

## Clinical Factors and Characteristics Associated With Traumatic Dental Injuries among Children

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### Abstract:

**Objective:** The purpose of this study was to assess the prevalence of Traumatic Dental Injuries (TDI) in children who attended the Department of Pedodontics and Preventive Dentistry, SRM Dental College, Chennai between the years 2013-2016 and to analyze the factors associated with it.

**Materials and Methods:** A retrospective study was carried out to retrieve data about the prevalence, gender, age, etiology of trauma, reasons for dental visit, number of injured teeth, type of injury, time elapsed and treatment rendered from the records of patients aged below 15 years.

**Results:** An overall prevalence of 0.05% was observed. Significantly more number of injuries was observed in boys (63%) of all age groups due to fall (82%) during the vacation months (20%). Majority of them had reported with their chief complaint as trauma (84%). Delayed reporting of more than a month was seen in significantly high number of cases (74%) ( $P < 0.05$ ). Permanent dentition (63%) was more involved than primary dentition (35%). Fracture involving enamel & dentin (38%) was the most common type of injury. Single tooth injuries (50%) and multiple tooth injuries (50%) were equally distributed; restorations were the most commonly done treatment.

**Conclusion:** Though a low prevalence rate of TDI has been found, the reporting time was delayed in significantly high number of cases, hence there is a pressing need to motivate the public about importance of early dental visit following trauma.

**Keywords:** Prevalence, retrospective study, dental injuries, children, characteristics

### I. Introduction

TDI is a common dental health problem amidst children, producing a substantial impact on their quality of life<sup>1</sup>. Traumatic dental lesions are caused by an external impact on a tooth and its surrounding tissues<sup>2</sup>. Children are uniquely susceptible to craniofacial injury because of their greater cranial-mass-to-body ratio. They lead to tooth lesions, affecting both supporting dental structures and hard tissues<sup>3</sup>. A survey in the United Kingdom has shown that trauma remains the leading cause of morbidity and mortality in children<sup>4</sup>. Some countries in Latin America report dental trauma for about 15% of schoolchildren whereas prevalence rates of 5-12% are found in children aged 6-12 years in the Middle East. However, recent studies from certain industrialized countries revealed that the prevalence of TDI is on the increase, ranging from 16-40% and 4-33% among 6-year-old and 12-14-year-old children respectively<sup>5</sup>. This information supports the concept that TDI is widespread among children. A person with injured tooth becomes a challenge for the dentist due to the rarity of the situation and uncertainty of the treatment prognosis<sup>6</sup>. It is important to realize that dental injuries to the deciduous teeth in addition to causing pain and loss of function have the potential for periapical sequelae, which can adversely affect the development of the permanent teeth as well as the developing occlusion. Hence, treatment of TDI in the young patient becomes unpredictable, complicated and expensive and can have lifelong impact on person's quality of life<sup>6</sup>. Several factors predispose to TDI in primary teeth. For a long time gender and age were considered the main risk factors, but currently other factors, such as the type of activity at the time of the accident, biological, environmental, behavioral and socioeconomic factors, have received greater attention<sup>7,8</sup>. According to WHO, reliable data on frequency and severity of TDI are still lacking in most countries, particularly in developing countries<sup>6</sup>. How and where dental trauma occurs, the type of trauma and etiological factors are sources of important information to dentists, as they use this information to educate parents on how best to prevent dental injuries<sup>2</sup>. This data may provide a basis for the evaluation of the concepts of effective treatment, prevention, channeling resources and planning within any health environment<sup>9</sup>. Thus, the present study was conducted to assess the prevalence of TDI and its associated factors among children in a private hospital set up, Chennai, India.

### II. Materials And Methods

The study was conducted in full accordance with the ethical clearance from the Institutional Review board, SRM University (SRMU/M&HS/SRMDC/2016/B.D.S - UG Student/001). The archival records over a period of 3 years and 6 months from January 2013 to July 2016 were retrospectively studied. Over 2333 case

records were accessed but only records of patients below 15 years and those who had history/clinical evidence of dental trauma were selected. This involved 127 records. Records with incomplete information were excluded. The data collected from the dental records for this study were organized according to year & month of reporting, age, gender, cause of trauma, reason for 1st visit, number of days elapsed since the injury, tooth affected, type of injury, and type of treatment procedure done. Recording of injuries was done according to Ellis and Davey's classification. The data were analyzed using SPSS statistical software (version 17.0; SPSS Inc., Chicago, IL, USA). Chi square test was used for comparison and level of significance was set at  $p < 0.005$ .

### III. Results

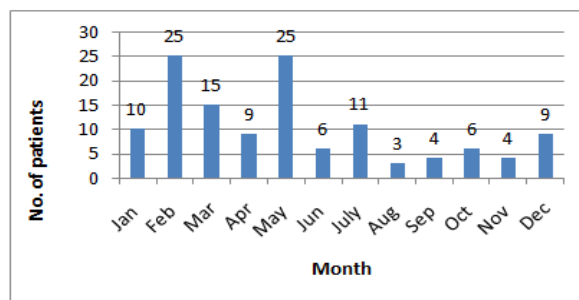
Among 2333 patients who reported to the Department during the study period of 3 years and 3 months, 127 case records fulfilled the inclusion criteria. Hence the overall prevalence rate was found to be 0.05%. Over a period of three years, more number of cases had reported in the year 2015 ( $n=48.8$ , Table 1). Patients reported significantly more during the month of May (20%) and February (20%) when compared to the other months ( $p < 0.000$ ) (Fig 1). Most common etiology was fall (82%), which was statistically higher ( $p < 0.000$ ), followed by hit (10%) and accidents (8%) (Table 2). Males (63%) were injured more frequently than females (37%). A significant difference was found ( $p = 0.003$ ). Male/female ratio was 2:1 (Fig 2a).

The age of the patients with TDI ranged from 1 to 15 years, mean age was 8 years, distribution of TDI according to age did not show any significant differences,  $< 5$  years (27.6%), 6-10 years (39.4%), 10-14 years (33%) ( $p = 0.26$ ) (Table 3). Patients who had reported to us with their chief complaint as trauma were higher (85.8%) ( $p < 0.000$ ). Few patients did not complain about the trauma though it was evident on clinical examination (14.2%) (Fig 2b). Comparing the number days elapsed from the moment of injury to treatment, patients who reported after 1 month ( $n=74$ , 58.3%) were significantly high ( $P < 0.005$ ), 11% of patients have reported within 1 month ( $n=14$ ), 25% of the patients reported within 1 week ( $n=32$ ), 5.5% of patients reported within 24 hours ( $n=7$ ) (Fig 3). By analyzing the number of teeth injured, we found that 50% of children sustained injury to single tooth while 50% had multiple teeth involved (Fig 4a). Most affected dentition was permanent dentition (63%) than the primary dentition (37%) (Fig 4b). The maxillary left central incisor was the most affected tooth in both primary (43%) and permanent dentition (51%) ( $p < 0.000$ ) followed by right central incisor (Primary dentition-34%, permanent dentition-42%) (Fig 4c,4d). In the hard tissues, highest number of cases reported with enamel and dentin fracture (38%), followed by fracture involving enamel, dentin and pulp (18%) (fig 5). The most common treatment done was non-endodontic composite restorations (38%) (Table 4) ( $p < 0.005$ ).

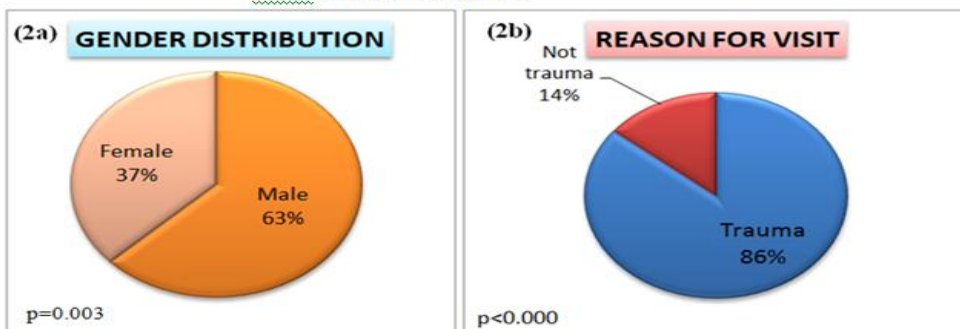
**Table 1:** Yearly distribution of TDI (From Jan 2013 to Aug 2016)

Dental Trauma		
Year	N	%
2013	6	4.7
2014	16	12.6
2015	62	48.8
2016	43	33.9

**Figure 1:** Monthly distribution of TDI



**Figure 2:** (a) Distribution of TDI according to gender (b) Distribution of patients according to the reason for their 1<sup>st</sup> Dental visit



**Table 2:** Causes of TDI

Cause of TDI	n (%)
Fall	104 (81.9)*
Hit	13(10.2)
Accidents	10(7.9)

\*p<0.000

**Table 3:** Distribution of TDI according to age

Age group	N (%)
1-5 years	35 (27.6)
6-10 years	50 (39.4)
10-15 years	42 (33.1)

p=0.26

**Figure 3:** Distribution of number of days elapsed from the injury and dental treatment.

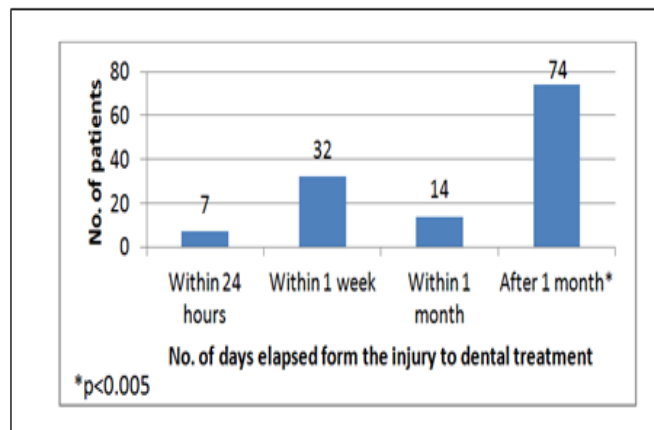
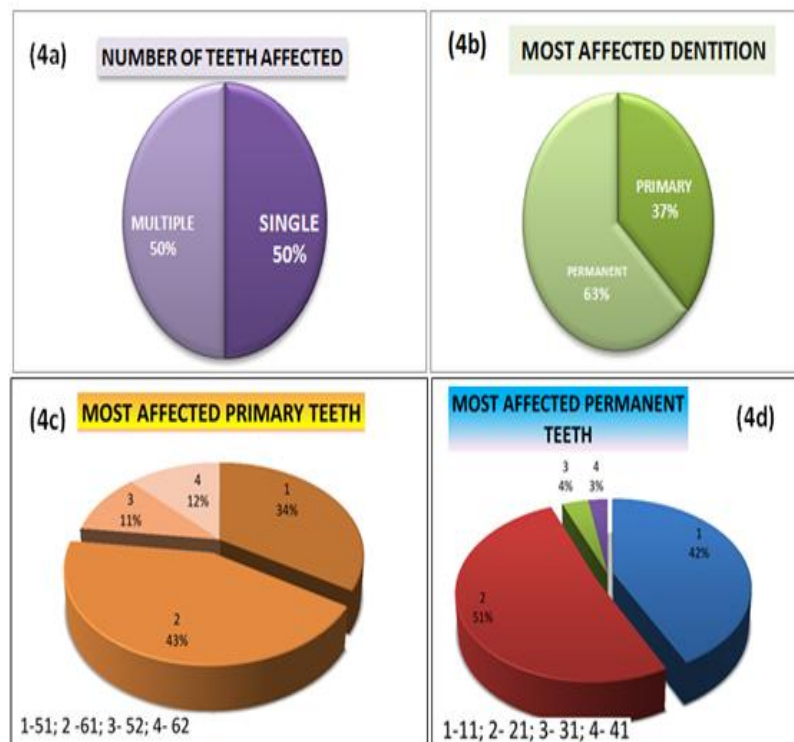
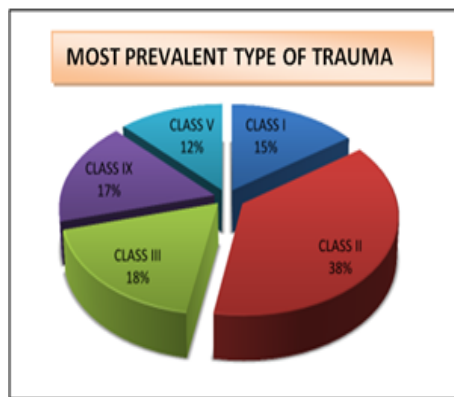


Figure 4: (a) Distribution of TDI according to the dentition affected (b) Distribution of patients according to number of teeth (c) Distribution of TDI among primary teeth (d) Distribution of TDI among permanent teeth.



**Fig 5:** Distribution of type of trauma according to Ellis and Davey's classification



**Table 4:** Distribution of treatment procedures done.

Type of treatment	N	Percentage
Restorations	49	39.8*
Root canal treatment	18	14.6
Apexification	8	6.5
Extraction	11	8.9
Space maintainer	6	4.7
Pulp therapy	10	7.8
Splinting	4	3.2
Medications	6	4.8
Observation	10	8.1
Review	5	4.0

\*p<0.005

#### IV. Discussion

The present study furnishes information on the need of oral health care in children with regard to dental injuries. The findings of this study are confluent with other published works in epidemiological patterns of the traumatic injuries in children. The prevalence of TDI reported in this study is 0.05%. Epidemiological data on prevalence of TDI differs from one area to the other. In Brazil, Kuwait, Thailand and Canada the reported prevalence of TDI are 10.5%, 14.5%, 35% and 18.5% respectively<sup>10-13</sup>. They might also vary with in the same country itself<sup>6</sup>. In India, prevalence of 10.2%, 2.7% and 8.7% is reported in Jaipur, Mathura and Vadodara respectively<sup>14-16</sup>. This discrepancy could be attributed to different epidemiological methodology used to record data<sup>6,17</sup>. In our study, the greatest number of trauma cases were seen in summer vacation months of May (20%) and February (20%), supporting the results of other studies<sup>2,3</sup>. These are the months were children are more likely to engage themselves in outdoor play activities. The present study shows gender predilection in TDIs towards males. Males accounted for 63% while females were 37 % with ratio 2:1. This is confluent with other published studies<sup>18,19</sup>. As quoted frequently, the increased incidence of TDI in boys is reflective of the behavioral differences between boys and girls as boys are known be more involved in enthusiastic outdoor physical activities than girls. However, in today's modern society girls can also be exposed to same risk factors as boys and the individual activities of the person involved plays a marked role more than their gender<sup>20</sup>.

The experience of TDI between three different age groups was analyzed. <5 years (27.6%), 6-10 years (39.4%),10-15 years (33%). The difference observed was not statistically significant. This is congruent with the other study done in Brazil<sup>21</sup>. Results from many published works have estimated that 90% of all TDIs sustained in life are during childhood and adolescence<sup>20</sup>. It is evident that though a significant number of patients have reported with TDI as their chief complaint (86%) the actual number of patients who reported on the same day of trauma was significantly less, the time elapsed was more than a month in nearly half of the cases. There are many studies in literature which have studied the time elapsed after trauma.<sup>2,22</sup> It might be because of the fact that as majority of the injuries are uncomplicated crown fractures in our study, the aesthetic or functional impairment produced might have not been associated with acute symptoms like pain, bleeding or oedma, hence many parents did not seek emergency care. This shows that common people are not aware enough about the long term consequences of trauma to the permanent successor; they tend to seek care only when symptoms arise<sup>2</sup>.

Etiology of trauma was most commonly due to fall (82%) followed by hit (10%) accident (8%). This is in accordance with other studies in literature<sup>3,7,23</sup>. In this study, it was observed that maxillary central incisors were most traumatized in both primary and permanent dentition. This is in accordance with the literature<sup>20,21</sup>. The reason could be due to the positional aspect of the anterior teeth. Their front position in the oral cavity leaves them more liable to trauma the lower teeth and the canines that are usually better protected by the lips and not so prone to injury the incisors are situated in front of the dental arch<sup>17</sup>. The most frequent type of TDI, observed in the current study, was enamel – dentin fracture in both primary and permanent dentition. The results are in agreement with other studies<sup>3,20,24</sup>. In case of primary dentition, due to resiliency of alveolar bone, luxation injuries have been reported to be more common<sup>21,22,24</sup>. In the present study, the rate of luxation injuries may be underestimated because many patients did not report immediately after trauma. The disadvantage of retrospective studies is that certain dental and oral soft tissue injuries could be missed if signs and symptoms do not exist at the time of the examination. Another shortcoming of retrospective studies is the recall bias. The patient's report of the injury may not always be accurate if the accident occurred months or even years before the examination, particularly in children. Thus the figures presented could be lower than the real values<sup>21</sup>. Most

common treatment done in our study was non-endodontic restorations followed by root canal therapy. This result could be correlated to the fact that majority of patients had reported with enamel-dentin fracture which were restored and the delay in reporting in significant number of cases has led to root canal therapy.

### **V. Conclusion/ Clinical Significance**

Most of the factors associated with TDI discussed in this study are same as that reported in literature. However, the number of patients with delay in reporting is substantially high. TDI is a significant dental problem faced by children and adults. As these injuries are preventable, there is an emerging awareness about the need for preventive programs in many communities. Preventable measures such as adult supervision during play time, childproofing play areas at home and school, encouraging children to wear sports helmets and precautionary protective wear mouth guards during contact sports and early correction of malocclusion and wearing of mouth guard during contact sports is recommended. Trauma awareness programs must necessarily emphasize early reporting to decrease the undesired consequences of trauma. The barriers of delayed reporting need to be scrutinized and preventive protocols needs to be emphasized.

### **Acknowledgements**

The authors are grateful to Institutional Ethical Committee, SRM Dental College, Ramapuram, Chennai for their approval and support and to Dr.S.Porchelvan, Head of the Department, Dept of Biostatistics, Saveetha Medical college, for biostatistics. The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

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