Association of maxillofacial injuries with their etiological factors, a retrospective analysis

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ABSTRACT

Objective: To develop association of various etiological factors of maxillofacial injuries with their patterns of presentation.
Study Design: Retrospective cross-sectional analysis
Place and Duration: At Oral and Maxillofacial department, Rawal Institute of Health Sciences. Retrospective data of two years from 1st August 2016 to 31st July 2018.
Methodology: All adult patients whose record of etiology and pattern of maxillofacial injuries was available were included and patients younger than 18 years of age, with missing records, and with bony pathology were excluded. A structured proforma was designed to record the relevant information of patients, regarding etiology and patterns of maxillofacial injuries.
Results: A total of 148 patients were included and motor bikers were found to be the most affected by RTA (53.3%) and out of them, riders without helmet were the main victims of maxillofacial injuries (37.8%). In our study most patients had mandibular fractures (43.9%) and there was a significant association of panfacial fractures with motor bikers not wearing helmets (p value=0.046).
Conclusion: Road traffic accident is the major cause of maxillofacial injury and it is more common in young male subjects, especially the motor bikers not wearing helmets.
Keywords: Maxillofacial trauma, Mandible, Maxilla, Fracture, Etiology, Road traffic accident, Panfacial injuries

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INTRODUCTION

Maxillofacial trauma is a major cause of morbidity and mortality globally[1]. The etiology of MF trauma (maxillofacial trauma) varies from country to country due to various socioeconomic, cultural and environmental factors[2]. Road traffic accidents (RTA), violence, fall and sport activities are the topmost causes of maxillofacial trauma[3]. In developed countries, interpersonal violence is the leading cause of maxillofacial trauma, while road traffic accident is the primary cause in developing countries[4]. The differences reflect a lack of traffic regulations enforcements, including seat belt and helmet, absence of safety measures in the vehicles and poor road frame in the underdeveloped and alcohol abuse in the developed countries[5,6]. The MF trauma most frequently affects male patients from 2nd to 3rd decade of life.

In developing countries, several forms of road transportation have progressed over time, with motor vehicles, motorcycles, and bicycles creating a significant proportion. The motorcycle has been identified as a vehicle that provides an economical transport to a lot of people, but at the same time, it can also be a source of incapacitating injuries and in severe cases may lead to loss of life[6,7]. Likewise, studies have shown that during collisions between motorcycles and passenger cars/vans, the motorcyclists and pillion passengers are more susceptible to injuries as compared to passengers travelling in relatively more protected bigger vehicles like cars and vans[7,8].

Maxillofacial trauma involves injuries of soft tissues of the facial region and as well as bony framework including bones of the mandible, mid-facial and frontal regions. The severity and pattern of the MF trauma depends on the anatomic site of trauma, magnitude and direction of the force[8,9]. The treatment of trauma costs more than of any other major disease. Annually, more than 1 million deaths are documented worldwide, while non-fatal road traffic accidents are a chief problem causing hospitalization and permanent disability to thousands of individuals annually[9].

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Trauma has been named as the leading cause of death up to the 4th decade of life and the main contributor to trauma is the road traffic accident[10]. It been estimated that RTAs by 2030 will become the fifth contributor to the global burden of diseases[11]. Maxillofacial trauma is a common part of the multiple traumatic injuries resulting from road traffic accidents. Most of the studies performed world over show that RTA is the main cause of maxillofacial injuries especially in the developing countries[11]. This high percentage has been shown in some other local studies as well[1,12]. Therefore understanding the association of different modes of RTA with the maxillofacial injury patterns has a considerable diagnostic and preventive impact as far as maxillofacial trauma management is concerned. Furthermore, we also tried to find the impact of helmet wearing on the severity and pattern of maxillofacial trauma which has not been studied previously by any of the local researchers.

The objective of this study was to develop association of various etiological factors of maxillofacial injuries with their patterns of presentation.

METHODOLOGY

This Retrospective cross-sectional analysis was conducted on cases that reported to Oral and Maxillofacial surgery department of Rawal Institute of Health Sciences, Islamabad in a two-year period (1st Aug 2016 to 31st Jul 2018). Permission from hospital's ethical review committee was taken before the start of study. Data was retrieved from the outpatient record books of the department of oral and maxillofacial surgery. Record of all the patients who reported to the outpatient department of Oral and maxillofacial surgery during the proposed period of study was screened without taking into consideration the mode of treatment and center where the definitive treatment of fractures was carried out. As our hospital is located in the center of very populous twin cities, near very busy main highways, we receive quite a significant number of patients of maxillofacial trauma in our outpatient department. Patients younger than 18 years of age, those with missing record of either etiology or type of maxillofacial injuries, and patients with severe osteoporosis and bony pathologies (cyst/tumor) of maxillofacial region were excluded from the study. All other adult patients who had maxillofacial bone injuries were included in our study.

A structured proforma was designed to record the relevant information regarding etiology and pattern of maxillofacial injuries. Etiology of maxillofacial injuries was categorized into four categories i.e. motor-bikers with helmets, motor-bikers without helmets, other road users (that included four-wheeler drivers/passengers, and pedestrians) and others (that included victims of interpersonal violence, sports injuries, falls, occupational and ballistic injuries). Pattern of maxillofacial injuries was categorized in four categories i.e. dentoalveolar injuries, fracture of mandible, midface fracture (that included maxillary, zygomatic bone and naso-orbitoethmoidal fractures) and panfacial fractures (fractures of both mandible and midface).

Data Analysis: Data will be analyzed using SPSS version 17. Frequency and percentages were calculated for categorical variables and mean± S.D were calculated for continuous variables. Chi square test was applied to determine association of etiology and pattern of maxillofacial injuries.

RESULTS

Our study sample comprised 148 patients including 130 (87.8%) males and 18 (12.2%) females. The mean age of the study group was 30.76±12.74 years with age range of 18 to 70 years. In our study most of the patients were in 18 to 30 years age group. (Fig-1).

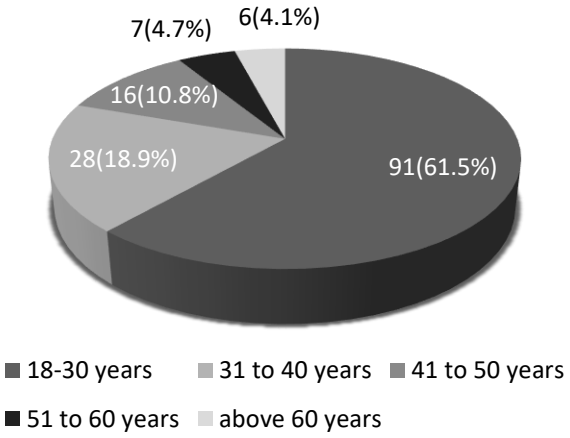

Figure-1: Distribution of Maxillofacial Injuries According to Age categories (N=148)

Motorbike accident was the most common cause of maxillofacial injuries in our study as more than half of the patients were motor-bikers (n=79, 53.3%). Furthermore, among motor bikers, riders without helmet were the main victims of maxillofacial injuries. Other road users (motor car/van/truck drivers, passengers and pedestrians) were the second most common victims (32.2%) while least number of patients had fire arm or sports injury (1.4% each). Overall, in our study road users account of 85.8% (n=127) of all maxillofacial injuries while just 14.2% (n=21) patients had maxillofacial injuries due to other mechanisms (falls, assault etc.). (Table-I)

Table-I: Frequency of etiology of fracture (N=148)

Cause	Frequency (n)	Percentage (%)
Motorbike (with helmet)	23	15.5
Motorbike (without helmet)	56	37.8
Other Road traffic users	48	32.4
Fall	10	6.8
Sports Injury	2	1.4
Firearm Injury	2	1.4
Assault	4	2.7
Occupational Injury	3	2
Total	**148**	**100**

In our study most of the patients had mandibular fractures (n=65, 43.9%), followed by midface fractures (n=48, 32.4%), panfacial fractures (n=26, 17.6%), and dentoalveolar injuries (n=9, 6.1%). Among mandibular fractures 27 patients had symphyseal or para-symphyseal fractures (41.5%), 18 patients (27.7%) had mandibular body fractures, 38 patients (58.5%) had angle fractures while 20 patients (30.8%) had condylar fractures. Furthermore, among Midface fractures 13 patients (27.1%) had lefort I, 12 (25%) had lefort II while just one patient (2.1%) had lefort III fracture. Thirty-eight patients (79.2%) in midfacial fracture group had zygomatic bone fractures while just six patients (12.5%) had nasal bone or naso-orbito-ethmoidal fractures.

Association of pattern of all maxillofacial fractures with etiology of fracture was then evaluated. It was also found that most patients with mandibular and panfacial fractures were motorbike riders who were not wearing helmet at the time of accident. Whereas midface fracture was the most common outcome among victims of other road traffic accidents that involved motor car/van/truck drivers, passengers and pedestrians. Then Chi square test was applied to analyze the association of pattern and etiology of maxillofacial injuries and p value was found to be 0.472. (Table-II)

Table-II: Association of pattern and etiology of maxillofacial fractures (N=148)

Pattern of Fracture	Etiology				Total	p value
	Motor bike with Helmet	Motor bike without Helmet	Other Road Traffic accidents	Others		
Dentoalveolar	1 (11.1%)	2 (22.2%)	5 (55.6%)	1 (11.1%)	9 (100%)	0.472
Mandible	12 (18.5%)	27 (41.5%)	17 (26.2%)	9 (13.8%)	65 (100%)	
Midface	9 (18.7%)	14 (29.2%)	18 (37.5%)	7 (14.6%)	48 (100%)	
Panfacial	1 (3.8%)	13 (50%)	8 (30.8%)	4 (15.4%)	26 (100%)	
Total	23 (15.6%)	56 (37.8%)	48 (32.4%	21 (14.2%)	148 (100%)	

Table-III: Association of Fracture Pattern with Type of Motorbike Accidents (n=79)

Pattern of Fracture		Etiology		Total	p value
		Motorbike with Helmet	Motorbike without helmet		
Dentoalveolar	**Yes**	1(33.3%)	2(66.7%)	3(100%)	0.870
	No	22(28.9%)	54(71.1%)	76(100%)	
Mandible	**Yes**	12(30.8%)	27(69.2%)	39(100%)	0.749
	No	11(27.5%)	29(72.5%)	40(100%)	
Midface	**Yes**	9(39.1%)	14(60.9%)	23(100%)	0.209
	No	14(25%)	42(75%)	56(100%)	
Panfacial	**Yes**	1(7.1%)	13(92.9%)	14(100%)	0.046
	No	22(33.8%)	43(68.2%)	65(100%)	
Total		23(29.1%)	56(70.9%)	79(100%)	

The relationship of different maxillofacial injuries with 'motorbike with helmet' group and 'motorbike without helmet' group was further evaluated. Chi square test was applied, and it was found that there was a significant association of panfacial fractures with motor bikers not wearing helmets (pvalue=0.046) as 92.9% of panfacial injuries were sustained by motorbike riders without helmets. Among other patterns of fractures (dentoalveolar, mandible and midface) we failed to develop any significant association between type of fracture and status of motor bikers as far as helmet wearing is concerned. (Table-III)

DISCUSSION

Road traffic accident is the major cause of maxillofacial injuries particularly in developing countries. This is supported by our study as well where RTA was the cause of maxillofacial trauma in 85.5% patients. Poor road infrastructure, careless attitude, lack of implementation and ignorance towards traffic rules are some of the reasons of high proportion of RTA induced maxillofacial injuries. Furthermore, mean age of the patients in our study was 30.76±12.74 years and most of the patient were in a younger age group (18 to 30 years). Many other studies also had similar findings where high frequency of patients of MF trauma belonged to a younger age group[1,13]. When the gender of the patients was considered there was a pre dominant male pattern in our study, which is supported by many local and international studies[6,14-16]. These findings might be due to the fact that in developing countries the burden of economy lies on the young male individuals of family who have to travel daily to a living usually on motorbikes predisposing them to traumatic injuries.

Globally nearly one fourth of deaths due to road traffic accidents are seen in motor bikers, with the highest percentage recorded in South East Asia and western Pacific[17]. In our study we found most of the patients to be motor bikers and out of those most of them were non-helmet users. This has been documented in some of the other studies as well where a high percentage of motor bikers were not using helmets at the time of accident[7,18]. Interestingly it is not only the non-compliance towards helmet use which predisposes to facial injuries, the use of substandard helmets by a large number of motor bikers further weakens the efforts, which could bring betterment to road safety[19]. The reason being that most of the standard full face type helmets are two to three times more expensive, than the substandard ones, which most of the people in low income countries like Pakistan cannot afford. In a study done in Uganda they found that most of the motor cyclists used the partial covering helmets, but they could not find a significant link between the type of helmet and maxillofacial injuries[20]. However a few researchers have reported a higher incidence of mandibular fractures in riders wearing a full face type of helmet as compared to the non-helmet users, the reason being attributed to the chin bar component of the full face type helmet[21]. In third world countries motorbikes are considered a cheap way of travelling, which uses less fuel and is easy to maintain as compared to other vehicles. Moreover, the youth enjoy a charm and joy of motorbike ride which they indulge into without following any

rules and regulations, especially in the road conditions of the third world countries[17,18]. The helmet which is considered a very integral safety measure for motor bikers is not worn by many a youth, reasons given for non-compliance are very unacceptable. They say that helmet wearing causes uneasiness, hot humid weather makes it a nuisance, it causes vision or hearing obscuring, they cannot afford helmets or even absurd reasons like ruffling up of the hairstyle is given[22].

In our study mandibular fracture was the most common fracture pattern observed followed by midface and panfacial fractures. This has been supported by some other studies as well[1,5,14]. Whereas a few studies have shown a higher incidence of midface fractures in road traffic users[23,24]. Basically the amount of force and point of impact during road traffic accident will determine the type of fracture. Among motorbike riders chin is usually the first point of impact during an incident of RTA resulting in high likelihood of mandibular fractures. Therefore, the high frequency of mandibular fractures in our study could be explained by the fact that most of our patients were motorbike riders and majority of them were not wearing helmets at the time of accident.

In our study when frequency of different injuries between motorbike riders with and without helmet groups was compared we found significant association of severe injuries i.e. panfacial fractures with motorbike riders without helmet group. Therefore, it can be inferred from our study that motorbike riders who do not use helmets are more prone to severe maxillofacial injuries. Whereas Brian et.al revealed no significant difference between helmeted and non-helmeted groups as far as severity of injuries is concerned[25]. Another study reported higher frequency of severe maxillofacial injuries in helmeted riders. These findings were ascribed to poor quality and improper use of helmets[23].

In a report by WHO Pakistan is one of the world's ten most populous countries where legislations regarding use of helmets are not being followed in their true spirits, thus resulting in a high morbidity and mortality among the motor bikers[19]. The rules regarding use of standardized helmets are also not being implemented[22]. Tough laws should be implied and fine and punishments should be imposed on the motor bikers who are not following these laws. Awareness campaigns should be launched to make not only the motor bikers but the pillion riders conscious of the importance of proper use of helmets. They should be made aware of the fact that spending a small amount of money on the helmets is easier than risking one's life and then spending a huge amount as the treatment cost.

In this study, although we were able to develop a statistical association of panfacial injuries with non-helmeted motorbike riders, further cohort study designs constituting bigger samples can further elucidate our results. Furthermore, future researches can include the helmeted or non-helmeted pillion riders as well because they are equally susceptible to maxillofacial injuries.

CONCLUSION

Road traffic accident is the major cause of maxillofacial injury and it is more common in young male subjects, especially the motor bikers not wearing helmets.

CONTRIBUTION OF AUTHORS

Aslam F: Manuscript writing, Literature review
Maqsood A: Data interpretation, Manuscript final reading and approval
Asim MA: Conceived idea, Designed research methodology, Data analysis and interpretation
Muzaffar A: Data collection
Abbasi S: Statistical analysis

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