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Prevalence Of Tooth Injuries Among Children 2 To 13 Years Of Age Reporting To Dental Hospital- An Institutional Based Retrospective Study

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Abstract: Traumatic dental injuries present complex injuries of the dentoalveolar system. Trauma to primary and permanent teeth and their supporting structures is one of the most common dental problems seen in children. The purpose of this study was to analyse the prevalence of traumatic dental injuries (TDI) in primary and permanent teeth among childrens 2 to 13 years of age visiting the dental hospital in Chennai, in the period of June 2019 - March 2020. Date of age, gender, type of teeth i.e primary or permanent, type of dental injury and the dental treatment were obtained from the records of the dental hospital. The data was analysed using SPSS software. Chi Square Test was performed to compare two proportions. The analysis was done for: age, gender, type of injury, treatment done for the injury in this study. Most common type of dental injury in primary teeth is luxation (26.3%) and in permanent teeth is complicated crown fracture (38.9%). Traumatic dental injury was observed most frequently in the age group of 2 to 3 years in primary teeth and 10 to 11 years in permanent teeth with 68.4% and 69.4% of gender predliction in boys with primary and permanent dentition respectively. In the primary dentition, the most commonly performed treatment was extraction whereas the most common treatment performed in permanent dentition is pulpectomy. The results of this study show that emergency intervention to traumatised teeth is important for good prognosis of teeth and oral tissues. Therefore, the parents should be informed about dental trauma in schools and dental hospital physicians should be subjected to postgraduate training.

Keywords: Complicated crown fracture, Extraction, Luxation, Pulpectomy and Traumatic dental injuries innovative technique

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INTRODUCTION

Traumatic dental injuries (TDI's) open present as serious and complex injuries of the dentoalveolar system.(Mahmoodi *et al.*, 2015) Dental trauma may vary from minor tooth fracture to extensive dentoalveolar damage involving supporting structures and tooth displacement or avulsion which needs an immediate assessment and management because of its association with resilience of alveolar bone.(Goenka *et al.*, 2016) The dental trauma was classified according to modified World health organisation proposed by Anderson Anderson (Shayegan, De Maertelaer and Vanden Abbeele, 2007) Soft tissue injury involves lip and facial laceration, degloving of gingiva, displacement of interdental papilla.(Sari *et al.*, 2014) This study is required as primary dentition play an important role not only in functional and psychological development of child but also identification of developmental and alterations in permanent dentition.(Jesus and de Jesus, 2012)

Traumatic dental injuries incidence is more common in boys than girls. The peak incidence in boys is 2 to 4 years and 9 to 10 years and in girls is 2 to 3 years.(Goenka *et al.*, 2016) The main causes of trauma can be due to accident falls in children between 2 to 5 years. In children between 6 to 12 years, the most common causes are sport accidents, falling off bicycles and crashing and are more prone to facial trauma. The maxillary Central incisor is the most common affected teeth in both primary and permanent dentition because of its position in the dental arch.(Unal *et al.*, 2014) In previous study, no standardized trauma records are available which do not allow collection of data at the time of injury or adequate patient history.(Assunção *et al.*, 2011)

Enamel loss or cracks represent small or minor TDI' s do not require immediate attention whereas severe TDI's that involve both hard soft tissues require prompt emergency treatment which includes pain Control, restoration of function or aesthetics and prevention of social and psychological consequences.(Goenka *et al.*, 2016) After the injury, immediate treatment is important for good prognosis.(Sari *et al.*, 2014) Treatment of trauma to primary

teeth has been recently found in places and literature but a prospective study hasn't been conducted in the Chennai population. Previously our team had conducted numerous clinical trials (Govindaraju and Gurunathan, 2017; Govindaraju, Jeevanandan and Subramanian, 2017a; Jeevanandan, 2017; Jeevanandan and Govindaraju, 2018; Nair *et al.*, 2018; Subramanyam *et al.*, 2018; Panchal, Jeevanandan and Subramanian, 2019; Lakshmanan *et al.*, 2020), in vitro studies (Christabel and Gurunathan, 2015; Somasundaram *et al.*, 2015; Gurunathan and Shanmugaavel, 2016; Govindaraju, Jeevanandan and Subramanian, 2017b; Ravikumar, Jeevanandan and Subramanian, 2017) and systematic review (Packiri, Gurunathan and Selvarasu, 2017; Ramakrishnan and Shukri, 2018) over the past 5 years. This experience led us to work on the current topic. Therefore,

Our department is passionate about research we have published numerous high quality articles in this domain over the past years (Abraham *et al.*, 2005; Devaki, Sathivel and BalajiRaghavendran, 2009; Neelakantan *et al.*, 2010, 2015; Arja *et al.*, 2013; Ramshankar *et al.*, 2014; Sumathi *et al.*, 2014; Surapaneni and Jainu, 2014; Surapaneni, Priya and Mallika, 2014; Ramamoorthi, Nivedhitha and Divyanand, 2015; Manivannan *et al.*, 2017; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; J *et al.*, 2018; Ravindiran and Praveenkumar, 2018; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Krishnaswamy *et al.*, 2020; Samuel, Acharya and Rao, 2020; Sathish and Karthick, 2020)

this study was aimed to analyse the prevalence of traumatic dental injuries (TDI) in primary and permanent dentition among children 2 to 13 years of age in the university dental clinic at Chennai by investigating age, gender, type of injury and treatment.

MATERIALS AND METHODS

A single centre retrospective study was done in an institutional setting. The ethical approval was received from the institution's ethical committee. The study involved selected patients data who reported with a chief complaint of dental trauma. The necessary approvals in gaining the data were obtained from the institutional ethical committee (SDC/SIHEC/DIASDATA/0619-0320). The number of people involved in this study includes 3 i.e guide, reviewer and researcher.

Selection of Subjects: All patients who reported to the institution with the chief complaint of dental trauma from the time period of June 2019 to April 2020 were selected for this study. There were three people involved in this study (guide, reviewer, and researcher). All available data were taken into consideration and there was no sorting process.

Data Collection: The patient's details were retrieved from the institution's patient record management software (Dental Information Archiving Software). Data regarding patients age, gender, type of injury, treatment done for the injury were taken into consideration for this study. Cross verification of the data was done with the help of photographs and radiographs. The data was manually verified, tabulated and sorted.

Inclusion Criteria: All patients who reported with a chief complaint of dental trauma in the age groups less than 17 years were taken into consideration.

Exclusion Criteria: Patients' records that were incomplete were removed from the study. Repetitive entries were excluded as well. Children's aged less than 17 years complained of dental trauma due to child abuse, affected by psychological disorders or facial deformity is not included in the study.

Statistical Analysis: The tabulation of data was analysed using SPSS software. (IBM SPSS Statistics 26.0) The method of statistical analysis that was used in this study was Chi Square Test to compare two proportions. The analysis was done for: age, gender, type of injury, treatment done for the injury in this study.

RESULTS AND DISCUSSION

The study included 91 participants who reported with the chief complaint of dental trauma. In this study, we observed that luxation was the most common type of dental injury (26.3%) followed by subluxation (21.1%) avulsion (21.1%), soft tissue injury (10.5%), complicated crown fracture (10.5%), crown-root fracture (5.3%) and non-vital tooth (5.3%) in primary dentition. On the other hand, complicated crown fracture (38.9%) was the most common type of dental injury in permanent dentition followed by crown fracture involving dentin (31.9%), crown-fracture involving enamel (9.7%), non-vital tooth (6.9%), avulsion (6.9%), luxation (4.2%), and subluxation (1.4%).

(Graph-1) shows that within different age groups, 2-3 years of age was the most common age group with traumatic injury among pediatric patients with primary teeth. (Graph-2) shows that male patients reported with the maximum number of traumatic injuries among pediatric patients with primary teeth (68.4%). (Graph-3) shows that extraction was found to be the most common treatment for traumatic injury among pediatric patients with primary teeth (57.9%). (Graph-4) shows that within different age groups, 10-11 year of age was the most common age group

with traumatic injury among pediatric patients with permanent teeth (43.1%). (Graph-5) shows that male patients reported with the maximum number of traumatic injuries among pediatric patients with permanent teeth (69.4%). (Graph-6) shows that Pulpectomy was found to be the most common treatment for traumatic injury among pediatric patients with permanent teeth (44.4%).

In our study, the most common injury in primary teeth is luxation (26.3%) and in permanent teeth is complicated crown fracture (38.9 %). The participants in the age group of 2 to 3 years (36. 8%) reported with maximum incidence of dental trauma in primary dentition and those in the age group of 10 to 11 years (43.1%) reported with maximum incidence of dental trauma in permanent dentition. 69.4% of the participants who reported with the chief complaint of dental trauma were boys and 30.6% of them were girls. Extraction was the most commonly performed treatment in primary dentition while pulpectomy in permanent dentition.

Luxation was the most common traumatic injury in primary dentition in our study. This finding is in line with the results of the study conducted in Chicago, who concluded the luxation with displacement were the most common type of injury to primary teeth (Shayegan, De Maertelaer and Vanden Abbeele, 2007) and also Assuncao et al., in his study proved that luxation injuries were the most common injuries of the traumatic dental injury because the primary teeth are the teeth which are most often displaced because of the flexibility of the young bones and periodontal ligament.(Assunção *et al.*, 2011) It is contradicting the study conducted by M.Unal et al., who reported with enamel dentin fracture (34%) was the most common type of dental injury in primary dentition.The complicated crown fracture was the most common type of injury in permanent dentition these findings is in line with study conducted in turkey by M.Unal et al, who reported with complicated crown fracture as the most frequently seen type of trauma in permanent dentition. This is mainly because, at adolescence children's are interested in sports activities and are more prone to facial trauma resulting in fracture of crown.(Unal *et al.*, 2014)

The study found that 2 to 3 years old children were the most affected by traumatic dental injuries. This finding is a line with the results of few previous studies. A study conducted in Jaipur concluded that the peak incidence in boys is 2 to 4 years and girls is 2 to 3 years (Amir shayegan et al).(Shayegan, De Maertelaer and Vanden Abbeele, 2007) A study conducted in Turkey by ME.Sari et al., also reported with 1 to 3 years as the most frequent age group for traumatic injuries. This is because of the psychomotor under development and poor motor skills, that do not allow the child to perform precise and safe moments.(Sari *et al.*, 2014) The study also found that 10 to 11 years as the most common age group of traumatic injuries in permanent dentition which is in line with the results of Sanchez AV et al. and ME.Sari et al., who reported with the maximum number of injury presented in the age group of 10 to 11 year olds. However Eyuboglu et al 2008., reported that the age in which dental injury was frequently observed was 5 years of age in primary teeth and in 10 years of age in permanent teeth.(Sanchez and Garcia-Godoy, 1990; Eyuboglu *et al.*, 2009; Sari *et al.*, 2014)

Boys usually report more traumatic dental injury than girls. This finding is in line with results of Nirwan et al.,ME.Sari et al., Kargul et al 2003., Sandalil et al 2005., who concluded that boys are exposed to trauma more frequently because of their active participation and games in sports. Extraction was found to be the most frequently performed treatment for primary teeth and for permanent teeth, pulpectomy was the most frequent treatment. Which is in line with study conducted in Brazil who reported with dental extraction as the main treatment choice for primary dentition (ME .Sari et al.,) and Amir shayegan et al., reported that pulpectomy was the most common treatment for permanent teeth.(Kargul, Cağlar and Tanboga, 2003; Sandalli, Cildir and Guler, 2005; Shayegan, De Maertelaer and Vanden Abbeele, 2007; Sari *et al.*, 2014; Goenka *et al.*, 2016)

The limitation of the present study is the lack of follow-up.based on our findings, future study on clinical findings and long-term survival rates could be conducted however, data gives an overview of the prevalence of traumatic dental injury in the south Indian population.

CONCLUSION

In conclusion, the most common type of dental injury in primary teeth is luxation (26.3%) and in permanent teeth is complicated crown fracture (38.9%). Traumatic dental injury was observed most frequently in the age group of 2 to 3 years in primary teeth and 10 to 11 years in permanent teeth with 68.4% and 69.4% of gender predliction in boys with primary and permanent dentition respectively. In the primary dentition, the most commonly performed treatment was extraction whereas the most common treatment performed in permanent dentition is pulpectomy. The information from this study would be extremely useful in detecting most cases of traumatic injuries in children (such as luxations, darkened teeth and small cracks or fractures) and referring these children to the dentist. Thus, an emergency intervention to traumatized teeth is important for good prognosis of teeth and oral tissues.

Author contributions: All authors discussed the results and contributed to the final manuscript. H.Firdus Fareen, Deepa Gurunathan carried out the experiment. H.Firdus Fareen, Deepa Gurunathan wrote the manuscript with support from Sri.Rengalakshmi.

Conflict of interest: The researcher claims no conflicts of interest.

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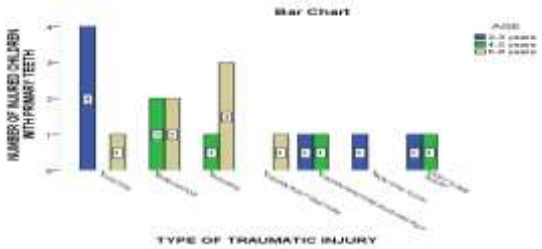
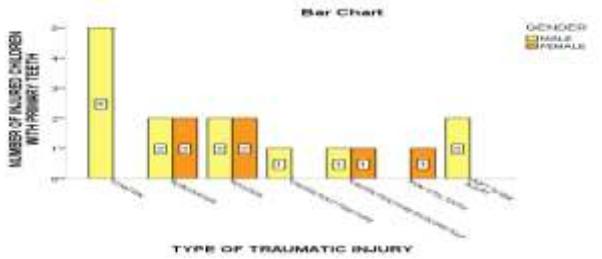
FIGURE LEGENDS:

Graph-1: Bar graph representing distribution of type of traumatic injury of primary teeth among affected pediatric patients aged 2-8 years.
Graph-2: Bar graph representing distribution of type of traumatic injury of primary teeth among affected pediatric patients according to gender.
Graph-3: Bar graph representing type of injury and its relative treatment for primary teeth among affected pediatric patients.
Graph-4: Bar graph representing distribution of type of traumatic injury of permanent teeth among affected pediatric patients aged 8-13years.
Graph-5: Bar graph representing distribution of type of traumatic injury of permanent teeth among affected pediatric patients according to gender.
Graph-6: Bar graph representing type of injury and its relative treatment for permanent teeth among affected pediatric patients.

GRAPHS:



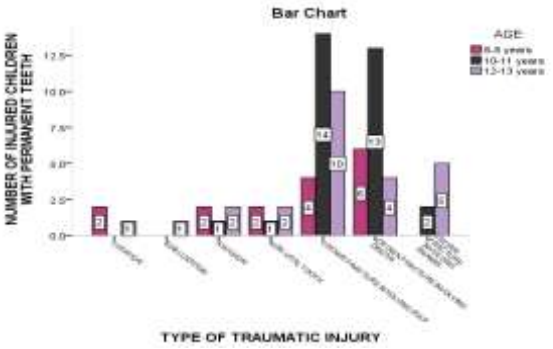
Graph 1: Bar graph representing distribution of type of traumatic injury of primary teeth among affected pediatric patients aged 2-8 years. X-axis represents the type of traumatic injury and Y-axis represents the number of injured children with primary teeth. Within different age groups, 2-3 year of age (blue colour) was the most common age group with traumatic injury among pediatric patients with primary teeth. There was a clinical significance but no statistically significant difference seen in pediatric patients with respect to age in primary teeth (chi square value-15.74, p value >0.05).



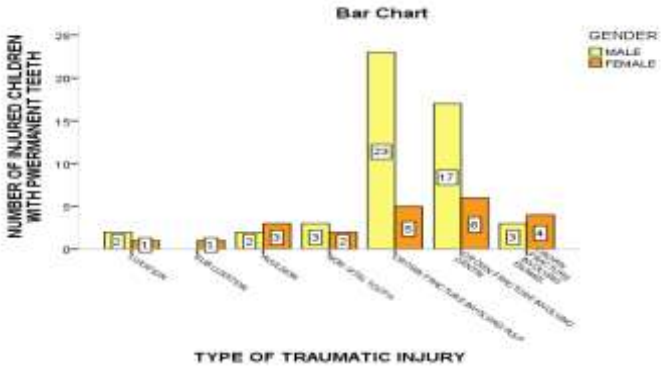
Graph 2: Bar graph representing distribution of type of traumatic injury of primary teeth among affected pediatric patients according to gender. X-axis represents the type of traumatic injury and Y-axis represents the number of injured children with primary teeth. Male patients (yellow colour) reported with the maximum number of traumatic injuries among pediatric patients with primary teeth (68.4%). There was a clinical significance but no statistically significant difference seen in pediatric patients with respect to gender in primary teeth (chi square value-7.42, p value >0.05).

Graph 3: Bar graph representing type of injury and its relative treatment for primary teeth among affected pediatric patients. represents soft tissue injury. X-axis represents the type of traumatic injury and Y-axis represents the number of injured children with primary teeth. Extraction (red colour) was found to be the most common treatment for traumatic injury among pediatric

patients with primary teeth (57.9%). There was a statistically significant difference seen in pediatric patients with respect to treatment in primary teeth (chi square value-50.95, p value <0.05).



Graph 4: Bar graph representing distribution of type of traumatic injury of permanent teeth among affected pediatric patients aged 8-13years. X-axis represents the type of traumatic injury and Y-axis represents the number of injured children with permanent teeth. Within different age groups, 10-11 year of age (black colour) was the most common age group with traumatic injury among pediatric patients with permanent teeth (43.1%). There was a clinical significance but no statistically significant difference seen in pediatric patients with respect to age in permanent teeth (chi square value-17.41, p value >0.05).



Graph 5: Bar graph representing distribution of type of traumatic injury of permanent teeth among affected pediatric patients according to gender. X-axis represents the type of traumatic injury and Y-axis represents the number of injured children with permanent teeth. Male patients (yellow colour) reported with the maximum number of traumatic injuries among pediatric patients with permanent teeth (69.4%). There was a clinical significance but no statistically significant difference seen in pediatric patients with respect to gender in permanent teeth (chi square value-9.21, p value >0.05).

Graph 6: Bar graph representing type of injury and its relative treatment for permanent teeth among affected pediatric patients. X-axis represents the type of traumatic injury and Y-axis represents the number of injured children with permanent teeth. Pulpectomy (Teal colour) was found to be the most common treatment for traumatic injury among pediatric patients with permanent teeth (44.4%). There was a statistically significant difference seen in pediatric patients with respect to treatment in permanent teeth (chi square value-141.55, p value <0.05).