

## Correlation between time of occurrence and severity of maxillofacial injuries in road traffic accidents- A Retrospective Study.

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### Abstract:

**Background:** Majority of the maxillofacial injuries in developing countries are still due to road traffic accidents when compared to western world where it is mainly due to interpersonal violence. Though there are studies evaluating the causes and mechanisms of the major and clinically significant maxillofacial injuries, less emphasis is made on the significance of time of occurrence and severity of maxillofacial injuries in road traffic accidents. Hence, this study was undertaken to evaluate the correlation between time of occurrence and severity of maxillofacial injuries in road traffic accidents.

**Materials and Methods:** A record based observational study was performed to evaluate the correlation between time of occurrence and severity of maxillofacial injuries in road traffic accidents. Data was collected from casualty register maintained in the Department of Oral and Maxillofacial Surgery, Government Dental College, Kozhikode during January 2019-December 2019. Parameters on which patients were evaluated included: age of the patient, gender distribution of the patient, time of occurrence, whether protective gears used or not, under intoxication or not and severity of maxillofacial injuries assessed using facial injury severity scale (FISS).

**Results:** A total of 1017 trauma cases were reported during the study period. Majority of the cases reported were mild injuries according to FISS (71%). Statistically significant difference was observed for the parameters, use of protective gears and time of occurrence ( $p$  value  $< .05$ ). The incidence of maxillofacial trauma cases were higher among those who had not used any type of protective gears and among the cases occurred between 6PM to 6AM.

**Conclusion:** Correlation exist between the time of occurrence and severity of maxillofacial injuries in road traffic accidents with greatest incidence and severity of injuries occurred between 6 PM to 6 AM.

**Key words:** facial injury severity scale, maxillofacial trauma, road traffic accidents, time of occurrence.

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### I. Introduction

Road Traffic Accidents (RTA) are reported to be the major cause for maxillofacial trauma. Annually, more than 1 million deaths are recorded worldwide due to RTAs, while non-fatal RTAs are a major problem, causing hospitalization and permanent disability to thousands of person each year.<sup>1</sup> Maxillofacial trauma in isolation or in combination with other injuries account for a significant percentage of emergency room and hospital admissions. Injuries to the maxillofacial region are quite common as it occupies the most prominent position in the human body. The alimentary and respiratory tracts, which are the two most important components start from this area. These injuries may cause serious functional, psychological, physical, and cosmetic disabilities. Factors like tendency to consume alcohol in the evening, substantial increase in traffic after the office hours, contribute to an increased incidence of trauma.<sup>2,3</sup> Majority of the maxillofacial injuries in

developing countries are still due to road traffic accidents when compared to western world where it is mainly due to interpersonal violence.<sup>4</sup>The research about road traffic accidents took on many formats ranging from 'on-site investigations' to retrospective studies of serious accidents.<sup>2,5</sup>The latter method served to establish causes and mechanisms of the major and clinically significant injuries, but less emphasis is made on the significance of time of occurrence and severity of maxillofacial injuries in road traffic accidents. Hence, this study was undertaken to evaluate the correlation between time of occurrence and severity of maxillofacial injuries in road traffic accidents.

## **II. Materials and Methods**

A record based observational study was performed to evaluate the correlation between time of occurrence and severity of maxillofacial injuries in road traffic accidents.

**Study design:** Record based observational study.

**Study setting:** Tertiary health centre-Department of Oral and Maxillofacial Surgery, Government Dental College, Kozhikode.

**Subjects and Selection method:** Data was collected from casualty register maintained in the Department of Oral and Maxillofacial Surgery, Government Dental College, Kozhikode during January 2019-December 2019.

### **Inclusion criteria**

All road traffic accident cases with maxillo-facial injuries reported to the casualty were included in the study.

### **Exclusion criteria**

Follow up cases were excluded from the study.

**Sample Size Estimation**  $n = \frac{(Z_{\alpha} + Z_{\beta})^2 pq}{d^2} \times 2$

Where,

$Z_{\alpha}=1.96$ ,  $Z_{\beta}=0.84$ ,  $p=67.7\%$ ,  $q=(100-67.7)$ ,  $d=10\%$

With 95 % confidence and 80% power sample size was estimated to be 343.<sup>6</sup>

**Study procedure:** Permission to access register data was obtained from head of the Oral and Maxillofacial Surgery Department, Government Dental College, Kozhikode. Ethical clearance was obtained from the Institutional Ethics Committee bearing a registration number 198/2020/DCC. Data was collected from casualty register maintained in the Department of Oral and Maxillofacial Surgery. Collected data was consolidated using proforma. Parameters on which patients were evaluated included: age of the patient, gender distribution of the patient, time of occurrence, whether protective gears used or not, under intoxication or not and severity of maxillofacial injuries. Patients were categorised into group I to VII based on age. Based on time of occurrence of injury, patients were divided into 2 groups. Group I included oral and maxillofacial trauma cases occurred between 6 AM morning to 6 PM evening and group II included cases occurred between 6 PM evening and 6 AM next day morning. Use of protective gears: helmet or seatbelt, intoxication with drugs or alcohol were also taken into consideration. The severity of facial injuries were graded according to the facial injury severity scale (FISS), where soft tissue and hard tissues were examined and scored according to FISS system. The FISS score was grouped into mild (FISS score 1-3), moderate (FISS score 4-7) and severe injuries (FISS score 8-15).<sup>7,8</sup>

### **Statistical analysis**

Data analysis was carried out using IBM SPSS (Statistical Package for Social Sciences) Version 21.0, Chicago, IL. The Pearson chi-square test was applied to determine if a statistical relationship existed between FISS and afore mentioned variables (critical p-value = <0.05).

## **III. Results**

A total of 1017 trauma cases were reported during the study period. Majority of the cases reported were mild injuries according to FISS (71%). Analysis on distribution of severity of cases in relation to gender revealed that males (85.6%) were most commonly injured when compared to females and most of the injuries were graded as mild (70.1%).Results were found to statistically insignificant as shown in Table 1.

**Table 1: Distribution of severity of cases in relation to gender**

Gender	Severity			Total
	Mild	Moderate	Severe	
Males	611	228	32	871
	70.1%	26.2%	3.7%	85.6%
Females	111	32	3	146
	76.0%	21.9%	2.1%	14.4%
Total	722	260	35	1017
	71.0%	25.6%	3.4%	100.0%

**P value = .29**

Statistically significant result was not obtained when distribution of severity of cases in relation to age was analysed. Majority of cases were reported in the second and third decade of their life, with a peak incidence of maxillofacial trauma observed in the age group of 20–29 years (38.2%). A decreasing trend was seen as the age advanced as depicted in Table 2.

**Table 2: Distribution of severity of cases in relation to age**

Age	Severity			Total
	Mild	Moderate	Severe	
10-19 years	95	24	5	124
	76.6%	19.8%	4.1%	12.1%
20-29 years	264	108	16	388
	68.0%	27.8%	4.1%	38.2%
30-39 years	157	58	8	223
	70.4%	26.0%	3.6%	21.9%
40-49 years	115	39	3	157
	73.2%	24.8%	1.9%	15.4%
50-59 years	55	17	2	74
	74.3%	23.0%	2.7%	7.3%
60-69 years	32	10	1	43
	74.4%	23.3%	2.3%	4.2%
70-79 years	4	2	0	6
	66.7%	33.3%	0%	.6%
80-89 years	0	1	0	1
	0%	100.0%	0%	.1%
90-99 years	0	1	0	1
	0%	100.0%	0%	.1%

**P value =.77**

Analysis on distribution of severity of cases in relation to status of intoxication revealed that most of the cases were not intoxicated with alcohol and drugs (83.1%). Among those who were intoxicated (16.9%) most of the trauma cases reported were mild injuries according to FISS (64.1%) as shown in Table 3.

**Table 3: Distribution of severity of cases in relation to intoxication**

Intoxicated	Severity			Total
	Mild	Moderate	Severe	
Yes	110	53	9	172
	64.0%	30.8%	5.2%	16.9%
No	612	207	26	845
	72.4%	24.5%	3.1%	83.1%

**P value =.06**

Analysis on distribution of severity of cases in relation to use of protective gears revealed a statistically significant difference (P value =.018) with a higher incidence of maxillofacial injuries reported (64.7%) for those who had not used any protective gears. Most of the trauma cases (68.2%) were graded as mild injuries (Table 4).

**Table 4: Distribution of severity of cases in relation to use of protective gears**

Protective gears used	Severity			Total
	Mild	Moderate	Severe	
Yes	273	73	13	359
	76.0%	20.3%	3.6%	35.3%
No	449	187	22	658
	68.2%	28.4%	3.3%	64.7%

**P value =.018\***

Analysis on the distribution of severity of cases in relation to time of occurrence, revealed a statistically significant difference (p value=.000) with greatest incidence of maxillofacial injuries (56.3%) occurred between 6PM to 6AM. Most of the trauma cases were categorized as mild (64.9%) according to the severity scale as depicted in Table 5.

**Table 5: Distribution of severity of cases in relation cases in relation to time of occurrence**

Time of Occurrence	Severity			Total
	Mild	Moderate	Severe	
6AM-6PM	350	87	7	444
	78.8%	19.6%	1.6%	43.7%
6PM-6AM	372	173	28	573
	64.9%	30.2%	4.9%	56.3%

**P value =.000\***

#### IV. Discussion

Road traffic injuries cause considerable economic losses to individuals, their families, and the nations as a whole. Majority of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have less than 54% of the world's vehicles.<sup>3</sup> Lower levels of protective device compliance and older design of vehicles in these countries may contribute to different types of injuries.<sup>9</sup> In the developing world, current trends in population growth, industrialization, and urbanization are putting heavy pressure on the transport network in general and on road system in particular.<sup>10</sup> A high prevalence of old vehicles that often carry many more people than they are designed to carry, lack of safety belt and helmet use, and poor road conditions are other factors that contribute to high rate of accidents. Despite this, road safety has not received enough attention in many developing countries. Many studies are available on the incidence and treatment of maxillofacial injuries. However, knowledge is limited on the existence of association between time

of occurrence and severity of maxillofacial injuries. To the best of our knowledge, this is the first study assessing the correlation between time of occurrence and severity of maxillofacial injuries in road traffic accidents. In the present study, males were almost six times more commonly injured than females. This discrepancy may be due to the fact that males are comparatively more involved in outdoor activities, more likely to drive vehicles and more possible to be chronic alcoholics and substance abusers. On the other hand, females are involved more into household and indoor activities in this country which was in accordance with study conducted by Gurung et al.<sup>3</sup> where males were three times more commonly injured than females. This study found the peak incidence of maxillofacial trauma in the 20 to 29 years age group which is the most active period of life. High risk-taking behaviours like immature, inexperienced, and rash driving during this decade are one of the main reasons behind it.<sup>3</sup> Similar findings was reported by Kapoor et al.<sup>2</sup> where he stated that peak incidence of maxillofacial trauma observed in the age group of 21–30 years. When the status of intoxication and severity of maxillofacial injuries was assessed, we have found that only 16.9% of cases were intoxicated with drugs or alcohol and they reported with mild injuries whereas in the study conducted by Shiffler et al.<sup>11</sup> those have been intoxicated were ten times more likely to have maxillofacial injuries. There was a significant increase in the incidence of maxillofacial injuries among those who had not used any types of protective gears which was in line with the study conducted by Manouchehrifa et al.<sup>12</sup> where strong correlation was observed between the increased severity of injury and no use of safety equipment. In our study, we observed that there existed a strong association between the time of occurrence and severity of maxillofacial injuries in road traffic accidents. Highest incidence of injuries were observed in the accident cases occurred between 6 PM to 6 AM. Significant difference was observed in the number of trauma cases occurred in two time points with more severe cases occurred between 6 PM to 6 AM (28 cases) compared to the counterpart (7 cases). When severity of cases were assessed, most of the cases were mild injuries. Similar findings were reported by Kapoor et al.<sup>2</sup> where the greatest incidence of maxillofacial trauma was observed in the evening hours between 6 PM and 12 AM. These findings can be attributed to the substantial increase in traffic after the office hours, when people are returning home, and to a tendency to consume alcohol in the evenings.

Various epidemiologic and demographic characteristics of maxillofacial injuries have been highlighted in this study. More elaborate prospective studies may further support the findings of our study and help in preparing more reliable and preventive health care measures against maxillofacial trauma. Emergency departments can be made more efficient and lifesaving by immediate attention of the victims of road traffic accidents with their full team during that particular period of time. The explicit requirements of trauma centres to be staffed and prepared to deliver optimal care independent of time of day may be instructive for emergency trauma care.<sup>2, 13</sup>

## V. Conclusion

Correlation exist between the time of occurrence and severity of maxillofacial injuries in road traffic accidents with greatest incidence and severity of injuries occurred between 6 PM to 6 AM.

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