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## **An Epidemiological Study of Maxillofacial Fractures at Tertiary Hospital in Kathmandu**

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### **Abstract**

**Introduction:** *The present epidemiological study was undertaken to determine the most common etiology, most common maxillofacial fracture and the demographic indicators of facial fractures.*

**Materials and Methods:** *A two- year retrospective study was performed and 330 patients who were treated by Department of Oral and Maxillofacial Surgery of National Trauma Center and Oral and Maxillofacial Surgery Unit of Bir Hospital, Kathmandu, Nepal. Out of 330 patients, only 299 patients were included in the study.*

**Results:** *The most affected group with maxillofacial fractures were found to be men of age group 21- 30 years. The main mode of injury recorded was Road Traffic Accident (RTA) followed by fall injury and physical assault. The highest occurrence of mandible fracture was noted in the study.*

**Conclusion:** *Road Traffic Accident remains the most common etiology of maxillofacial fracture and the mandibular bone was most commonly encountered fracture. This study emphasizes the application of road safety mechanism and stringent enforcement of traffic laws.*

**Keywords:** *Maxillofacial fracture, Road Traffic Accident (RTA), Open reduction and Fixation (ORIF), Mandible, Nasoorbitoethmoid (NOE)*

## **Introduction**

Trauma to the maxillofacial region is one of the prominent health hazards across the world. Maxillofacial fractures can lead to severe morbidity, cosmetic disfigurement and problems in oral functioning. The incidence varies according to geographical area and socioeconomic status of the population<sup>1-4</sup>. These injuries can present as isolated or as a part of a polytrauma, coexisting with intracranial, ocular, spinal, thoracic, abdominal and limb injuries that can significantly

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increase the complexity and morbidity of the case. Alteration of the facial features of an individual may have functional, psychological and social consequences that can be difficult to reverse over time.

Determining the etiological and epidemiological factors of a disease in a certain geographical area provides prudent data for implementing adequate prevention, diagnostic and treatment strategies<sup>4-10</sup>.

The main aim of this study is to determine the epidemiology and the etiology of maxillofacial fractures, also to correlate them in order to identify the main categories of affected patients depending on etiology. The results of this research will be useful in implementing legislative norms for the prevention of maxillofacial fractures, increasing general oral health, as well as training the medical staff and dentists for the adequate management of this pathology and collaboration with a certain type of patients. These findings can definitely assist to identify vulnerable age groups and gender. Thereby the results can emphasize the need for better education of road safety and stringent enforcement of traffic laws.

## Methods

This is a retrospective study conducted at the Department of Oral and maxillofacial surgery, National Trauma center and Oral and Maxillofacial Unit, National Academy of Health Sciences, Bir Hospital, Kathmandu from the period of July 2021 to July 2023. The ethical approval of the research was obtained by ethical institutional review board of National Academy of Medical Sciences. All patients with maxillofacial fractures with complete case records were included in the study. However, all patients with incomplete medical records, patients with soft tissue injuries only and those with dentoalveolar injuries was excluded. A proforma was developed to record age, gender, etiology, type of fracture and treatment modalities.

The data was analyzed using SPSS® Statistics, version 21 (International Business Machines Corporation, Armonk, New York, USA), and the level of significance will be set at  $P < 0.05$ . The descriptive statistics were documented and correlation analysis was done to identify significant variables. Bivariate analysis was done using Chi-square test and frequency distribution analysis.

## Results

In total, 330 patients were treated from July 2021 to July 2023. Among these only 299 had complete database. Out of 299, male were 251 (83.9%) and 48 (16.1%) were female. The average age was 33.6 ( $\pm 15.14$ ) years. The range of age varied from 4 – 88 years.

Etiology: The highest occurrence of maxillofacial fracture occurred in the 21- 30 (33.11%) age group followed

by 31-40 (22.07%). There was significant correlation observed with age group and type of fracture [Table 1]. The commonest mode of injury was observed to be Road Traffic Accident (58.5%), followed by fall injury (24.1%) and physical assault (9.4%).

Pattern: Mandibular fracture (44.5%) was the most common maxillofacial fracture followed by combination fracture (nasorbitoethmoid, zygomatic, midface and mandible - 23.7%). The association with mode of injury and maxillofacial fracture was calculated using chi- square test.

In Mandible, parasymphysis fracture (31.5%) was the most common followed by mandibular condyle (23.5%) and mandibular angle (14.7%) [Table 2].

In RTA, fall injury and physical assault cases, mandibular fracture was the commonest fracture. followed by combination fracture and orbitozygomatic + zygomatic bone [Table 3]. However the results were not statistically significant ( $p < 0.05$ ).

Table 1. Distribution of maxillofacial Fracture according to Age

Age in years	Fracture							Total
	Orbital +nasal + NOE	Midfacial	Orbitozygomatic	Mandible	Zygomatic arch only	Floor of orbit	Combination	
4-10	0 0.0%	0 0.0%	0 0.0%	5 100.0%	0 0.0%	0 0.0%	0 0.0%	5 100.0%
11-20	0 0.0%	0 0.0%	12 25.0%	18 37.5%	1 2.1%	0 0.0%	17 35.4%	48 100.0%
21-30	2 2.0%	3 3.0%	24 24.2%	42 42.4%	3 3.0%	3 3.0%	22 22.2%	99 100.0%
31-40	0 0.0%	2 3.0%	14 21.2%	35 53.0%	1 1.5%	3 4.5%	11 16.7%	66 100.0%
41-50	0 0.0%	2 6.5%	4 12.9%	14 45.2%	3 9.7%	0 0.0%	8 25.8%	31 100.0%
51-60	0 0.0%	1 3.4%	4 13.8%	14 48.3%	1 3.4%	0 0.0%	9 31.0%	29 100.0%
61-70	1 10.0%	0 0.0%	2 20.0%	2 20.0%	1 10.0%	0 0.0%	4 40.0%	10 100.0%

>71	0 0.0%	0 0.0%	2 33.3%	1 16.7%	1 16.7%	2 33.3%	0 0.0%	6 100.0%
Total	3 1.0%	8 2.7%	62 21.1%	131 44.6%	11 3.7%	8 2.7%	71 24.1%	294 100.0%

Chi square test: p value: 0.007

Fracture Mandible	Frequency	Percentage (%)
Ramus	4	1.7
Condyle	55	23.7
Angle	34	14.7
Body	32	13.8
Parasymphysis	73	31.5
Symphysis	30	12.9
Coronoid	4	1.7
Total	232	100

Table 2. Mandibular Fracture Pattern

Mode of Injury		Types of maxillofacial Fracture							Total
		Orbital +nasal + NOE	Midfaci al	Orbitozy gomatic +zygom atic	Mandibl e	Zygoma tic arch only	Floor of orbit	Combin atio	
RTA		0	7	36	71	8	3	49	174
		0.0%	4.0%	20.7%	40.8%	4.6%	1.7%	28.2%	100.0%
Fall injury		3	1	15	35	1	3	13	71
		4.2%	1.4%	21.1%	49.3%	1.4%	4.2%	18.3%	100.0%
Physical assault		0	0	5	13	2	2	5	27
		0.0%	0.0%	18.5%	48.1%	7.4%	7.4%	18.5%	100.0%
Sports		0	0	1	3	0	0	0	4
		0.0%	0.0%	25.0%	fall.0%	0.0%	0.0%	0.0%	100.0%
Animal attack		0	0	2	0	0	0	1	3
		0.0%	0.0%	66.7%	0.0%	0.0%	0.0%	33.3%	100.0%
Work		0	0	2	7	0	0	3	12
		0.0%	0.0%	16.7%	58.3%	0.0%	0.0%	25.0%	100.0%
Play injury		0	0	0	2	0	0	0	2
		0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Total		3	8	61	131	11	8	71	293
		1.1%	2.7%	21.1%	44.6%	3.7%	2.7%	24.1%	100.0%

Table 3. Distribution of maxillofacial Fracture according to mode of injury

Chi square test: p value: 0.73

## Discussion

The present study showed that 299 patients with maxillofacial fracture was treated during the period of two year. The commonest mode of injury was RTA followed by fall injury and physical assault. There are many other studies performed in other countries in which RTA was the leading cause of maxillofacial fractures 1,2,3,12. The major risk factors are overspeeding, alcohol intoxication, failure to abide traffic rules, road condition etc1,2,12. However recent studies have highlighted that in countries like United Kingdom, violence and falls were the main cause rather than RTA12. In our study also two - wheeler (47.8) was the most common

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vehicle to be involved in RTA followed by four - wheeler. People using two- wheeler including pillion rider should wear a helmet to prevent traumatic head injury along with maxillofacial fractures. In Nepal there is a stringent rule for rider of two – wheeler to wear helmet. The general public should be made aware of the harsh consequences if failed to follow traffic lane discipline. The importance of safe driving rules should be reinforced time and again.

Apart from the mentioned mode of injury, we also had one case of ballistic injury, one case of blast injury and two cases of landslide. Alcohol intoxication is another contributing factor. Although we have not studied the pattern of maxillofacial fracture in alcohol intoxicated patients with RTA, further studies would prove to be beneficial.

In our study, mandibular fracture (40.8%) was the commonest maxillofacial fracture. This finding is in accordance to other studies<sup>1,12</sup>. Park et al concluded that nasal bone was the most common fracture observed in their study<sup>2</sup>. In the mandible, parasymphysis (31.5%) was frequently fractured followed by condyle fracture (23.7%). We have given combination fracture type which can be combined involving Naso-orbitoethmoid, orbitozygomatic, midface, orbital fracture. In case of RTA and physical assault, the second most common fracture is combination fracture type (28.2%) and (18.5%) respectively. The midface group comprised of Lefort I, Lefort II, Lefort III and midpalatine split (2.7%).

The higher prevalence of maxillofacial fractures in males is well documented in the literature<sup>1,2,3,5,9,12</sup>. Males are at great risk due to their greater involvement in outdoor activities like driving vehicles, sports, etc. In contrast females who were in physical assault group had husband as the perpetrator. For such victims, Nepal government provided treatment free of charges. Target specific awareness programmes are needed at local level to manage the conflict.

Regarding age distribution in our study the highest occurrence of maxillofacial fracture occurred in 21-30 (31.11%) followed by 31- 40 (22.07%). Our findings correlate with other study done by Ongkila et al in India. This could be because this age group is actively participating in outdoor activities.

The patients were managed with open reduction and fixation (98.6%) and only (1.4%) were treated in conservative manner.

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The study has its limitations being a retrospective one. Further studies are needed at various centers in different location within the country so as to know the epidemiological pattern of that geographical location. It must be emphasized that the data from this study does not reflect the incidence of maxillofacial injuries.

## Conclusion

Road traffic accident is the most common mode of injury for maxillofacial fractures followed by fall injury and physical assault. Maxillofacial injuries affect men more frequently than women in the age group of 21- 30 years. The relatively high incidence of injuries necessitates to reinforce road safety mechanism and stringent enforcement of traffic regulations. Mandible is the most common fracture involved in maxillofacial injuries.

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