

DEMOGRAPHIC DISTRIBUTION, ETIOLOGICAL SPECTRUM, INJURY CHARACTERISTICS, MANAGEMENT AND PREVENTIVE RECOMMENDATIONS FOR MAXILLOFACIAL INJURIES AT A TERTIARY CARE CENTRE IN CENTRAL INDIAKaruna Jindwani¹, Y. K. Paharia²**HOW TO CITE THIS ARTICLE:**

Karuna Jindwani, Y. K. Paharia. "Demographic Distribution, Etiological Spectrum, Injury Characteristics, Management and Preventive Recommendations for Maxillofacial Injuries at a Tertiary Care Centre in Central India". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 64, August 10; Page: 11193-11201, DOI: 10.14260/jemds/2015/1612

ABSTRACT: Oral and maxillofacial injuries worldwide can pose considerable long term orofacial deformity and disability. They present a therapeutic challenge to trauma, maxillofacial and plastic surgeons practicing in developing countries. **OBJECTIVE:** This retrospective study was conducted to find out the epidemiological characteristics, etiology, pattern of maxillofacial injury and the subsequent treatment planned in northern regions of Madhya Pradesh at a tertiary care teaching institution at Gwalior. **METHODOLOGY:** A total of 170 consecutive maxillofacial trauma patients reporting at the trauma Centre and the outpatient department (OPD) of dental surgery at Gajra Raja Medical College, Gwalior were analyzed in a span of 18 months to determine the demographic details, etiological risk factors, pattern of facial injuries and treatment given at this institute. **RESULTS:** An 18 months survey was conducted from November 2013 till March 2015 to evaluate 170 subjects. Males outnumbered females with a male: female ratio of 5.5: 1. Road traffic accidents (RTA) turned out to be the dominant etiological risk factor involved in 52.9% of the cases. Motor cycle accidents and the influence of alcohol played a prominent role in etiology. Mandible was the most common bone involved in injuries. Parasymphysis and midsymphysis were the commonly involved sites. Closed reduction with arch bar fixation under local anesthesia was the commonly given treatment modality used in 73.5% cases. **CONCLUSION AND RECOMMENDATIONS:** RTA on two- wheelers and under the influence of alcohol is still the most promising risk factor of facial trauma. Periodic review of driving skills, stricter implementation of traffic rules, timely maintenance of faulty roads and promotion of educational campaigns to create general awareness regarding the relation between risk factors and the mortality and morbidity associated with maxillofacial injuries are recommended.

KEYWORDS: Maxillofacial injuries, Retrospective study, Parasymphysis, Midsymphysis, Closed reduction, Arch bar fixation.

INTRODUCTION: Oral and maxillofacial trauma refers to injuries involving soft and hard tissues of face extending from frontal bone superiorly to mandible inferiorly. The magnitude and etiology of oral and maxillofacial injuries varies from one geographic region to another or even within the same region depending on the prevailing socioeconomic, cultural and environmental factors.^[1,2] These injuries can lead to significant orofacial deformity and malfunction which diminishes quality of life and work productivity.^[3]

The common risk factors for these injuries are road traffic accidents (RTA) and assaults or interpersonal violence by sharp objects, blunt injuries or fire-arm injuries.^[1,2,4,5] However, other causes include a fall from height, sports related injuries, injuries due to hit by train, hit by machines in

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industries or on farms and trauma by animals.^[6,7] Current information indicates that RTA is the leading cause of facial fractures in developing countries^[7,8] while interpersonal violence, sport injuries and industrial accidents are more common in developed countries. The etiology and pattern of such injuries reflect trauma patterns within the community and thus provide a guide to the design of plans and programs indicated for their prevention and management.^[7]

No studies have been done so far to evaluate the clinical demographic profile and etiological factors of maxillofacial injuries in the northern regions of Madhya Pradesh (M. P.) in India. It is gravely essential to understand that injuries to the face represent one of the greatest challenges to public health services worldwide due to their association with high incidence of morbidity, varying degrees of physical, functional or aesthetic damage and significant financial cost involved in their management.^[9] The previously published studies report that open reduction and internal fixation (ORIF) of maxillofacial fractures result in restoration of satisfactory facial expression and function.^[10] However, in a resource limited country like ours and that too in a government set up, lack of funds and facilities for ORIF and late presentation are a major problem in achieving acceptable cosmetic outcomes in patients with facial injuries.

The aim of the current retrospective analysis was to investigate and describe our own experience regarding the characterizing patterns of maxillofacial fractures, etiological spectrum and demographic profile of patients attending the dental OPD and trauma centre at this tertiary care medical college of Gwalior.

MATERIALS AND METHODS: This retrospective study included all consecutive maxillofacial injury patients approaching Gajra Raja Medical College (G. R. M. C), Gwalior from a huge catchment area involving many districts of M.P. like Gwalior, Bhind, Guna, Shivpuri, Morena, Datia and Teekamgarh, few districts from Uttar Pradesh namely Jhansi, Jalon, Urai, Etawah, and Mahoba and Dhaulpur from Rajasthan. 170 patients were analysed in a span of 18 months from November, 2013 at the OPD of dental surgery at G. R. M. C which is a tertiary care referral centre in this area and is providing quality patient care in all medical and dental specialties.

Prior to this research, protocol of the study was approved by the joint institutional ethic review committee. All patients from November 2013 till March 2015 consented to the study and were interviewed to obtain data including socio-demographic information on personal data like name, age, gender, date of injury, site, cause, anatomical site of fracture and treatment modalities which was recorded on a specially prepared clinical proforma. Detailed clinical examination was done and diagnosis was made on the basis of signs and symptoms and investigations including panoramic pantamographs and computed tomography scans.

RESULTS: During a period of 18 months, a total of 170 patients with 237 fractures were enrolled as single isolated fractures were rare and usually were found associated with cases of interpersonal violence involving hard – blunt object injuries. Pan facial trauma involving multiple fractures of various facial bones and soft tissues was more encountered in RTA cases.

Demographic Analysis: 144(84.7%) patients were males and 26(15.2%) patients were females with a male to female ratio of 5.53:1. [Table 1]

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Male	144	84.7%
Female	26	15.2%
Total	170	100%

Table 1: Distribution of maxillofacial fractures according to gender (n=170)

Sl. No.	Age (in years)	No. Of cases	Percentage
1.	0 - 10	09	5.3
2.	11 - 20	38	22.3
3.	21 - 30	66	38.8
4.	31 - 40	22	12.9
5.	41 - 50	20	11.7
6.	51 - 60	10	5.8
7.	61 - 70	05	2.9

Table 2: Distribution of maxillofacial fractures according to age (n=170)

Patient's age ranged from 02years to 66 years. The modal age group was 21–30years as 66 patients (38.8%) were from the 3rd decade of life followed by 38 patients (22.3%) from the 2nd decade of life. [Table 2] The vast majority of patients were unemployed and most of the injuries were unintentional and due to RTA crash (52.9%). [Table 3]

ETIOLOGY: Most common risk factor of facial injury, identified in our study was RTA which accounted for trauma in 90 patients (52.9%) followed by cases of assaults due to interpersonal violence, fall from height, sports injuries and injuries due to trauma by machines, trains or animals in descending order. [Table 3] Majority of the injuries in the RTA cases included two wheeler accidents involving motorbikes and bicycles. Alcohol by any means was found to be involved in most of the cases of maxillofacial trauma.

Sl. No.	Risk factors	No. Of patients	Percentage
1.	RTA	90	52.9
2.	Assault		
	(a) hard and blunt object	26	15.3
	(b) fire arm (gunshot)	6	3.5
3.	Fall	27	15.9
4.	Sports	6	3.5
5.	Misclaneous (injury by train/machine/animal)	15	8.8
Total		170	100

Table 3: Distribution of maxillofacial fractures according to risk factors (n=170)

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According to our study, maximum number of patients was recorded in the months of May and September which is usually the time of marriages and festivals in our country. [TABLE 4]

Sl. No.	Name of the month In 2014	No. Of cases
1.	January	12
2.	Febuary	08
3.	March	08
4.	April	14
5.	May	16
6.	June	14
7.	July	13
8.	August	08
9.	September	16
10.	October	05
11.	November	11
12.	December	07
Total		132

Table 4: Distribution of maxillofacial fractures according to time of injury of patients in the year 2014 (n=132)

Site and Type of Injury: Fractures of the mandible were the most common type of fracture found in 164 fractures (69.2%) among 237 fractures in 170 patients. [Table 5] Among the mandibular injuries parasymphysis and midsymphysis fractures were the most common fracture sites in 86 cases (36.3%). Lefort fractures of midface were recorded in 23 cases (9.7%) and zygomaticomaxillary fractures were seen in 17 patients (7.1%) in the current study. Dentoalveolar injuries were found in association with bony and soft tissue injuries of both jaws in 25 patients (10.5%). Isolated soft tissue injuries requiring tissue repair and dressing under local anesthesia were recorded in 8 cases (3.4%) which were mostly located extra - orally and included contusions, lacerations and abrasions.

Sl. No.	Site of Injury	No. of fractures	Percentage
1.	Mandible		
	(a) Midsymphysis and parasymphysis	86	36.3
	(b) Body of mandible	20	8.4
	(c) Angle of mandible	26	10.9
	(d) Processes of mandible (condylar/subcondylar and coronoid)	32	13.5
2.	Mid face (Lefort I, II, III)	23	9.7
3.	Zygomatico maxillary complex	17	7.2
4.	Dento alveolar	25	10.5
5.	Isolated soft tissue injury	08	3.4
Total		237	100

Table 5: Distribution of maxillofacial fractures according to anatomical site of fracture (n=237)

Management:

Sl. No.	Treatment modalities	No. of cases	Percentage
1.	Closed reduction under L.A.	125	73.5
2.	ORIF	15	8.8
3.	Soft tissue repair	07	4.1
4.	Conservative follow up	23	13.5
Total		170	100

Table 6: Distribution of maxillofacial fractures according to treatment modalities (n=170)

73.5% (125) patients were treated with mandibulo- maxillary inter- fixation (MMF) under local anesthesia. ORIF under general anesthesia was done in 15 cases (8.8%) with displaced fragments and multiple fractures. Conservative therapy including extractions of grade 3 mobile teeth and regular follow up and monitoring was planned in 23 patients (13.5%) with normal occlusion and function. [Table 6]

DISCUSSION: This research was carried out between November 2013 till March 2015 in the department of dental surgery at G. R. M. C, Gwalior, covering a huge population inhabiting many districts of Madhya Pradesh, Uttar Pradesh and Rajasthan. Various epidemiological surveys show that risk factors, types and frequencies of injury vary according to geographical location, culture and socio economic background of communities^[1,2,11] The present study was conducted to retrospectively assess the demographic profile of 170 patients approaching the OPD of dental department and trauma centre at G.R.M.C. Gwalior. The time of injury, etiology of injury, the type of maxillofacial injury and its management was recorded on a prepared clinical proforma approved by institutional ethic review committee. The gender distribution revealed a male preponderance in all age groups with a male: female ratio of 5.53:1. This ratio is higher or is comparable with other studies reported in literature.^[6,10,12,13,14]

This is most likely due to the fact that in a developing and resource limited country like ours, men are often the primary bread winners of the family and tend to indulge in outdoor activities for a long period of time, thus, males are more vulnerable to alcohol consumption, vehicular accidents, involvement in inter personal violence and sports. In regions where women participate directly in social activities and consequently are more susceptible to maxillofacial and general trauma, the ratio of men: women incurring trauma is generally low.^[9]

In the current study, the study subjects revealed that the age group 21–30 years represented the peak age of incidence of maxillofacial injuries. The possible explanation for this as also reported in literature is that this age group is most active and energetic and tend to remain outdoors in search of their livelihood and thus indulge in high speed and careless transportation, violence and fights and dangerous exercises and sport- related activities. This finding correlates with reports from India and other parts of the world.^[11,14,15,16] However, we differ from the studies done in Turkey^[17] and Pakistan^[18] where the dominant age groups having a high incidence were 1st decade and 2nd decade respectively.

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In coincidence with the changes in community life style, industrialization, transportation, and legislative measures, the causes of maxillofacial fractures also tend to change. In developing countries, RTA is generally believed to be the most common cause of facial trauma and this has been confirmed by some of the previous studies.^[1,2,9,15,19] In most of the developed countries violence and sports are increasingly replacing traffic accidents.^[14,20,21] However, in our study, RTA was the dominant cause of maxillofacial trauma and made up to 52.9% of all incidents which correlates with the findings from the developing part of the world. Majority of the traffic accidents in the current study were due to two- wheelers i.e. bicycles and motorcycle accidents. Alcohol consumption in RTA and inter personal violence also deserves special attention as in this survey. Many authors have consistently linked alcohol abuse and motorbike accidents.^[10,12,21,22,23] However, in a review of 230 cases of maxillofacial injuries in Sharjah, United Arab Emirates, no cases were associated with alcohol abuse.^[8] This discrepancy may be explained by differences in the strictness of laws governing the sale and consumption of alcohol which may be effective in reduction in driving while under the influence of alcohol.

Besides these, seasonal variations regarding incidence of maxillofacial trauma have been reported in literature. ^[24] An analysis of the month of reporting revealed that the maximum number of facial injuries in our study occurred in the months of May and September which differs from some other studies^[24] and is in conformity with few surveys in literature.^[11,25]

Patterns of facial fractures also vary according to various studies. It has been said that in the maxillofacial region, the mandible is the most vulnerable, perhaps because of its position and its predominance on face. This preponderance could be due to the fact that the osteology of mandible, various muscle attachments and their influence on the presence of developing or completed dentition, all play a role in weakness of the lower jaw.^[23] In the current survey, the fracture of the mandible (69.2%) outnumbered other facial fractures. This finding is in accordance with many previous studies,^[14,17,23,25,26] and differed from few other studies.^[6,27] Parasymphysis and midsymphysis fractures were the most common sites of fracture in mandible followed by condylar fractures which coincides with the survey in western Nepal.^[25]

There are many treatment regimens in maxillofacial fractures, but the treatment chosen may differ depending on many factors like cost of treatment, affordability by the patient, feasibility in the hospital, doctor's decision and skill, patient's willingness to avail the treatment advised, all of which may vary from one country to another. Open reduction and internal fixation (ORIF) has been reported to be reported to be the "gold standard" for treatment. However, this form of treatment has not become popular in our environment due to lack of facilities at our institute. Most of the patients (73.5%) treated in our institute had closed reduction with arch bar fixation as the treatment and few (8.8%) were treated with ORIF. Conservative therapy with follow up and regular monitoring was planned in 23 patients with normal bilateral occlusion. Closed reduction with mandibulo- maxillary fixation (MMF) despite of its nutritional and oral hygiene challenges was the treatment chosen in 73.5% cases in the present study which was consistent with various studies conducted by varying authors in different geographical belts and countries.^[15,17,23]

CONCLUSION AND RECOMMENDATIONS: India is a developing country. It seems that RTA remains the dominant etiological factor of maxillofacial trauma in this part of India. Various epidemiologic and demographic characteristics of facial injuries were highlighted in our survey which is in general similar to those of the literature.

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The male: female ratio was higher and injuries most commonly occurred in the 3rd decade of life. According to our survey, motorcycle accidents on rural and urban roads and the influence of alcohol deserve special attention. Single isolated fractures were rare and pan facial trauma in association with general trauma involving the lower jaw was the most common finding. Majority of the fractures were treated with closed reduction under local anesthesia at dental chair in the department of dental surgery.

Following recommendations are advised in the light of this study to reduce maxillofacial trauma in this belt:

- Thorough intentional amendments and reinforcement of traffic rules and strategies.
- Regular and timely maintenance of faulty roads by government.
- Strict implementation of legislations involving the use of seat belts and helmets.
- Creating awareness in public for not carrying passengers more than the capacity of vehicle.
- Provision of pedestrian friendly paths and segregation of heavy and light motor vehicles.
- Strict legislative implications regarding disposal of out of date vehicles.
- Strictness of laws governing the sale and consumption of alcohol and educational programs for awareness regarding the hazards of drinking and driving to reduce the morbidity and mortality associated with RTA.
- Prohibition of easy access to dangerous weapons.
- Adequate safety features in building design in order to reduce the incidence of pediatric facial trauma secondary to fall.
- Educational campaigns for recommending the use of mouth guards, helmets, knee- pads and elbow- pads while practicing sports.
- Establishment of dedicated and fully equipped maxillofacial trauma units in all primary, secondary and tertiary care Centers.
- Encouraging regional epidemiological surveys on large scale for precise planning of programs by professionals and policy makers to prevent and treat facial injuries in their respective regions.

We hope that our study conducted would help health care providers to, identify the major etiological factors involved in maxillofacial trauma in this region and provide proper preventive legislation and also help them establish well equipped trauma units. However, more elaborate prospective surveys may further corroborate our findings and help prepare more reliable measures against maxillofacial trauma.

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FINANCIAL OR OTHER

COMPETING INTERESTS: None

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Date of Submission: 20/07/2015.
Date of Peer Review: 21/07/2015.
Date of Acceptance: 04/08/2015.
Date of Publishing: 08/08/2015.