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A cross sectional study to determine anterior tooth trauma prevalence among children aged 9-13 years

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***Abstract*---**Aim: To determine the prevalence of traumatic dental injuries (TDIs) to anterior teeth in 9-13 year old schoolchildren and factors associated with it. Materials and Methods: A Cross-sectional survey was conducted on 1000 school going children. Lip competency, Overjet, and overbite were examined. Dental injuries to anterior teeth were recorded according to the Ellis classification. Data were collected on a performa. Results: The prevalence was found to be 10.4%. Maximum injuries occurred in the 12 year age group. Boys were more affected than girls. Home was the most common place with fall being the most common reason. A statistically significant relationship was found between TDIs and incompetent lips, incisal overjet ≥5 mm. Ellis class I fracture was the most predominant type. Conclusion: The present study gives a bird's eye view on the prevalence and common

etiology of TDI in school children. There is a need for increased awareness among parents and children regarding dental trauma.

***Keywords*---**anterior, dental, injury, trauma.

Introduction

Traumatic dental injury (TDI) is a challenging public health problem to professionals, and it has been seriously neglected.[1] [1]Primary school children are more exposed to dental health problems. After epidemiological survey, data showed a wide variation in the prevalence of dental injuries in children.[2] Traumatic dental injuries (TDI) have been projected as the fifth most prevalent disease worldwide.[3] As per literature, the global prevalence of traumatic dental injuries has been estimated to be 13 to 17.5 percent, while the pooled prevalence of TDI in India was estimated as 13%.[4] Maxillary incisors are the most frequently injured teeth in both primary as well as permanent dentition (exposed position in the dental arch) and in most of the cases direct impact occur on crown resulting in fracture of tooth. Incisal injury occurs more frequently in male children, children with prognathic maxilla and children with pronounced overjet.[5]

Numerous risk factors{Age, environment (school, home etc.), gender, and socioeconomic background} for TDI have already been identified and complex interaction between them is well established.[4] Development of the permanent teeth as well as the developing occlusion is severely affected in addition to pain and loss of function which has the potential for periapical sequelae.[6] Dental professionals are quite aware about the risks of traumatic dental injuries but they are not able to disseminate the same to general public and prevent its occurring, also several epidemiologic studies have referred it as a serious dental health problem.[2] The present study was conducted to determine the prevalence of TDIs to anterior teeth in 9-13 year old schoolchildren and to investigate the relationship of dental trauma with various risk factors.

Materials and Methods

A cross-sectional study was conducted to assess the prevalence of anterior tooth trauma among the children aged between 9-13 years. A simple random sampling procedure was adopted for the study. The study was carried out on 1,000 schoolchildren aged 9-13 years, equally derived from government and private institutions. Children of both sexes were examined. The time and date of respective visits to the selected schools were scheduled with school authorities prior to the survey. Children in the selected age group who agreed to participate in the study were examined at their respective schools in predetermined time schedule, as arranged by the school authorities. Information letter for the parents along with consent from parents were distributed one day before examination and collected prior to survey. The consent of parents was obtained explaining the aim and importance of the study and asking for their child's participation.

Standard infection control guidelines were applied. In the daylight away from direct sunlight, all the children were made to sit on ordinary chair and recordings

were carried out. A sufficient number of mouth mirrors, probes, tweezers, instrument trays, gloves, masks, and gauze were packed and sterilized for each day of work. To avoid interexaminer variability, investigation was done by only one examiner. The name of the child was entered into the questionnaire by the assistant. The age of the child was confirmed from the school record book. The age of child at his/her last birthday was recorded. The class of the child was confirmed by the respective teacher. The phone number of the child was noted down from the school diary or from the identification card of the student. Children with debilitating systemic disease, missing incisors due to caries or physiological exfoliation, and who failed to return the consent forms and completed questionnaires were excluded from the study.

The number of injured teeth, type of trauma, type of tooth, lip competancy and location in the upper or lower jaw were recorded. The presence of anterior open bite was assessed based on the criterion of lack of vertical overlap of the incisors in the occlusal position. The overjet size was measured in millimeters by a metal ruler. Lip competency determination was done with the child seated on a chair without his/her awareness. Dental injuries were recorded according to the Ellis classification.[2] Visual inspection and digital examination were done to assess fractured teeth. Pulp vitality testing was not considered and discolored teeth were noted as non-vital. Root fracture was not recorded as no intraoral radiographs were taken. The class 9 fracture was not included as children were 9-13 years old and permanent incisors had erupted. The statistical analysis was done using Statistical Package forSocial Sciences (SPSS) version 21.0 and Epi Info version 3.0. The Chi-square test was used as a statistical test for difference between the proportions. At a probability value of 0.05 or less, significance of all statistical tests was predetermined.

Results

The prevalence of traumatic dental injuries was recorded to be 10.4%. Of the 1,000 school children, 500 (50%) were Boys and 500 (50%) were Girls (Table I). Table I also shows the prevalence of traumatic dental injuries according to age, gender and type of institution. Maximum children with dental trauma belonged to the 12 year age group (18%). Boys children (13.6%) sustained more injuries as compared to Girls (7.2%) (<0.001). The prevalence of dental trauma was more in government schools (12.6%) as compared to private schools (8.2%) (<0.002). Maximum number of TDIs occurred due to fall (57.4%) (Fig I) with the home being the most common place of injuries (46.4%) (Fig II). Ellis class I trauma was seen more often (69%) than any other type of trauma (FigIII). Single traumatized tooth was seen in (72.1%) children, two traumatized teeth were seen in (26.1%) three teeth in 1.2% and four teeth in 0.6% children.

Table II shows the prevalence of traumatic dental injuries according to the characteristics of lip competency, incisal overjet. Children with incompetent lips experienced more dental trauma (46.4%) as compared to children with competent lips (2.4%) ($p < 0.001$). A statistically significant association was found between the occurrence of dental trauma and incisal overjet more than or equal to 5mm (p <0.002). Most of the TDIs involved maxillary teeth (93.8%). The maxillary central incisors were the most common teeth affected by trauma (74.9%) followed by the

maxillary lateral incisors (12.7%), mandibular central incisors (6.9%), mandibular lateral incisors (3.7%) and maxillary canine (1.8%).

Discussion

Traumatic dental injuries affects both physical and psychological development of children which accounts for around 18% of the all facial injuries[7,8] In the present study, the prevalence of anterior tooth fracture due to trauma was 10.4%. The prevalence was found to be more when compared with Tangade PS[9] and Dighe K et al.[10] Differences in prevalence may be due to the difference in the type of study, classification of dental trauma, age groups, and behavioral differences between different countries.[10] In the present study, TDIs was found to be more in boys (13.6%) than girls (7.2%) and this difference was found to be statistically significant (<0.001). The results of our study were found to be similar to the study conducted by Hegde MN et al[6] where males were found to have more TDIs when compared to females. The results of our study were contradictory with the study conducted by Sgan-Cohen HD[11] where this difference was found to be statistically non significant. Gender difference may be due to more exposure of boys in comparison to girls to external environment like contact sports, road accident and their aggressive nature. Also, the reason for lesser prevalence of TDIs among girls could be that in traditional Indian society as girls grow up, more cultural restriction and house hold responsibilities are imposed on them leading to reduced exposure to the predisposing factors for trauma, such as contact sports, falls, and road accident. Whereas in the case of boys, as they grow, they get involve more in outdoor activities.[10]

In our study, the prevalence of TDI was more in children attending government school as compared to private school children and the difference was found to be statistically significant (<0.002). This result was in accordance with the study conducted by Soriano EP et al. The possible reason might be that children from government institutions usually belong to less educated and poor families and they are left unattended by their parents. A number of children per family are also more with consequent less attention being paid to each child.[12] In our study, most common cause of TDI was due to fall on the floor/ground (57.4%) with home being the most common place of injury (46.4%). In a similar study conducted by Singh N et al[1], most common cause of TDI was due to fall on ground/floor. The result of our study was also supported by Marcenes W et al[13] where most TDI occur due to fall. The reason for this might be as children spend most of their time at home followed by school where they are engaged in various activities like bicycle riding, fighting with siblings, etc. Games during lunch breaks in school can cause trauma due to fall, fighting among friends that's why every sports activity at school should be supervised by the sports teachers all the time and appropriate preventive measures should be made compulsory, i.e., helmet, protective mouth guard, and face mask. It is important that preventive education should be made part of curriculum which should be provided to parents, children, and school teachers.[1,13]

In the present study, traumatic injuries were most commonly seen in maxillary teeth (93.8%). This was in accordance with the study conducted by Dighe K et al[10] and Garcia Godoy FM[14] where maxillary arch was more commonly involved.

Because of their exposed position in the dental arch, upper central incisors are affected by traumatic injury at significantly higher rates than other teeth.[10] Maxillary Cental Incisor was most affected (74.9%) in our study. The reason can be explained by the fact that in the vertical plane, the maxillary arch is located more anteriorly than the mandibular arch as a result of which the impact of injury would be more on the maxillary arch. A majority of injuries occurred in the maxillary central incisor followed by the maxillary lateral incisor, this could also be due to early eruption of the maxillary central incisor than the maxillary lateral incisors and, thus, are at risk for a longer period of time.[7]

The present study found that most common injuries were of Ellis Class I (69%) which was in accordance with the study conducted by Dighe K et al[10] and Gupta K et al.[15]Children with incompetent lips experienced more dental trauma (36.4%) as compared to children with competent lips (3.9%). There was also a significant association between dental trauma occurrence and incisal overjet ≥5 mm. This could be due to the reason that within the arch, the proclination of central incisors and their forward placement in the vertical plane also make them more prone to the injury.[7] Most of the children had only one tooth traumatized (72.1%). When one tooth is traumatized, the majority of the force of impact is dispersed by the fractured tooth and no more teeth are traumatized.[16]

Conclusion

Traumatic dental injuries are relatively common but it can be prevented or treated well by dental surgeon on time so that not much physical and psychological effect on children occur during their growing age. Proper awareness programmes should be started specially in school communities, so that appropriate mode of prevention and treatment can be rendered promptly.

Bibliography

1. Singh N, Singh A, Jolly MS. Prevalence of traumatic dental injuries in school going children of Lucknow, India. Int J Oral Health Med Res 2015;2(2): 39-42.
2. Sulieman AG, Awooda EM. Prevalence of anterior dental trauma and Its associated factors among preschool children aged 3–5 years in Khartoum city, Sudan. Int J Dent 2018;1-5.
3. Petti S, Glendor U, Andersson L. World traumatic dental injury prevalence and incidence, a meta-analysis-One billion living people have had traumatic dental injuries. Dent Traumatol. 2018;34(2):71-86.
4. Kaul R, Saha S, Koul R, Saha N, Mukhopadyay S, Sengupta AV, Sarkar S. Prevalence and attributes of traumatic dental injuries to anterior teeth among school going children of Kolkata, India. Med J Armed Forces Ind 2021:1-8.
5. Saraswathi S, Rathinavelu PK. Prevalence of permanent anterior teeth trauma in children between 8-12 years in urban and rural districts in Rohtak, Haryana, India. Biomed Pharmacol J 2018;11(1): 469-75.
6. Hegde MN, Abootty S, Attavar S. Prevalence of anterior tooth fracture due to trauma. World J Dent 2015;6(2): 77-81.
7. Andreasen JO, Andreasen F, and Andersson L, Textbook and Color Atlas of Traumatic Injuries to the Teeth, Blackwell, Oxford, UK, 4th ed, 2007.

8. Rodd H, Noble F. Psychosocial impacts relating to dental injuries in childhood: The biggest picture. Dent J(Basel) 2019;7(1): 23-29.
9. Tangade PS. The prevalence of anterior teeth fracture and its relation to malocclusion in 12 and 15 year old schoolchildren Belgaum City India. J Oral Health Comm Dent 2007;1(1):7–11.
10. Dighe K, Kakade A, Takate V, Makane S, Padawe D, Pathak R. Prevalence of traumatic injuries to anterior teeth in 9-14 year school-going children in Mumbai, India. J Contem Dent Pract 2019;20(5): 622-30.
11. Sgan-Cohen HD et al. Dental trauma and its association with anatomic, behavioral and social variables among fifth and sixth grade schoolchildren in Jerusalem. Community Dent Oral Epidemiol 2005;33:174–180.
12. Soriano EP, Caldas Jr AF, et al. Prevalence and risk factors related to traumatic dental injuries in Brazilian Schoolchildren. Dent Traumatol 2007;23:232–240.
13. Marcenes W, Al BN, Tayfour D, Issa S. Epidemiology traumatic dental injuries to the permanent incisors of 9-12- year old schoolchildren in Damascus, Syria. Dent Traumatol 1999;15:117-23.
14. Garcia-Godoy FM. Prevalence and distribution of traumatic injuries to the permanent teeth of Dominican children from private schools. Community Dent Oral Epidemiol 1984;12(2):136-39.
15. Gupta K, Tandon S, et al. Traumatic injuries to the incisors in children of South Kanara District. A prevalence study. J Indian Soc Pedod Prev Dent 2002;20(3):107–113.
16. Ravishankar TL, Kumar MA, et al. Prevalence of traumatic dental injuries to permanent incisors among 12 year old schoolchildren in Davangere, South India. Chin J Dent Res 2010;13(1):57-60.
17. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). The COVID-19 pandemic. *International Journal of Health Sciences*, *5*(2), vi-ix. https://doi.org/10.53730/ijhs.v5n2.2937
18. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2022). Post-pandemic health and its sustainability: Educational situation. *International Journal of Health Sciences*, *6*(1), i-v. https://doi.org/10.53730/ijhs.v6n1.5949

Table I
Prevalence of TDIs according to age, gender and type of school

Variables	No. of children examined	No. and % of children with TDIs
Age		
9	250	4 (1.6%)
10	250	25(10%)
11	250	30 (12%)
12	250	45 (18%)
Gender		
Boys	500	68 (13.6%)
Girls	500	36 (7.2%)
Type of school		
Government	500	63 (12.6%)
Private	500	41 (8.2%)

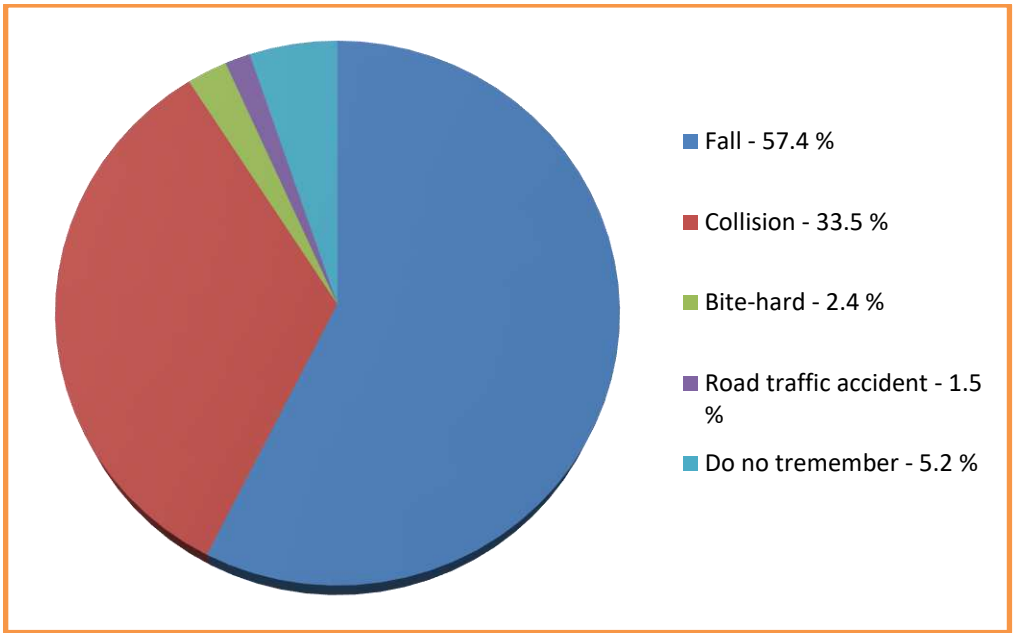

Figure I. Traumatic dental injury distribution according to cause of injury

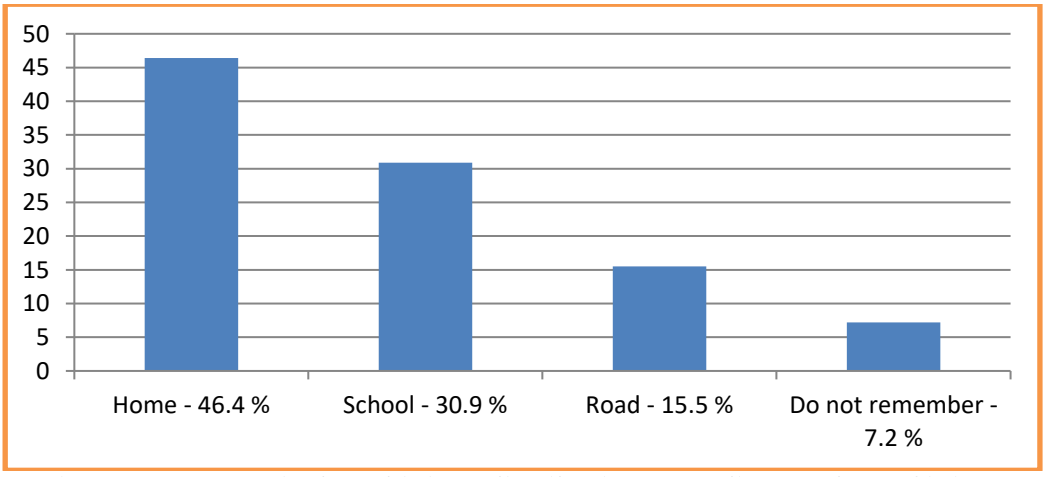

Figure II. Traumatic dental injury distribution according to place of injury

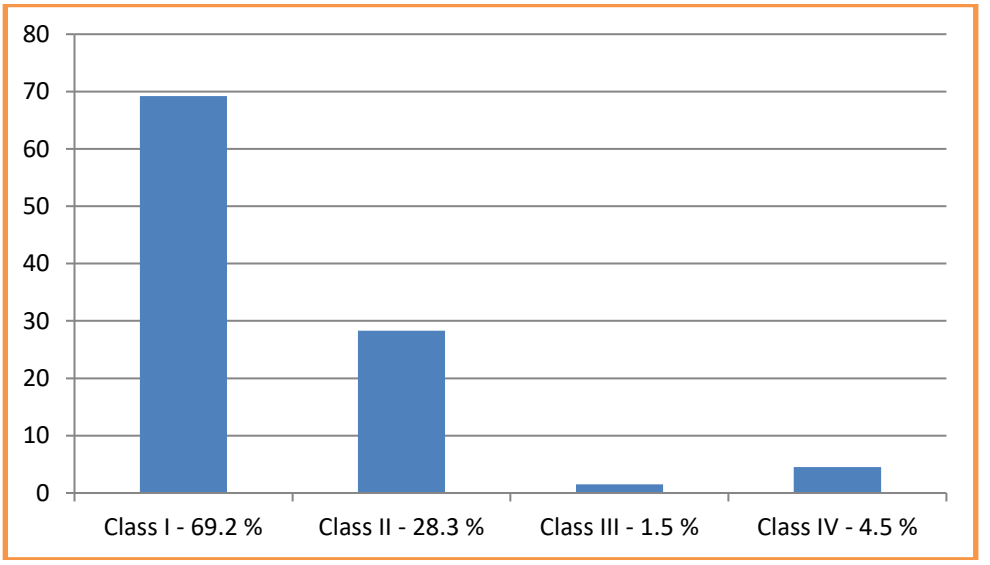

Figure III. Traumatic dental injury distribution according to type of trauma

Table II
Prevalence of TDIs according to lip competency, incisal overjet

Variables	N	No. and % of children with TDIs
Lip Competency		
Competent lips	799	31 (3.9%)
Incompetent lips	201	73 (36.4%)
Incisal Overjet		
Less than or equal to 5mm	712	17(2.4%)
More than or equal to 5mm	188	87 (46.4%)