International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Mapping The Jawline Breaks: Trends, Causes and Management of Mandible Fracture in Tertiary Care Center

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Abstract: ***Overview**: This study aimed to evaluate the patterns, causes, and treatment outcomes of mandibular fractures in patients at a tertiary care center, providing insights into the demographics, fracture sites, and etiological factors involved. **Materials and Methods**: A prospective, observational study was conducted involving 15 patients aged 18 to 80 years diagnosed with mandibular fractures. Data were collected using a structured questionnaire and analyzed using descriptive statistics. **Results**: The study found that 60% of mandibular fractures occurred in males, with the highest incidence in the 18-40 years age group. The Para symphyseal region was the most commonly affected site (53.33%), with road traffic accidents being the leading cause (72.81%). Simple linear fractures were the most frequent type, and closed reduction was the preferred treatment in 60% of cases **Discussion**: The findings align with global trends, showing a higher prevalence of mandibular fractures in young adult males, primarily due to road traffic accidents. The study emphasized the need for early intervention and highlighted the importance of individualized treatment strategies. **Conclusion**: This study provides a comprehensive analysis of mandibular fracture patterns, underscoring the importance of targeted prevention and tailored treatment approaches to improve patient outcomes in maxillofacial trauma care.*

Keywords: Mandible fracture, types, ORIF, IMF

1. Introduction

Mandibular fractures are a significant public health concern worldwide, accounting for a substantial portion of maxillofacial injuries. According to the World Health Organization (WHO), road traffic accidents are a leading cause of facial trauma globally, with mandibular fractures representing a large fraction of these injuries. Globally, the incidence of mandibular fractures varies widely, depending on geographic region, socioeconomic status, and cultural factors. The WHO estimates that over 1.35 million people die annually due to road traffic accidents, with many more suffering serious injuries, including mandibular fractures [1]. In terms of epidemiology, the global incidence of mandibular fractures is estimated to range between 27.5 to 55.0 per 100,000 individuals annually [2]. These fractures are more common in males than females, with a male-to-female ratio of approximately 3:1. This higher prevalence in males is often attributed to increased exposure to risk factors such as road traffic accidents, violence, and contact sports. The age group most affected by mandibular fractures is typically between 20 and 40 years, which coincides with the period of highest physical activity and risk-taking behaviour [3].

In India, the incidence of mandibular fractures is also significantly high, with road traffic accidents being the most common cause, followed by falls and interpersonal violence. A study conducted in India reported an incidence of 40.7 per 100,000 individuals per year, with a similar male predominance observed globally [4]. The urban areas in India, in particular, show higher rates of mandibular fractures, primarily due to the increasing number of vehicles and the resultant road traffic accidents. Additionally, the lack of stringent traffic regulations and the prevalence of two-wheeler vehicles without adequate protective gear contribute to the high incidence of facial injuries, including mandibular fractures [5].

The patterns and causes of mandibular fractures in India reflect global trends, with significant regional variations influenced by local socio-economic conditions, traffic density, and cultural practices. This highlights the need for region-specific strategies in the prevention and management of mandibular fractures.

Aim

To evaluate the patterns of mandible fracture in patients presenting to a tertiary care centre.

2. Material & Method

Study Design and Setting: This prospective, observational study was conducted in the Department of ENT at a tertiary care centre. The study is designed to capture detailed

information on mandibular fractures over a defined period, providing a robust dataset for analysis.

Study Population: The study includes a cohort of patients diagnosed with mandibular fractures, ranging in age from 18 to 80 years, and encompasses both male and female patients. The inclusion and exclusion criteria were strictly adhered to, ensuring that only patients with confirmed clinical and radiographic diagnoses of mandibular fractures were included.

Inclusion Criteria:
- Individuals diagnosed with mandibular fractures.
- Age ranges from 18 to 80 years.

Exclusion Criteria:
- Individuals with developmental disorders affecting the mandible.
- Patients with pre-existing mandibular pathology.
- Cases with mandibular tumours.
- Cases with incomplete clinical or radiographic data.
- Patients who did not provide informed consent for inclusion in the study.

3. Methodology

- The study was performed at the tertiary care centre. The study was approved by institutional ethics committee. Participant ready to fill the consent form were explained the procedure.
- This retrospective study enrolled 15 cases of clinically and radiographically diagnosed mandibular fractures at a tertiary care centre.
- After obtaining informed consent, patients were enrolled in the study. Data collection was carried out using a recorded demographic information, the anatomical site of the fracture and relevant clinical details. The type of procedure done also noted.that is two procedure i.e. open reduction and internal fixation(ORIF), and intermaxillary fixation (IMF) and conservative management done.
- The data was analysed using SPSS software, providing descriptive statistics to elucidate patterns in fracture types, causes, and treatment outcomes.

4. Results & Observations

Table 1: Age & Gender distribution study

Age group (years)	Male (N)/%	Female (N)/%	Total (N)/%
18 - 40	5 (33.33)	3 (20)	8 (53.33)
41 - 60	2 (13.33)	2 (13.88)	4 (26.66)
61 - 80	2(13.33)	1 (6.93)	3 (20)
Total	9 (60)	6 (40)	15 (100)

Table 1 illustrates the demographic distribution of mandibular fractures within the studied population, categorized by age groups and gender. The data indicates that 53.33% of the total cases were observed, with males constituting 33.33% and females 20%. In the 41 - 60 years age group, a total of 26.66% of mandibular fractures were recorded, with males at 13.33% and females at 13.88%. The 61 - 80 years age category contributed to 20% of the total cases, with 13.33% in males and 6.93% in females. Overall, the distribution demonstrates that 60% of mandibular fractures occurred in males and 40% in females across all age groups. It is notable prevalence of mandibular fractures in younger individuals, particularly males.

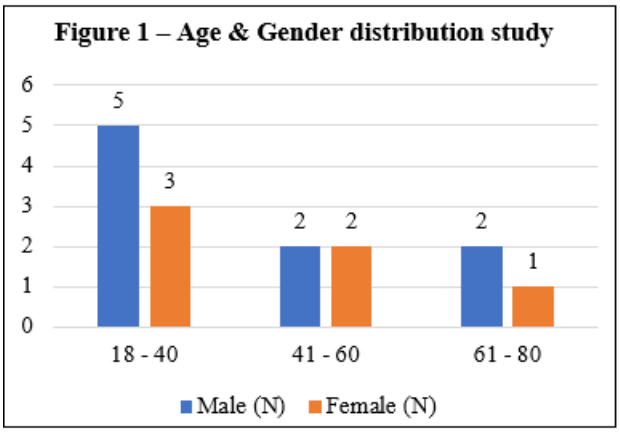


Table 2: Etiology of the mandibular fractures

Aetiology	No of Patients (N)	Percentage (%)
Road Traffic accident & Fall	11	72.81
Sport Injuries	2	13.33
Assaults	1	6.93
Extraction of Teeth	1	6.93
Total	**15**	**100**

Table 2 provides a comprehensive overview of the etiological factors contributing to mandibular fractures Road traffic accidents and falls emerge as the predominant causes, collectively accounting for the majority at 72.81%. This finding underscores the significant impact of external forces, such as vehicular incidents and falls, in precipitating mandibular fractures within this cohort. Notably, sports injuries constitute 13.33% of the cases, reflecting a non-negligible contribution to the overall aetiology. Assaults and the extraction of teeth each represent a smaller proportion at 6.93%, underscoring the diverse array of factors that can lead to mandibular fractures. Collectively, these results emphasize the multifactorial nature of mandibular fractures, with external traumatic events, sporting activities, and less common factors all playing distinctive roles in their occurrence.

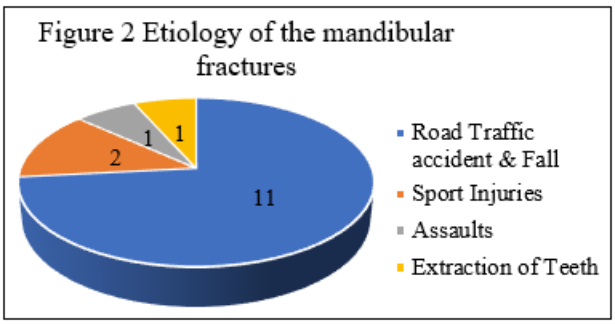


Table 3: Site of the mandibular fractures

Site of injury	No of Patients (N)	Percentage (%)
Para symphyseal fracture	8	53.33
Angle fracture	4	26.66
Condylar fracture	2	13.33
Symphyseal fracture	2	13.33
Total	15	100

Table 3 illustrates the distribution of mandibular fractures by site in the studied population. Para-symphyseal fractures are the most common (53.33%), followed by angle fractures (26.66%), condylar fractures (13.33%), and symphyseal fractures (13.33%). This diversity emphasizes the need for site-specific considerations in diagnosis and treatment planning, aiding clinicians in optimizing patient care.

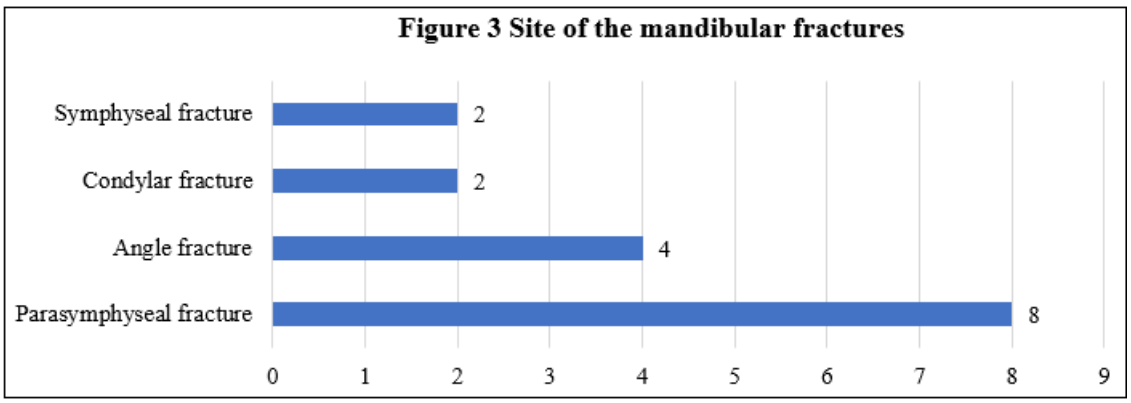


Table 4: Type of Fracture

Type of Facture	No of Patients (N)	Percentage (%)
Simple linear	6	46.67
Compound	2	13.33
Communited	2	13.33
Complex	2	13.33
Other	3	20
Total	15	100

Table 4 outlines the distribution of mandibular fractures by type in the studied population. Simple linear fractures are most common (46.67%), followed by compound and comminated fractures, each at 13.33%. Complex fractures and other less specified types constitute 13.33% and 20%, respectively. This treatment approaches tailored to the specific characteristics of each fracture type, facilitating more effective clinical management.

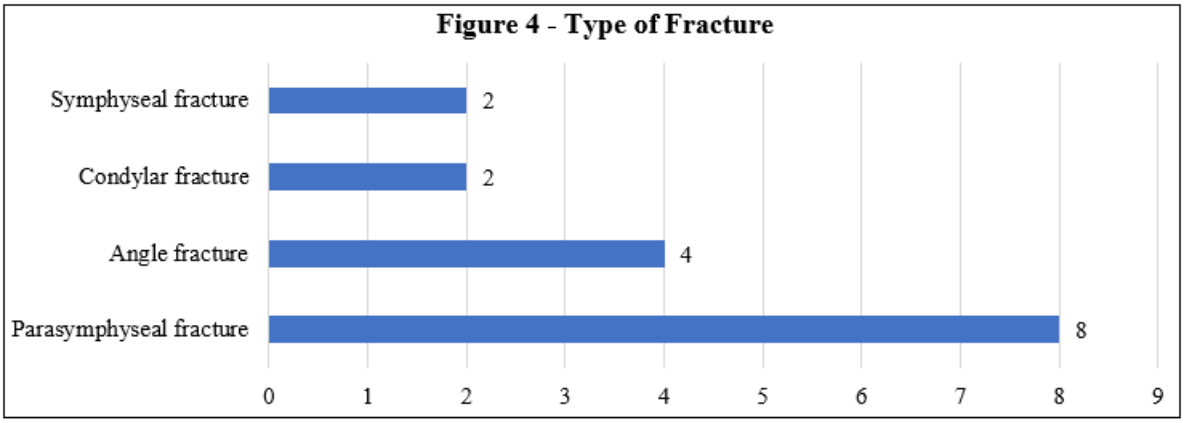


Table 5: Management of the mandibular fractures

Management of Fracture	No of Patients (N)	Percentage (%)
Closed Reduction	9	60
Open Reduction	6	40
Total	15	100

Table 5 indicates that in the studied population, 60% of mandibular fractures were managed through closed reduction, a non-surgical approach, while 40% underwent open reduction, involving surgical intervention. This distribution highlights a prevalent use of non-surgical methods in managing mandibular fractures within the cohort.

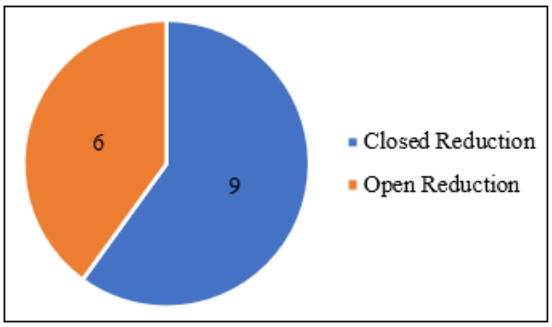
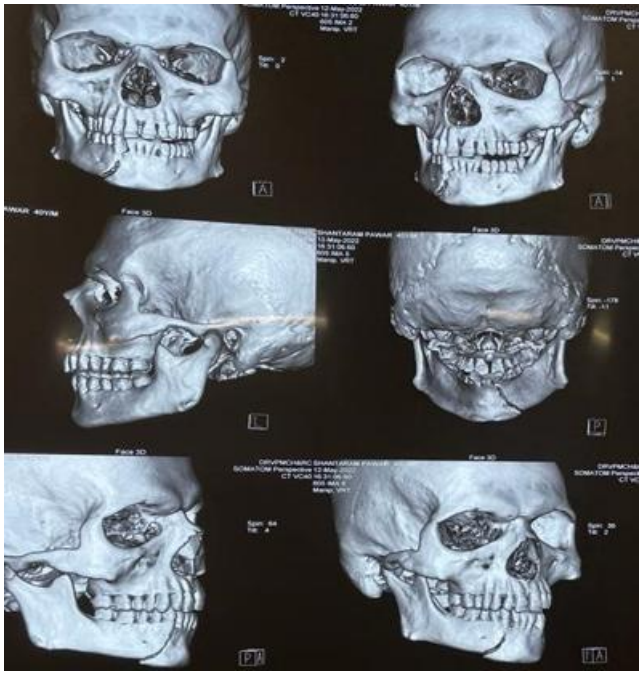


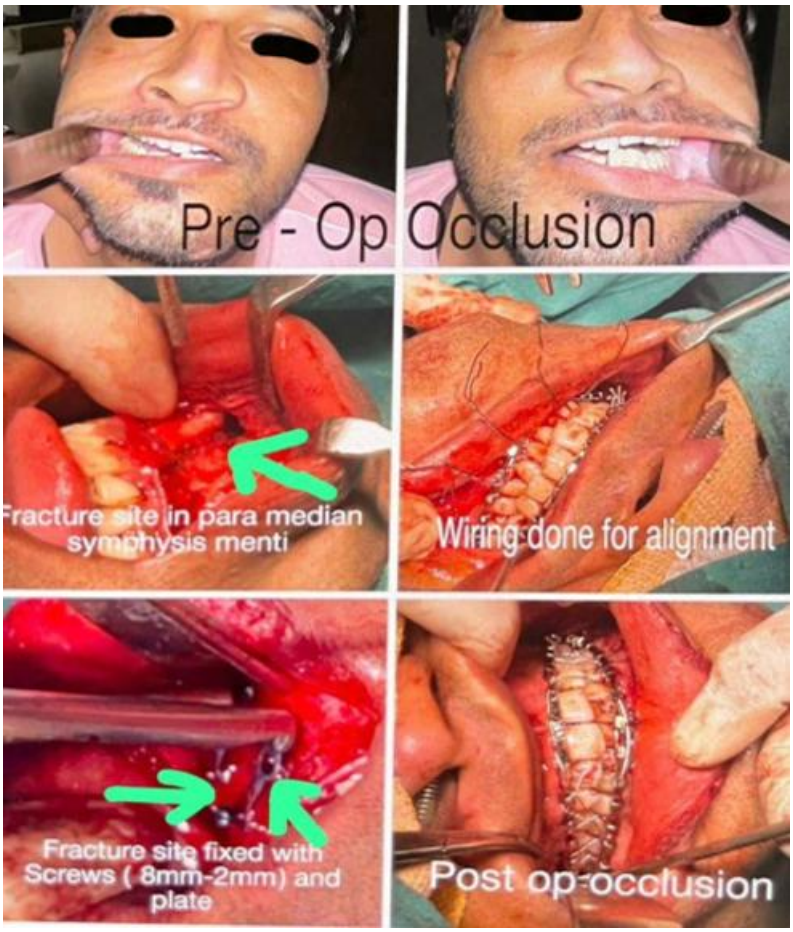
Figure 5: Management of the mandibular fractures

Some actual Images of Patient, of Mandible fracture during procedure



Fracture in Para symphyseal region on 3D CT (3-Dimensional CT) in 45 year old male.

Ongoing procedure to align the segments of mandible, fixation done with locking plate and screws in Para symphysis menti region.



Malocclusion due to mandibular fracture, Intermaxillary fixation done for coordinated alignment of maxillary and mandible region with stainless steel wire loops as shown in image.

5. Discussion

This study's findings align with and expand upon recent research in the field of maxillofacial trauma. The results demonstrate a higher incidence of mandibular fractures in males compared to females, particularly in the 20 to 40 years age group. This pattern is consistent with global trends, where young adult males are disproportionately affected due to their higher exposure to risk factors such as road traffic accidents, violence, and sports-related injuries.

A study by Rai et al. (2021) conducted in Northern India also reported a male predominance in mandibular fractures, with road traffic accidents being the most common cause [6]. This study highlighted the role of alcohol consumption as a significant contributing factor in traffic accidents leading to mandibular fractures.

Similarly, a retrospective study by Lee et al. (2019) in South Korea found that road traffic accidents were the leading cause of mandibular fractures, accounting for nearly 60% of cases, followed by falls and assaults [7]. The study also reported a higher incidence of fractures in urban areas, reflecting the increasing traffic density and high-speed accidents.

In another study, Patel et al. (2020) in the United Kingdom examined the epidemiology of mandibular fractures over a five-year period. They observed that the Para symphyseal region was the most commonly fractured site, which aligns with the findings of the present study [8]. The study emphasized the importance of early intervention and appropriate surgical management to reduce complications.

A recent study by Mohammed et al. (2018) in Nigeria analysed the patterns of mandibular fractures in a large cohort of patients and found that interpersonal violence was the second most common cause of fractures after road traffic accidents [9]. The study highlighted the influence of socio-economic factors and cultural practices on the incidence of mandibular fractures.

Furthermore, a study by Al-Moraissi et al. (2022) conducted in Yemen demonstrated a high prevalence of mandibular fractures due to tribal conflicts and violence, emphasizing the impact of local socio-political factors on maxillofacial trauma [10]. The study also observed that the majority of fractures were managed using closed reduction techniques, similar to the findings in the present study.

An epidemiological study by Chen et al. (2021) in China reported that sports-related injuries were a significant cause of mandibular fractures in younger individuals, particularly in rural areas where safety measures were often inadequate [11]. The study recommended the implementation of protective gear and safety protocols in sports to reduce the incidence of these injuries.

Lastly, a comprehensive review by Nguyen et al. (2023) in Australia explored the changing patterns of mandibular fractures over the past decade. The study found a decline in the incidence of fractures due to road traffic accidents, attributed to improved traffic regulations and the widespread use of safety devices such as seatbelts and helmets [12]. However, the study noted an increase in fractures related to falls in the elderly population, underscoring the need for targeted prevention strategies in this demographic.

6. Conclusion

This study provides a detailed analysis of the patterns, causes, and management of mandibular fractures in a tertiary care setting. The findings emphasize the predominance of mandibular fractures among young adult males, largely due to road traffic accidents, which aligns with global and regional trends. The Para symphyseal region was identified as the most common site of fracture, with simple linear fractures being the most frequent type. The study also highlights the importance of individualized treatment approaches, with a preference for closed reduction techniques in less complex cases. Given the significant impact of socio-economic and cultural factors on the incidence of mandibular fractures, the study underscores the need for region-specific prevention strategies and the implementation of effective public health measures to reduce the occurrence of these injuries.

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