Frequency, Pattern and Etiology of Oral and Maxillofacial Fractures in Chhindwara District of Madhya Pradesh: A Retrospective Analysis

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Abstract

Introduction: One of the most vital public health concern is Oral and maxillofacial trauma (OMFT) due to its significant impact on facial aesthetics and function. Our study aims to assess the frequency, pattern, and etiology of Oral and maxillofacial fractures in Chhindwara district of Madhya Pradesh.

Materials and Methods: A retrospective, cross-sectional study was conducted at the Chhindwara Institute of Medical Sciences, analyzing records of 162 patients from January 2020 to December 2022. Data were categorized by age, gender, and etiology and fracture pattern. Chi-square test was utilised for statistical analysis with a significance level of p < 0.05.

Results: The highest prevalence of Oral and maxillofacial fractures was observed in patients aged 31–40 years (30.2%), followed by the 21–30 age group (28.4%). Males comprised 77.2% of cases, indicating a higher susceptibility due to occupational hazards and risk-prone behaviors. Road traffic accidents (RTAs) were the prime cause of trauma (76.8% in males, 43.2% in females), followed by falls and assaults. Mandibular fractures were the most common, accounting for 45% of cases, followed by Le Fort I fractures, dentoalveolar fractures and zygomatic fractures.

Conclusion: Oral and maxillofacial trauma is primarily caused by RTAs, particularly affecting males aged 21–40 years. Targeted prevention strategies including public awareness programs regarding traffic sense and traffic regulation enforcement are essential to decline the incidence of such injuries.

Keywords: Oral and Maxillofacial Trauma, Facial Fractures, Retrospective Study, Dentoalveolar.

Introduction

Trauma is defined as any injury caused by physical force and remains the chief cause of death in the first quadragenarian of life [1]. Among several types of trauma, Oral and maxillofacial Trauma (OMFT) are the most prevalent with road traffic accidents (RTAs) being the prime contributing factor [2]. The oro-maxillofacial region consists of both soft and hard tissues, extending from the frontal bone superiorly to the mandible inferiorly. Trauma to this region can lead to injuries to skeletal structures, dentition and soft tissues [3]. Researches have consistently shown that OMFT is the most frequently encountered type of trauma in hospitals [4]. The prominent and protruding anatomy of the facial skeleton makes it prone to injury [5].A comprehensive understanding of OMFT is necessary for effective preventive strategies and minimizing injury-related complications.

This study aims to analyse the frequency, pattern, and etiology of oral and maxillofacial fractures in a tertiary care centre in Chhindwara, Madhya Pradesh.

Materials and Methods

The authors conducted a single-centre cross-sectional study in the Department of Dentistry at

Chhindwara Institute of Medical Sciences (CIMS), Madhya Pradesh, India. The study was carried out retrospectively and data was collected from outpatient department records over a three-year period (January 2020 to December 2022). Prior ethical clearance was obtained from the institutional ethics committee.

All OMFT patients who reported to the dental OPD of CIMS with complete data were included for retrospective analysis. Patients with head and brain injuries and those with incomplete records were excluded from the study. After data extraction, the final sample size was counted to be 162.

The collected data were manually cross-verified for accuracy before being entered into Microsoft Excel. The data were categorized based on age, gender, aetiology of trauma and the pattern of OMFT. Age groups were categorised as 0–10 years, 11–20 years, 21–30 years, 31–40 years, 41–50 years, 51–60 years, and >61 years. Etiological factors were grouped into RTAs, self-falls and assaults. Trauma patterns were grouped into dentoalveolar fractures, nasal bone fractures, zygomatic fractures, Le Fort fractures (I–III) and mandibular fractures.

Statistical analysis was executed via IBM SPSS statistics 25. The chi-square test was applied to assess the significance of associations with a p-value of <0.05 considered statistically significant.

Results

This study highlights that the highest prevalence of oral and maxillofacial fractures were observed among patients aged 31-40 years (30.2%) and followed closely by those aged 21-30 years (28.4%). The 41-50 years age group accounts for 17.3% of trauma cases, while the prevalence decreases in older age groups, with 9.9% in the 51-60 years group and 4.9% in individuals over 61 years (Table 1).

These findings suggest that trauma is most common in younger and middle-aged adults, likely due to higher activity levels, occupational exposure, and engagement in risk-prone behaviors, while children and the elderly exhibit a lower incidence of trauma, potentially due to different lifestyle and environmental factors.

Males represent the majority of oral and maxillofacial cases, accounting for 77.2% of the total, while females comprise only 22.8% (Figure 1). This suggests that males are at a substantially higher risk of experiencing OMFT compared to females.

The data demonstrates significant age-related differences in the etiology of trauma (p-value = 0.03). RTAs are the most common source of trauma, particularly affecting individuals aged 31-40 years (33.7%) and 21-30 years (30.7%), with

lower rates in older and younger age groups. Falls are more evenly distributed across ages but are most frequent in the 31-40 years group (27.3%), followed by those aged 41-50 years (18.2%) and over 61 years (13.6%). Assault-related trauma is most prevalent in the 21-30 years group (35.3%), with secondary peaks in the 41-50 years (23.5%) and 11-20 years (11.8%) groups, while being absent in those over 61 and under 10 years (Table 2). Overall, trauma due to RTAs is concentrated in younger adults, particularly in the 21-40 age range, while falls tend to affect both younger and older individuals more evenly.

Assaults are more common in younger adults, particularly those in their 20s. These trends indicate that specific age groups are at heightened risk for different types of trauma, influenced by factors such as activity level, environment, and vulnerability.

Among males, the leading cause of trauma is RTAs, accounting for 76.8% of cases, then falls (19.2%) and assaults (4%). In contrast, females show a more diverse pattern, with 43.2% of trauma cases attributed to RTAs, but a notably higher incidence of assault-related trauma (45.9%), making it the most common cause of injury among females.

Falls represent a smaller proportion of trauma in both genders, though slightly higher in males (19.2%) compared to females (10.8%). These findings suggest that while males are predominantly affected by RTAs, females experience a significantly higher rate of assault-related trauma, pointing to gender-specific risk factors and possibly social and environmental influences contributing to the differences in trauma etiology (Table 3).

The data in Table 4 reveals distinct patterns of trauma across different age groups, with statistically significant variations in the incidence of specific facial fractures (p-value = 0.001). Dento-alveolar trauma is most prevalent among individuals aged 31-40 years (28.6%) and 21-30 years (21.4%), while nasal bone fractures predominantly affect those in the 31-40 (40%) and 21-30 (26.7%) age groups. Zygomatic fractures follow a similar trend, with the highest incidence in the 31-40 years group (32.1%), followed by 41-50 years (21.4%). Lefort fractures, categorized by severity (Lefort 1, 2, and 3), also show a higher occurrence in younger adults, particularly in the 21-30 and 31-40 years age groups, with Lefort 1 fractures peaking at 32% in the 21-30 group, while Lefort 3 is most frequent in the 31-40 group (50%). Mandibular fractures, the most common type, are significantly present in individuals aged 31-40 years (31.5%) and 21-30 years (26%), with a gradual decline in older age groups. Notably, trauma is less frequent in children under 10 years

and adults over 61, suggesting reduced exposure to high-risk activities in these populations. Overall, the 31-40 years age group consistently exhibits the highest trauma rates. As some patients sustained multiple fractures, the cumulative number of fractures recorded exceeded 162, leading to a higher total count in the distribution table 4. Pattern of trauma also described in Figure 2.

Table 1: Frequency of trauma among different Age Groups

Age Groups	n	%
0-10 years	3	1.9
11-20 years	12	7.4
21-30 years	46	28.4
31-40 years	49	30.2
41-50 years	28	17.3
51-60 years	16	9.9
> 61 years	8	4.9
Total	162	100.0

Table 2: Distribution of Trauma patients according to Etiology of trauma and Age Group

Etiology of Trauma		Age Group							p-Value (Chi-square test)
		0-10 years	11-20 years	21-30 years	31-40 years	41-50 years	51-60 years	> 61 years	
RTA (101)	n	0	7	31	34	16	11	2	**0.03***
	%	0.0%	6.9%	30.7%	33.7%	15.8%	10.9%	2.0%	
Fall (44)	n	3	3	9	12	8	3	6	
	%	6.8%	6.8%	20.5%	27.3%	18.2%	6.8%	13.6%	
Assault (17)	n	0	2	6	3	4	2	0	
	%	0.0%	11.8%	35.3%	17.6%	23.5%	11.8%	0.0%	
Total (162)	n	3	12	46	49	28	16	8	
	%	1.9%	7.4%	28.4%	30.2%	17.3%	9.9%	4.9%	

- RTA : Road Traffic Accident
- p-Value < 0.05 Considered as significant

Table 3: Etiology of trauma among different Genders

Gender		Etiology of Trauma			p-Value (Chi-square test)
		RTA	Fall	Assault	
Male (125)	n	96	24	5	0.000**
	%	76.8	19.2	4	
Female (37)	n	16	4	17	
	%	43.2	10.8	45.9	

- RTA : Road Traffic Accident
- p-Value < 0.05 Considered as significant

Table 4: Pattern of Trauma among different Age groups

| Pattern of trauma		Age Group							p-Value (Chi-square test)
		0-10 years	11-20 years	21-30 years	31-40 years	41-50 years	51-60 years	> 61 years	
Dento-alveolar (28)	n	3	4	6	8	2	4	1	
	%	10.7	14.3	21.4	28.6	7.1	14.3	3.6	
Nasal bone fracture (15)	n	0	0	4	6	3	2	0	
	%	0	0	26.7	40	20	13.3	0	
Zygoma fracture (28)	n	0	1	5	9	6	5	2	
	%	0	3.6	17.9	32.1	21.4	17.9	7.1	
Lefort 1 (50)	n	0	5	16	13	12	3	1	**0.001***
	%	0	10	32	26	24	6	2	
Lefort 2 (21)	n	0	1	8	7	2	1	2	
	%	0	4.8	38.1	33.3	9.5	4.8	9.5	
Lefort 3 (8)	n	0	0	2	4	1	0	1	
	%	0	0	25	50	12.5	0	12.5	
Mandibular Fracture (73)	n	0	6	19	23	14	7	4	
	%	0	8.2	26	31.5	19.2	9.6	5.5	

- p-Value < 0.05 Considered as significant
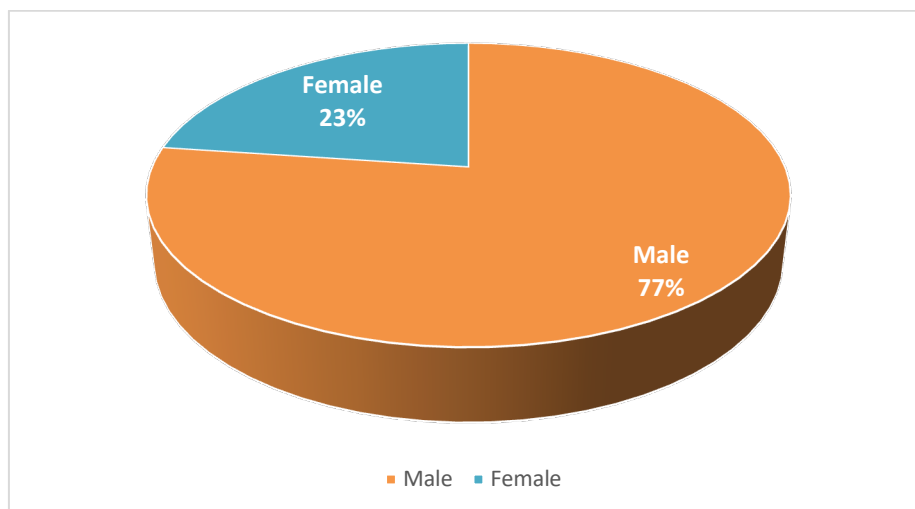
Figure 1: Distribution of Trauma patients according to Gender.
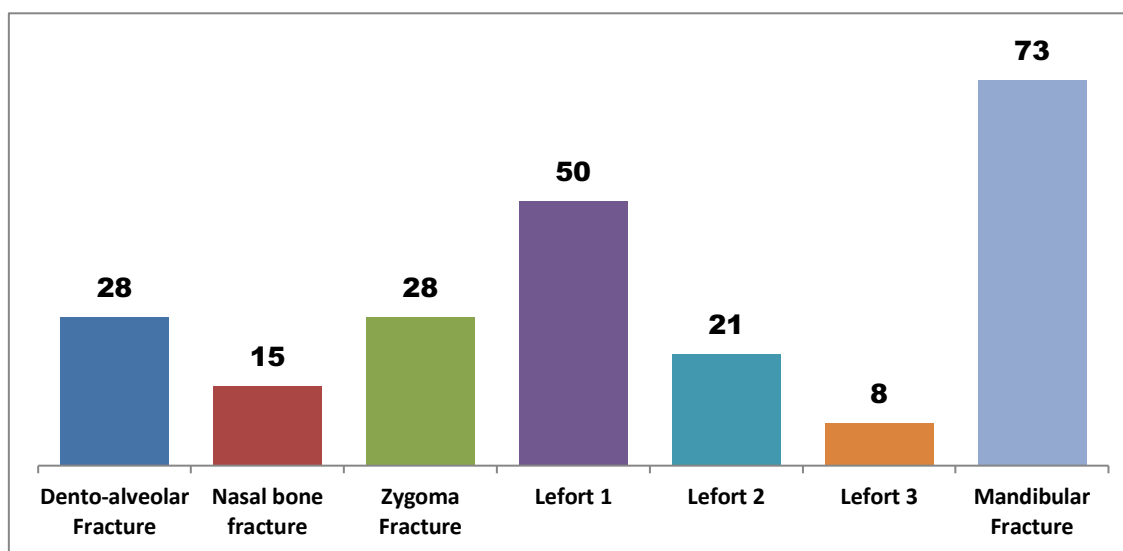

Figure 2: showing Pattern of Trauma among patients.

Discussion

The present retrospective study reveals that the highest prevalence of OMFT was observed in the 31–40 years age, accounting for 30.2% of the total study population. The lowest prevalence rates, at 7%, were seen in individuals below 10 years and above 61 years. Trauma was significantly more common among males, with a prevalence of 77.2%. While study conducted by Subhashraj et al. in Chennai showed the highest occurrence in the 21–30 years age group, with males showing a greater incidence of trauma [6], consistent with findings from Gaddipatil et al [7]. And studies conducted in Iran [8], Brazil [9], Japan [10], and Korea [11], our study shows a shift, with maximum prevalence in the 31–40 years group. However, all studies agree on the higher prevalence of trauma among males.

Our study identifies RTAs as the chief reason of oral and maxillofacial fractures, followed by self-falls and assaults. Notably, assault accounts for 45.9% of trauma cases among females. Similar findings were reported by Kansara A et al., where RTAs accounted for 48% of maxillofacial trauma [12]. Another study highlighted those RTAs involving two-wheeler riders were most prevalent, contributing to 56.4% of cases [13]. Contrary to our findings, Miao R et al. reported that only 28.12% of maxillofacial trauma cases were due to RTAs, with falls being the primary cause, accounting for 38.9% of cases [14]. Given that RTAs are the leading cause, it is crucial to educate the public on safe driving practices, promote helmet use among two-wheeler riders, and enforce stricter traffic regulations. Additionally, awareness programs should address the high prevalence of assaults among females, encouraging them to report such incidents to nearby police stations or women's helpline numbers for timely intervention.

This study reveals that mandibular fractures are the most prevalent type of OMFT, comprising 45% of

all cases, followed by Lefort I fractures, dentoalveolar fractures and zygomatic fractures. Similarly, Menon et al. reported mandibular fractures as the most prevalent, comprising 48.72% of cases [15]. In contrast, a study by Park et al. identified nasal bone fractures as the most frequent, occurring in 61.7% of the study population, while mandibular fractures accounted for only 18%[16]. Similarly, Shome et al. reported that mandibular fractures constituted just 12.3% of cases, with the majority being isolated orbital or orbital floor fractures [17].

One of the constraint of this study is the relatively small sample size may be attributed to Covid-19 pandemic, which significantly reduced patient visits and trauma cases during lock downs and restricted mobility. Future studies should focus on assessing how maxillofacial trauma impacts patients' quality of life, including functional, psychological, and social aspects, to provide a more comprehensive understanding of its long-term effects.

Conclusion

The study concluded that maxillofacial trauma is most commonly caused by RTAs, predominantly affecting males. The most frequently impacted age group is 21–40 years. Additionally, mandibular fractures were identified as the most common type of injury in this study.

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