
Luxation injuries in primary teeth - A University based retrospective study

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Abstract: Traumatic dental injuries (TDIs) are one of the most serious dental public health problems among children who seek emergency dental treatment. These injuries may influence further tooth growth, resulting in irreversible damage if they occur during the initial stages of development. The aim of the study was to find the prevalence of luxation injury in primary teeth in a university dental clinic in South India, Chennai. The data regarding pediatric patients treated for trauma who have visited the hospital during the study periods from June 2019 to March 2020 was retrieved from the university database. The search resulted with 15 in total of patients who underwent treatments for dental trauma to primary teeth. The age range of the patients included in this study was 3-10 years of age. Data tabulation was carried out in Excel. The data is imported and transcribed in Statistical Package for Social Sciences version 16 (SPSS, IBM Corporation). Descriptive analysis was based on quantitative variables and frequencies for categorical variables. P less than or equal to 0.005 was considered statistically significant with a confidence interval of 95%. A higher prevalence in male (58.3%) children reporting with luxation injuries was compared to female (41.7%) children was observed. The highest prevalence of luxation injuries was subluxation 41.7%, followed by extrusive luxation 25%. It was also observed that female children took less time to report to the clinic when compared to the male children. The increased health awareness and the importance of prevention methods have essentially contributed to the decrease in the prevalence of TDIs, with an increase of subluxation injuries and a male gender prevalence.

Keywords: Subluxation; Luxation injuries; prevalence; primary teeth innovative technique

INTRODUCTION

Dental trauma is a serious problem among children with most injuries constituting dental emergencies that require immediate assessment and management. Luxation injuries that affect the primary dentition are commonly reported and associated with resilience of the alveolar bone and supporting structures in young children (Gupta, 2011). It is the responsibility of parents to pursue health-related necessities of their children. In this regard, the lack of parent's or guardian's attention will have a negative influence on the child's oral status. (Gurunathan and Shanmugaavel, 2016) Primary dentition plays an important role in the functional and psychological aspects of child development, which may contribute to new studies focused on trauma in the primary dentition (King, Anthonappa and Ithagarun, 2007). Additionally, researchers unanimously agree the dental trauma to primary teeth can lead to alterations in succedaneous dentition, especially in cases of intrusive luxation and avulsion. (Da Silva Assuncao *et al.*, 2009)

One of the topics that is most controversial is the diagnosis and management of traumatic dental injuries in children. Although the majority of injury to the primary anterior dentition comprises luxation, particularly intrusive luxation and lateral luxation. Luxation injuries are categorised as; intrusions, extrusions, lateral luxation and avulsion (Skaare, Aas and Wang, 2015). Dental trauma shows a higher prevalence up to three years of age in both genders was reported in Spain. (Da Silva Assuncao *et al.*, 2009) In South Korea one of the main causes for trauma in primary teeth was falling at home. The one main treatment option suggested by the study was splinting of the offended teeth which showed a success rate of 58.9% (Choi *et al.*, 2010).

Most of the dental trauma data available in literature is collected retrospectively from cross sectional or longitudinal studies of patient records with no standardized trauma records or adequate trauma history at time of injury was found to be available. The purpose of a study was to analyse the prevalence of luxation injuries in primary teeth in a University dental clinic in Chennai India. As different treatment protocols are followed in different hospitals, the analysis of treatment done, duration taken to report to dentist post injury, age, gender,

etiological factors, the type of injury in patients etc will help in better understanding and providing effective treatment. There is a lack of consistency in the knowledge among general dentist regarding traumatic dental injuries of primary teeth. There is a need to create awareness and education regarding traumatic injuries of primary teeth. (Ravikumar and Jeevanandan, 2017) .

Previous studies involving various treatment modalities (Govindaraju and Gurunathan, 2017; Packiri, Gurunathan and Selvarasu, 2017; Subramanyam *et al.*, 2018), prevalence of frenal attachment (Christabel and Gurunathan, 2015), post operative pain perception (Nair, Jeevanandan and Vignesh, 2018), fluoride levels (Mahesh R, 2018; 10(4) : 109- 114; Somasundaram *et al.*, 2015) , rotary files for pediatric treatment ,KAP studies (Govindaraju and Jeevanandan, 2017; Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b) , efficiency of rotary files (Jeevanandan, 2017; Jeevanandan and Govindaraju, 2018; Panchal *et al.*, 2019) have been conducted in our institution letting us focus on the prevalence of traumatic injuries in pediatric patients in this study . Treatment of trauma to primary teeth has recently found place in literature, conducting the study in a different socio economic and geographic locations should be a novel addition.

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 Balaji Raghavendran, 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)

The aim of the study was to find the prevalence of luxation injury in primary teeth in a university dental clinic in South India , Chennai .

MATERIALS AND METHODS

This is a retrospective clinical study that is performed to assess the prevalence of luxation injury in primary teeth in a university dental hospital . After obtaining approval from the ethical review board of Saveetha institute of medical and technical sciences (SDS/SIHEC/2020/DIASDATA/0619-032020).

Selection of subjects :

The study population consists of a predominantly South Indian population. The list of pediatric patients treated for trauma were retrieved by reviewing 86000 patient records who have visited the hospital during the study periods from June 2019 to March 2020 from the university database, based on the following criteria .

Inclusion criteria :

1. Patients below the age of 10
2. Patients with primary dentition who underwent treatment for dental trauma between the June 2019 and March 2020
3. Records with complete data and photographs during treatment .

Exclusion criteria :

1. Records with incomplete data of clinical examination and blood reports.

Statistical analysis:

The search resulted with 15 in total of patients who underwent treatments for dental trauma to primary teeth . The age range of the patients included in this study was 3-10 years of age. Internal validity of the study was maximised with cross verification by patient and department along with the photographic evidence. The results of the study can be applied to the South Indian population for epidemiological inferences and is therefore externally valid . The incomplete data was verified by the department and or the patient which if couldn't be verified as a possibility of bias was excluded from the study. Data tabulation was carried out in Excel. The data is imported and transcribed in Statistical Package for Social sciences version 16 (SPSS, IBM corporation). Descriptive analysis was based on quantitative variables and frequencies for categorical variables. P less than or equal to 0.005 was considered statistically significant with a confidence interval of 95% .

RESULTS AND DISCUSSION

The mean age of the patients included in the study ranged from 3 to 10 years. A higher prevalence in male (58.3%) children reporting with luxation injuries was compared to female (41.7%) children was observed. The highest prevalence of luxation injuries was subluxation 41.7%, followed by extrusive luxation 25%. Subluxation was the most prevalent type of injury among both the genders (Graph 1). Our data also suggests that the most frequently occurring tooth displacement during a traumatic injury is labial displacement 25%. It was also observed that female children took less time to report to the clinic when compared to the male children. The most commonly affected tooth was the maxillary incisor.

Injuries to the primary dentition occur frequently. (Soporowski, Allred and Needleman, 1994) Luxation injuries comprise a large portion of traumatic dental injuries in the primary tooth due to resilience of alveolar bone. Various types of luxation injuries are possible depending upon the force and direction of impact. (Malmgren *et al.*, 2012) For a considerable period, clinical studies emphasised that the main factors predisposing children to TDIs were gender and age (de Fátima Guedes de Amorim, Estrela and da Costa, 2011); in later studies, however, other factors, such as falls, driving accidents, sports, violence, inadequate lip protection and protrusion, received more attention. (Malmgren *et al.*, 2012; Norton and O'Connell, 2012)

The increase in the prevalence of dental trauma in recent years is confirmed by many studies in the literature. . Lexomboon *et al.* (Lexomboon *et al.*, 2016) reported an increase of TDIs in Brazilian preschool children in the last 10 years and in children living in the county of Värmland, Sweden in the past 20 years, respectively. The predominant age group in our study was 3 to 5 years. This was in agreement with studies that found an increase in incidence of TDIs in children between the age of 3 to 5 years (Jorge *et al.*, 2009; Viegas *et al.*, 2010) . However this finding disagreed with another study reporting that the peak age of TDI incidence in children is 2 to 4 years (Bhayya and Shyagali, 2013). Male children have seen an incidence of injury than girls (58.33%), which was consistent with other studies (Rajab, 2003) and may reflect the observation that boys are more energetic and more likely to take part in outdoor activities than girls are. The predominant age of boys in the series was 4 to 5 years, while that of girls was 2 to 3 years. This was in agreement with the study that found the predominant age of boys was older than that of girls (Ritwik, Massey and Hagan, 2015). These changes between the previous studies and current data are attributed to: elasticity of alveolar bone in the younger studied age groups and increased attention of parents about the importance of mouthguards not only for certain sports activities but also with active children

In our study most of the luxation injuries were subluxation (41.7%), followed by extrusive luxation (25%). contradicting these findings (Soporowski, Allred and Needleman, 1994) reported lateral luxation (57%), followed by intrusions (15.3%) extrusion (8.5%), since their sample was almost five times larger the findings may be more representatives of the types of luxation injuries occurring in paediatric population. Another study reported 32.6% of injuries to be subluxation with the highest prevalence (Da Silva Assuncao *et al.*, 2009) , thus supporting our findings. In the limits of our study the most commonly affected tooth was a primary central incisor, supporting this finding (Soporowski, Allred and Needleman, 1994) reported 80.8% of the injury was sustained by the central incisors, where as they found no significance between injuries occurring right (52.1%) and left dental arch (47.9%) 4, which was also supported the findings of our study. The prominent and most vulnerable position of the maxillary incisors makes these teeth more susceptible to injuries compared to the lower teeth (Lacerda *et al.*, 2004). A large variability in the reported prevalence of TDIs can be found in the literature. Differences in sample composition as well as in the definitions and classifications of trauma make the comparison between various data on uniform basis difficult.

CONCLUSION

The most frequent type of injury that occurred among children was subluxation. Male children suffered from dental trauma significantly more often than female children and the most commonly affected teeth were the central incisors This study also shows that in the absence of acute symptoms parents tend to not apply to a dental clinic for children's injuries. We should further highlight the importance of informing the public about primary tooth injuries and the consequences.

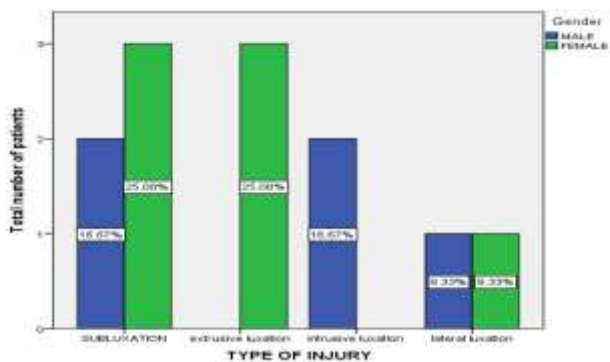
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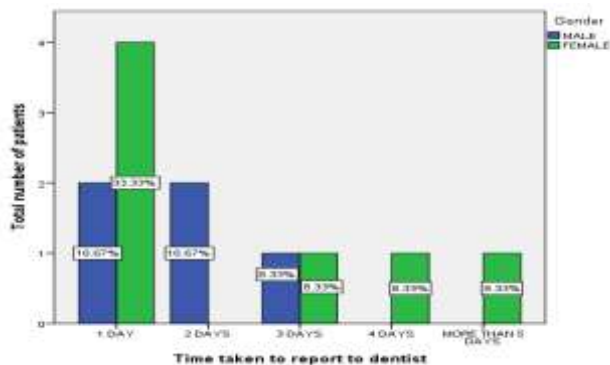
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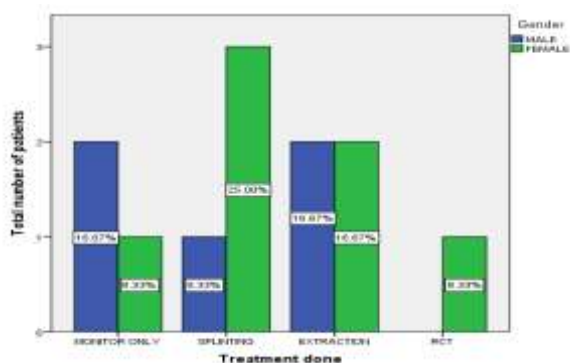
GRAPHS AND TABLES



Graph 1: Bar Graph depicts the gender distribution of different types of luxation injury . The X-axis represents the luxation injuries and the Y-axis the number of the patients . Higher prevalence of subluxation among male (blue) and female (green) patients seen which is statistically significant .(Chi- square test , p value - 0.002 {<0.05, hence statistically significant }). Also , 25% of the female population (green) has extrusive luxation and 16.67% of males (blue) show intrusive luxation . Lateral luxation seems to be equal in incidence in both male(blue) and female(green) patients 8.3%.



Graph 2: Graphs representing time taken to report to the dentist from the time of injury .X-axis represents the time taken to report to the dentist post trauma and Y-axis represents the number of patients A higher prevalence among female(green) children is seen . Among the study population , 33.3% of the female(green) children happened to report to the dentist within one day of injury .About 16.6% of themale(blue) children reported on the same day as the trauma . On the second day 16.6% of the male population reported to the dentist. On the subsequent days , 8.3% of the male (blue) and 8.3% female(green) patients reported to the dentist .



Graph 3: Graph depicts the various treatments carried out for patients with luxation injuries . X-axis represents treatment modalities and Y-axis represents the number of patients . The most prevalent treatment appears to be splinting 25% , carried out among the female(green) patients , followed by extraction 16.6% in both male(blue) and female(female) patients. Around 16.6% of

the male(blue) patients were put on observation . Only 8.3% of the female (green) patients were advised an RCT .

Table 1: Table representing the frequency of the different direction of displacement in pediatric patients with luxation injuries.A total of 12 patients reported during the study duration. Approximately 58.3% of the study population did not have any displacement in the direction of the injured tooth. Higher incidence of labially displaced teeth is seen in 25% of the pediatric patients .

| Direction of displacement of tooth | Number of patients (occurrence) | Percentage of patients |
|------------------------------------|---------------------------------|------------------------|
| Nil | 7 | 58.3% |
| Palatally | 2 | 16.7% |
| Labial | 3 | 25% |
| Total | 12 | 100% |

Table 2: Table showing the number of pediatric patients who reported to the university hospital with luxation injuries. A total of 12 pediatric patients reported during the retrospective study duration. Subluxation is the most prevalent type of dental trauma 41.7% seen , followed by extrusive luxation 25%, intrusive luxation 16.7% and lateral luxation 16.7%.

| Type of injury | Number of patients | Percentage |
|--------------------|--------------------|------------|
| Subluxation | 5 | 41.7% |
| Extrusive luxation | 3 | 25% |
| Intrusive luxation | 2 | 16.7% |
| Lateral luxation | 2 | 16.7% |
| Total | 12 | 100% |