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# A Retrospective Evaluation of Traumatic Dental Injuries in Children Visiting Dental Setup in Delhi-NCR

Juneja A<sup>1</sup>, Sultan A<sup>2</sup>, Siddiqui M<sup>3</sup>

<sup>1</sup>Associate Professor, Department of Pediatric and Preventive Dentistry, Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India;

<sup>2</sup>Professor, Department of Pediatric and Preventive Dentistry, Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India; <sup>3</sup>Tutor,

Department of Pediatric and Preventive Dentistry, Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India.

## ABSTRACT

**Rationale:** Dental trauma during childhood and adolescence is a health hazard as it is commonly associated with accidents, sports activities and violence.

**Objectives:** This study aimed to understand the characteristics and factors associated with anterior tooth trauma in the case reported in a dental college of Delhi-NCR during the 5 years (2011-2016).

**Methods:** A retrospective cross-sectional analysis of dental records of patients of the age group of patients of age 6-13 years with anterior tooth trauma, reported in 5 years, was done, and injury-related data for permanent dentition was collected. Statistical analysis was performed using the Chi-square test ( $p < 0.05$ ).

**Results:** Ellis Type II (Enamel-dentin) fractures were the most common type (29%), followed by Ellis Class VII (24%). Permanent Maxillary central incisors were the most commonly affected teeth. Only 9% of patients reported within 4 hours of anterior tooth trauma. The prevalence rate was 55% in males and 45% in females with no statistically significant difference.

**Conclusion:** Traumatic dental injuries can adversely affect the physical as well as the psychological growth of children and adolescents. Health promotion and educational policies are needed to provide create awareness at ground level and to motivate patients for immediate intervention.

**Key Words:** Accidents, Health education, Permanent teeth, Retrospective, Tooth trauma, Traumatic dental injuries

## INTRODUCTION

Dental trauma during childhood and adolescence is a health hazard as it is commonly associated with accidents, sports activities and violence. It affects the overall quality of life of an individual including the physical and psychological aspect.<sup>1</sup> Some studies have reported body injuries as a major cause of mortality in people of the age group 12- 24 years.<sup>2,3</sup> There is a wide variation in the prevalence of dental injuries throughout the world. While in some review studies it has a wide range of 6-59%.<sup>2</sup> Some authors report the prevalence to be approximately 15-30% in primary dentition and 16-40% in permanent teeth in children aged 6-12 years old.<sup>4</sup> This can also be interpreted as approximately one-third of all children till the age of 12 experience dental trauma at least once during their life. In Asian countries, the prevalence of traumatic injuries to anterior teeth among adolescents ranges from 4% to 35%.<sup>5,6</sup>

First 3 years of child is considered the age of greatest incidence of dental trauma to primary dentition, as this is the period during which motor skills develop.<sup>7</sup> The common cause of injuries to permanent dentition is secondary to falls, accidents, sports activities and violence. Anterior tooth trauma cases may present in mild form as a subluxation or a severe form as crown fracture, root fracture, luxations, intrusion extrusion or avulsion.<sup>8</sup> Late complications of traumatic dental injuries include pulpal necrosis, inflammatory root resorption, pulp canal obliteration secondary to continuous calcification of the pulp etc. Increased overjet and insufficient lip coverage are reported as significant predisposing factors.<sup>9</sup> These cases of traumatic injuries could have an improved outcome if there is better public awareness regarding first-aid measures and the necessity to seek immediate treatment. Prevention of traumatic anterior tooth injuries by spreading public awareness is only

### Corresponding Author:

**Dr. Akanksha Juneja**, Associate Professor, Department of Pediatric and Preventive Dentistry, Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India; Ph: 9971404330; Email: [ajuneja@jmi.ac.in](mailto:ajuneja@jmi.ac.in).

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possible only if it is based on reliable, complete and comprehensive data of cases of traumatic dental injuries, which should include the type of tooth trauma, age, risk factors, prevalence, causes, present awareness of parents and reasons for the delay in seeking treatment.

The purpose of the current retrospective study was to analyze the recorded data related to the anterior tooth trauma of the patients seen in the clinic of Department of Pediatric and Preventive Dentistry, Faculty of Dentistry, during 2011-2016, and to assess the relationship if any, based on the gender, age, number of injured teeth, and type of traumatic anterior tooth injury and the post-trauma period after which patient reports for a first dental visit.

## MATERIAL AND METHODS

The present cross-sectional retrospective study was carried out in the Department of Pediatric and Preventive Dentistry of a dental college in Delhi. The study was reviewed and approved by an Institutional Ethics Committee (Proposal 21/6/65/JMI/IEC/2016). The dental records of all patients in the age group of 6-13 years seen by the dental surgeon in the OPD of the department, from June 2011 to May 2016, were examined for the collection of data. Out of the entire database, male and female patients of the selected age group, with a history of anterior tooth trauma to permanent dentition were included. Cases with incomplete documentation or no dental trauma and children with special health care need having dental trauma were excluded. Data relating to gender (male to female ratio), age, number of injured teeth, tooth affected and type of trauma, the time elapsing between the injury and the presentation for treatment was collected. As dental injuries are mostly related to anterior teeth; hence data collection was limited to dental injuries to the four maxillary and the four mandibular permanent incisors. Records of all acute and non-acute dental visits that related to the treatment of traumatized permanent anterior incisors within the 5-year study period were reviewed.

Tooth fracture was assessed according to Ellis and Davey classification of fractures (1970).<sup>5,10</sup> Data analysis included frequency and percentage distribution and cross-tabulation. Statistical analysis was performed using the Chi-square test ( $p < 0.05$ ).

## RESULTS

After screening the entire data from June 2011 to May 2016, it was observed that a total of 183 children (2.5% of the total patient number) presented with anterior tooth trauma involving permanent teeth, 272 teeth being affected. Of these 45% case were reported in females; while 55% were reported

in males, which was not statistically significant (Table 1). Out of the total number of cases reported 61% cases were of single tooth trauma; while 39% of cases of multiple tooth trauma (Table 2, Figure 1). A comparison of age of occurrence of dental trauma showed that maximum of 26% of cases happened in the age group of 11-12 years, followed by 12-13 (24%) and 10-11 years (23%) (Table 3 and Figure 2). Ellis type II was the most common type of traumatic dental injury seen (29%); followed by Ellis Class VII (24%) (Table 4, Figure 3). Cases of avulsion were seen only during the age group of 7-8 years and 8-9 years (Table 5, Figure 4). In the age group of 8-9 years, Ellis Class VII was a most common type of dental trauma whereas in all the other groups Ellis class II was a most common type (Table 5, Figure 4). Only 9% of patients reported within 4 hours of dental injury, while 5% reported between 4 hours to 1 day. 10% of patients reported within 1 week; while maximum patients (35%) reported between 1 to 6 months post dental trauma (Table 6, Figure 5). Permanent Maxillary Central Incisor was the most commonly involved tooth in the cases reported (Table 7, Figure 6).

## DISCUSSION

The present retrospective study was conducted in the Department of Pediatric and Preventive Dentistry, in a government college in Delhi, India. The OPD where this study was performed is located in a low socio-economic area and treats minor facial trauma including soft tissue lacerations with tooth involvement. The present study can, therefore, be considered to cover reliably the whole spectrum of minor tooth traumas among the low socioeconomic population in Delhi, India. Higher numbers of traumatic dental injuries i.e. 73% were recorded in 10-13 years age group. This study has highlighted that the occurrence of dental injuries increased according to age, which was maximum in the 10-13-year age group as reported in earlier studies.<sup>11-13</sup>

The male to female ratio for the current population was found to be 1.24:1 which was not found to be statistically significant. This ratio has been shown to vary with different regions. Patel et al. (2012) observed male to female ratio of 1.28:1 in children of the age group of 8-13 years in Vadodara city, Gujarat,<sup>14</sup> while in Mumbai, Maharashtra, the ratio was found to be 1.6:1 in the age group of 13-14 years.<sup>15</sup> Many past studies have concluded that males experienced traumatic dental injuries more frequently than females in the permanent dentition; with a ratio ranging from 1.3 to 2.5:1 respectively.<sup>2</sup> This could be ascribed to the fact that males have been seen to have greater involvement in contact sports, violent behaviour etc.<sup>16,17</sup> However, it is now being observed in recent studies that gender disparity is on a decline,<sup>16,18</sup> as was evident in this study. This could be attributed to an increased involvement of females in sports indoor and outdoor

as well as in violent activities.

Majority of epidemiological studies have suggested that anterior teeth are most commonly affected in permanent dentition and the majority of cases being of single tooth trauma.<sup>2,4,19</sup> Gabris et al. (2001) in a retrospective study of 15 years concluded that 70% of the cases were of single tooth trauma with the most common injury type observed was an enamel-dentin crown fracture.<sup>13</sup> In the present study also 61% of the cases were of single tooth trauma with Permanent Maxillary Central Incisor being most frequently affected tooth. The present study showed Type II (enamel and dentin fracture) as the most common type of fracture and accounted for 29% of the total fractures, followed by Type VII and Type III. Protrusive position and being inadequately covered by upper lip make maxillary central incisors more prone to anterior tooth trauma.<sup>20,21</sup> Also, the maxillary arch is rigid whereas mandible is movable, making maxillary arch more prone to a certain type of tooth injury.<sup>22</sup> Ellis and Davey Classification of fractures (1970) were preferred for this study as compared to other classifications, as it was reliable, easy to use and comprehend from the data available.<sup>10</sup> The Ellis classification of fractures of anterior teeth has been used in many previous studies for recording traumatic dental injuries.<sup>23,24</sup>

In the present study, only 9% of patients reported within 4 hours of dental injury; while 35% reported within 1 week to 6-month post-trauma. The maximum percentage of patients (41%) reported after a minimum of 6 months post-trauma. In majority cases, the patients visited the dental clinic only after the appearance of signs and symptoms of sensitivity, pain and swelling etc. The study also revealed that patients who had suffered trauma without symptoms or obvious complications did not consult dental clinics and were therefore seen at routine appointments.<sup>9</sup> Delayed reporting for treatment could be attributed to the fact that maximum patients reported from low socioeconomic status; where awareness regarding seeking dental treatment post-trauma is low. Due to financial constraints also not, much importance is given to dental treatment, especially if no signs and symptoms are present.

However, this study had limitations. Since it was a retrospective study, the aetiology of the trauma, various treatment procedures and their success could not be assessed. A prospective longitudinal study can be useful to find the association of various types of anterior tooth trauma, the etiological and risk factors and treatment success.

## CONCLUSION

Traumatic dental injuries can adversely affect the physical as well as the psychological growth of children and adolescents. Health promotion policies are needed to provide affordable treatment and at the same time create a safe environment

around the school, home and society. Educational policies are needed to create awareness regarding the prevention of trauma as well as about the benefits of the immediate treatment and how that can minimize the sequelae of traumatic injuries.

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**Table 1: Gender wise distribution of trauma cases**

Gender	Total patients reported	Percentage of cases
Males	101	55
Females	82	45

**Table 2: Distribution According To Gender and No Of Teeth Involved**

Cases of Trauma	Male	Female
Cases of single tooth trauma	62	50
Cases of multiple tooth trauma	39	32
Total trauma cases	101	82

**Table 3: Age-wise distribution of cases**

Age Group	Number of cases	Percentage
7-8 years	6	3%
8-9 years	21	11%
9-10 years	23	13%
10-11 years	42	23%
11-12 years	48	26%
12-13 years	43	24%

**Table 4: Distribution between Gender and Dental Injuries**

Ellis Anterior Tooth Trauma Type	No of teeth involved	Gender		
		Percentage	Male	Female
I	21	8%	14	7
II	80	29%	44	36
III	61	22%	36	25
IV	34	13%	14	20
V	10	4%	8	2
VII	66	24%	34	32

**Table 5: Distribution between Age and Dental Injuries**

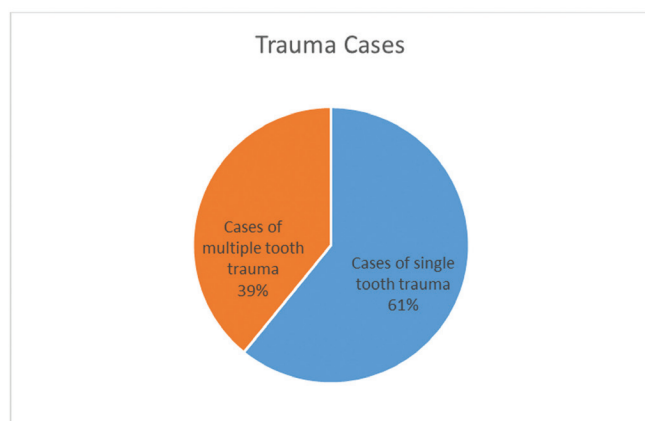
Ellis Type	Age					
	7-8 years	8-9 years	9-10 years	10-11 years	11-12 years	12-13 years
I	1	2	4	6	6	2
II		4	12	26	20	18
III		8	7	17	15	14
IV	1	2	4	3	11	13
V	6	4				
VII	4	15	9	6	17	15
Total	12	35	36	58	69	62

**Table 6: Distribution according to Time of Reporting**

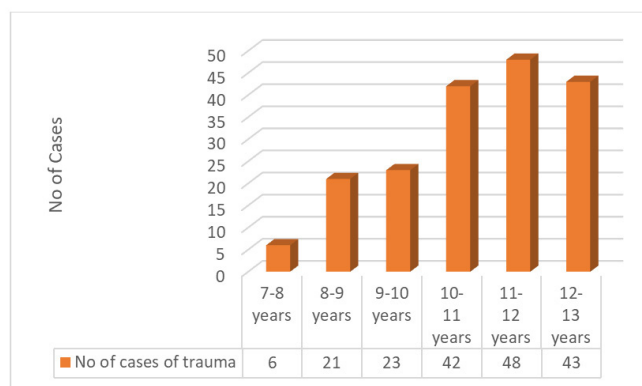
Reporting time since trauma	No of cases
Within 4 hours	16
Within 4-24 hours	10
1 day to 1 week	19
1 week to 6 month	64
6 - 12 month	27
1-2 years	38
2-3 years	6
3-4 years	3

**Table 7: Distribution of affected tooth according to TDI type**

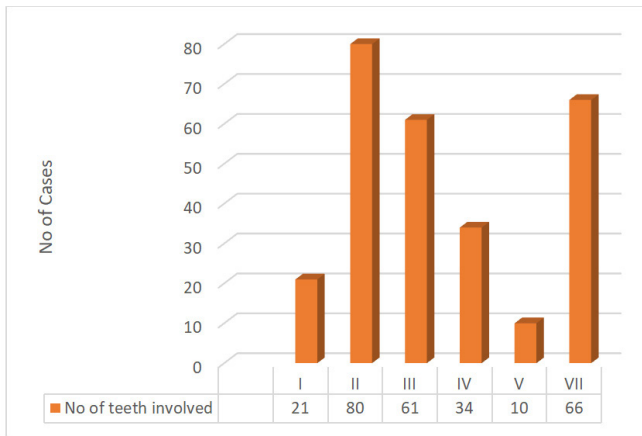
Tooth involved	No of cases	Class I	Class II	Class III	Class IV	Class V	Class VII
Right Maxillary Central Incisor	126	11	35	28	17	5	30
Right Maxillary Lateral Incisor	6	1	2		1		2
Left Maxillary Central Incisor	121	9	34	29	14	4	31
Left Maxillary Lateral Incisor	5		1			1	3
Left Mandibular Central Incisor	8		4	2	2		
Right Mandibular Central Incisor	5		3	2			
Right Mandibular Lateral Incisor	1		1				
Total		21	80	61	34	10	66



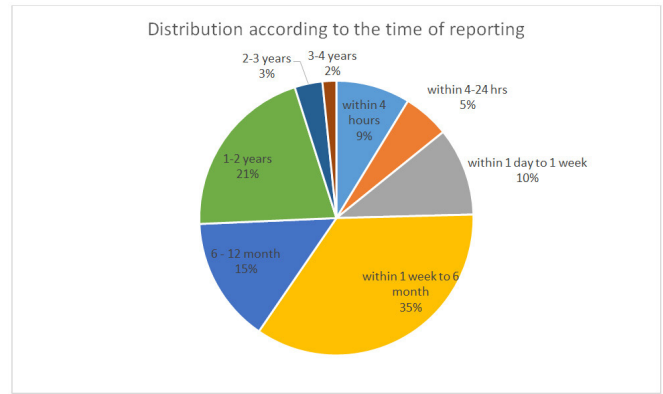
**Figure 1:** Distribution of single and multiple tooth trauma.



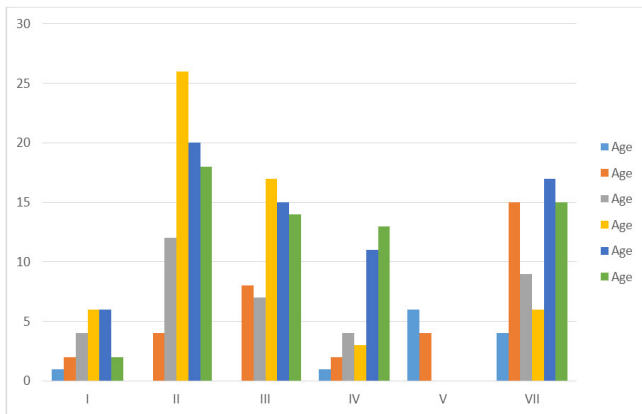
**Figure 2:** Age-wise distribution of cases.



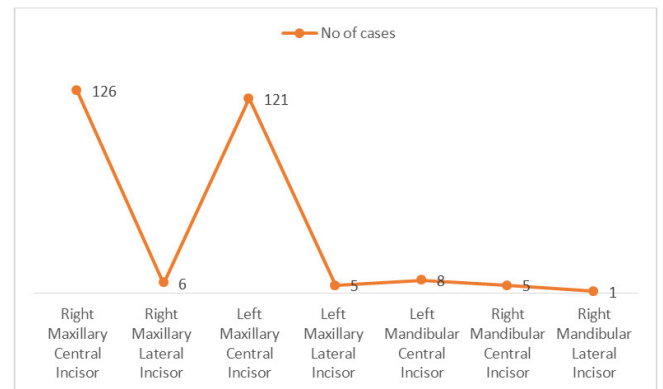
**Figure 3:** Distribution according to Ellis classification of Trauma.



**Figure 5:** Distribution according to the time of Reporting post trauma.



**Figure 4:** Age wise distribution of type of trauma.



**Figure 6:** Distribution according to tooth involvement.