

Etiology and Complications of Dental Trauma Among 7-18 Year Old - A Retrospective Study

Research Article

Pooja Umaiyal. M¹, Deepa Gurunathan^{2*}, Jaiganesh Ramamurthy³¹ Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077, Tamil Nadu, India.² Professor and Head, Department of Pedodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077, Tamil Nadu, India.³ Professor and Head, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077, Tamil Nadu, India.

Abstract

Study of dental trauma and its associated factors is a common dental finding or at times an emergency that can facilitate planning of preventive measures, better assessment and effective treatment to carry out. The aim of this study is to evaluate the incidence of etiology and complications of dental traumas among children aged 7 to 18 years. We reviewed and analysed the data of 86000 patients between June 2019 and March 2020, among which 158 children in the age group of 7-18 years who had dental trauma were examined from the recorded details provided by the institute. Documented information included patients' age, gender, dental status, tooth involved, type of trauma, etiology of trauma and treatment done. The collected data was then tabulated and analysed using SPSS software. Chi Square test was performed and the p value was determined to evaluate the significance of the variables. Among 158 children participating in this study, 75.3% were males. Falls were the leading cause of traumatic dental injuries as reported by 96.56% of the children. The most predominantly affected tooth during trauma was the permanent incisors (96.2%). Fracture of the coronal portion of the tooth was highly prevalent among the patients when compared to the occurrence of other forms of dental trauma. In terms of treatment, root canal treatments were predominantly performed over the patients with the most delayed consultation period being less than 10 days. Within the limits of the study, overall occurrence of dental trauma was predominantly higher among males than females. Falls were the leading cause of trauma with permanent incisor being affected the most. Long term prognosis of the tooth depends on the treatment and immediate consultation. Treatment of dental injuries is usually delayed and not given as much attention as other treatments which can explain the occurrence of pulpal and periodontal complications.

Keywords: Dental Trauma; Tooth Fracture; Fall; Road Traffic Accidents.

Introduction

Traumatic dental injury (TDI) to the teeth only or other hard and soft tissues around and within the vicinity of the mouth. It is a consequence of certain unavoidable factors that pose risk in life. It's usually unexpected, sudden, accidental and often needs emergency attention [30]. Dental trauma is one of the most common reasons for dental emergencies, which is followed by oral bleeding, dental infections and TMJ disorders [54]. TDIs among children majorly occur as a result of their activities, so these dental issues will be persistent as long as children remain active [19]. Permanent tooth to be injured is often a traumatic experience to

the children due to the occurrence of pain, discomfort and damage to the aesthetic appearance of the child [34].

Traumatic injuries are classified into various luxations, fractures and a combination of both the types might occur as well. Furthermore, usually they are associated with other possible types of maxillofacial injuries and soft tissue injuries. TDIs may bring about changes in the quality of life if not corrected or treated. These may also affect the psychology of the child, cause pain, loss of certain factors like speech, esthetics and eventually might lead to pulpal necrosis and periapical pathosis [54].

Factors that are associated with TDIs are age, gender, incisal

*Corresponding Author:

Deepa Gurunathan,
Professor and Head, Department of Pedodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077, Tamil Nadu, India.
E-mail: deepag@saveetha.com

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overjet that is greater than 5 mm and an anterior open bite. Subsequently the most affected teeth are the anteriors, with a male: female ratio of 3:1. Among the age group of 0-6 years, the oral traumas comprise about 17% [8]. A dental injury to the permanent teeth or dentition (58.6%) is more prevalent than in primary dentition which constitutes about 36.8% only [32, 18]. Dental trauma sums upto 66% of the total dental emergencies that occur. It is highly recommended that educational programs be held for parents to create awareness about the immediate management of traumatized teeth as they seek delayed care for these injuries [3]. Previously our team had conducted numerous clinical trials(Christabel and Linda Christabel, 2015 [7]; Govindaraju and Gurunathan, 2017 [14]; Govindaraju, Jeevanandan and E. Subramanian, 2017 15), in-vitro studies(Somasundaram et al., 2015 [55]; Subramanyam et al., 2018 [57]), comparative studies (Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a [15]; Jeevanandan and Govindaraju, 2018 25; Nair et al., 2018 36; Panchal, Jeevanandan and Subramanian, 2019 [42]), case reports(Jeevanandan, 2017 [24]), surveys (Gurunathan and Shanmugaavel, 2016 [22]; Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017b [17]; Ravikumar, Jeevanandan and Subramanian, 2017 [50]) and reviews (Packiri, Gurunathan and Selvarasu, 2017 [39]; ‘Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children - Review’, 2018 [13]) over the past many years. Now we are focusing on epidemiological studies. The idea for this study stemmed from the current interest in our community.

Previously our team has a rich experience in working on various research projects across multiple disciplines. (Jain, 2017 [23]), (Varghese, Ramesh and Veeraiyan, 2019 [58]), (Ashok and Ganapathy, 2019 [2]), (Padavala and Sukumaran, 2018 [40]), (Ke et al., 2019 [27]), (Ezhilarasan, 2018 [10]), (Krishnan et al., 2018 [28]), (Ezhilarasan, Sokal and Najimi, 2018 [12]), (Pandian, Krishnan and Kumar, 2018 [43]), (Ramamurthy and Mg, 2018 [48]), (Gupta, Ariga and Deogade, 2018 [21]), (Vikram et al., 2017 [61]), (Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020 [44]), (Palati et al., 2020 [41]), (Samuel, Acharya and Rao, 2020 [53]). Now the growing trend in this area motivated us to

pursue this project.

The aim of the study is to evaluate the incidence of etiology and complications of dental traumas among children aged 7 to 18 years.

Materials and Methods

A retrospective institutional based study was conducted. The advantage of this study was the ease of Data Collection containing similar ethnicity with the involvement of both the genders. Ethical clearance was obtained from the institutional ethical committee.

We reviewed and analysed the data of 86000 patients visiting an institutional dental hospital from June 2019 to March 2020, among which 158 children in the age group of 7-18 yrs who had dental trauma were examined. Data was collected from the patient records maintained by the hospital and was then tabulated in excel and then imported into SPSS software. Incomplete data was verified with the concerned department or patient or excluded from the study.

Documented information included patients’ age, gender, dental status, tooth involved, type of trauma, etiology of trauma and the type of treatment done.

A statistical test was done using a chi-square test with SPSS by IBM. Independent variables included age and gender of the participants, whereas the dependent variables included the type of trauma and the aetiology of trauma. All of these were analysed using correlation and association.

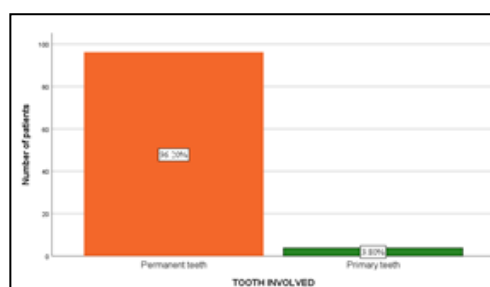
Results

A total of 158 patients had a history of dental trauma, among them 75.3% were predominantly of males. The prevalence of dental trauma was higher among the age group of 11-14 years

Table 1: Describes the distribution of study population based on Age and Gender. It is found that the majority of the participants had been subjected to dental trauma at the age of 11-14 yrs.

Age in Years	Gender		Total
	Male	Female	
7-10	39(24.7%)	13(8.2%)	52 (32.9%)
11-14	51(32.2%)	17(10.7%)	68 (43%)
15-18	29(18.3%)	9(5.7%)	38 (24%)
Total	119 (75.3%)	39(24.7%)	158 (100%)

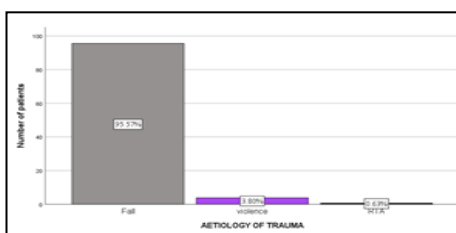
Graph 1: Bar chart represents the frequency distribution of the type of teeth affected by dental trauma among the study population. X axis denotes the type of tooth involved and Y axis denotes the number of patients in terms of percentage. The prevalence of permanent teeth being affected by dental trauma was predominant with 96.2%.



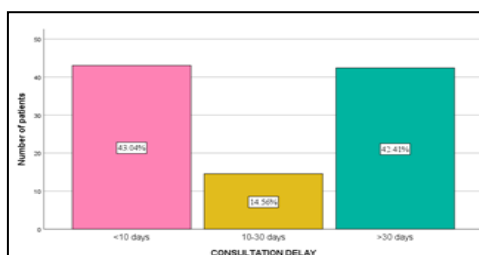
with 43% (Table 1). The prevalence of permanent teeth being affected by dental trauma was predominant with 96.2% (Graph 1). According to the etiology of trauma, fall was the predominant reason for trauma with 95.56% prevalence followed by violence (3.8%) and road traffic accidents accounted for 0.6% of the cases (Graph 2). Time between the date of trauma and the date of consultation differs between patients. Delay of less than 10 days was the most predominant with 43.04% followed by a delay of more than 30 days (42.31%) (Graph 3). Tooth fracture was predominantly high among patients with fall as the etiology of trauma (74.05%) followed by violence (3.8%) and RTA (0.63%). Predom-

inance of tooth fracture was followed by avulsion with 7.59% among patients with fall as the etiology of trauma (Graph 4). In terms of the treatment required, prevalence of RCT was predominantly high among the study population with 28.48% performed on fractured teeth and 2.53% on non-vital teeth followed by restoration. The association between the type of treatment and type of trauma caused was found to be statistically significant with a p value <0.05 (Graph 5). According to the type of trauma, patients among the age group of 7-10 yrs and 11-14 yrs most frequently had tooth fracture 31.65% and 25.32% respectively (Graph 6). In accordance to gender, the prevalence of tooth fracture was

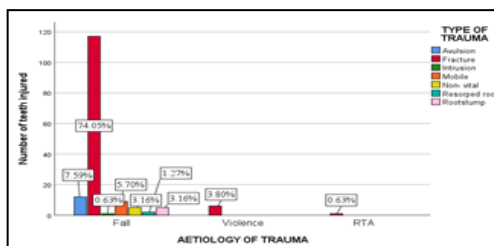
Graph 2: Bar chart represents the frequency distribution of the aetiology of trauma among the study population. X axis denotes the aetiology of trauma and Y axis denotes the number of patients in terms of percentage. According to the aetiology of trauma, the prevalence of fall (grey) was the most predominant among the study population with 95.57% followed by violence (violet) (3.80%) and the least frequent being the road traffic accidents (RTA) denoted by black with 0.63%.



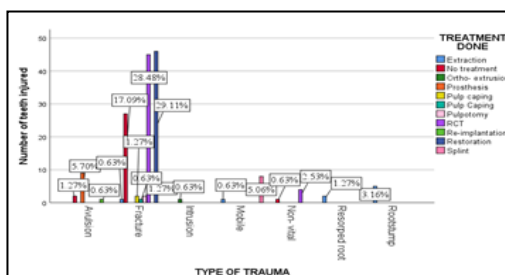
Graph 3: Bar chart represents the frequency distribution of consultation delay among the study population. X axis denotes the consultation delay in terms of days and Y axis denotes the number of patients in terms of percentage. The prevalence of consultation delay less than 10 days (pink) was the most predominant with 43.04% followed by a delay of more than 30 days (42.31%) denoted by teal.



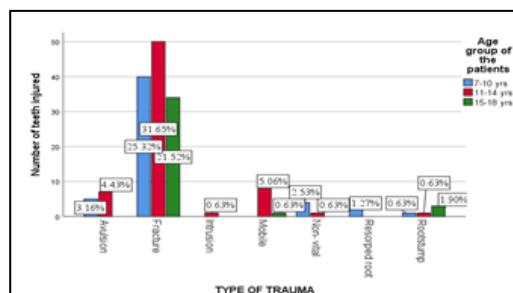
Graph 4: Bar chart denotes the association of the type of trauma caused based on the etiology of trauma. X axis denotes the type of trauma based on the aetiology of trauma and Y axis denotes the number of teeth injured. The prevalence of tooth fracture was predominantly high among the study population followed by avulsion. However the association between the etiology and type.



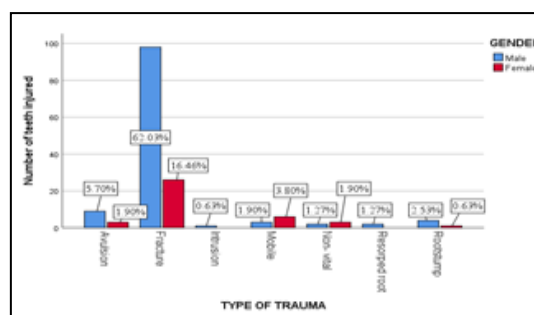
Graph 5: Bar chart denotes the correlation of the type of treatment done based on the type of trauma. X axis denotes the type of treatment done based on the type of trauma and Y axis denotes the number of patients. The prevalence of RCT was predominantly high among the study population followed by restoration. The association between the type of treatment and type of trauma caused was found to be statistically significant with a p value <0.05. Pearson Chi Square= 558.824, df= 60, p value=0.000 (<0.05).



Graph 6: Bar chart denotes the association of the type of trauma based on the age group of the study population. X axis denotes the type of trauma based on the age group of the population and Y axis denotes the number of teeth injured. The prevalence of tooth fracture was most predominant among 11-14 yrs followed by 7-10 yrs. The association between the type of trauma and the age group of the population was found to be statistically significant with a p value <0.05. Pearson Chi Square= 26.761, df= 12, p value=0.008 (<0.05).



Graph 7: Bar chart denotes the association of the type of trauma based on gender of the study population. X axis denotes the type of trauma based on gender and Y axis denotes the number of teeth injured. The prevalence of tooth fracture was most predominant among males than females. The association between the type of trauma and gender was found to be statistically significant with a p value <0.05. Pearson Chi Square= 13.851, df= 6, p value=0.031 (<0.05).



most predominant among males (62.03%) than females (16.46%) (Graph 7).

Discussion

The present study showed that males had greater risk for traumatic dental issues than the female population, which is in agreement with the other studies(Ekanayake and Perera, 2008 [9]; Gulinelli et al., 2008 [20]; Lam et al., 2008 [29]; Noori and Al-Obaidi, 2009 [37]; Lauridsen et al., 2012 [31]; Bücher et al., 2013 [5]; Borin-Moura et al., 2018 [4]). Higher prevalence in males among the children can be attributed to their involvement in certain activities like sports and also due to their violent nature of behaviour.

In our study 96% of the dental trauma was caused due to fall. This was in agreement with Kavre’s study done by Dr. Deepti Shrestha et al., reporting fall 43.8% being the majority of the aetiology of the trauma, in accordance with another study conducted in Palestine by Vaida Zaleckiene et al., which had 64.2% of the etiology as fall. This could be explained by the fact that the children as a whole, usually get involved in fighting and boys in general engage themselves more in contact sports. Whereas, girls at this age display maturity or mature behaviour and tend to engage themselves in passive games [38, 26, 46].

In the present study, it was observed that children among the age group of 11-14 years experienced more trauma than the children of other age groups. This result differed from those of Ohio et al. [38, 26, 46], who reported those three quarters of the injuries caused by trauma occurred between 10-12 years of age. Whereas, the results correlated and differed with those of Murithi et al.

[35], who found 5.3% of 12 years old children to have experienced dental traumas more than those of 13 years (4%). 14 years (3.6%) and 15 years (3.6%) having lower prevalence. It is notable that Muriithi’s study was hospital based and the duration elapsed since when the injury occurred 55.6% of 13 years old in the current study reported to have been more than a year ago, which mean injury occurred at 12 years or younger and thus they might have been injured in 10-12 years of age bracket.

Majority of the children who had traumatic dental injuries had not sought any treatment following injury, this finding is in agreement with the study by Al-Khateeb et al. [1], in Jordan. The permanent teeth are more prone to fracture than luxate when injured as compared to primary teeth, because the permanent teeth are firmly embedded in the alveolar bone.

Maxillary central incisors or the permanent tooth in general (96.2%) were the most affected teeth in dental trauma. Similar findings have been reported by Vaida Zaleckiene et al., involves 66.7% of the trauma affecting the maxillary incisors. This can be explained by the location of teeth which is most vulnerable and also its morphology. This finding is very important as their incisors play an important role in the children’s aesthetic, functional activities and phonetics.

Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadoss, 2018 [45]; Ramesh et al., 2018 [49]; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018 [60]; Ezhilarasan, Apoorva and Ashok Vardhan, 2019 [11]; Ramadurai et al., 2019 [47]; Sridharan et al., 2019 [56]; Vijayashree Priyadharsini, 2019 [59]; Chandrasekar et al., 2020 [6]; Mathew et al., 2020 [33]; R et

al., 2020 [51]; Samuel, 2021 [52]). We hope this study adds to this rich legacy.

The limitation of the study conducted includes the reduction or availability of the data, the unequal distribution of the cases and the unavailability of location specific datas. Hence, the results of this study must be interpreted within the limitations of this study and further cohort studies must be done including larger data size. Such study should also include the other associated parameters like abuse, physical limitations, environmental factors, etc.

Conclusion

Within the limits of the study, overall occurrence of dental trauma was predominantly higher among males than females. Falls were the leading cause of trauma with permanent incisor being affected the most. Long term prognosis of the tooth depends on the treatment and immediate consultation. Treatment of dental injuries is usually delayed and not given as much attention as other treatments which can explain the occurrence of pulpal and periodontal complications.

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