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Prevalence of maxillofacial injuries by motorized two wheeler road traffic accidents in Bangalore city

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Abstract – Introduction: Two wheeler users in India are the most vulnerable for road fatalities and two wheelers constitute the major portion of vehicular traffic. *Objectives*: To assess the prevalence of maxillofacial injuries among the victims of motorized two wheeler road traffic accidents in Bangalore city. Materials and methods: Medical records of cases reported during January 2006-June 2007 to hospitals were considered and data regarding age, sex, date of trauma, rider or pillion rider, alcohol consumption, site of injury on the face and associated injuries to other parts of the body were recorded. Results: The prevalence of injuries among males and females was in the ratio of 3:1. Most of them were in the age group of 21-30 years. Most of the cases were recorded on Saturdays (17.4%) and in the months of August (9%) and September (9.7%) and the least number of cases were reported in January, March and June (2.1%) of 2007. The decrease in number of cases coincides with the implementation of the Helmet Rule in the city. Conclusion: There is a need to stress on the importance of usage of helmets and adherence to traffic rules during the high-risk periods to reduce the incidence of road traffic accidents and accompanying maxillofacial injuries.

Road traffic injuries contribute significantly to mortality and morbidity throughout the world, and a disproportionately large number of these occur in developing countries (1). It is ranked ninth globally among the leading cause of Disability Adjusted Life Years (DALY) lost and is projected to rise to the third place by 2020.

India is undergoing a major economic and demographic transition coupled with increasing urbanization and motorization. Over 1.2 million people are seriously injured; 300 000 disabled permanently and 80 000 die in traffic accidents annually in India (2). Road traffic accidents will victimize not only the driver alone but also create emotional and economic burden on the family of the injured. Bicycles in India do not have separate dedicated lanes and as such they along with the pedestrians are at an increased risk of injuries.

Road traffic accidents are becoming a significant public health problem (2). Even though India has about 1% of the world's vehicle population, 6% of the world's road accidents occur here. 3% of the Gross Domestic Product (GDP) is spent on hospitalization of these victims (3).

Motorized two wheelers (MTWs) are the main component of Indian road traffic constituting 70% of the total vehicles, and have been identified as the most vulnerable group (60–80%) for road fatalities (1). Motorcycles often have excessive performance capabilities, especially, rapid acceleration and high speeds and they are comparatively less stable than cars. Per kilometer travelled, the number of deaths or injuries caused by motorcycles is about 10–15 times more than enclosed vehicles (3).

The number of two wheelers in Bangalore has increased from 0.67 million in 1996 to 2.1 million in 2007 (4). The exponential growth can be attributed to Bangalore transforming itself in to an IT hub during this period. This transformation has opened up a huge number of highly rewarding employment opportunities attracting a lot of talent from all over the country (5, 6). Majority of these migrants are young professionals who more often than not use two wheelers as the major mode of transportation. This has lead to an increase in the two wheelers density and load on the roads and thus contributing to increased prevalence of road traffic accidents.

It has been variously reported that 20–60% of all people injured in road traffic accidents had some form of maxillofacial injury (7). Maxillofacial injuries pose many significant problems physiologically, functionally, and aesthetically (8). The maxillofacial region is the most exposed part of the body and that makes it most vulnerable for trauma resulting from road traffic accidents. The incidence of maxillofacial injuries among victims of RTA varies with age, climatic conditions, traffic volumes, traffic rules and individual awareness.

The information regarding maxillofacial injuries due to motorized two wheeler road traffic accidents in Bangalore city is minimal. Hence, this study was conducted to assess the prevalence of maxillofacial injuries among the victims of motorized two wheeler road traffic accidents.

Materials and methods

This retrospective study was conducted from May to September 2007 in major hospitals of northwestern part of Bangalore city. Permission from the concerned hospital authorities was taken prior to the study.

Case records of the patients admitted due to maxillofacial injuries by motorized two wheeler road traffic accidents reported during January 2006–June 2007 were collected from the medical record department of the hospitals.

Data was collected regarding the age, sex, date of trauma (to asses daily and monthly variation), rider or pillion rider, under the influence of alcohol, site of injury on the face, type of injury or type of trauma (in midfacial, mandibular region) and associated injuries to other parts of the body.

Frequencies and association were used to analyze the data using spss ver. 10.

Results

Out of 477 patients with injuries due to motorcycle road traffic accidents, 144 (30.1%) maxillofacial injuries cases were registered.

The prevalence of maxillofacial injuries was found to be commonest in patients aged between 21 and 30 years (39.6%) followed by those in the 31-40 years (22.9%) age bracket. The least number of cases were recorded among those aged 60 years and above (0.7%).

Injuries were more commonly seen in males (Table 1) (P > 0.05).

Maxillofacial injuries were seen to occur most commonly on weekends particularly Saturdays (17.4%) than on weekends (Table 2). But this finding was not statistically significant (P > 0.05) 9.7% of the maxillofacial injuries occurred in the month of September 2006, 9% in the month of August 2006, 8.3% in the month of May and June 2006 and only 2.1% of number of cases were recorded in the months of January, March and April 2007. Prevalence of maxillofacial injuries in other months is given in Fig. 1 (P > 0.05).

Table 1. Distribution of maxillofacial injuries according to age and sex

	Sex			
Age (years)	Male	Female	Total	
1–10	02 (40%)	03 (60%)	05 (3.5%)	
11–20	12 (85.8%)	02 (14.3%)	14 (9.7%)	
21–30	45 (78.9%)	12 (21.1%)	57 (39.6%)	
31–40	33 (78.6%)	9 (21.4%)	42 (29.2%)	
41–50	11 (73.3%)	04 (26.7%)	15 (10.4%)	
51–60	06 (60%)	04 (40%)	10 (6.9%)	
>60	0	01 (100%)	01 (0.7%)	
P = 0.162				

Table 2. Distribution of maxillofacial injuries according to the day of trauma

	Number of cases (n)	Percentage (%)	
Sunday	23	16	
Monday	17	11.8	
Tuesday	20	13.9	
Wednesday	20	12.7	
Thursday	18	13.6	
Friday	21	14.6	
Saturday	25	17.4	
Total	144	100	

The distribution of maxillofacial injuries to the patients is given in Table 3a. The injury to the mandibular and midfacial were equal in number. In Table 3b the distribution of injuries in patients was seen more in bone (57.5%) followed by soft tissues (22.9%) and dentoalveolar (11.1%).

The Figs 2 and 3 shows the distribution of maxillofacial injuries according to the site. Among mandibular fracture, 27.1% were parasymphysis fractures, 20% were dentoalveolar fractures (Fig. 2). In middle third fractures, zygomatic arch fractures (22.2%) were common, followed by dentoalveolar fractures (21%); Le Fort III fractures were quite rare (Fig. 3). Along with the maxillofacial injuries, 31.3% of the patients suffered injuries to cranium and 21.5% injuries to upper limb (Fig. 4).

Among the 144 patients with maxillo facial injuries, 75.7% were driving the vehicle and 24.3% were pillion riders. 78.8% of the drivers and 21.2% of the pillion riders were found to be under the influence of alcohol at the time of accident (Table 4).

Discussion

Severe facial trauma results most often from road traffic accidents than any other mechanism of injury. Other organ systems are also most likely to be injured and the management of these injuries often impacts on the treatment of facial injury. This demands high levels of inter specialty cooperation (9).

In the present study, it was found that 39.6% of patients with maxillofacial injuries were aged between 21 and 30 years. This result is in congruence with previous studies (10–13). Injuries due to road traffic accidents especially in the developing countries are found to affect the economically productive age group (15–44 years). The high prevalence of road traffic injuries in this age group could be because of the relative inexperience of the riders, disregard to the traffic rules and safety measures especially with that of wearing helmets and an increased tendency to drive under the influence of alcohol.

Males were found to be injured 3.1 times more than females. This probably could be because men drive two wheelers relatively more frequently for their outdoor jobs, trading and recreational activities. This finding is in agreement with previous studies (13–15). Out of the 144 injured 22.9% were found to be driving under the influence of alcohol (riders and pillion riders) and the significant point is all of them were males.



Fig. 1. Distribution of inaxillofacial injuries according to month of injury.

Table 3a. Maxillofacial injuries according to individuals

Region			п	Total
Mandibular	Dentoalveolar (DA)	Pure, plus soft tissue	3 + 4	7
	Bone	Condvlar	3	33
		Ramus	1	
		Angle	5	
		Body	6	
		Parasympsis	14	
		Symphysis	4	
		> one	7	7
	Mixed	DA+Bone	3	3
Midfacial	Dentoalveolar (DA)	Pure, plus soft tissue	4 + 5	9
	()	Zvgomatic complex	3	27
		Nasal complex	6	
		LeFort I	3	
		LeFort II	3	
		LeFort III	2	
		Zvgomatic arch	9	
		Orbital	1	
		> one	10	10
	Mixed	DA + Bone	4	4
Both mandibular + midfacial			11	11
Only soft tissue injuries			33	33
Total				144

Table 3b. Distribution of maxillofacial injuries according to number of patients

Region	Number of patients (n)	Percentage (%)
Dentoalveolar Bone(more than one) Mixed M and MF Only soft tissues	16 77 (17) 7 11 33	11.1 53.5 (11.8) 4.9 7.6 22.9

The urban population tends to spend their weekends out of their homes engaged either in recreation or social gatherings (11). In the present study, 17.4% maxillofacial injuries occurred on Saturdays and 16% on Sundays. Maximum number of cases were recorded in the months of August and September (9%), followed by May and June (8.3%). This finding substantiates the fact that there is an increased risk of sustaining facial fractures during rainy and holiday seasons (11, 14). However these finding was not statistically significant in our study.

Interestingly, it is evident from this study that the number of maxillofacial injuries showed a declining trend from November 2006 onwards. This might be due to the implementation of helmet rule in Bangalore from 1 November 2006 (result was not found to be statistically significant). A review report by Cochrane reviewers (16) also suggested that wearing helmets during driving significantly protects against facial injury following a crash. The usage of helmets by the riders should be stressed upon. And the rule should be applicable for pillion riders as well as we found 24.3% of the injured were pillion riders.

The distribution of maxillofacial injuries in patients was, the injury to the mandibular and midfacial were equal in number. The distribution of injuries in patients



was seen more in bone (57.5%) followed by soft tissues (22.9%) and dentoalveolar (11.1%) (17). Injuries to the maxillofacial area are routinely treated by the technique of open reduction and internal fixation. There is also a need to treat soft tissue injuries since it also consists of 23% of injuries. Many serious facial injuries can cause permanent facial disfigurement and psychological distress with extensive soft tissue scarring.

Among the maxillofacial injuries, mandibular fractures were most common (34%) followed by fractures of middle third (32%) (7, 10). In some of the studies (9, 18), the midface was injured more frequently than the mandible and the majority of patients had multiple facial injuries. Mandibular fractures were most common probably because mandible is mobile and has less bony support than maxilla. Parasymphyseal region was more

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Table 4. Distribution of maxillofacial injuries to rider and pillion rider according to their age, sex and alcohol

Category	Classification	Rider	Pillion	Р
Age (years)	<10	_	5 (100%)	0.01
	11–20	10 (71.4%)	4 (28.6%)	
	21–30	51 (89.5%)	6 (10.5%)	
	31–40	29 (69.0%)	13 (31.0%)	
	41–50	12 (80.0%)	3 (20.0%)	
	51–60	7 (70.0%)	3 (30.0%)	
	>60	-	1 (100%)	
Sex	Male	91 (83.5%)	18 (16.5%)	0.01
	Female	18 (52.9%)	16 (47.1%)	
Alcohol consumed	No	83 (74.8%)	28 (25.2%)	0.64
	Yes	26 (78.8%)	7 (21.2%)	

commonly involved in patients with mandibular factures (27%) followed by dentoalveolar fractures (20%).

Dentoalveolar fractures in this study were numbering 31 (21.5%) inclusive of both the mandibular and maxillary region (19). In motor vehicle accidents, injury to the dentoalveolar can be in isolation or in association with multisystem. It can be a result of direct trauma to the teeth or from indirect trauma caused by the mandibular dentition forcibly closing against the maxillary dentition. In case of direct trauma protruding anterior teeth are at a major risk of injury (20).

The hospital records did not contain details regarding the occupation of the victim, time and place of accident and whether he was wearing a helmet or not. If these details were also to be included in the hospital records, then further assessment of the associated risk factors could be ascertained.

The elements that increase the vulnerability factor due to road traffic accidents in India are the poor road infrastructure, increased vehicle density, lack of traffic discipline and encroachment of the pedestrian pathways. And when an individual meets with an accident, it results in emotional trauma, personal loss, and economic hardship, which have to be borne by the family of the affected. Hence further studies are warranted to ascertain the risk factors thus leading to implementation of preventive measures.

Further it is suggested that the validity period for licenses issued can be reduced to 5 years from the present 20 years, thus testing or updating rider's knowledge about latest rules and safety practices. All this can be achieved if authorities aim at zero incidence of road traffic accident.

Conclusions and recommendations

Present study shows that there was an increase in the prevalence of maxillofacial injuries among young adults especially males. There is an increased prevalence of road traffic injuries during monsoon season and holiday periods. Therefore, greater caution should be exercised by the drivers during these seasons.

It was evident that after implementation of the helmet rule there was a reduction in the prevalence of maxillofacial injuries. Strict implementation of the helmet rule and existing traffic rules should be done. 'Don't Drink and Drive' campaign should be intensively promoted.

Awareness campaigns should target the young group. There is a need to educate and stress on the importance of helmets, traffic rules and other safety measures should be a part of the academic curriculum in schools, 'Catch Them Young' should be the motto.

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