



## Incidence and Prevalence of Maxillofacial Injuries in patients reporting to Ashwini Hospital, Cuttack, Odisha a Tertiary care center- Two Year Retrospective Study

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### Abstract

**Introduction:** Maxillofacial injuries have been quite common in modern day road traffic accidents. This can have serious consequence to the airway and quality of life later on. Most important, of course, is to create public awareness about RTAs and stricter implementation of road traffic legislation.

**Aim:** This study aimed to assess retrospectively the profile of maxillofacial injuries in patients reporting to a tertiary care hospital in Odisha.

**Materials and Methods:** The study was conducted at Ashwini hospital, Cuttack. Case record sheets of patients reporting to the hospital emergency were scrutinized. Data pertaining to demographic, epidemiological factors, including the patient's age and gender, time and day of reporting, the etiology factors, nature of injury and influence of alcohol were recorded.

**Results:** The peak incidence of maxillofacial injury was observed in the age group of 21–30years, with males out numbering females in all age groups. Maximum number of trauma cases reported in late evening hours, especially in the month of October and November. The primary etiological factor was road traffic accidents. Maxillofacial fractures were most frequently observed in the zygomatic maxillary complex region followed by the mandible. Alcohol influence was found to be prevalent in most RTA cases.

**Conclusion:** The present regional epidemiological analysis will definitely help the policy makers and the care givers to reduce the fatality rate as well as the accident rate in the State of Odisha and adjoining States where the socio-economic conditions are similar.

**Keywords:** Road traffic accidents, maxillofacial trauma, retrospective analysis.

### Introduction

In recent past, maxillofacial injuries are one of the most common injuries due to road traffic accident which are often associated with other injuries. For the past few decades, there has been a significant

surge in maxilla facial traumas. Maxillofacial trauma results in soft tissue and hard tissue injuries. Maxillofacial injuries are most common, from road traffic accidents, while other sources such as sports injuries, personal violence,

occupational injuries, and falls are also seen. Penetrating injuries like stabbings, gunshot wounds and explosions could also result in maxillofacial injuries.

Patients with maxilla facial injuries those who reported to Ashwini Hospital, Cuttack were included in this retrospective study to analyze various parameters.

### Materials and Methods

This is a retrospective descriptive study conducted in Ashwini Hospital, Cuttack. It is the tier 3 tertiary super-specialty hospital and it is a main referral center for all places in and around the district. The sample included all trauma patients those who reported to Ashwini hospital casualty department from February 2018 to March 2020.

This retrospective study was reviewed and Ethical committee approval was granted.

### Study Variable

The etiological factor of trauma were subdivided into categories as road traffic accidents (RTAs), fall from height, assault, occupational accidents, sports injuries, animal bite and others (blasts, gunshot). The RTA cases were further subdivided according to the type of vehicle injury (bicycle, two-wheelers, three- and four-wheelers, and foot).

Age, sex, time of injury, influence of alcohol was analyzed. The anatomical locations of cranio-maxillofacial fractures were divided into groups involving various region such as frontal bone fractures, naso-orbito-ethmoid (NOE), LeFort I, LeFort II, LeFort III, zygomatico-maxillary complex (ZMC), zygomatic arch, nasal bone and mandible fractures. Associated injuries including traumatic brain injury, cervical spine injury, chest and abdominal injury, upper limb and lower limb fracture, pelvic bone fractures were assessed.

Patient with head injuries or chest injury those who required tracheostomy before or during maxillofacial surgeries were also analyzed in this study.

This retrospective study was reviewed and approved by ethical committee.

### Results

Data was analyzed from casualty medical record, in which 321 patients had cranio-maxillofacial injuries.

#### Sex Distribution (Table 1 and Graph 1)

Among 321 patients, 75.7% of patients were males and 24.3% were females, with a male to female ratio of 3:1.

#### Age Group Distribution (Table 2 and Graph 2)

Among all age groups, there was high prevalence of male gender. The peak incidence was in the 21-30 age group (35.5%), followed by 31-40 age group and the 11-20 age group with 24.8% and 15.3%, respectively.

#### Distribution of Time of Injury (Table 3 and Graph 3)

The maximum number of cases were reported at 6 pm-12 am (42.3%) followed by 12 pm-6 pm (25.5%).

#### Month Wise Distribution of Injuries (Table 4 and Graph 4)

Cranio-Maxillofacial trauma's were highest in the months of October (18.7%) followed by November (15.6%), with least incidence in the month of April (3.3%).

#### Distribution of Etiology of Trauma (Table 5 and Graph 5)

RTA was the major cause of cranio-maxillofacial injuries with the incidence of 58.2%, followed by fall (22.9%) and assault (10.6%). Only least number cases were reported due to injuries caused by animals (1.0%) and others (blasts, gunshot) (0.7%).

#### Distribution of Injuries by Type of Vehicle (Table 6 and Graph 6)

Regarding vehicle involved RTA, two-wheeler was the leading cause with the incidence of 55.8% followed by four-wheeler 26.7%, three-wheeler 12.1%, and least percentage of cases were reported due to bicycle-related accident 5.4%, respectively.

#### Distribution of Alcohol Influence (Table 7)

Majority cases were affected under the influence of alcohol with the occurrence of 60.1%.

**Distribution of Pattern of Maxillofacial Fractures (Table 8 and Graph 7)**

Increased number of cases were affected with ZMC fracture (25.2%), followed by mandible fractures (20.9%), and dentoalveolar fracture (7.1%). Lefort III fracture showed 2.1% which was found to be least among the all

**Distribution of Associated Injuries (Table 9)**

Head injury (74.6%) accounted for the greater majority of associated.

**Table 1:** Sex distribution of the patients

SEX	FREQUENCY (Y%)
Male	243(75.7)
Female	78 (24.3)
Total	321 (100)

**Table 2:** Age group distribution

Age group (years)	Frequency (%)
1-10	11 (3.4)
11-20	49 (15.3)
21-30	114 (35.5)
31-40	80 (24.8)
41-50	31 (9.7)
51-60	17 (5.2)
61-70	10 (3.9)
71-80	8 (3.1)
81-90	1 (0.03)
>90	0 (0.0)
Total	321 (100.0)

**Table 3:** Distribution of time of injury

Time	Frequency (%)
12 am-6 am	66 (20.6)
6 am-12 pm	37 (11.6)
12 pm-6 pm	82 (25.5)
6 pm-12 am	136 (42.3)
Total	321 (100.0)

**Table 4:** Month wise distribution of injuries

Month	Frequency (%)
January	26 (8.1)
February	17 (5.2)
March	17 (5.4)
April	11 (3.3)
May	15 (4.6)
June	24 (7.6)
July	27 (8.6)
August	20 (6.4)
September	31 (9.8)
October	61 (18.7)
November	51 (15.6)
December	21 (6.7)
Total	321 (100.0)

**Table 5:** Distribution of etiology of trauma

Etiology	Frequency (%)
RTA	187(58.2)
Fall	74 (22.9)
Assault	34(10.6)
Occupational injury	
Sports injury	10 (3.2)
Injuries caused by animals	3 (1.0)
Others (blasts, gunshot)	2 (0.7)
Total	321 (100.0)

**Table 6:** Distribution of injuries by type of vehicle

Type of vehicle	Frequency (%)
Bicycle	17 (5.4)
Two wheeler	179 (55.8)
Three wheeler	32 (10.1)
Four wheeler	86 (26.7)
Foot	7(2.0)
Total	321 (100.0)

**Table 7:** Distribution of alcohol influence

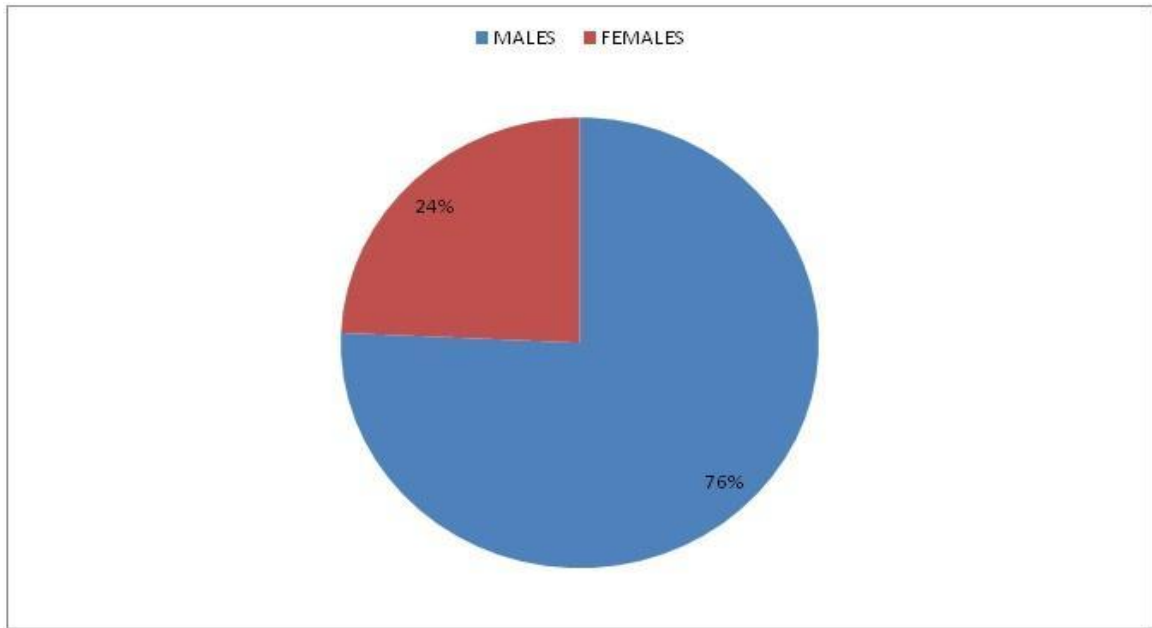
Alcohol influence	Frequency (%)
Yes	193 (60.1)
No	138 (39.9)
Total	321 (100.0)

**Table 8:** Distribution of pattern of maxillofacial fractures

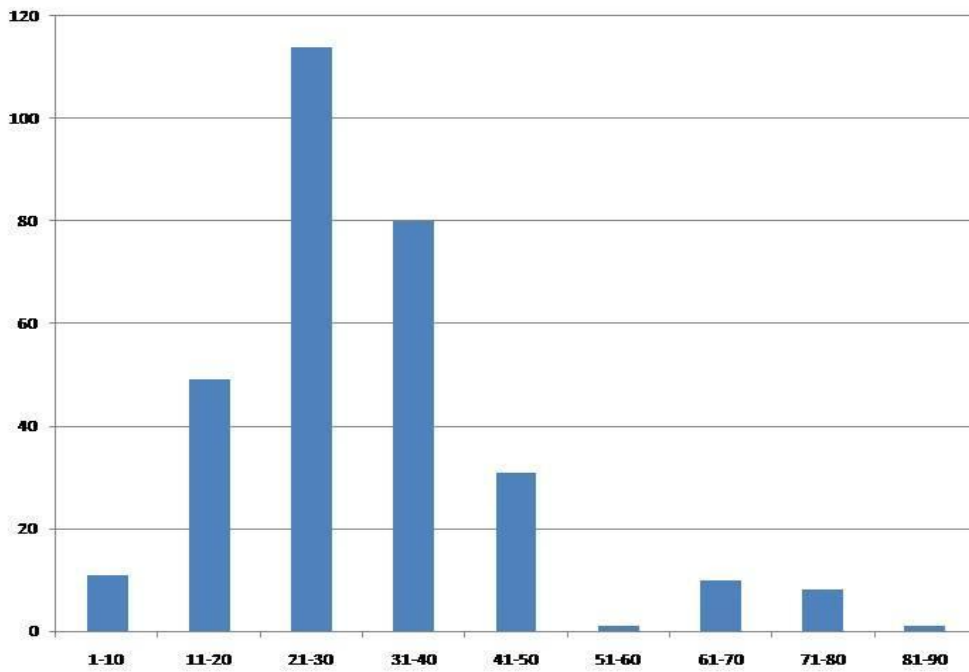
Pattern of fracture	Frequency (%)
Frontal	24 (7.5)
ZMC	81 (25.2)
Nasal	25 (7.9)
Orbit	22 (6.9)
Le Fort I	28 (8.7)
Le Fort III	24 (7.3)
Le Fort III	7 (2.1)
Mandible total**	67 (20.9)
Dento-alveolar***	23 (7.1)
Zygomatic arch alone	9 (2.9)
NOE	11 (3.5)
Total	321 (100.0)

**Table 9:** Distribution of associated injuries

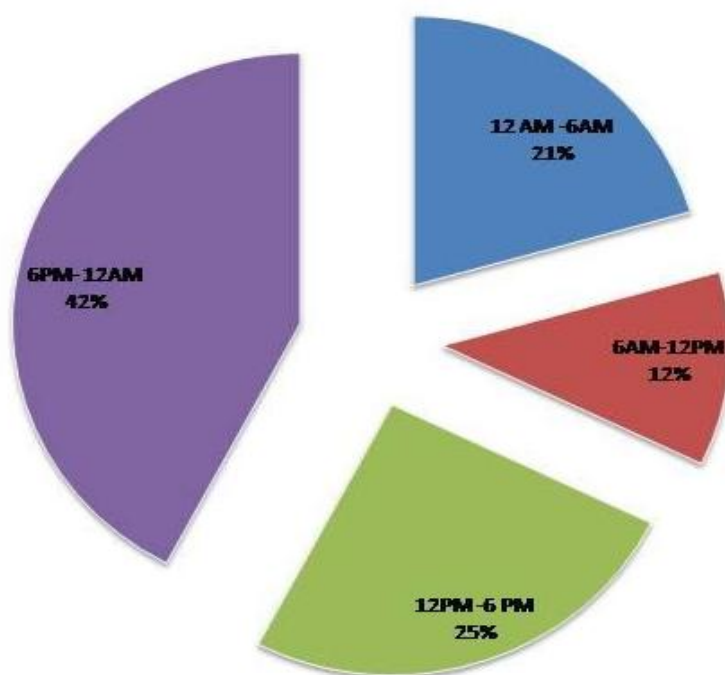
Associated injuries	Frequency (%)
Head injury	239 (74.6)
Chest and abdominal injury	16 (4.8)
Upper limb fracture	25(7.7)
Lower limb fractures	35(10.9)
Cervical spine injury	6( 2 )



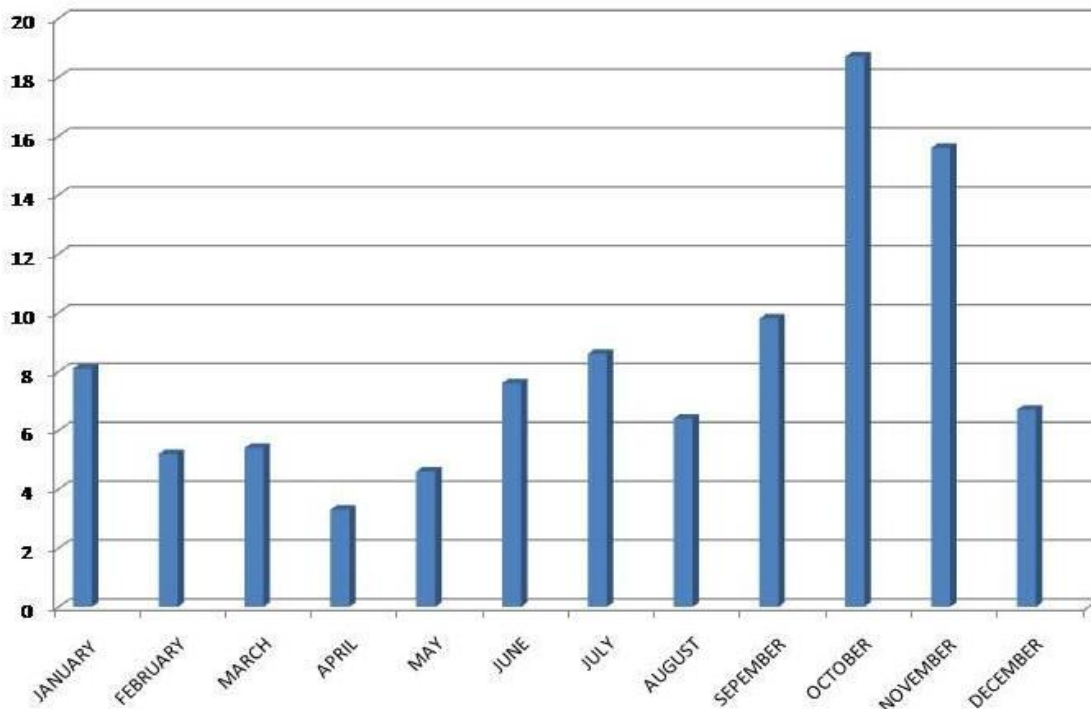
Graph 1: Sex distribution



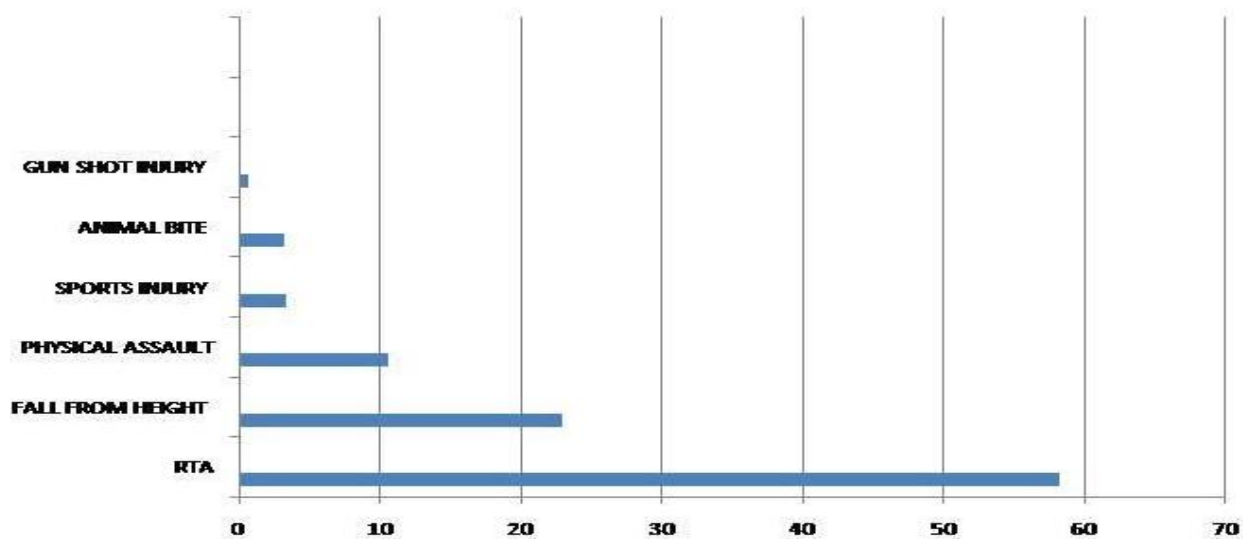
Graph 2: Age distribution



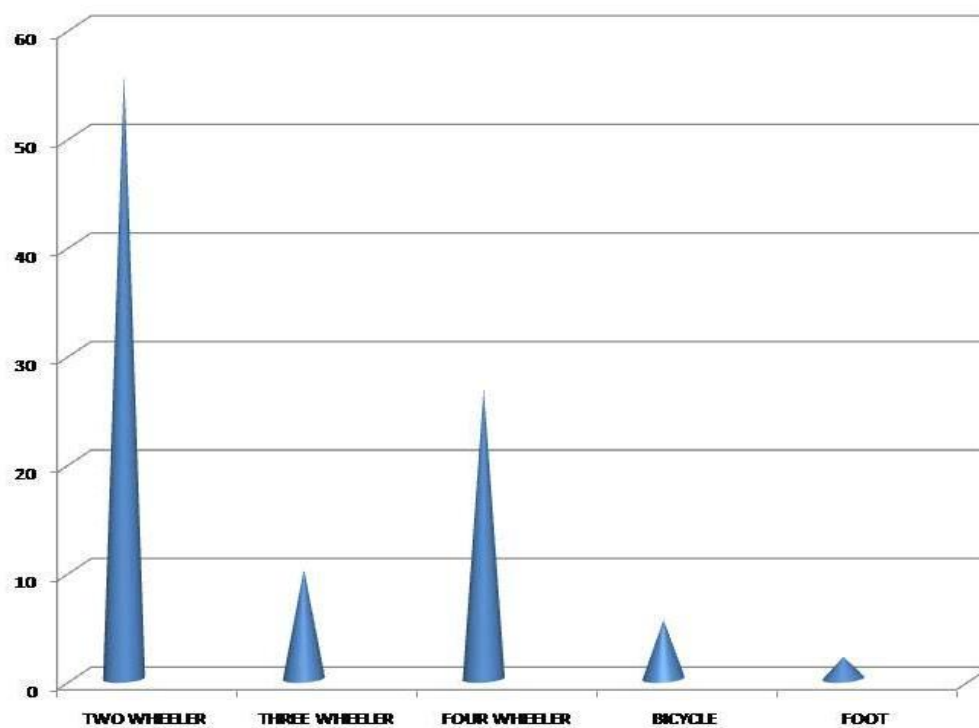
Graph 3: Time distribution



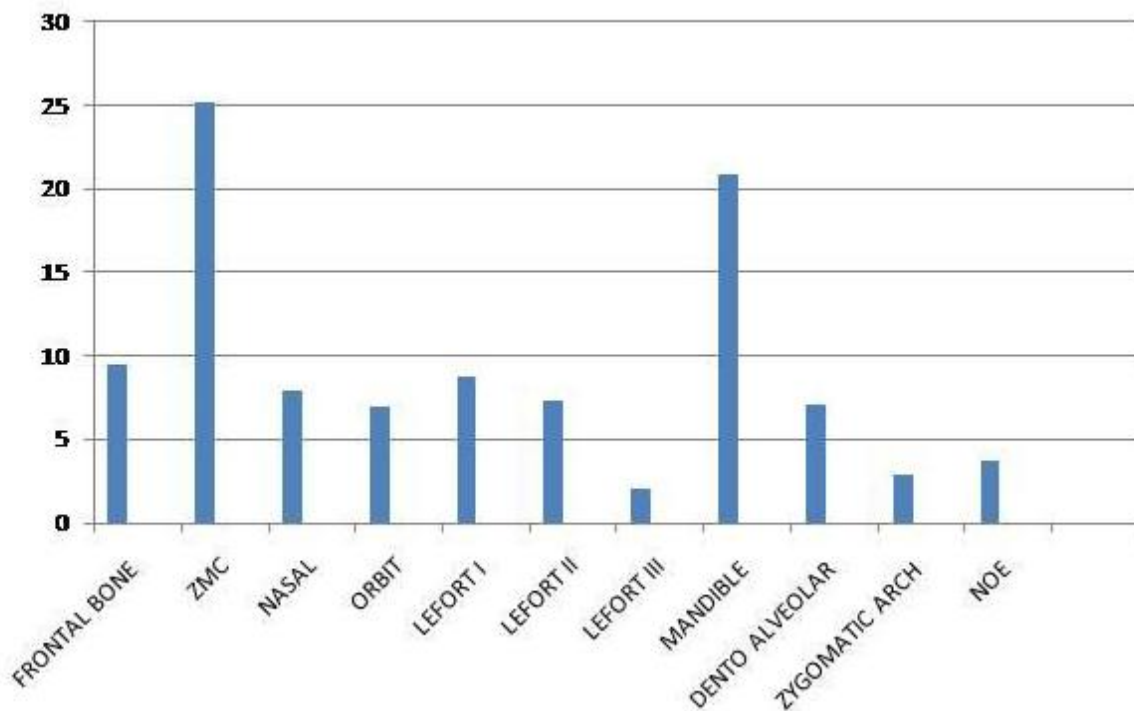
Graph 4: Month wise distribution



Graph 5: Etiology of maxillofacial trauma



Graph 6: Mode of transport



**Graph 7:** Distribution of fracture

### Discussion

Face is categorized as the second body region out of the six body regions for the calculation of Abbreviated Injury Severity Score. The other body regions are head and neck including cervical spine (region 1), chest including mediastinum (region 3), abdomen and visceral pelvis (region 4), extremities and bony pelvis (region 5) and external injuries (region 6). While traumatic brain injury and cervical spine injuries are the most common injuries causing serious morbidities and increased mortality, the facial injuries are especially important in view of the air-way compromise that fractures of the jaws can cause. Severe naso-orbito-ethmoidal complex fractures can cause bleeding which can further compromise the airway, serious involvement of the orbital contents which can lead to loss of vision and diplopia.

In view of the above, maxillo-facial surgeons form an integral part of the trauma team today. Plenty of literatures are available in the area of management guidelines (both acute and old) of these injuries. However, a few epidemiological

reports are available regarding the association of other injuries and patterns of maxilla-facial trauma, especially in the eastern part of India. The present study shows that maxillofacial trauma has a close association with injuries of head and neck. Even though young bike riders are more at risk, significant numbers of victims have been noticed among the three and four-wheeler riders. As is commonly believed, substance abuse is the most common cause of road traffic accidents as well as maxillofacial injuries. Later part of the evening and early morning hours goes hand in hand with substance abuse. This along with speed, rash driving behavior and lack of protective gears may be the reason for increasing number of poly-trauma and consequent morbidity and mortality. In September 2019 the amended motor vehicle act was effective in bringing down the number of road accidents soon after.

### Sex and Age Distribution

This study showed males (75.7%) were predominately affected than females (24.3 %); in which the male to female ratio was 3:1. Most of



the studies showed similar statistics as the present one. The sex ratio in various studies ranges from 2.3:1 to 11.8:1<sup>[1]</sup>. The predomination of male was because the males had more active role in outdoor work. Besides, rash driving, substance abuse, higher involvement in social work is other reason making them more prone to be affected by road traffic accidents, violent contact and sports. Age of the patients suffering from cranio-maxillofacial trauma ranged from 1 year to 90 years (mean age 45 years), the most common affected age group being 21-30 years (35.5%). Similar results were seen in various other studies<sup>[2,3]</sup>. The people in this age group were more active in high-speed motoring, sports, fights, violent activities, and industrial work. In the present study, the second and third commonly affected age groups were 31-40 (24.8%) and 41-50 (9.7) (Tables 1 and 2; Graphs 1 and 2).

#### **Time and month-wise distribution**

This study shows peak incidence of fractures occurring at late evening particularly 6 pm-12 am (42.3%). This is mainly because people rush back home from office, colleges and schools, and from various other works. It was followed by incidences at 12 pm to 6 pm (25.5%), 12 am to 6 am (20.6%), and 6 am-12 pm (11.6 %). Padmanaban *et al.*<sup>[2]</sup>, Kapoor and Kalra<sup>[4]</sup> reported that maximum number of trauma occurred in the late evening. In the present study conducted, the 2<sup>nd</sup> highest peak time of trauma was found to be between 12pm to 6 pm which was in consistent with the study conducted by Padmanaban, *et al.*<sup>[2]</sup> where it was found to be between 12pm to 6 am. The number of maxillofacial trauma cases was significantly high in the months of October (18.7%) and November (15.6%) in this study. This is because of the festive season which is generally associated with increased mobility and increased consumption of alcohol. In contrast, Ogundare *et al.* reported facial injuries were a peak in summer (31%) and winter (28%) months (Tables 3 and 4; Graphs 3 and 4).

#### **Etiology of trauma**

This study shows that the most common etiological factor of maxillofacial injuries was RTAs (58.2%). Similar results were published in various studies<sup>[2,3]</sup> where RTA was found to be the prime factor. However, this is in contrast with other studies carried out in developed countries, which reported assaults as the most common cause of maxillofacial injuries<sup>[3,16]</sup>. This large number of maxillofacial injuries consistent with RTA in the present study was due to recklessness and negligence of the driver, not using helmet while riding, non-use of seat belt, often driving under the influence of alcohol and complete disregard of traffic laws, over speeding, overloading, underage driving and poor conditions of roads and vehicles. Fall (22.9%) was the second most common cause of injury followed by Assault (10.6%), occupational injury (3.4 %), sport-related injury (3.2%) and injuries caused by animals (1.0%) in our study. In contrast, other studies carried out in developed countries, reported assaults as the most common cause of maxillofacial injuries<sup>[16]</sup>.

Regarding vehicles involved in RTA, two-wheelers (55.8%) were the predominant cause of injury followed by four-wheelers (26.7%), three-wheelers (12.1%), and bicycle (5.4%). Two-wheeler was the main causative factor as reported by Chandra Shekar and Reddy<sup>[14]</sup>, Calderoni *et al.*<sup>[15]</sup>. In contrast, four-wheeler remains to be the major cause for RTA in developed countries. Identification and verification of the etiological factors of maxillofacial fractures may help to assess the nature of proficiency of road safety measures such as speed limits, drunk driving, seat belt laws, and behavioral patterns (Tables 5 and 6; Graphs 5 and 6).

#### **Influence of Alcohol**

Excessive consumption of alcohol is strongly associated with road traffic accidents and domestic violence. Alcohol impairs judgment, cognitive ability and impaired ability to assess the risk and protect the person. This fact probably



brings out aggression, leads to interpersonal violence and is also a major factor in motor vehicle accident and assault. The prevalence of alcohol consumption among the middle-aged group was due to high income, peer pressure, lack of parental supervision, and unemployment. In this study, alcohol consumption before the injury was recorded in 60.1% of cases. In contrast some countries (Saudi Arabia, Iran, and Libya) where selling and consumption of liquor is illegal and forbidden as shown in study conducted by Al Ahmed *et al.*<sup>[13]</sup>. Their study reported that alcohol does not play a major role for facial fracture etiology in the Middle East. This discrepancy may be explained by differences between one country to another, in the strictness of laws governing the sale and consumption of alcohol which may be effective in preventing alcohol-related injuries (Table 7).

#### Site, nature and pattern of fractures

A zygomatic maxillary complex fracture was the most common site (25.2%) of all facial fractures followed by mandible. Various studies have supported this result,<sup>[1]</sup>. This preponderance could be because the Malar region of the face being the most prominent has a greater chance of receiving the impact of an injury. Mandible fractures are more common because of its movable nature and presence in prominent position than the well-articulated other mid-facial bones. Similar results were also reported by other studies<sup>[4, 5, 11, 12]</sup>. In the present study it was found that fractures of dento-alveolar area were 7.1%, orbit 6.9%, frontal 7.5%, nasal 7.9% and zygomatic arch alone in 2.9% cases. Fractures of Le Fort I pattern was noticed in 8.7%, II in 7.3% and III in 2.1% cases. A fracture of NOE was seen in 3.5% cases. Frontal bone fractures were more compared to other studies because of high percentage of patient's not using helmet so these patients. The higher incidences of Le Fort I and II fractures seen in our study in comparison to other studies conducted around the world is because of lesser use of protective helmets.

#### Associated Injuries

Head injury (74.6%) accounted for the greater majority of associated injuries followed by lower limb fracture (10.9%), upper limb fracture (7.7%), cervical spine injury (2%), chest and abdominal injury (4.8%) (Table 9).

#### Conclusion

The last 4 years saw an alarming 5000 deaths in Odisha per year. The fatality rate last year was 47% (deaths per 100 accidents) in Odisha against the national average of 32%. The present regional epidemiological analysis will definitely help the policy makers and the care givers to reduce the fatality rate as well as the accident rate in the State of Odisha and adjoining States where the socio-economic conditions are similar.

Since RTAs continue to be the leading cause for the maxillofacial injury with increased predominance in male population, certain criteria need to be followed. Most important, of course, is to create public awareness about RTAs and stricter implementation of road traffic legislation such as legal prohibition of drunk driving, usage of cell phone while driving, incorporation of safety devices such as seat belt, helmet etc. In brief, road traffic accidents in general and maxilla-facial trauma in particular, are avoidable. Every attempt should be made by the law-enforcing agencies in a continuous basis to protect the life of the citizen.

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**Conflict of interest:** Nil

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