Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i6.6465

EPIDEMIOLOGICAL PATTERN OF MANDIBULAR FRACTURES IN ISLAMABAD

Dr Musa Cheema[1], Dr Khadija Irshad[2], Dr Maniha Musarrat[3], Dr Sibtul Hassan[4*], Dr Mahnoor Haroon[5], Dr Eman Haroon[6]

[1]General Dentist, Dr Anser and Associates Dental Clinic F-8 Markaz, Islamabad, Pakistan
[2]Resident Prosthodontics, AFID, Rawalpindi, Pakistan
[3, 4]Resident OMFS, Foundation University College of Dentistry and Hospital, Islamabad, Pakistan
[5]PGT (Prosthodontics), Foundation University College of Dentistry and Hospital, Islamabad, Pakistan
[6]Final Year BDS Student, Rawal Institute of Health Sciences, Islamabad, Pakistan

***Corresponding author:** Dr Sibtul Hassan
*Resident OMFS, Foundation University College of Dentistry and Hospital, Islamabad, Pakistan
Email: hassansibtul11@gmail.com

ABSTRACT:

Introduction: In the realm of maxillofacial injuries, trauma stands out as the primary cause, with mandibular fracture being the second most prevalent type. Mandibular fractures represent a significant portion of cases involving facial trauma. The primary culprits behind facial fractures are high-impact incidents such as motor vehicle accidents, physical altercations, sports-related injuries, and work-related mishaps. Depending on the severity of the trauma endured, mandibular fractures can affect a single site or involve multiple anatomical sites simultaneously. Individuals who have sustained a fracture in the lower jaw frequently encounter sensations of pain, discomfort, challenges with communication, and eating, as well as noticeable changes in appearance and aesthetic deformity. These types of injuries also carry psychological implications and come with associated financial burdens.

Aim: The aim of this research is to evaluate the epidemiology and fracture patterns associated with mandibular fractures in the region of Islamabad.

Methodology: This prospective cross-sectional study was conducted in Islamabad, with a sample size of 170 patients determined using the WHO sample calculator. The sampling technique employed was non-probability consecutive sampling. A comprehensive case history was recorded by conducting both clinical and radiological examinations, including PA Face and OPG's (Orthopantomogram). The collected data were meticulously analyzed using SPSS version 23.0 for statistical analysis.

Results: Among the 170 patients included in the study, the highest percentage of mandibular fractures occurred in individuals aged 18 to 30 years, with males accounting for 88.2% of the cases and females comprising only 11.2% of the population. Road traffic accidents were identified as the leading cause of mandibular fractures, representing 64.1% of the cases. The most common site of fracture was the para symphysis, observed in 16.5% of the patients. When examining combined fracture sites, the combination of the para symphysis and the angle of the mandible was the most frequent, accounting for 10% of cases.

Conclusion: The leading cause of mandibular fractures and trauma was road traffic accidents (RTA). Mandibular fractures were more prevalent in men than women, with the majority of patients falling

within the 18-30 age range. The parasymphysis emerged as the most common location for fractures, and in cases where fractures were concurrent, the parasymphysis and the mandibular angle exhibited the highest occurrence. There was a significant correlation between the type of injury mechanism and the precise anatomical site of the fracture. Understanding these associations is crucial for surgeons to determine the appropriate and timely management of mandibular fractures.

Keywords: Mandibular fractures, parasymphysis, Road Traffic Accidents (RTA), Maxillofacial trauma, Etiology, Site of fracture

INTRODUCTION

The mandible is the most commonly affected site in cases of maxillofacial trauma. Among facial injuries treated at trauma centers, mandibular fractures rank as the second most frequent. Various studies have reported that mandibular fractures account for a range of 15.5% to 59% of all facial fractures (1). The mandible is highly susceptible to injury and is considered one of the most commonly affected facial bones. It exhibits significant clinical variability in terms of the types and severity of injuries. These injuries can result from various causes, including assaults, road traffic accidents, and falls (2). To ensure optimal management, it is crucial to have a comprehensive understanding of the patterns, etiology, and incidence of mandibular fractures (3). Mandibular fractures can occur in various locations depending on the type of injury and the direction of the force involved. These fractures can affect different regions of the mandible. In addition to functional impairment, mandibular fractures can lead to varying degrees of deterioration or defects, ranging from mild to moderate. Precise diagnosis and thorough assessment of these fractures are crucial for determining the suitable treatment approach and mitigating the risk of additional complications (4). Individuals who have sustained a fracture in their lower jaw commonly experience discomfort and pain. They may encounter difficulties with chewing and speaking due to the impaired functionality of the jaw. Additionally, the fracture can result in an esthetic deformity, impacting the appearance of the jaw and potentially affecting the person's self-confidence (5). Mandibular fractures often have cognitive and psychological effects on individuals, and they also come with associated pecuniary costs (6). The epidemiology of these fractures varies based on geographical locations and socioeconomic factors (7). The etiology of mandibular fractures is multifactorial, with Road Traffic Accidents (RTA) being the most prevailing factor, subsequently by assaults, sports injuries, work-related injuries, falls, and injuries resulting from epileptic seizures. The present study focuses on analyzing the patterns of mandibular fractures assessed at the Department of Oral and Maxillofacial Surgery in teaching hospitals located in Islamabad. By determining the frequency and occurrence patterns of mandibular fractures, early diagnosis and treatment can be improved, leading to a reduction in associated morbidity and mortality rates.

MATERIALS AND METHOD

This prospective cross-sectional study was carried out at multiple oral and maxillofacial surgery departments across different hospitals in Islamabad after obtaining the ethical approval from PIMS hospital, Islamabad. The study period extended from July 2022 to September 2022. The sample size was determined using the World Health Organization software for sample size calculation, resulting in a minimum sample size of 170 patients. The study employed a non-probability consecutive sampling technique, ensuring that patients were included in the study as they presented consecutively during the specified time period. The study included patients aged 13 years and above who presented with mandibular fractures resulting from road traffic accidents (RTA), assaults, sports-related injuries, work-related injuries, fall injuries, and epileptic seizure-related injuries. Nevertheless, individuals with gunshot wounds, bomb blast injuries, firearm-related injuries, as well as specific medical conditions like cystic lesions, neoplasms, and metabolic disorders were not included in the study. Comprehensive data was collected, encompassing age groups, genders, socio-demographic backgrounds, chief complaints, histories of presenting illnesses, prior medical records, injury length and extent, causes, and any related injuries. Following the collection of patient history, a

comprehensive clinical examination was conducted, accompanied by radiological assessment utilizing PA Face and OPGs (Orthopantomogram) for each participant in the study. The collected data were then analyzed, considering variables such as age, gender, fracture etiology, location of the fracture line, unilateral or bilateral nature of the fracture, isolated fractures versus mandibular fractures with associated injuries, the most common combination of fracture sites in the mandible, and the correlation between the incidence of etiology and fracture location. Statistical analysis was conducted utilizing SPSS (Statistical Package for Social Sciences) Version 23.0 software for data analysis. The outcomes were summarized in the form of frequencies and percentages to present the findings.

RESULTS

The study included a total of 170 patients with mandibular fractures, ranging in age from 13 to 68 years. The average age of the patients was 30.3 years. Among the participants, there were 150 men (88.2%) and 20 women (11.8%) (Table 1). This gender distribution resulted in a male-to-female predominance of 7.5:1. In the study, the most common cause of mandibular fractures was road traffic accidents (RTAs), accounting for 64.1% of the cases. Assault was the second most frequent cause, comprising 11.8% of the fractures. Sports-related injuries accounted for 10% of the fractures, followed by work-related injuries (5.3%), epileptic seizure injuries (4.7%), and fall-related injuries (4.1%). These findings are summarized in Table 2. The study included 47% (n=80) of unilateral fractures and 52% (n=90) of bilateral fractures. This means that out of the total sample size, 80 patients (47%) had fractures affecting only one side of the mandible, while 90 patients (52%) had fractures on both sides (Table 3). In patients with unilateral fractures, the para-symphysis was the most commonly observed site of fracture, comprising 16.5% of the cases. The body of the mandible was the second most common site, representing 13.5% of the fractures. Other sites of unilateral fractures included the condyle (2.4%), symphysis (2.4%), angle (9.4%), and ramus (1.2%). These percentages indicate the distribution of fracture sites within the unilateral fracture group (Table 4). In patients with bilateral fractures, the most prevalent combination of fracture sites was observed at the para-symphysis and angle, making up 10.0% of the cases. The next most frequent combination was the body and angle, comprising 5.9% of the fractures. Other combinations of bilateral fractures included bilateral subcondyle and symphysis (3.5%), condyle and para-symphysis (2.9%), subcondyle and symphysis (2.9%), and body and ramus (2.4%). These percentages represent the distribution of fracture sites within the bilateral fracture group (Table 5).

Table 1. Gender status of the study:

S.No.	Gender	Frequency	Percentage
1	Male	150	88.2%
2	Female	20	11.8%

Table 2. Etiology-wise Dissemination of Study Subjects:

S.No.	Etiology	Frequency	Percentage
1.	Road Traffic Accidents (RTA)	109	64.1%
2.	Assaults	20	11.8%
3.	Sports Injury	17	10%
4.	Work injury	9	5.3%
5.	Epileptic seizure injury	8	4.7%
6.	Fall injury	7	4.1%

Table 3. Prevalence of mandibular fractures in consonance with unilaterality/bilaterally of the fracture site:

S.No.	Site	Number of Patients	Percentage
1.	Unilateral	80	47%
2.	Bilateral	90	52%

Table 4. Unilateral mandibular fractures:

S.No.	Site	Frequency	Percentage
1.	Angle	16	9.4%
2.	Body	23	13.5%
3.	Parasymphysis	28	16.5%
4.	Symphysis	4	2.4%
5.	Condyle	4	2.4%
6.	Subcondyle	3	1.8%
7.	Ramus	2	1.2%

Table 5. Combinations of Mandibular Fractures:

S.No.	Site	Frequency	Percentage
1.	Bilateral angle	2	1.2%
2.	Bilateral Parasymphysis	1	0.6%
3.	Bilateral condyle + Symphysis	1	0.6%
4.	Body + Angle	10	5.9%
5.	Parasymphysis + Angle	17	10%
6.	Body + Ramus	4	2.4%
7.	Angle + Condyle	3	1.8%
8.	Parasymphysis + Symphysis	5	2.9%
9.	Body + Subcondyle	1	0.6%
10.	Angle + Subcondyle	3	1.8%
11.	Bilateral Subcondyle + Body	1	0.6%
12.	Condyle + Parasymphysis	5	2.9%
13.	Ramus + Sub condyle + Coronoid	1	0.6%
14.	Bilateral Subcondyle + Parasymphysis	2	1.2%
15.	Ramus + Symphysis	3	1.8%
16.	Subcondyle + Symphysis	10	5.9%
17.	Bilateral Subcondyle + Angle	4	2.4%
18.	Body + Angle + Ramus + Subcondyle	2	1.2%
19.	Parasymphysis + Body	1	0.6%
20.	Bilateral Condyle + Angle	1	0.6%
21.	Angle + Ramus	2	1.2%
22.	Symphysis + Body	1	0.6%
23.	Parasymphysis + Ramus	2	1.2%
24.	Bilateral Subcondyle + Ramus	1	0.6%
25.	Bilateral Condyle + Angle	1	0.6%
26.	Bilateral Condyle	2	1.2%
27.	Bilateral Subcondyle	4	2.4%

DISCUSSION

The rapid pace of contemporary life, characterized by fast transportation and a society marked by growing violence and prejudice, has transformed facial trauma into a pervasive issue affecting individuals from all walks of life. The shifting dynamics within our society may be held accountable for the noticeable alterations observed in the prevalence, severity, and clinical characteristics of facial injuries, ultimately leading to significant harm to the maxillofacial skeleton(8). The facial region stands out as a frequently affected area in terms of injuries, comprising a significant proportion ranging from 23% to 97% of all reported facial fractures(9). The mandible, being the only movable bone in the facial skeleton, has experienced a significant rise in the occurrence of fractures in recent years. As an embryologically derived membrane bone, it is more prone to fractures compared to other facial bones (10). Untimely or inadequate identification and treatment of mandible fractures can result in significant repercussions, affecting both the cosmetic appearance and functional aspects of the

individual. The purpose of this study was to investigate the frequency, the most common locations, and combinations of mandibular fractures in connection with age, gender, and causative factors. Mandible fractures are consistently ranked among the most common facial bone fractures, accounting for an incidence ranging from 15.5% to 67% of all reported facial fractures (11,12,13). In this study, the occurrence of mandibular fractures demonstrated an upward trend within the age range of 18 to 30 years, followed by a gradual decline from 33 years onwards (Figure 1). This pattern can be attributed to the transition from adolescence to adulthood, where individuals are more prone to engaging in reckless driving, exhibiting physical aggression, alcohol misuse, and participating in contact sports. Conversely, individuals aged 40 and above typically lead a more serene, peaceful, and disciplined lifestyle.

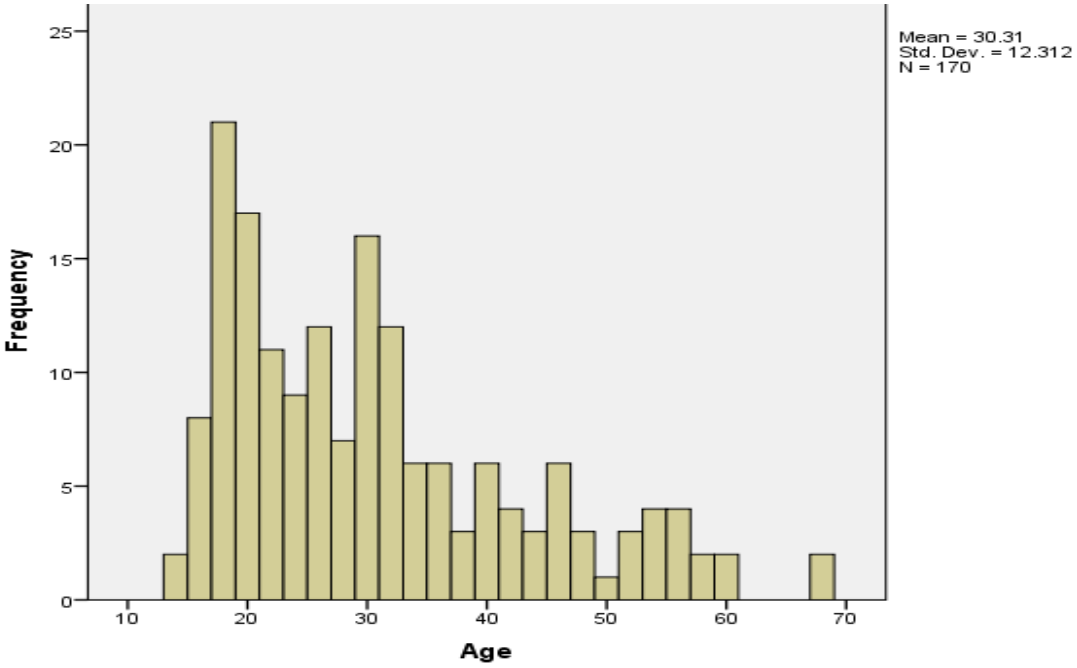

Figure 1. Age-wise Distribution

Our study findings align closely with previous research, particularly regarding age and gender patterns. Consistent with studies conducted by Dongas and Hall (14), Ahmed et al. (15), and Brasileiro and Passeri (16), we observed the highest incidence of mandibular fractures among individuals aged 18 to 30 years. However, our findings differ from Teoman et al. (17) who reported a mean age range of 36.2 years. Notably, our study exhibited a significant male predominance, with males accounting for 88.2% of cases and females comprising only 11.8%. This gender distribution yielded a ratio of 7.5 males to every 2 females, aligning with previous large-scale investigations (18). The etiology and incidence of mandibular fractures exhibit variations influenced by factors such as geographical regions, socioeconomic status, and traffic regulations. Notably, road traffic accidents (RTAs) have consistently been identified as the primary cause of mandibular fractures in developing countries. Our study's findings align with previous research (19,20), as RTAs accounted for 64.1% of cases, followed by assault at 11.8%. Additional contributing factors included sports-related injuries (10%), work-related injuries (5.3%), falls (4.1%), and injuries resulting from epileptic seizures (4.7%). These findings highlight the relative significance of different causes, with RTAs emerging as the leading cause and other factors constituting a minor proportion of mandibular fractures. Within this study, out of the 170 patients examined, unilateral fractures were reported in 47% (n=80) of cases, while bilateral fractures accounted for 52% (n=90). Among these cases, the most commonly affected site was the parasymphysis, observed in 28 cases (16.5%). This was followed by the body (13.5%), angle (9.4%), condyle (2.4%), symphysis (2.4%), subcondyle (1.8%), and ramus (1.2%). These findings align with the results reported by Atilgan et al. (21), Sardar (22), and Natu and Pradhan (8), which also suggested that the parasymphysis is likely the most frequently involved site. This can be attributed to the

existence of permanent tooth buds in the mandible during childhood, leading to a higher tooth-to-bone ratio. Furthermore, in adults, the vulnerability of the structure at the parasymphysis can be partially linked to the length of the canine root. In our study, a total of 27 different combinations of mandibular fractures involving multiple fracture sites were identified. The most frequent combination observed was parasymphysis and angle fractures, accounting for 10.0% of cases. This was followed by the combination of body and angle fractures (5.9%), bilateral subcondyle and symphysis fractures (3.5%), condyle and parasymphysis fractures (2.9%), subcondyle and symphysis fractures (2.9%), and body and ramus fractures (2.4%). These findings align with the conclusions presented by Dongus and Hall (14) as well as Teoman (17), who both noted that fractures in the anterior arch of the mandible are frequently connected with fractures in the posterior region. These findings align with the conclusions presented by Dongus and Hall (14) and Teoman (17), who both noted that fractures in the anterior arch of the mandible are frequently connected with fractures in the posterior region.

CONCLUSION

Mandibular fractures were more prevalent among men compared to women, with a higher occurrence in individuals aged 18-30 years. Road traffic accidents (RTAs) emerged as the leading cause of mandibular fractures and trauma. Among the various fracture sites, the parasymphysis was the most commonly affected area. When fractures occurred in combination, the most frequent combination involved the parasymphysis and the angle of the mandible. The mechanism of injury exhibited a significant correlation with the specific anatomical location of the fracture, highlighting the importance of understanding these associations for appropriate and timely management by surgeons. In order to decrease the frequency of road traffic accidents (RTAs) and the consequent occurrence of fractures, it is imperative to institute and rigorously enforce stringent seat belt laws, speed limits, and other traffic regulations. These measures have proven to be effective in mitigating the occurrence of RTAs and the resulting fractures, thus playing a significant role in diminishing the incidence of both.

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