

# Proportion of Traumatic Dental Injuries to Permanent Anterior Teeth among Patients attending the OPD, GDC-Kottayam A Cross Sectional Study

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**Abstract**— The aim of the study was to measure the proportion of permanent anterior teeth fracture in patients attending the OPD, GDC Kottayam and its association with predisposing factors such as, overjet, lip coverage, molar relationship and variables such as age, gender, etiology, place of occurrence of trauma, teeth involved in trauma, type of tooth trauma & time gap between trauma and treatment. Materials and Methods. The study was conducted on 400 patients reporting at the OPD, GDC, Kottayam from January 2018 to June 2018. Patients were questioned with a standard questionnaire from Oral Health Survey WHO format 2013. Results were evaluated using Pearson's Chi-square test. Out of the 400 patients examined, traumatized dental injuries (TDI) to anterior teeth were seen in 104 (26%) cases, increase in prevalence in males (58%) between the age group of 15-30 years (56.7%), common etiological factor seen was falls (51%). The most common type of fracture was enamel-dentine fracture (52.9%) with class 1 molar relation (83.7%)

Conclusions: In the present study we noticed that fall was the most frequent cause and are seen more in males with an increased prevalence in 15–30 years of age. Furthermore, fracture of maxillary central incisor was most common and among all, fractures involving enamel and dentin were most common.

**Index Terms**— Falls, tooth fracture, trauma, TDI, overjet, enamel fracture, dentin fracture

## 1 INTRODUCTION

TRAUMATIC dental injuries (TDI) may be direct or indirect, which have physical impact on tooth and its surrounding tissues<sup>1</sup>. It is a phenomenon with no definite etiology and associated with factors such as oral environment and human behavior<sup>1</sup>. The number of traumatic dental injuries, resulting from facial trauma has shown a marked increase since last 30 years. Severity and frequency of TDI is associated with an increase in overjet, incompetent upper lip, and inadequate soft tissue coverage<sup>2</sup>. Age, sex, and behavioural problems also have an influence in the frequency of traumatic dental injuries<sup>2</sup>. Most studies have stated that permanent maxillary central incisors are the most frequently affected teeth<sup>2</sup>. Fall, collisions, sports, and traffic accidents are the main cause for dental injuries. The reported prevalence of TDI ranges from 4.1% to 58.6%<sup>3</sup>. Hence, the objective of this study was to measure the proportion and to evaluate the risk factors involved in anterior teeth fracture in patients attending the OPD of GDC, Kottayam.

## 2 MATERIALS AND METHODS

Institutional ethics clearance was obtained from Institutional ethics committee (IEM/M/14/2017/DCK) and the study was conducted on 400 patients, reporting to the outpatient de-

partment of GDC, Kottayam from January to June 2018. Informed consents were obtained and patients were questioned with a standard questionnaire from Oral Health Survey WHO format 2013<sup>4</sup>. Patients were examined under good illumination using sterile diagnostic instruments.

The scoring criteria according to the WHO classification are as follows.

- Score 0 = No sign of injury
- Score 1 = Treated injury
- Score 2 = Enamel fracture only
- Score 3 = Enamel and dentin fracture
- Score 4 = Pulp involvement
- Score 5 = Missing tooth due to trauma
- Score 6 = other damage
- Score 7 = Nonvital tooth
- Score 8 = Displacement of the tooth without the fracture of crown or root
- Score 9 = Excluded tooth.

Inclusion criteria: Patients aged between 12-70 years.

Exclusion criteria: Patient who has undergone orthodontic treatment, tooth with caries, tooth with root fracture, differently abled patients.

Statistical analysis Data obtained were analyzed using Statistical Package for Social Sciences version 16.0. Differences between variables were analyzed using the Pearson's Chi-square test,  $p < 0.05$  was considered to be statistically significant.

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### 3 RESULTS

The sample size of this study included 400 patients. Out of 400 patients, 104 (26%) cases had anterior teeth fracture due to trauma. 58% males and 42% females had anterior tooth fracture where  $P < 0.001$  which is statistically significant (Table 1). Statistical analysis showed 56.7% of anterior tooth fracture due to trauma were in the age group of 15–30 years, followed by 19.3% cases in age group of 30–45, 12.5% in the age group of 12–15 and 11.5% between 45–60 (Table 2). Most frequent etiology of anterior teeth fracture was falls 51%, followed by RTA 18.3%, collision 13.5%, biting on hard objects 11.5%, sports 3.8% and 1.9% from violence (Figure 1). Occurrence of trauma was more outdoor (58.7%) than indoor trauma (41.3%) (Figure 2)

**TABLE 1**  
ASSOCIATION OF GENDER WITH TRAUMA STATUS

		Trauma status		P value
		No trauma	Trauma present	
Gender	Male	112 65.1%	60 58%	0.0001
	Female	184 80.7%	44 42%	

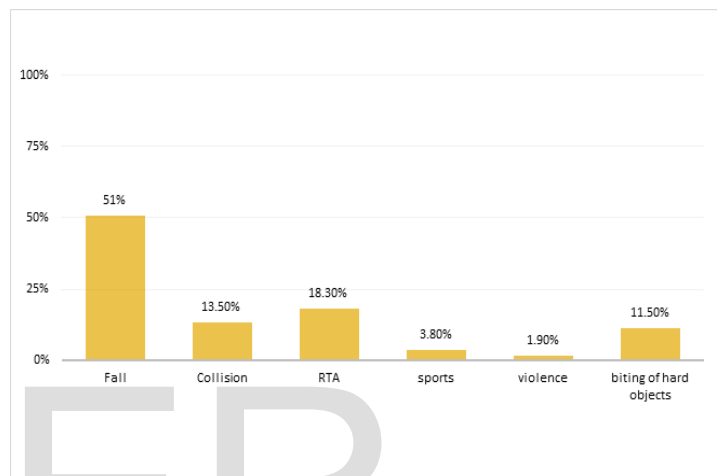
**TABLE 2**  
ASSOCIATION OF AGE GROUP WITH TRAUMA STATUS

		Trauma status		P value*
		No trauma	Trauma present	
Age	12-15 years	12 48.0%	13 12.5%	0.0001
		15-30 years	99 62.7%	
	30-45 years		90 81.8%	
		45-60 years	80 87.0%	
	> 60 years		15 100.0%	

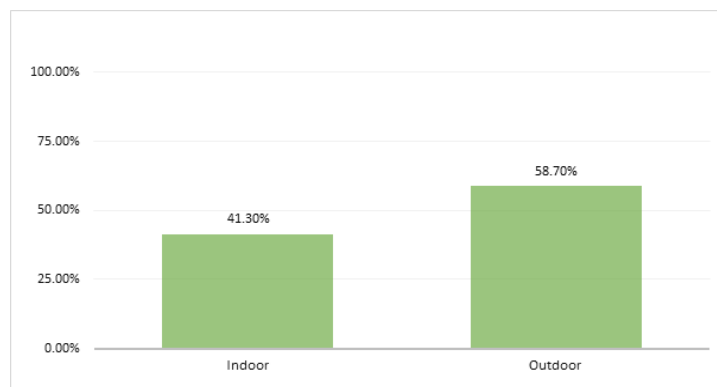
Maxillary arch showed 95% of anterior tooth fracture while 5% were seen in the mandibular arch (figure 3). Maxillary central incisor showed the maximum frequency of anterior tooth fracture with 74.4% and least frequent was maxillary canine with 5.76% (figure 3). In this study, 59.6% of the cases had only single tooth fracture and while 40.4% had multiple teeth

fracture (figure 3). Among the type of tooth fracture, 52.9% had enamel and dentin fracture, 23.1% of teeth showed enamel only fracture, followed by 22.1% with pulpal involvement and 2%, had treated injuries or non vital teeth (Table 3). 87.5% had adequate lip coverage and 12.5% inadequate lip coverage (figure 3). 83.7% had Class I molar relation and 16.3% had Class II Division I molar relation (figure 3). 85.6% had overjet of 0–3mm and while 14.4% cases had overjet of 3–6mm (figure 3). 51.9% immediately turned for treatment while the rest after 6 months of trauma (figure 4)

**FIGURE 1**  
ETIOLOGY OF TRAUMA



**FIGURE 2**  
PLACE OF TRAUMA



**FIGURE 3**  
PROPORTION OF ANTERIOR TOOTH FRACTURE

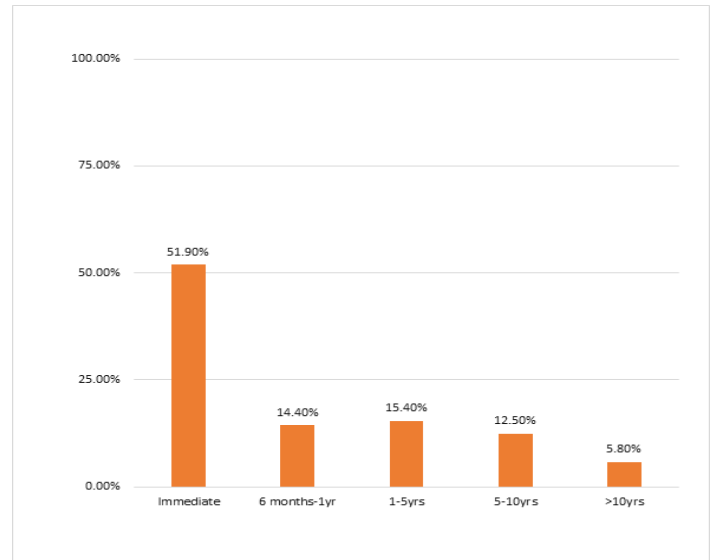


**TABLE 3**  
TYPE OF TRAUMA

WHO Score	Frequency	Percent
Score 1	1	1.0
Score 2	24	23.1
Score 3	55	52.9
Score 4	23	22.1
Score 7	1	1.0

Total	104	100.0
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**FIGURE 4**  
TIME GAP BETWEEN TRAUMA AND TREATMENT



#### 4 DISCUSSIONS

In the present study, it was observed that the overall proportion of anterior tooth fracture was 26% in 400 patients. A study conducted by Jubana & Hegde<sup>5</sup> in 2017, the overall prevalence was only 7.2%. An increase in the prevalence of anterior teeth fracture due to trauma in this study may be correlated to life style habits & behaviour. The prevalence of anterior tooth fracture with respect to gender was found to be greater in males (58%), females (42%), where  $P < 0.001$  which is statistically significant (Table 1). Similar result was found by Hegde and Shabin<sup>1</sup>, Hegde and Sajani<sup>6</sup>, Hedge N and MN Hedge<sup>7</sup>, Glendor<sup>3</sup>, Castro et al<sup>8</sup>, Caldas<sup>9</sup> and Lam et al<sup>10</sup> in their study. Males showed higher prevalence of anterior tooth fracture due to trauma that could be due to occupational accidents, road traffic accidents, sports injuries, violence.

Maximum prevalence of fracture of anterior tooth due to trauma, 56.7% was seen in the age group of 15-30 years, followed by 19.3% in the age group of 30-45 years, where  $P < 0.001$  which is statistically significant (Table 2). The high prevalence in these age groups could be due to the active participation of the individuals of these age groups in extra-curricular activities, dangerous work practices and road traffic accident and the general tendency of taking greater risks. This is similar to the results of the study conducted by Hegde and Sajani<sup>6</sup>, which showed the maximum prevalence of anterior tooth fracture in the age group of 15-30 years. According to Lam et al<sup>10</sup>, 92% of traumatic dental injuries occur before the age of 34 years.

Among the different etiologic factors, prevalence of anterior tooth fracture occurred mostly because of falls (51%) (figure 1). Similar findings were observed by Hegde and Shabin<sup>1</sup>, Hegde and Sajani<sup>6</sup>, Hedge N and MN Hedge<sup>7</sup>, Caldas and Burgos<sup>9</sup>, Lam et al.<sup>10</sup> Zuhail et al<sup>11</sup>. Other etiologies such as road traffic accident (18.3%), collision (13.5%), biting on hard objects

(11.5%), sports (3.8) accident (3.8%), violence (1.9%) also contributed for anterior tooth fracture. Anterior tooth trauma occurred more outdoor (58.7%) than indoor (41.3) in this study, which underscores the fact that outdoor activities, travel and sports are promoted more among males rather than females. (Figure 2)

In this study maxillary arch showed 95% of anterior tooth fracture while 5% were seen in the mandibular arch (figure 3). Maxillary central incisor showed the maximum frequency of anterior tooth fracture with 74.4% and least frequent was maxillary canine with 5.76% (figure 3). This is in accordance with the findings by Hegde and Shabin<sup>1</sup>, Hegde and Sajani<sup>6</sup>, Hedge N and MN Hedge<sup>7</sup>, Castro et al<sup>8</sup>, Lam et al<sup>10</sup>, Zuhail et al<sup>11</sup>, Kania et al<sup>12</sup>. The fracture of maxillary central incisor could be because prognathic maxilla and anatomic position of the maxillary central incisors in the arch thus whenever any individual falls or collides with any object; they have high chances to fracture. Furthermore, since they are the first teeth to erupt in the oral cavity, they will be present when the child begins to play or participate in any activity. Bozabadi<sup>13</sup> et al. concluded in his study that mandible has a nonrigid connection with the cranial base, and Class III malocclusion dissipates the blows to mandible and offers natural protection to mandibular incisors<sup>13</sup>. In this study 59.6% had only single tooth fractured while 40.4% had multiple teeth fracture (figure 3). Single tooth fracture is more commonly observed than multiple teeth fracture, but if they occur, they tend to occur from sports injuries, RTA and physical violence.

When different types of fractures in the teeth were compared, fracture involving enamel and dentin (52.9%) was the most common, followed by enamel only fracture (23.1%) which is in accordance with the studies by Hedge and Sajani<sup>6</sup>, Zuhail et al<sup>11</sup>, Brunner et al<sup>14</sup>, Bücher et al<sup>15</sup>. Individuals with only enamel fracture might not opt for treatment as they don't have any complaints or sometimes, they might not be aware of it. Prevalence of fracture involving pulp 22.1% were recorded in this study (Table 3)

In this study, anterior tooth trauma was seen in 83.7% with Class I molar relation and 16.3% had Angle's Class II Division I molar relation (figure 3). This observation was similar to the finding by Hedge N and MN Hedge<sup>7</sup>, but not in accordance with the findings of the study by Hegde and Sajani<sup>6</sup> where anterior tooth fracture was seen frequently in cases of Angles Class II Division I. In this study 85.6% had an overjet of 0-3 mm and only 13.65% cases had 4-6mm overjet (figure 3).

Among the patients with anterior tooth fracture, 51.9% immediately turned for treatment which may be due to sensitivity related with enamel and dentin fracture, and the rest 48.1% after 6 months for any kind of treatment (figure 4). This may be because the individuals may have given low priority to their dental injuries as they might not have any pain and aesthetic problems. Lack of awareness can also be one of the major reasons for the decrease in the number of patients undertaking treatment

#### 4 CONCLUSION

In the present study, a high prevalence of traumatic injuries to

the anterior teeth were recorded in the age group of 15-30 years. Fall was the most frequent cause of teeth fracture that is seen more in males. Among the anterior teeth trauma, fracture of maxillary central incisor was most common and among all the fractures, that involving enamel and dentin was most common. Furthermore, individuals with Angle's Class I molar relationship showed higher prevalence of anterior tooth fracture due to trauma. Furthermore, we noted that traumatic dental injury is a serious public dental health problem and preventive educational campaigns should be introduced, to educate people about the problems of dental trauma and the importance of immediate treatment would minimize the sequelae of these traumatic injuries

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