

Original Research

Pattern of Maxillofacial Injuries in University Hospital of Bhubaneswar: A Retrospective Study

Authors

**Dr Kiran Kumar. M¹, Dr Arka.Kanti.Dey², Dr K.N.V Sudhakar³,
Dr Rajat Mohanty⁴, Dr Mohan Raju. P⁵, Dr Arnab Mandal⁶**

Corresponding Author

Dr Arka.Kanti.Dey

Department of Oral and Maxillofacial Surgery, Kalinga Institute of Dental Sciences (KIDS), Campus-5,
KIIT University, Patia, Bhubaneswar-751024, Odisha

Email: arka.dey1989@gmail.com. Contact number- +919438220110

Abstract

Background: Trauma can be designated as the most common cause for injuries to maxillofacial region and it may lead to fracture of bone, soft tissues injuries and even both in some instances. Identification of the cause of trauma provides the insights on the behavioural pattern of the individuals which differ from country to country. It also assist us preventive approach to reduce the incidence of maxillofacial injuries.

Aim: To evaluate the demographic data of the patients with maxillofacial trauma and to assess the major risk factors and prevention strategies to reduce maxillofacial fractures.

Material and Methods: A 5 years cross-sectional retrospective study was conducted by the case records of the patients reported at Kalinga Institute of Medical & Dental College & hospital in Bhubaneswar. A total 494 patient records were evaluated for various demographic, etiological factors, type and location of injury, alcohol involvement, treatment done, daily and monthly variation of injury.

Results: Majority of the maxillofacial injuries occurred in male than in female. Third decade being the most common age group for occurrence of maxillofacial fractures. 78.9% of cases occurred due to RTA. 40% of cases were reported in rainy season and the least in the winter season. Influence of alcohol is very high (74.89%) in occurrence of maxillofacial fractures.

Conclusion: Maxillofacial fractures are one of the common injuries during trauma by any cause. Identification of the risk factors for the cause of trauma may give us a clue to prevent maxillofacial injuries.

Keywords: Maxillofacial, Mandibular, Trauma, Road Traffic accidents.

Introduction

Maxillofacial injuries depict the injuries that occur to the face, skull and mandible. Maxillofacial injuries are one of the common cases that an oral and maxillofacial surgeon encounter in his day to day practice. Trauma can be designated as the most common cause for injuries to maxillofacial

region and it may lead to fracture of bone, soft tissues injuries and even both in some instances. Identification of the cause of trauma provides the insights on the behavioural pattern of the individuals which differ from country to country. It also assist us preventive approach to reduce the incidence of Maxillofacial injuries.^{1,2}

A major factor for trauma are Road traffic Accidents (RTA), Interpersonal Violence, Sports Injuries, Industrial Mishaps, attack by animals etc^{3,4,5} These etiological factors are influenced by a wide range of predisposing factors like geographical location, social trends, road traffic legislations, alcohol and drug abuse and climatic variations. All of these may contribute to trauma either directly or indirectly.⁶

Bhubaneswar, one of the most populated city and capital of the state Orissa. Recently Bhubaneswar has been selected for the list of World smart cities. According to the reports of Census India, population of Bhubaneswar in 2011 is 843,402; of which male and female are 446,204 and 397,198 respectively.⁷ A report by Government of India in 2015 stated that Orissa stood at 12th position among 29 states in India with an annual fatalities by RTA being 11,825/year.⁸ Apart From RTA other causes also cause maxillofacial injuries.

Other causes for maxillofacial injuries constitute a very less percentage of the overall percentage of maxillofacial injuries occurring in the present scenario. Though they constitute to a low prevalence they may cause severe disability or disfigurement causing considerable mortality/morbidity to an individual. So measures should be taken to prevent these domestic violence, industrial accidents and sports injuries etc.

Based on the above literature a study was designed to assess the maxillofacial injury pattern in the Bhubaneswar city to know the behavioural and treatment status of the injured patients.

Material and Methods

A 5 year institutional retrospective study was conducted based on the medical reports of the patients who were treated by the Emergency Service Department and the Dept of Oral & Maxillofacial Surgery, Kalinga Institute of Medical & Dental Sciences, Bhubaneswar between January 2012 to 2017 January were analysed.

Demographic data such as Date, age, gender, occupation, etiology, site of injury, type of injury, date of injury, date of surgery, addictions, date of hospital discharge, monthly and daily variation and treatment were gathered from hospital inpatient and outpatient records. Anatomical location of the fracture site in the maxillofacial region and associated injuries was also recorded.

All the available medical records pertaining to the maxillofacial injuries & associated injuries were assessed and included for the study, Records with insufficient data (Clinical, Radiological or follow up) were excluded from the study.

The Collected data was entered into specific proforma designated for the study.

Ethical clearance was obtained from the institutional ethical committee.

The data was entered into excel spreadsheet and subjected to statistical analysis using SPSS (Statistical Package for Social Sciences, IBM Inc) ver. 22

Results

During the 5 year period (2012-2017), 570 patients were reported to the hospital out of which 76 were excluded from the study due to lack of data. So a total of 494 cases were reviewed for the patterns of maxillofacial injuries.

A total of 494 individual, in which 385 (77.93%) were male and 109 (22.07%) were female. (Table 1). Age wise distribution of the maxillofacial injury patients showed maximum maxillofacial injuries occur in the age group of 21-30 years (33.19%) followed by 31-40 years age group (25.10%). With a least (3.03%) at the age group of 0-10 years. (Graph 1)

Monthly distribution of cases reported showed variation as follows with highest in the months of June (52, 10%), July (93, 18%) and August (86, 19%) and the least were in the months of October (14, 3%), November (14. 3 %) and December (25, 5%). (Table 2)

Road traffic accidents were the major cause of injury which accounts for 78.9% (390 out of 494) cases while the least are industry related injuries

accounts for 1.82% (9 out of 494) cases. There is statistically significant difference between the genders in the type of cause of injury with male being more often affected than female. ($p < 0.001$) (Graph 2)

Occupation of the individual is evaluated in the study population showed that 21.86% of cases in which maxillofacial fractures occurred were labourers (Class IV) employees, followed by the unemployed people (18%) and the least was the government employees (7.08%) (Graph 3)

Influence of alcohol in road traffic accidents is evaluated and the results showed that 74.89% (370 of 494) cases had alcohol involvement at the time of injury, only 18.21% (93 of 494) of cases were reported without alcohol involvement. (Graph 4)

Distribution of type of maxillofacial injuries showed that mandibular fractures were the most common fractures (42.30%, 209 of 494 cases) followed by middle third injuries (20.85%, 103 of 494 cases), soft tissue injuries (18.01%, 89 of 494 cases) and the least were cranial bone involvement (3.03%, 15 of 494 cases). There is statistically significant differences present between the genders in occurrence of various fractures ($P = 0.02$) (Graph 5)

Isolated maxillofacial injuries were uncommon they may be associated any other injuries at various locations. Further evaluation of associated injuries along with maxillofacial injuries were done which revealed, isolated maxillofacial injuries account for 33% (163 of 494 cases), the highest were maxillofacial injuries associated with orthopaedic injuries (40.08%, 198 of 494 cases) and the least were maxillofacial injuries along with abdomen/thoracic injuries (3.03%, 15 of 494 cases). (Graph 6)

Mandibular fractures includes various fractures like condylar, body, symphysis etc. detailed evaluation of the type of mandibular fractures in the study population showed parasymphysis fractures were highest (27.27%, 57 of 209 cases), followed by condylar fractures (14.83%, 31 of 209 cases), symphysis fractures (12.44%, 26 of 209

cases), dentoalveolar (9.09%, 19 of 209 cases) and the least were coronoid fractures (3.34%, 7 of 209 cases). (Graph 7)

Response of the patients towards the treatment were evaluated, it revealed that 92% (457 of 494 cases) underwent treatment and only 8% (37 of 494 cases) were not treated due to any unavoidable reasons. (Table 3)

Table 1: Gender wise distribution of study population.

Gender	N	%
Male	385	77.93
Female	109	22.07
Total	494	100

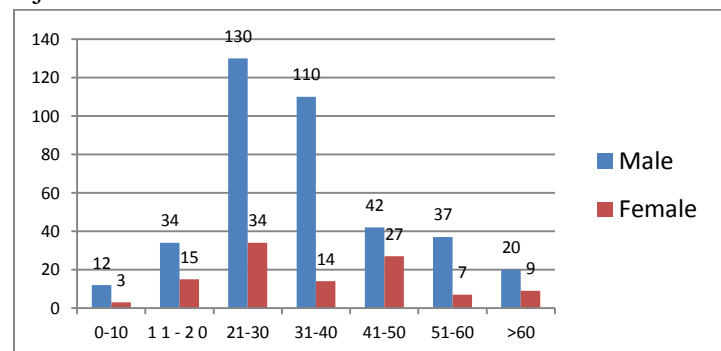
Table 2: Monthly distribution of study population:

Month	No of patients (%)
January	25 (5%)
February	34 (6%)
March	37 (7%)
April	42 (8%)
May	47 (9%)
June	52 (10%)
July	93 (19%)
August	86 (18%)
September	25 (5%)
October	14 (3%)
November	14 (3%)
December	25 (5%)
Total	494 (100%)

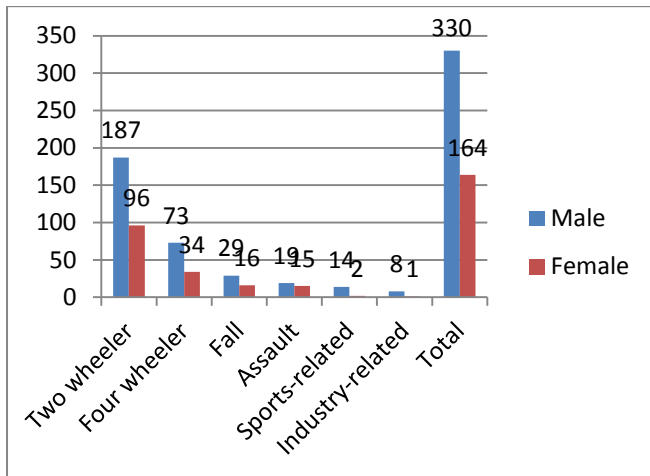
Table 3: distribution of study population according to treatment.

Treatment	Number (%)
Treatment taken	457 (92%)
Treatment not taken	37 (8%)

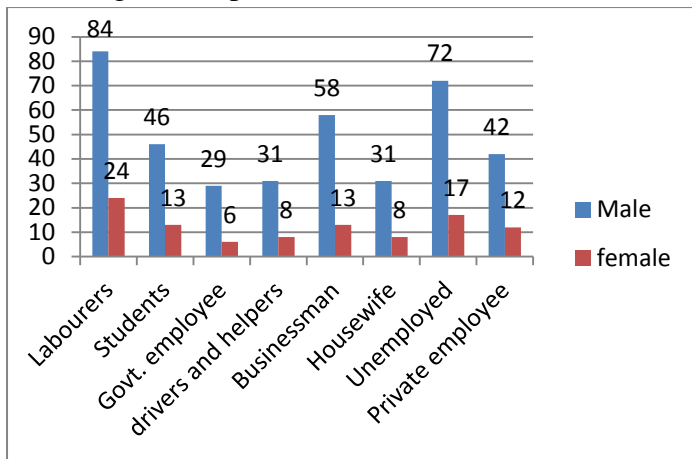
Graph 1 : Age group distribution of maxillofacial injuries.



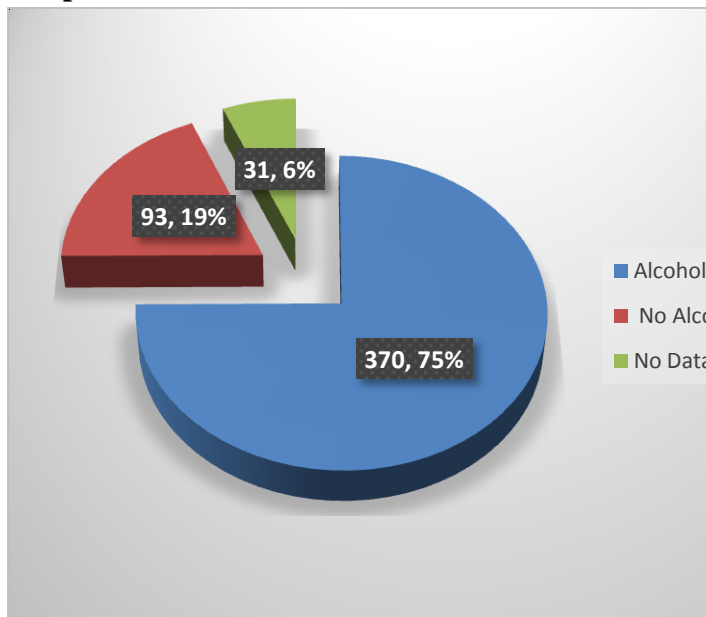
Graph 2: Cause of injury



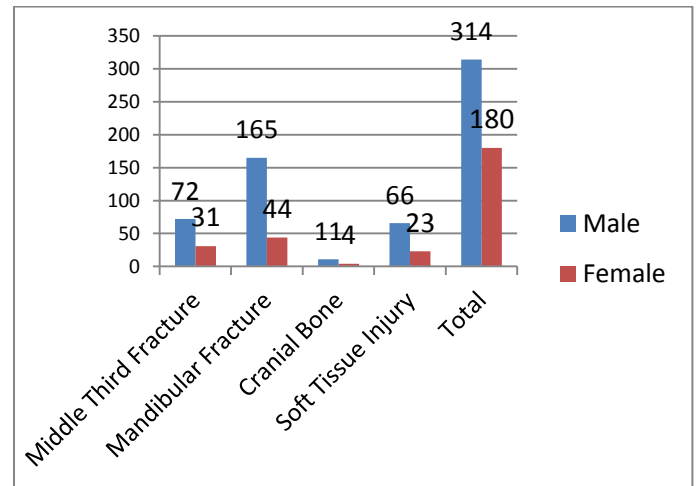
Graph 3: Distribution of study population according to occupation



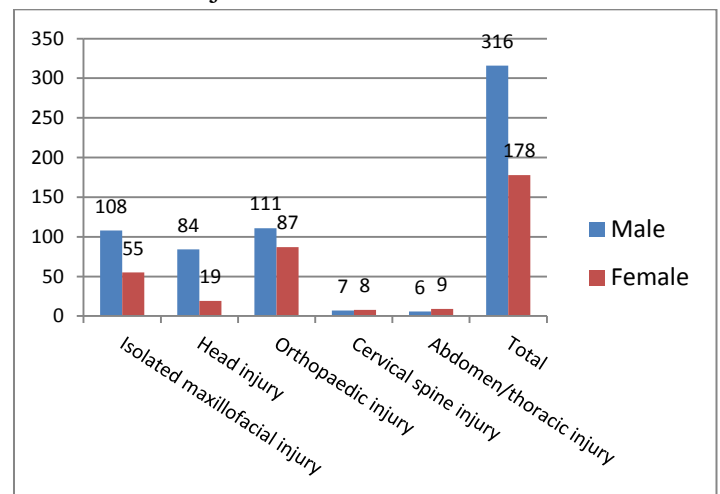
Graph 4: Alcohol involvement



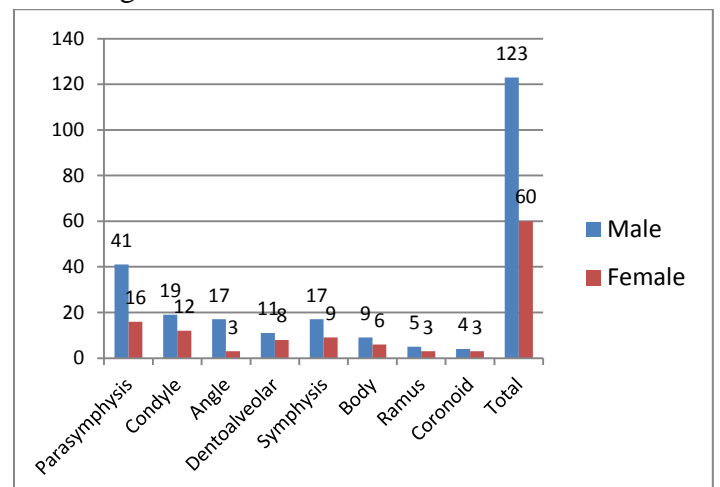
Graph 5: Distribution of study population by type of maxillofacial injuries



Graph 6: associated injures in patients with maxillofacial injuries



Graph 7: Distribution of study population according to mandibular fractures



Discussion

Trauma is typically considered as a main cause affecting primarily young adult male. Road traffic accidents remain the most common aetiology for maxillofacial trauma in the present scenario. Other factors such as sports injuries, fall, industrial accidents contribute to some extent. The number of cases of maxillofacial trauma are increasing day to day. The main reason for this hike in maxillofacial trauma are modifications in life style, food and drinking habits, industrialization/urbanization.^{9,10}

The most common age group of maxillofacial fractures are the younger adults (21-30 years) which is in consistent with previous studies like Vasiu Larne et al (2005),¹¹ Al-khateeb T et al (2007),¹⁰ Rajinikanth K et al (2014)¹² and several other studies in various parts of the world.¹³⁻¹⁸ The high incidence in 3rd decade of life might be due to the facts that people belonging to this decade are more active and tries to take risky stunts in life. The low incidence in 3-10 (2.87%) years has been explained by the high elasticity of paediatrics bones size and less common to expose to major trauma.

The male: female ratio in maxillofacial fractures in the present study was 3.5:1 there are various other studies which showed higher incidence of maxillofacial fractures in male like Ellis E et al, Fridirch KL et al, Hussain K et al, Batianeh et al.¹⁹⁻²²

In our study we have evaluated the occupation of the injured in which the major accidents or the maxillofacial fractures occurred in the Class IV employees and the unemployed persons and even the business persons also had these type of injuries which showed that there is no correlation between the type of occupation and maxillofacial trauma.

The reasons for higher frequency of RTA in developing countries are unsuitable road conditions without expansion of the motorway network, violation of speed limit, inadequate road safety awareness, old vehicles without safety features, violation of highway code, not wearing

seat belts or helmets and use of alcohol or other intoxicating agents. This finding is consistent with reports by Obuekwe ON et al²³, Odunsany SA et al²⁴, Odai ED et al²⁵, Abiodun A et al²⁶.

Studies published by Lee KH et al²⁷, Snape L et al²⁸ and O Meara C et al²⁹ have also found the interpersonal violence to be a major cause of maxillofacial trauma when alcohol is involved.

However, in our study RTA was the major cause of maxillofacial trauma. In our study we found that the majority of cases with alcoholic influence were due to RTA, which is in contrast to numerous studies conducted elsewhere.

In our study, we found that mandible was more commonly fractured than midface and parasymphysis (31 %) was the most common site of fracture followed by condyle (17%). The mobile nature of the bone, angulation and presence of tooth sockets has been implicated to make it prone to fractures. This is similar to findings of the many indigenous studies by Schaftenaar E et al³⁰, Kubilius R et al³¹, Banks P et al³², and Pradip KG et al³³.

Patterns of fracture also vary in study. Studies by Rashid A et al³⁴, and ZixJA et al³⁵ have found the body of the mandible, angle of the mandible or condyle and subcondyle to be the most common sites of fracture.

In our study, in middle third fractures, ZMC (38.2 %) was most commonly involved. This is because of the prominent positions; zygomatic bone and nasal bone are more vulnerable to trauma followed by lefort fractures.

Variations in the incidence of maxillofacial trauma on various days in a week have also been reported in many studies, Fasola AO et al¹⁴, Kontio R et al³⁸, Chrcanovic BR et al³⁹ and they have found it to be most common on the weekends.

In our study, we found Friday & Saturday to be the most common day of occurrence of maxillofacial trauma. Saturday is the last working day of the week, and people tries to relax and enjoy by doing party and most of the road traffic accident occurred at the night time.

During the 6-year period, the highest incidence of maxillofacial fractures was during August, September and October, the monsoon season. Insufficient visibility, bad maintenance of vehicles, poor road condition, and rash driving all contributed to the increased number of injuries.

Other studies, RajibKhadka et al³⁷ stated that winter season is the most common time for maxillofacial injuries as there will be high amount of fog and snow fall in some countries. So climatic variations also play an critical role in the occurrence of trauma which is unavoidable. Apart from climate, Natural calamities like Tsunami, Earthquakes may also be a part of these incidents which are prevalent in many geographical locations like northeast India.

It's a moral duty that every citizen should be educated about the safety legislations of the government and the personal safety measures to control the RTA, strict rules and ordinances by the government regarding alcohol consumption and diving under the influence of alcohol as it can be treated as the main reason for most of the maxillofacial trauma.³⁶

Conclusion

Risk indicators for maxillofacial fracture included male gender, alcohol consumption, and RTA.

Therefore, there is a need to ensure strict traffic rules and regulations, improvement in automotive safety devices, organize prevention programs to minimize assaults, implement school education in alcohol abuse, improve protection during sporting activities, and legislate wearing of protective headgear in workers.

These should include the mandatory use of seatbelts and crash helmets. Also, community education to the urban population on proper road use and safety measures would complement the other measures in the further reduction of maxillofacial injuries.

Preventive strategies remain the cheapest way to reduce direct and indirect costs of the squeal of trauma. Attitudes of the society towards road safety and behaviours must be modified before a

significant reduction in the incidence of maxillofacial fractures will be seen.

References

1. Telfer MR, Jones GM, Shepherd JP: Trends in the aetiology of maxillofacial fractures in the United Kingdom (1977-1987). *Br J Oral Maxillofac Surg* 29:250, 1991
2. Olosoji HO, Tahir A, Arotiba GT: Changing picture of facial fractures in northern Nigeria. *Br J Oral Maxillofac Surg* 40:140, 2002
3. Gassner R, Tuli T, Hachl O, et al: Craniomaxillofacial trauma: A 10-year review of 9543 cases with 21,067 injuries. *J Craniomaxillofac Surg* 31:51, 2003
4. Ugboko VI, Olosoji HO, Ajike SO, et al: Facial injuries caused by animals in northern Nigeria. *Br J Oral Maxillofac Surg* 40:433, 2002
5. Tu AH, Giroto JA, Singh N, et al: Facial fractures from dog bite injuries. *Plast Reconstr Surg* 109:1259, 2002
6. Khan AA: A retrospective study of injuries to the maxillofacial skeleton in Harare, Zimbabwe. *Br J Oral Maxillofac Surg* 26: 435, 1988
7. Bhubaneswar (Bhubaneswar Town) City Census 2011 data <http://www.census2011-co.in/census/city/270-bhubaneswar.html>
8. Road Accidents in India Report by GOI, MINISTRY OF ROAD TRANSPORT & HIGHWAY TRANSPORT RESEARCH WING 2015 (www.morth.nic.in).
9. Wade CV, Hoffman GR, Brennan PA: Falls in elderly people that result in facial injuries. *Br J Oral Maxillofac Surg* 42:138, 2004
10. Al-Khateeb T, Abdullah FM. Craniomaxillofacial injuries in the United Arab Emirates: a retrospective study. *Journal of oral and maxillofacial surgery*. 2007 Jun 30;65(6):1094-101.

11. Adeyemo WL, Ladeinde AL, Ogunlewe MO, James O. Trends and characteristics of oral and maxillofacial injuries in Nigeria: a review of the literature. *Head & Face Medicine*. 2005 Oct 4;1(1):7.
12. Rajanikanth K. The pattern of maxillofacial fractures in central India AUnicentric retrospective study. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*.;1(13):28-31.
13. Maraoka M, Nakai Y: Twenty years of statistics and observation of facial bone fracture. *ActaOtolaryngolSuppl* 538:261, 1988
14. Fasola AO, Nyako EA, Obiechina AE, et al: Trends in the characteristics of maxillofacial fractures in Nigeria. *J Oral MaxillofacSurg* 61:1140, 2003
15. Jha N, Srinivasa DK, Roy G, et al: Injury pattern among road traffic accident cases: A study from south India. *Indian J CommunMed XXVIII*:2, 2003
16. Bataineh AB: Etiology and incidence of maxillofacial fractures in the north of Jordan. *OralSurg Oral Med Oral Pathol Oral RadiolEndod* 86:31, 1998
17. Bamjee Y, Lownie JF, Cleaton-Jones PE, et al: Maxillofacial injuries in a group of South Africans under 18 years of age. *Br J Oral MaxillofacSurg* 34:298, 1996
18. Davison SP, Clifton MS, Davison NM, et al: Pediatric mandibular fractures. *Arch Facial PlastSurg* 3:185, 2001
19. Ellis III E, Moos KF, el-Attar A. Ten years of mandibular fractures: an analysis of 2137 cases. *Oral Surg Oral Med Oral Pathol* 1985;59:120–9
20. Fridrich KL, Pena-Velasco G, Oslon RA. Changing trends with mandibular fractures: a review of 1067 cases. *J Oral MaxillofacSurg* 1992;50:586–9
21. Hussain K, Wijetunge DB, Grubnic S, Jackson IT. A comprehensive of analysis of craniofacial trauma. *J Trauma* 1994;36:34–47.
22. Olasoji HO, Tahir A, Arotiba GT. Changing pictures of facial fractures in northern Nigeria. *Br J Oral Maxillofac Surg*. 2002 Apr;40(2):140–3.
23. Obuekwe ON, Ojo MA, Akpata O, Etetafia M. Maxillofacial trauma due to road traffic accidents in Benin City, Nigeria: a prospective study. *Ann Afri Med* 2003;2:58– 63
24. Ugboko VI, OdunsanySA,Ogunbodede EO. Maxillofacial fractures in children and analysis of 52 Nigerian cases. *Paediatr Dent J* 1998;8:31-35.
25. Odai ED, Obuekwe ON. Is there any difference in the treatment outcome of maxillofacial fractures following use of rigid or semi-rigid osteosynthesis? *J of Med Biomed Res* 2013;12:120-128.
26. Abiodun A, Atinuke A, Osuagwu Y. Computerised tomography assessment of cranial and mid-facial fractures in patients following road traffic accident in South-west Nigeria. *Ann Afr Med* 2013;11:131-138.
27. Lee KH, Snape L, Steenberg LJ, Worthington J. Comparison between interpersonal violence and motor vehicle accidents in the aetiology of maxillofacial fractures. *ANZ J Surg* 2007;77:695-8
28. Lee KH, Snape L. Role of alcohol in maxillofacial fractures. *N Z Med J* 2008;121:15-23.
29. O'Meara C, Witherspoon R, Hapangama N, Hyam DM. Mandible fracture severity may be increased by alcohol and interpersonal violence. *Aust Dent J* 2011;56:166-70.
30. Schaftenaar E, Bastiaens GJ, Simon EN, Merx MA. Presentation and management of maxillofacial trauma in Dar es Salaam, Tanzania. *East Afr Med J* 2009;86:254-258.
31. Kubilius R, Keizeris T. Epidemiology of mandibular fractures treated at Kaunas

- University of Medicine Hospital, Lithuania. *Stomatolo* 2009;11:73-76.
32. Banks P, Brown A. Fractures of the facial skeleton. 1st ed. Oxford: Wright. 2001; 1-155.
33. Pradip KG. Synopsis of Oral and Maxillofacial Surgery,(An Update Overview). Jaypee Brothers Medical Publishers. 2006 ed., 164-181.
34. Rashid A, Eyeson J, Haider D, van Gijn D, Fan K. Incidence and patterns of mandibular fractures during a 5-year period in a London teaching hospital. *Br J Oral MaxillofacSurg* 2013;51:794-8.
35. Zix JA, Schaller B, Lieger O, Saulacic N, Thorén H, Iizuka T. Incidence, aetiology and pattern of mandibular fractures in central Switzerland. *Swiss Med Wkly* 2011 27;141:w13207 .
36. Personal communication. Iowa Department of Transportation, Office of Driver Safety and Improvement, Des Moines, IA, October 1999
37. RajibKhadka, Nitesh Kr. Chaurasia . Four years prospective study of the maxillofacial trauma at a tertiary center in WesternNepal. *Journal of Orofacial Sciences* Vol. 6• Issue 2• July 2014.
38. Kontio R, Suuronen R, Ponkkonen H, Lindqvist C, Laine P. Have the causes of maxillofacial fractures changed over the last 16 years in Finland? An epidemiological study of 725 fractures. *Dent Traumatol* 2005;21:14-9.
39. Chrcanovic BR, Freire-Maia B, Souza LN, Araújo VO, Abreu MH. Facial fractures: A 1-year retrospective study in a hospital in Belo Horizonte. *Braz Oral Res* 2004;18:322-8.