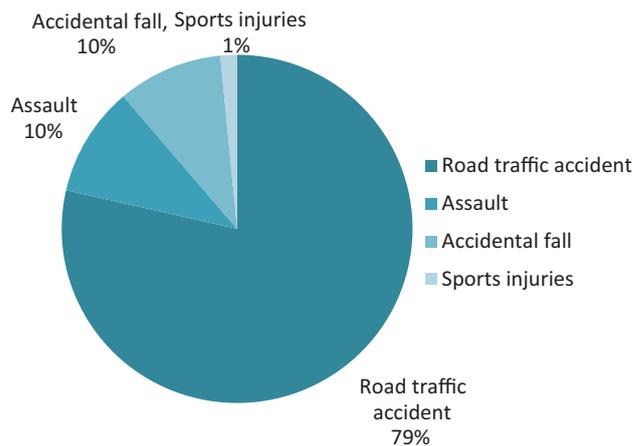
**Table 1 - Distribution of fracture cases according to age**

Anatomical fracture site	Frequency	%
Symphysis	41	13.18
Parasymphysis	113	36.33
Body	12	3.86
Angle	51	16.40
Ramus	5	1.61
Condyle	87	27.97
Coronoid	2	0.64
Total	311	100.00

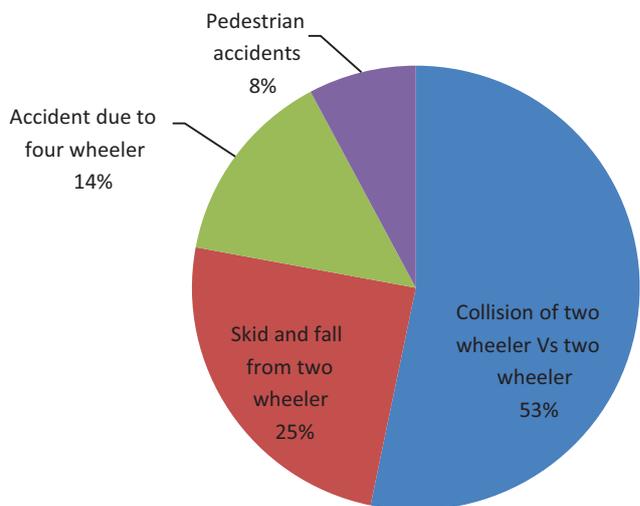
**Table-2: Frequency distribution of anatomical fracture site**

Fracture pattern	No.of cases
Single mandibular bone	82
Bilateral mandibular bone	103
Other facial bones	46
Total	231
Treatment method	No.of cases
ORIF without post-operative IMF	110
ORIF with post-operative IMF	81
Closed reduction with circummandibular wiring	5
Total	196

**Table-3: Fracture pattern & treatment modality**



**Chart-1: Etiology of fracture**



**Chart-2: Causes of road traffic accidents**



**Chart-3: Gender distribution during study period**

## DISCUSSION

This study is a retrospective analysis of mandibular fracture cases treated over last 4 years in the Department of Oral and Maxillofacial Surgery, SRM Medical College and Hospital, Chennai. Many studies have been published on mandibular fractures etiology worldwide. But the causes, types and the pattern of the fractures changes with the geographic area, population density and cultural differences.

Our study we analysed the etiologic factors, prevalence, pattern and management of mandibular fractures which reported to our trauma care centre situated at the Northeast part of Chennai, which got its own different culture, habits and the factors like traffic rule regulations followed by the peoples. Our study revealed that road traffic accident were the main cause for mandibular trauma, which is leading cause of maxillofacial trauma in developing countries. Chennai is one of the metro city in India with dense population, again people from different parts of the country with different cultures are residing. The road facilities in urban areas need to be developed according to the population which rises day by day. Male population are at greater risk for maxillofacial trauma with age group of 20 to 30 years. They are more exposed by two wheelers on road by ignoring the traffic signals and rules like helmet wearing. Again the influence of alcohol or drug usage is more common in male population with the young age group.

Second etiology for trauma according to our data is assault. Socioeconomic status plays an important role in influencing this factor. Assaults are mainly common among the people of low socioeconomic status and male young adult population are more involved in the assault cases. Females are reported with history of trauma to mandible as a result of domestic violence, included in our study under assaults. The age group of female population was higher in 30 to 40 years with main etiology of domestic violence. Drug or alcohol influences were not found in female patients with history of RTAs. The main causative factor for RTAs causing mandibular fracture among female population was noted as the collision of four wheeler vehicle. Almost all the RTA cases were happened during the night and early morning time. This shows the in obedience of people towards the rules like speed limit and traffic signals during night time. All these causes highlights the need of strict actions from the traffic police team during day and night time along with much care in the accident prone areas of the Chennai city.

Third etiology we came across was accidental fall and was noted among the male age group of 50 years above and in pediatric age group of 0 to 10 years. Age group above 60 years with mandibular fractures were noted to have the main etiology as pedestrian accidents followed with accidental fall. Factors like physiological consequences of aging and correlated disease can be the main reason for this. Hussain et al reported that elderly age group are more prone for injury as pedestrian owing to factors like tremor, weakness, poor proprioception, failing vision and impaired reflexes.<sup>4</sup> Sports injuries were the least common etiology which seemed

among the age group of 10 to 20 years. Common etiology for maxillofacial trauma differs from developing countries to developed countries. In developing countries RTAs found to be the commonest cause for maxillofacial trauma while in developed countries interpersonal violence and gunshot injuries are the main etiologies. We think that factors like good safety features of vehicles, strict traffic rule system and better road condition also plays an important role in road traffic accident.

Considering the effect of alcohol influence in maxillofacial trauma, 47% patients with mandibular fracture was under the influence of alcohol at the time of incidence. Alcoholism can have a direct impact on the person's motor coordination which may lead to road traffic accidents.<sup>4</sup> When looks into the distribution of number of mandibular and maxillofacial trauma cases over last four years we can see a varying number of distributions on each year. In our study we noted a gradual reduction in the number of maxillofacial trauma from 2015 to 2017 period and then increase in number from 2017 to 2018 period. But mandibular fracture distribution over last four years showed a typical varying distribution from year to year. In our study we noted that the total maxillofacial trauma and mandibular trauma cases were less in 2018 when compared to 2014 and 2015. These results are highlighting the benefits of following the traffic rules and regulations by the populations for past few years. Even the use of seat belts and helmet wearing shows a huge impact in the reduction of maxillofacial trauma.

When observing the patterns of mandibular fractures according to the anatomic sites, in our study we noticed that the commonly involved site was parasymphysis region 36%, followed by condyle 28%. Our study showed similar patterns in accordance with Khan et al study reported in 2011.<sup>5</sup> According to Hung et al the most commonly involved site was body/angle region of mandible.<sup>5</sup> The least involved site was coronoid process of mandible followed by ramus region. Among body and angle region, angle of the mandible was commonly involved site. In contrast to our study various study reported other anatomic sites of mandible as the commonest site like symphysis, body, angle and condyle. Again this highlights the reasons for varying trauma pattern in accordance with geographical, social, cultural, and environmental factors. In contrary to our study, the other commonest sites involved in mandible as reported by other authors are symphysis,<sup>6,7</sup> mandibular body,<sup>8-11</sup> angle,<sup>12,13</sup> and condyle.<sup>14,15</sup> The difference might be reflection of the causative factors.

In our study the bilateral mandibular fractures were common than single mandibular fractures and 46 case had accompanying other facial bone fractures. The common associated fractures were zygomatico-maxillary complex fractures and Le fort fractures. Different treatment modalities were used in treatment of mandibular fractures. Open reduction and internal fixation without post-operative MMF was used in 110 cases and 81 patients were treated with ORIF with post-operative MMF. All the pediatric age group mandibular fractures of 5 cases were treated using

closed reduction with circummandibular wiring.

## CONCLUSION

Our study evidences the importance of maxillofacial surgeon's role in trauma care unit. We also like to highlights the socioeconomic reasons like inadequate enforcement of road safety regulations, speed limits, reluctance to use helmets can increase the road traffic accidents which is one of the most etiologies for mandibular trauma in our study. With the support of our study results we believe that strict enforcement of traffic rules can make a great impact in the reduction of maxillofacial trauma and along with factors like better road conditions, good safety features of vehicle can bring down the incidence of maxillofacial trauma occurring as a result of RTAs in our developing countries.

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