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Incidence and Prevalence of Mid-facial Fractures in Mahatma Gandhi Memorial Hospital- Government Hospital Trichy-Five Years Retrospective Study (2015-2020)

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ABSTRACT

Introduction: The incidence of mid-facial fractures varies widely between different countries. The large variability in reported incidence and etiology is due to a variety of contributing factors, including environmental, cultural, and socioeconomic factors.

Aim: This study aimed to assess retrospectively the incidence and prevalence of maxillofacial fractures in patients reported in Mahatma Gandhi Memorial hospital- Trichy.

Materials and Methods: The data collected includes age, sex, place, date and month, time, etiology, the influence of alcohol, nature, and pattern of the facial bone fractures, associated injuries.

Results: As per records a total of 19148 patients were reported with maxillofacial injuries, of which 4400 patients had mid-facial fractures. Nearly 97% of the patients were men, and the most frequently affected age group was 21-30 years (33.5%) with males outnumbering females in all age groups. The highest number of trauma cases was reported between 6 pm-12 am (40.3%). Road traffic accidents (RTAs) (57.2%) were the primary etiological factor followed by assault (21.6%). Among the mid-facial fractures, the most frequent fracture is the zygomaticomaxillary complex region (34.2%), followed by dentoalveolar fractures (26.1%).

Conclusion:RTAs remain the major cause of mid-facial injuries. The driving skills of the public must be periodically reviewed and traffic rules must be strictly implemented to minimize maxillofacial trauma.

Keywords: Facial injury, Facial trauma, midfacial trauma, Retrospective study

I. INTRODUCTION

Nowadays, maxillofacial injuries are commonly encountered in day-to-day human life and are often associated with other injuries. A significant increase in maxillofacial traumas has been noted over the past few decades. Maxillofacial fractures result from blunt or penetrating trauma. The most common is that of blunt injuries including motor vehicle accidents, sports-related trauma, personal violence, occupational injuries, and falls. Gunshot wounds, stabbings, and explosions comprise the Penetrating injuries. The trauma of the midfacial region frequently involves the soft tissues and facial skeleton including maxilla, zygoma, orbit, nasal bone, etc. Any injury to the facial complex drives the patient to undergo severe consequences due to which injured patients are been affected both functionally which involves masticatory and their aesthetic appearance. The complication of mid-facial injuries such as ocular injuries, visual acuity, traumatic optic neuropathy, diplopia, paresthesia at the site of injury of the midface and also associated with neurological problems such as tinnitus and vertigo.

II. MATERIALS AND METHODS

This is a retrospective descriptive study conducted in the Mahatma Gandhi Memorial Hospital Trichy. Since it is the main referral center for all places in and around the area, it includes the patients from the districts of Trichy, Perambalur, Karur, Pudukotai, Ariyalur, Musiri, Dindigul, Salem, Cuddalore with faciomaxillary and other injuries. All these patients are recorded as medicolegal cases and hence a detailed description of the parameters included in the study is readily available in the Medical Records Department. All the patients who reported to the casualty department of Mahatma Gandhi Memorial Hospital, Trichyfrom January 2015 to January 2020 were included in the study sample. Pathology cases such as toothache, Dentoalveolar abscess, Space infection, Pathological fracture, Tempero-mandibular joint dislocation other than due to trauma were excluded from the study. Mandibular fractures have been excluded in this study as the study mainly focuses on mid-facial injuries.

III. STUDY VARIABLE

Collection of data including the various parameters of age, sex, place, date and month, time, etiology, the influence of alcohol, nature, and

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pattern of the fractures, associated injuries was done systematically. The etiological factors were classified as road traffic accidents (RTAs), falls, assault, occupational, and sports, injuries caused by animals and others (blasts, gunshot).The RTAs were further subdivided according to the type of vehicle (bicycle, two-wheelers, three- and four-wheelers, and others). The anatomic locations of the middle-third of the face were grouped as Frontal, Zygomaticomaxillary complex (ZMC), Zygomatic arch alone, Nasal, Naso-orbito-ethmoid (NOE), Le Fort I, Le Fort II, Le Fort III, Dentoalveolar and associated injuries were taken including Head injury, Chest, and Abdominal injury, Upper Limb Fracture, Lower limb fracture, Pelvic fracture, and Cervical spine injury. The month-wise distribution of injuries, Sex distribution, Age, Time of injury, and Aetiology of injuries whenever possible are recorded. The results were noted and tabulated as shown below. The percentage of individual factors evaluated is provided with a graphical representation for simpler interpretation.

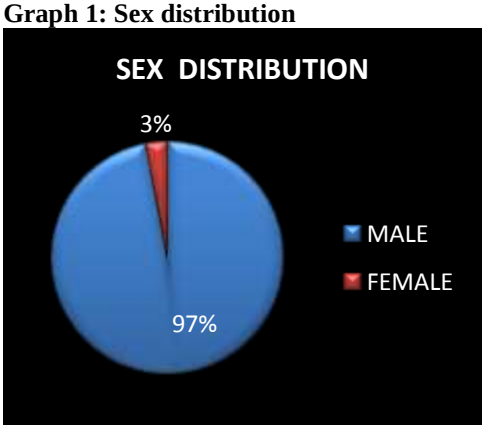
IV. RESULTS:

As per casualty records examined, a total of 19148 patients reported faciomaxillary injuriesand associated injuries. In which, 4400 patients had a mid-facial fracture.Among 4400, 4268(97%) patients were male and the rest were female (Table1, Graph 1). The male to female ratio is32.66:1

Table 1: Sex distribution

Sex	Frequency(%)
Male	4268(97)
Female	132(3)
Total	4400(100.0)

Graph 1: Sex distribution



Distribution ofAge Group (Table 2 and Graph 2)

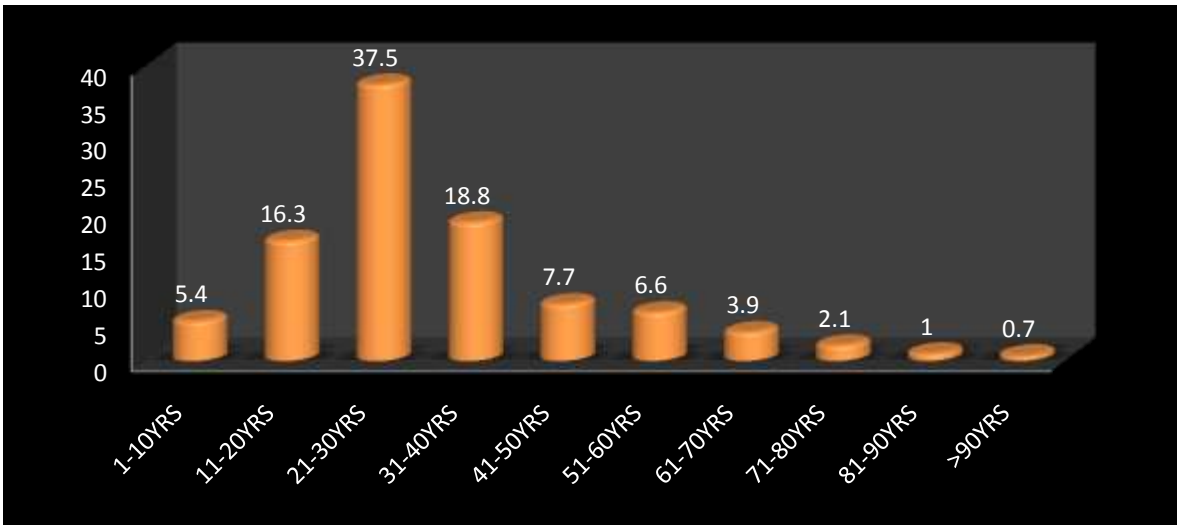
In all age groups, there was male gender preponderance in the RTA cases. The peak incidence wasin the 21-30 age group (37.5%), followed by the 31-40 age group (18.8%) and the 11-20 age group (16.3%). In the age group, 21-30 majority were male 34.2%

Table 2: Age group distribution

Age group (years)	Frequency (%)
1-10	238(5.4)
11-20	718(16.3)

21-30	1648(37.5)
31-40	828(18.8)
41-50	340(7.7)
51-60	290(6.6)
61-70	173(3.9)
71-80	90(2.1)
81-90	45(1.0)
>90	30(0.7)
TOTAL	4400(100)

Graph 2: Age GroupDistribution



Time of Injury (Table 3 and Graph 3)
The maximum number of cases were reported at 6 pm-12 am (40.3%) followed by 12 pm-6 pm (24.7%).

Table 3: Time of injury

Time	Frequency (%)
Midnight-6 am	590 (13.4)
6 am-12 pm	950(21.6)
Mid noon-6 pm	1087(24.7)
6 pm-12 am	1773(40.3)
Total	4400(100.0)

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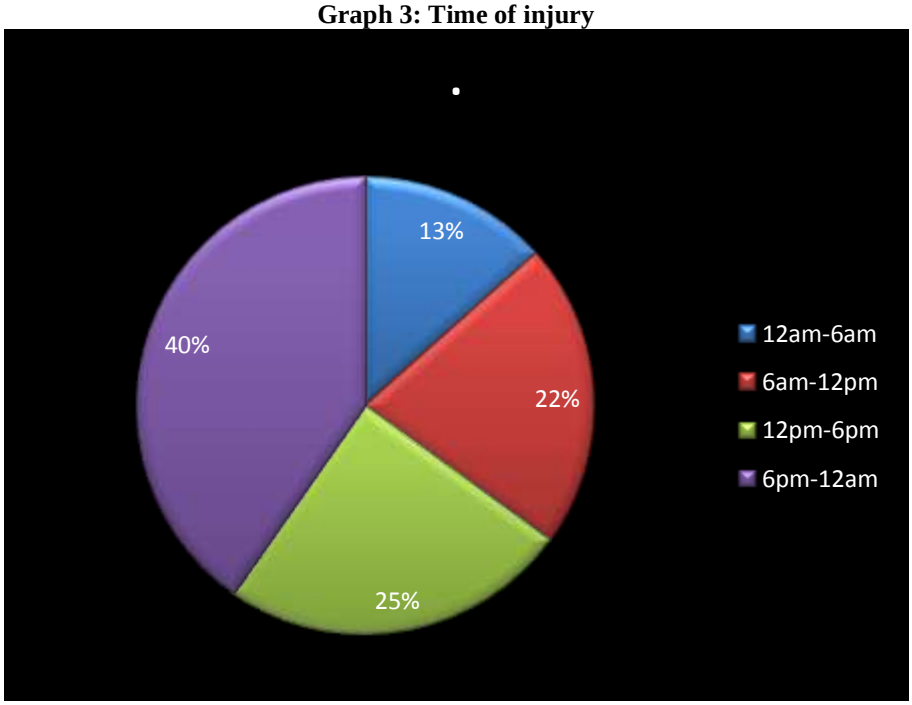
Graph 3: Time of injury



Month Wise Distribution of midface trauma (Table 4 and Graph 4)
Midface traumas were highest in September (20.8%) followed by October (14.6%), with the least incidence in April (3.3%).

Table 4: Month-wise distribution of midface trauma

Month	Frequency (%)
January	320(7.3)
February	220(5.0)
March	190 (4.3)
April	145 (3.3)
May	335 (7.6)
June	285(6.5)
July	220(5.0)
August	175 (4.0)
September	915(20.8)
October	643(14.6)
November	347 (7.9)
December	605(13.70)
Total	4400 (100.0)

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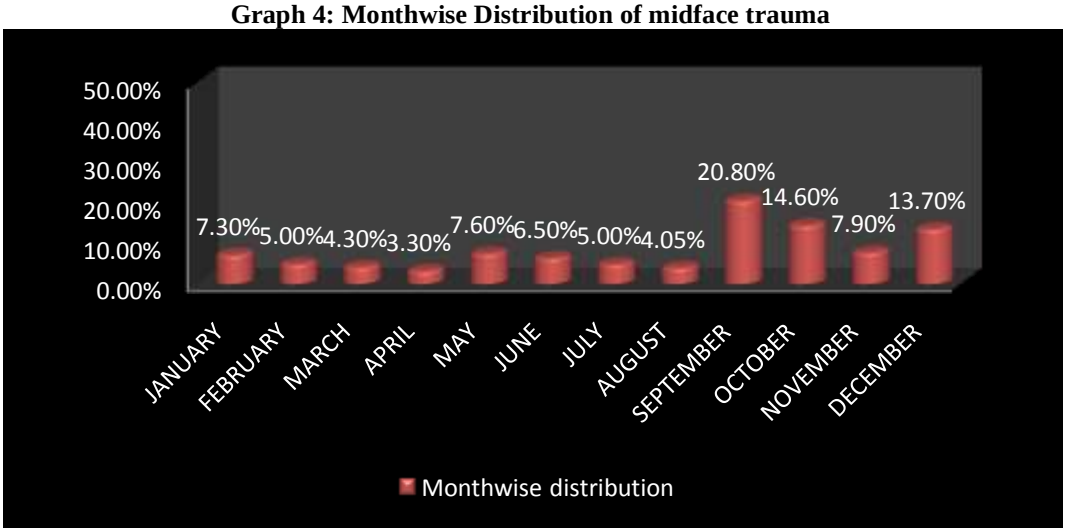
Graph 4: Monthwise Distribution of midface trauma



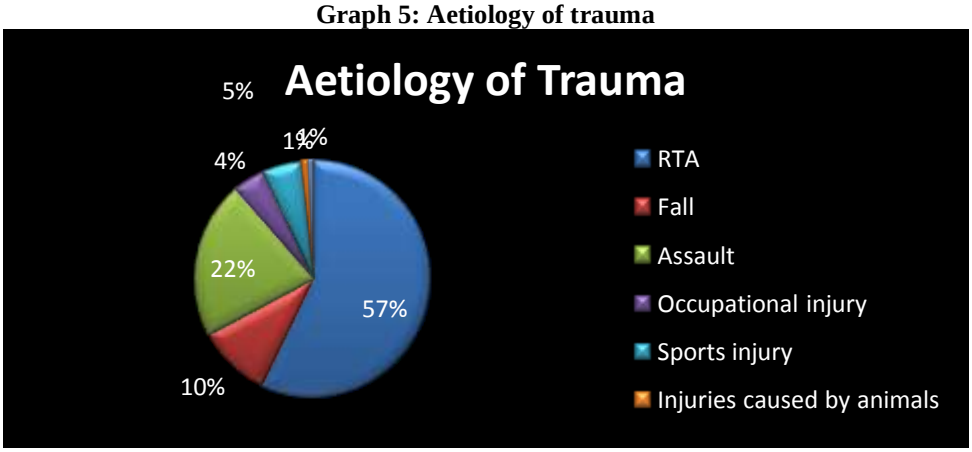
Etiology of Trauma (Table 5 and Graph 5)

The most common cause of maxillofacial injuries was RTA with an incidence of 57.2%. the second frequent cause was assault (21.6%) followed by falls (10.9%). Only the least number of cases were reported due to injuries caused by animals (1.0%) and others (blasts, gunshot) (0.6%).

Table 5: Aetiology of trauma

Etiology	Frequency (%)
RTA	2518(57.2)
Fall	440 (10)
Assault	950 (21.6)
Occupational injury	192 (4.4)
Sports injury	230 (5.2)
Injuries caused by animals	45 (1.0)
Others (blasts, gunshot)	25 (0.6)
Total	4400 (100.0)

Graph 5: Aetiology of trauma



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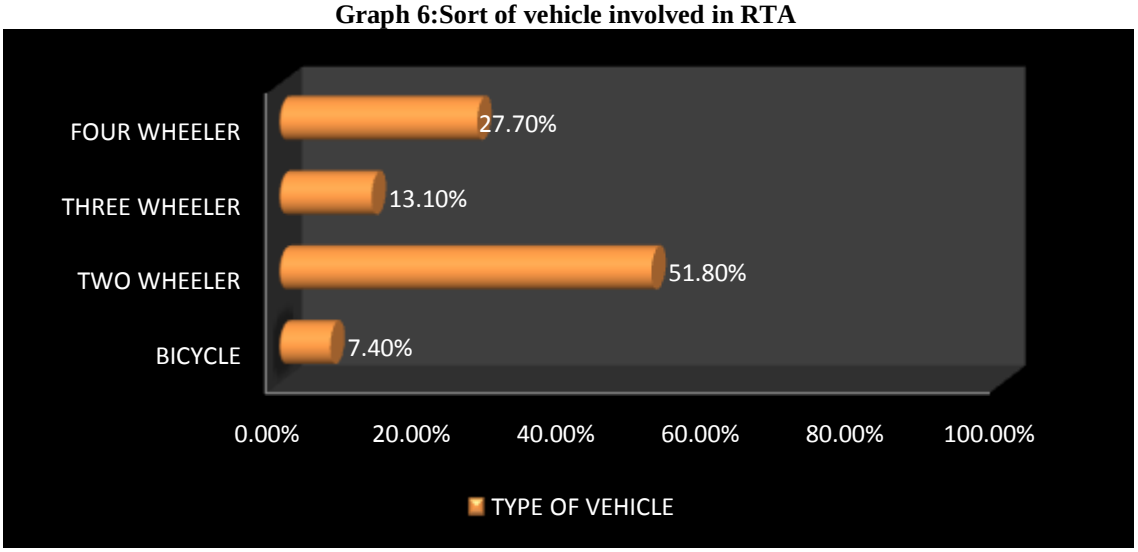
Sort of Vehicle involved in RTA (Table 6 and Graph 6)
Two-wheeler was the most commonleading cause with the incidence of 51.8% followed by four-wheeler 27.7%, three-wheeler 13.1%, and least percentage of cases were reported due to bicycle-related accident 7.4%, respectively.

Table 6: Sort of vehicle involved in RTA

Type of vehicle	Frequency (%)
Bicycle	186(7.4)
Two-wheeler	1304(51.8)
Three-wheeler	330(13.1)
Four-wheeler	698(27.7)
Total	2518(100.0)

Graph 6:Sort of vehicle involved in RTA



Distribution of Alcohol Influence (Table 7)
The majority of cases were affected under the influence of alcohol with the occurrence of 66.1% (n = 2908)

Table 7: Distribution of alcohol influence

Alcohol influence	Frequency (%)
Yes	2908 (66.1)
No	1492 (33.9)
Total	4400 (100.0)

Distribution of Pattern of Midfacial Fractures (Table 8 and Graph 7)
The highest number of cases were affected with fracture ofZMC (34.2%), and the next common type is the dentoalveolar fracture (16.1%). NOE complex fracture showed 0.7% which was found to be the least among them all.

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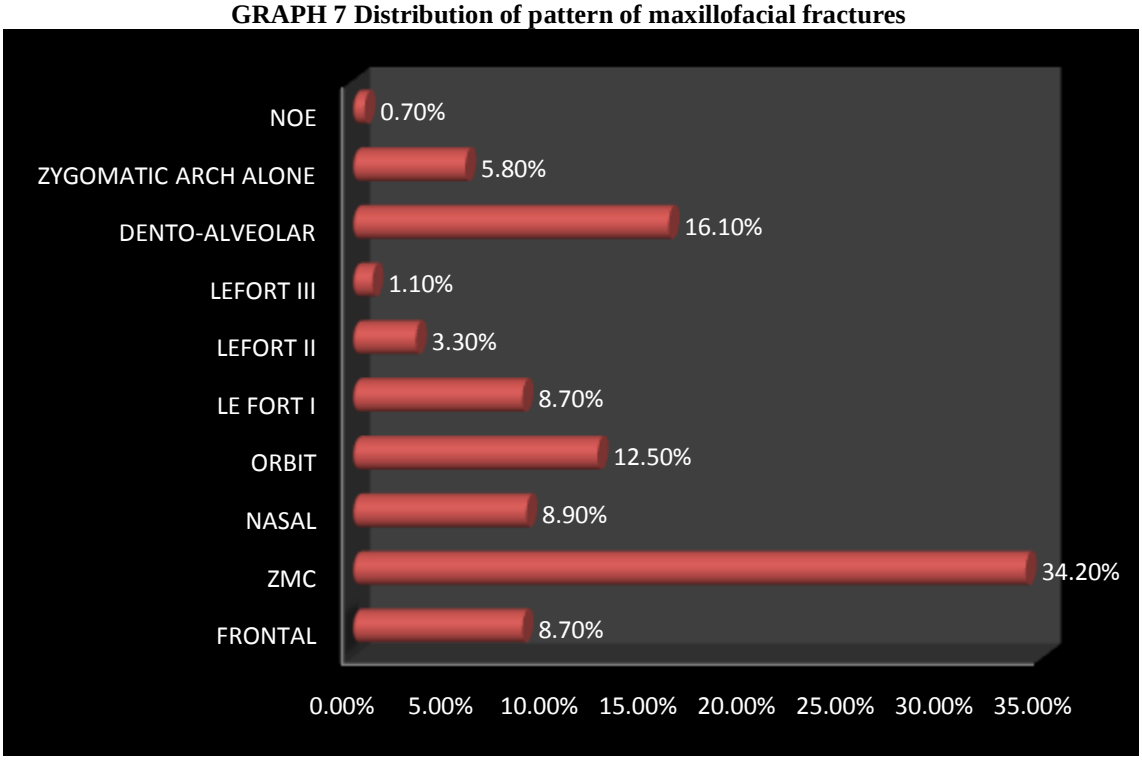
Table 8: Distribution of pattern of midfacial fractures

Pattern of fracture	Frequency (%)
Frontal	383 (8.7)
ZMC	1505 (34.2)
Nasal	392 (8.9)
Orbit	550 (12.5)
Le Fort I	384(8.7)
Le Fort II	145(3.3)
Le Fort III	48(1.1)
Dentoalveolar***	708 (16.1)
Zygomatic arch alone	255(5.8)
NOE	30 (0.7)
Total	4400(100.0)

GRAPH 7 Distribution of pattern of maxillofacial fractures



Distribution of Associated Injuries (Table 9)
Of the total 4400 patients with mid-facial injuries, 1268 patients had associated injuries. Head injury (77.9%) accounted for the greater majority of associated injuries followed by lower limb fracture (10.2%).

Table 9: Distribution of Associated Injuries

Associated injuries	Frequency (%)
Head injury	988(77.9)
Lower Limb fracture	129(10.2)
Chest and abdominal injury	54(4.2)
Upper limb fracture	72 (5.7)
Pelvic fracture	25(2.0%)
Total	1268(100.0)

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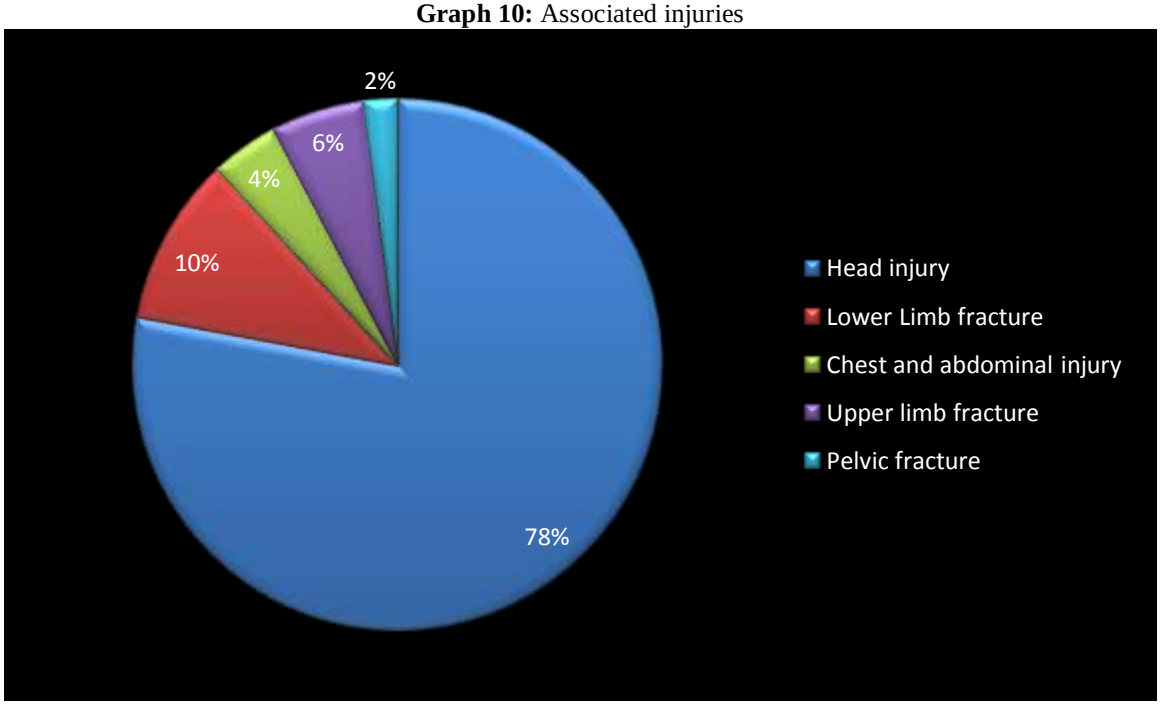
Graph 10: Associated injuries



V. DISCUSSION

The etiological factors and pattern of maxillofacial injuries have been reported to vary from one country to another depending on socioeconomic status, geographic condition, and cultural characteristics.

Sex and Age Distribution

In this study, males (97%) were predominately affected than females (3 %) the male to female ratio was 32.66:1. Most of the studies showed similar to as the present one. The sex ratio in various studies ranges from 2.3:1to 11.8:1.In most of the studies, it had been around 3:1. The preponderance of male because that males are more likely the earners of the family and also plays an active role in social work; therefore, they are more prone to be affected by accidents, violent contact, and sports. The age of the patients suffering from maxillofacial trauma ranged from 1 year to 95 years (mean age 47.5 years) the most commonly affected people in the age group were 21-30 years (33.5%), similar results showed in various studies.[5,6,9,10,15-17]The people in this age group are more active regarding sports, fights, violent activities, industrial work, and high-speed transportation. In the study, the second commonly affected age groups were 31-40 (21.3%) and 41-50 (18.7) (Tables 1 and 2; Graphs 1 and 2).

Time and Monthly Distribution

Based on the study results, it is clearly stated that the incidence of fractures is extremely high in the late evening particularly 6 pm-12 am (40.3%). This is mainly due to people rushing back home from the office, colleges, and schools, and various other works. It was followed by incidences at 12 pm-6 am (24.7%), 6 am-12 pm (21.6%), and 12 am-6 am (13.4 %). Chandra Shekar and Reddy 1, Kapoor and Kalra10 reported a maximum number of trauma has occurred in the late evening.

A significantly high incidence of maxillofacial trauma cases was found to be in the month of September (20.8%) and October (14.6%). 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 (57.2%). Similar to ours, RTA was the major cause in various studies.3,6,7,9 However, in contrast to other studies carried out in developed countries, which reported assaults as the most common cause of maxillofacial injuries.1,3,10.The recklessness and negligence of the driver, often driving under the influence of alcohol and complete disregard of traffic laws, overspeeding, overloading, underage driving, and poor conditions of roads and vehicles can be clearly stated as the

reason for the high incidence of maxillofacial trauma. Assault (31.0%) was the second most common cause of injury followed by fall (10.9%), sport-related injury (5.2%), and occupational injury (4.4 %), injuries caused by animals (1.0%). In contrast to other studies carried out in developed countries, reported assaults as the most common cause of maxillofacial injuries interpersonal violence and is also a major factor in a 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 66.1% of cases. In contrast, Al Ahmed et al.11 reported alcohol does not play a major role in facial fracture etiology in the Middle East where it is forbidden in some countries (Saudi Arabia, Iran, and Libya) and consumed minimally within the other countries- the reason could be the religious and cultural beliefs. 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

Mandible was the most common site of fracture followed by mid-face. Various studies have supported this result.1,7. This preponderance could be because the mandible is the most prominent and only moveable facial bone, and hence has a greater chance of being fractured than the well-articulated mid-facial bones.

Among fractures of the mid-facial region, ZMC fracture (24.2%) was the most common site of the fracture, similar results were also reported by other studies.4,5,11,12,15 Followed by dentoalveolar (16.1%), orbit (8.7%), frontal (5.5%), nasal (4.9%), zygomatic arch alone (4.9%), Le Fort I (3.7%), II (2.3%), III (1.1%), and NOE (0.7%). The orbital fracture was the third most common site of fracture in the present study, similar reports were obtained in other studies.3

Associated Injuries

Head injury (77.8%) accounted for the greater majority of associated injuries followed by lower limb fracture (5.6%), upper limb fracture (5.7%) cervical spine injury (4.7%) chest and abdominal injury (4.2%), and pelvic fracture (2.0%) (Table 10)

VI. CONCLUSION

Since Road traffic accidents continue to be the leading cause for maxillofacial injury with increased predominance in the male population, certain criteria are needed to be followed such as public awareness about road traffic accidents and importance of road traffic legislation, legal prohibition of drunk and driving, usage of cell phone while driving, reduce the distractions of changing the radio stations or CDs, keeping at least one hand on the steering wheel and incorporation of safety factors such as seat belt, the helmet should be recommended compulsorily to reduce the incidence of maxillofacial injuries.

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