

## Prevalence of Maxillofacial Trauma with Frontal Fracture at Hasan Sadikin General Hospital Bandung

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Received: 26-12-2022 / Revised: 14-01-2023 / Accepted: 27-01-2023

DOI: <https://doi.org/10.32553/ijmbs.v7i2.2668>

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Conflict of interest: No conflict of interest.

### Abstract

Patients with maxillofacial fractures have a high risk of accompanying head injury because of the close anatomical location of facial bones and cranium. Forces striking the face are transmitted directly to the neurocranium, resulting in more severe brain injury. **Objective:** To analyze the prevalence of patients with maxillofacial fractures with frontal fractures at RSHS Bandung in 2020. **Methods:** Descriptive study of medical records of maxillofacial trauma patients with frontal fractures at Hasan Sadikin Hospital, Bandung, January-December 2020. The data collected included gender, age, aetiology and location of the fracture. **Results:** The majority gender was 79.8% male, while the female was only 20.2%. The age range is 17-25 years old (36%). Most fracture locations were maxillofacial trauma without frontal fracture (92.2%), compared to maxillofacial fracture with frontal fracture as much as 10%. The most common trauma etiology was Traffic accidents (81.3%), followed by falls as much as 17.8%, and physical violence 0.7%. **Conclusion:** Maxillofacial trauma with frontal fracture has relatively few incidences, and the primary aetiology is Traffic accidents in young adults.

**Keywords:** Maxillofacial Trauma, Frontal Fracture, facial fracture, Traffic accident

### Introduction

Maxillofacial trauma occurs in about 6% of all traumas. The causes of maxillofacial trauma may vary, such as Traffic accidents, physical violence, falls, and sports and gun trauma. Traffic accidents are the main cause of maxillofacial trauma that can lead to death and disability in adults in general under the age of 50 years, and the most significant number usually occurs in men with an age limit of 21-30 years<sup>1,2</sup> For patients with fatal Traffic accidents, it becomes a problem because they must be treated in hospital with a permanent disability. Studies show that 72% of deaths due to maxillofacial trauma are mainly caused by Traffic accidents<sup>3</sup>. The most common causes in Indonesia are traffic accidents (40-45%), while

others are assault or fighting (10-15%), sports (5-10%), falls (5%), and others (5-10%). In children, the most frequent causes are sports, such as riding a bicycle (50-65%), while others are traffic accidents (10-15%), molestation or fighting (5-10%), and falls (5-10%)<sup>4</sup>

The report from the Emergency Unit of Hasan Sadikin Hospital in Bandung shows that head and neck injuries are relatively high due to Traffic accidents. This head injury was also noted to involve maxillofacial trauma. Maxillofacial trauma has many variations, including nasal bone fractures, maxillary bone fractures, mandibular bone fractures, surrounding soft tissue injuries or a combination of these<sup>5</sup>.

Several researchers have suggested the relationship between maxillofacial trauma and head injury severity. Jeyaraj, in his research, stated that about 5% of maxillofacial injuries have frontal bone fractures.<sup>6,7</sup> The prevalence of neurologic injury associated with mid-face fractures is 76%. Tolerance of the middle facial bone to force is lower than that of the frontal and mandibular bones. Massive trauma to the mid-face can result in the dispersion of forces, leading to the transmission of forces to the skull base and cranium<sup>8</sup>. This is similar to that found in the study of Beogo et al., who concluded that motorcyclist accidents caused a moderate degree of maxillofacial trauma (more than one fracture line). Isik et al.<sup>9,10,11</sup> found that the number of patients with head injury with maxillofacial trauma was 15.44% (38/246). Most of the patients with maxillofacial fractures in the study occurred due to Traffic accidents, so that more patients with multiple fractures than single fractures<sup>12</sup>

RSUP Dr. Hasan Sadikin is a first class general hospital which belongs to the Central Government located in Bandung as a national referral hospital for West Java region, and

receives many cases of maxillofacial trauma. The purpose of this study was to determine the prevalence of maxillofacial trauma accompanied by frontal fractures at Hasan Sadikin General Hospital regarding to improve maxillofacial trauma services.

## Methods

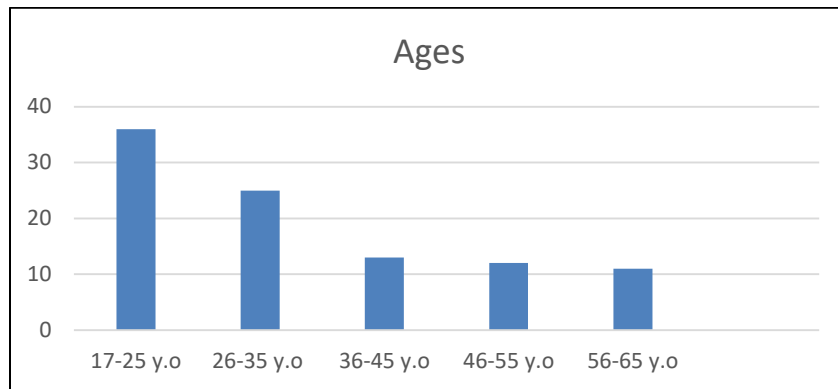
This type of research is a retrospective descriptive study from the medical records of maxillofacial trauma patients at Hasan Sadikin Hospital from January to December 2020. The data collected included gender, age, etiology, and fracture location. The data are then arranged in tables and analyzed. The research has obtained permission from the Research Ethics Committee of FK UNPAD / Hasan Sadikin General Hospital with number 203/UN6.KEP/EC/2022

## Result

The results of the descriptive analysis of the characteristics of maxillofacial trauma patients obtained a sample of 129 people, as shown in table no.1.

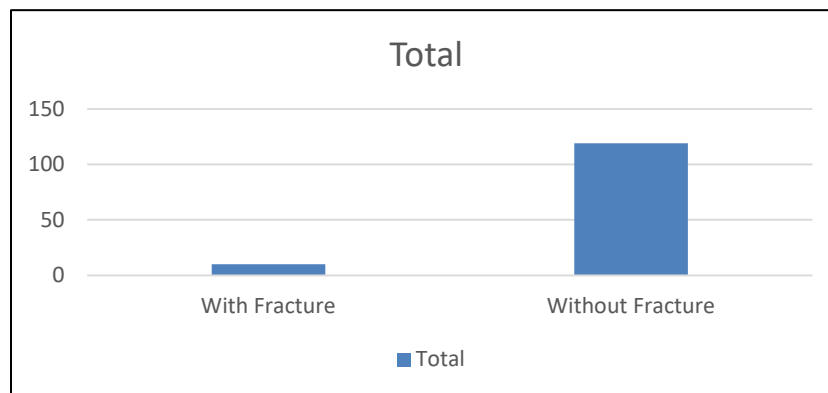
Patient characteristic	f (n)	Percentage (%)
Gender		
<b>Male</b>	103	79.8
<b>Female</b>	26	20.2
Age		
<b>5-16 y.o</b>	23	17.8
<b>17-25 y.o</b>	36	27.9
<b>26-35 y.o</b>	25	19.3
<b>36-45 y.o</b>	13	10.0
<b>46-55 y.o</b>	12	9.3
<b>56-65 y.o</b>	11	8.5
Fracture location		
<b>With Frontal Fracture</b>	10	7.7
<b>Without Frontal Fracture</b>	119	92.2
Trauma mechanism		
<b>Traffic accident</b>	105	81.3
<b>Falling</b>	23	17.8
<b>Physical accident</b>	1	0.7
<b>Total</b>	129	

The sex majority was male with a percentage of 79.8% of the total 129 patients studied and only 20.2% female patients.



**Figure 4.2:** Characteristics of maxillofacial patient age

The highest age range is 17-25 years, with a percentage of 27.9% of the total 129 patients. While the rest are in the age range of 5-16 years to more than 26-65 years.



**Figure 4.3** Characteristics of frontal fractures in maxillofacial trauma patients

The description of frontal fractures in cases of maxillofacial trauma in January – December 2020, as many as ten patients out of a total of 129 patients (figure 4.3)

The most trauma mechanism is Traffic accidents, as much as 81.3%; the second most falls is 17.8%, while physical violence is 0.7%.

**Discussion**

Maxillofacial trauma could cause soft or hard tissue injury, including maxillofacial fracture. Maxillofacial fractures can be considered a consequential injury and are accompanied by fractures of the skull base because they can result in death, severe morbidity, facial deformities, and functional limitations. The increase in population and advances in transportation have led to an

increase in the incidence of injuries, particularly facial injuries. Data from the Indonesian Center of Statistics reported that the number of traffic accidents in Indonesia reached 103,645 cases in 2021, increasing 3.62% compared to the previous year, which was 100,028 cases. Oral and maxillofacial fractures can assume complex forms related to their origin mechanism. The most common causes are traffic accidents, assaults, work-related injuries, sporting accidents, and falling. Classifications, pathophysiology, and biomechanics of facial fractures are described in the literature as the current approaches to fracture reduction and fixation. The pattern of maxillofacial fractures should be addressed in two sections: the anatomy and buttress system of

facial bone and the mechanism and pathogenesis of facial injury.<sup>1,6,10</sup>

This study showed that male patients were the majority of the female patients, namely 103 people; the number was almost four times that of female patients. Based on the causal mechanism, it can be seen that Traffic accidents caused the maxillofacial trauma mechanism of as many as 105 people, the most from other mechanisms, namely 23 people falling and physical violence of as many as one person. Trauma can illustrate the relationship with activities outside the home, mainly carried out by the male sex community.<sup>13</sup> Traffic accidents are still the highest cause of maxillofacial trauma. These data are supported by Goodison et al., who found significant results in patients with traumatic brain injury with maxillofacial injury. Of the 2307 patients treated with traumatic head injuries, 5% had maxillofacial injuries.<sup>14</sup> Types of facial bone injuries were associated with the presence or absence of intracranial lesions. Patients with fractures of the lower (particularly mandibular), middle, and upper facial bones single commonly have mild traumatic brain injury (71%, 62%, and 61%, respectively).<sup>15</sup>

In this study, the age group of 17-25 years was the age group that experienced the most trauma, namely as many as 36, and the least in the group of 55-65 years, namely 11 people. This situation can describe high activity in one of the productive age groups. According to research by Goedecke et al., from January 2010 to December 2014, there were 573 cases of maxillofacial trauma in Mainz, Germany, with a mean age of 41 years, men 39 years, and women 53 years.<sup>14</sup> The number of maxillofacial fractures accompanied by frontal fractures is only ten people or 7% of the total patient. This study's results follow previous studies by Sahil et al., Naveen Shankar et al., and Mijiti et al. However, in this study, the prevalence was more in the middle third of the face, in contrast to previous studies by several other researchers, namely Bali et al. 41 31%, Mesgarzadeh et al. 22%, Kostakis et al. 40 as

many as 47% and Chaya et al. as many as 15%. In another study by Erdman et al., 42 70% showed a higher prevalence of injury.<sup>6</sup>

Motor vehicle accidents are still the highest causative factor in Indonesia which causes maxillofacial trauma and head injuries. The incidence of maxillofacial trauma cases caused by Traffic accidents at Dr Soetomo Surabaya in 2010 as many as 102 people with a percentage of 79%, and in 2011 as many as 113 with a percentage of 81% In another area, namely Andi Makkasau Hospital, Pare-Pare City in July-August 2013 cases of maxillofacial trauma caused by Traffic accidents were 90 with a percentage of 74% Motor vehicle accidents are still the highest causative factor in Indonesia which causes maxillofacial trauma and head injuries. At Dr. Soetomo Surabaya, the incidence of maxillofacial trauma cases caused by traffic accidents was 102 in 2010, with a percentage of 79%, and 113 in 2011, with a percentage of 81%. In another area, namely Andi Makkasau Hospital in Pare-Pare City, there were 90 cases of maxillofacial trauma caused by traffic accidents in July-August 2013, with a percentage of 74%.<sup>6</sup> The NTB Provincial Hospital said cases of maxillofacial trauma caused by traffic accidents were 90 for a percentage of 74%. The results showed that the rate of maxillofacial fractures with frontal fractures was in the mild category. The results of this study follow previous research by Ruslin et al. ahril et al., Naveen Shankar et al. and Mijiti et al.<sup>5</sup> The leading cause of the high rate of motor vehicle accidents is difficult to pinpoint, but several factors can cause it, as discussed earlier. Poor road conditions are not proportional to the increase in the number of vehicles, the level of safety in driving, driving speeds that exceed the safe limit, and errors in the use of helmets 11 Motor vehicle accidents are also a significant problem due to poor driving safety, the carelessness or negligence of drivers while driving due to drinking alcohol or toxic drugs, bad driving habits, and the driver's socioeconomic condition. These factors require significant

government funds to improve and reduce the number of motorized accidents on the highway.<sup>16</sup>

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A study in Delhi shows the same result with a total of 2250 patients in five years. Male shows more case than female, 1053 against 225 consecutively. In Riyadh, Saudi, motor vehicle accidents are still the main cause of trauma, with 80% of cases. A ratio of 2.78:1 between male and female trauma was recorded in Osijek. The result shows an increase in female cases, just like in other urban cities in Europe, with an increasing female role in daily activities.<sup>17,18,19</sup>

### Conclusion

Maxillofacial trauma with a frontal fracture at Hasan Sadikin General Hospital in Bandung is among the few and most common in young men of productive age with the most causes of Traffic accidents.

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