**Traumatic Dental Injuries Among 12-15 year-old Schoolchildren in Panchkula: Prevalence, Risk Factors and Treatment Need**

**ABSTRACT**

## Aim:

To determine the prevalence of anterior tooth traumatic dental injuries in 12-15 year old school children of Panchkula district and correlate it with the cause; gender; extent of overbite and over-jet and whether any treatment was undertaken.

## Methods:

A multistage sample of 12-15 yr-old school children (n = 810) in Panchkula district, Haryana was considered. Trained Dental Surgeon was involved in the examining and the children were screened using WHO criteria for oral examination and those found with clinical traumatic injury were further examined for the type of traumatic injuries using Elis classification modified by Holand and over-jet and overbite was recorded. After examination questions regarding cause of trauma and treatment undertaken were asked. The data were subjected to statistical analysis using Chi square test and Mantel–Haenszel test developed using the SPSS 20.0 statistical package.

## Results and conclusion:

The results showed that out of 810 children, 86 (10.2 %) had suffered traumatic injuries. Male had higher prevalence of trauma as compared to females (p<0.05). The common cause for trauma was fall (51.11%) followed by sports injuries (41.86%). Enamel-dentin fracture without pulpal involvement was the commonest type of trauma and the teeth mostly involved were maxillary central incisors. A significant association was observed between overjet and overbite and trauma. Only 3.5% of children affected with trauma received treatment.

**Conclusion**

The prevalence of traumatic injuries to permanent incisors in 12-15year-old Panchkula schoolchildren was relatively high. TDI was associated with gender, overjet and lip competence. There was a great unmet treatment need.

**Keywords**

traumatic dental injuries, prevalence, risk factors

**INTRODUCTION**

Traumatic dental injury (TDI) in children and adolescent has become one of the most serious dental public health problem.1 They occur commonly and world-wide affect approximately, 20-30% of the permanent dentition that often lead to functional, aesthetic and psychological disturbances which are accompanied by great concern from the child, parents and dentists.2 A wide range of prevalence in the levels of TDI has been reported from different countries (Patel MC et al (2012); Malikaew et al. (2005); Artun et al. (2005); Shulman & Peterson (2004); Nik Hussein (2001); Marcenes et al. (2001)3-8

Despite such a high prevalence of dental trauma, very less attention has been given to TDI; its etiology and prevention. Risk evaluation for dental trauma is not carried out during the routine dental examination and even for those who participate in various sports. Since the majority of these injuries are preventable, there is a rising consensus of TDI. It is also of paramount importance that educational programs for children, parents and teachers about the importance of early treatment for dental trauma, ways of preventing these traumas and procedures for appropriate emergency management be instituted. These educational programs for the public in a country should preferably be preceded by an investigation of background information on the occurrence of oro-dental injuries in the community. Anterior tooth trauma has been studied in the article as studies report them as most susceptible tooth for TDI.9

This initiated our present study to evaluate prevalence of traumatic injuries involving permanent anterior teeth in 12-15 year old schoolchildren of Panchkula district and further to correlate it with the cause; gender; lip coverage and extent of over-jet and whether any treatment was undertaken.

**METHODOLOGY**

A cross-sectional study was conducted over a period of 6 months from April 2013 to September 2013 among 12-15 year old school going children of Panchkula District, Haryana. Ethical clearance was obtained from the institutional ethical committee and oral informed consent was obtained from the participants. A pilot study was conducted 1 month prior to the original study with a sample of 80 individuals who were not part of the main sample. Prevalence of traumatic dental injury was found to be 8.8%. Based on results of pilot study, sample size was calculated to 810.

A multistage sampling technique was adopted to select the children. The primary sampling unit consists of four blocks of Panchkula (i.e. Pinjore, Raipur Rani, Barwala and Morni). Within each block, the schools were randomly selected proportional to number of private and government schools and the total number of school going children. Before examining the children the consent was obtained from the concerned authorities of education department and principal of respective schools of the District Panchkula. All the children belonging to the age group of 12-15 years and who were available on the day of examination in the selected schools were examined till the desired sample size was achieved.

**Inclusion**

* The children who had entered 12th or 15th year on their last birthday and in whom permanent anterior had erupted.

**Exclusion**

Children who were

* Undergoing or had finished orthodontic treatment or children in whom the permanent anterior teeth had not yet erupted were excluded.
* The permanent anteriors were lost due to caries or cause other than trauma or those having partial/ complete anodontia involving permanent anteriors.
* Physically challenged children.
* Cleft lip or palate patients.
* Not willing to participate.

The examiner was trained and calibrated in prior to the commencement of the study. A pre- survey calibration was performed on group of 30 subjects in the age group of 12-15 years who were chosen from the school oral health programme conducted by Dental institution. The results so obtained were subjected to kappa statistics. The calibration exercise and the kappa value (0.95) showed good agreement for these observations and measurements in terms of intra examiner variability which validated the examination procedure. Dental examination was conducted using individually wrapped and sterilized sets of plain mouth mirrors, community periodontal index probes and gauze pads. The children were examined at their schools under natural light. Because radiographic examination was not carried out, root fractures were not recorded. Pulp vitality tests were not performed. The dental examination for TDI included only anterior permanent teeth. Injuries were classified according to the epidemiological classification given by **Ellis modified by Holland** et al. (1988).10 (Photograph)

Measurement of **maxillary overjet** was made with the teeth in centric occlusion; the distance from the labio-incisal edge of the most prominent maxillary incisor to the labial surface of the corresponding mandibular incisor was measured using the Community Periodontal Index (CPI) probe, as described in the 1997 WHO basic oral health survey guidelines.11

**Lip coverage** was recorded on visual inspection as adequate if lips covered the maxillary incisors in rest position, and as inadequate if two-thirds of the crown height was exposed and visible. Demographic information and questions regarding cause of trauma and treatment undertaken was recorded as part of the clinical examination.

The data were processed and analysed by means of SPSS PC Version 20.0 (Chicago, IL, USA). Data analysis included descriptive and analytic statistics. The chi-square test was used to compare qualitative data, and strength of association between the variable (lip coverage, gender, and incisal overjet) and outcome was calculated using the Mantel–Haenszel Common Odds Ratio. The level of statistical significance was set at *P*<0.05.

**RESULTS**

Out of the 810 students who were examined and responded the questionnaire, 415 were male participants and 395 were female participants. The prevalence of traumatic dental injuries was found to be 10.2% (86), with 60 boys and 26 girls being affected. In all, 94.2% of the injured children had only one tooth damaged.

The maxillary central incisors were the most frequently affected teeth (81.4%), followed by the maxillary lateral incisors (10.5%), then the mandibular central incisors (5.8%) and then mandibular lateral incisors (1.2%) and maxillary canines (1.2%). (Figure 1) The most frequent reason for TDI was fall (51.4%) followed by playing sports (41.9%). (Table 1) The most common type of injury was Type 1 (enamel fracture) (80.2%), followed by type 2 fracture i.e. involving enamel/dentin (8.1%). (Figure 2)

Only 3.5% of children having trauma were treated. The type of treatment recorded was acid-etched, adhesively luted restorations or crowns. (Figure 3)

The numbers of injured teeth were more in boys compared to girls. With the odds ratio of -0.875 (95% CI,*P*=0.000). Thus, showing negative association between female gender and prevalence of TDI. (Table 2)

Children with adequate lip coverage showed less number of injuries (27) as compared to those with inadequate lip coverage (59). Also, children having inadequate lip coverage were 3.1 times more prone to injuries as compared to adequate lip coverage (OR=3.065, 95% CI, *P*=0.000) [Table 2]. Hence, inadequate lip coverage was identified as the most important and an independent risk predictor for traumatic injuries to permanent anterior teeth.

The maximum injuries occurred in children with increased overjet (69) followed by those having normal overjet (17). With an odds ratio of 2.441 (95% CI,*P*=0.000). Thus increased overjet was identified as an important risk factor for traumatic dental injury when compared to normal overjet.

**DISCUSSION**

This cross sectional study identified a prevalence of 10.2% of TDI to permanent anterior teeth of 12- 15 year old school going children of Panchkula District. Table 3 shows the comparative prevalence of current studies with previous studies.3-8 The difference in prevalence can be due to behavioral and cultural diversity may explain differences in findings between countries and also within a country.

There was a significant difference in dental trauma between genders – boys had a higher prevalence than girls – which is in accordance with previous studies.4, 8The difference by gender is explained by boys are more inclined towards vigorous activities and also due to the restricted behaviour of girls enforced by conservative parents due to cultural and social conditions in India can be added to the possible factors.

Most common fracture was type 1 fracture i.e. involving enamel and most commonly involved tooth was maxillary central incisor. This was in concordance to study done by Patel MC (2012)3 and Nik-Hussein (2001)7.

Most of TDI in present study was due to falls occurred at home and school, followed by playing sports in the street. This is of special importance for health policy makers seeking to establish prevention strategies to reduce traumatic oro-facial injuries. This includes involving parents more closely to control the home environment. The role of the school environment as a determinant of TDI is well established; in schools with a supportive social and physical environment, TDI is less likely. 4

The prevalence of treated traumatized teeth was only 3.5%, which was in concordance to epidemiological studies done in other part of world.8, 11-13 This study showed high unmet treatment need which can be due to lack of adequate knowledge and proper motivation about TDI among children, parents and school teachers which may be further compounded by limitations imposed due to socioeconomic constraints.

Regarding increased overjet and inadequate lip coverage, the finding in the present study is in agreement with previous reports.3, 4,7 The results of the present study support previous findings in that reduced incisor protection through lip incompetence increases the likelihood of trauma (Artun et al, 2005). Therefore, the treatment of increased overjet is a necessary preventive measure for avoiding TDI.

This study has some limitations, such as 1) Since the data were cross sectional, causal relationships cannot be established and the observed association could be due to other unexplored factors; 2) Trauma detection was carried out visually, without taking radiographs; 3) Nonschool going children were not studied.

However, strength of our study remains in the fact that it provides an overview of burden of TDI among representative sample of children between 12-15 yrs for the first time and can prove to be a benchmark for future comparisons by the public health personnel and decision makers.

There is a need for public interventions to reduce the risk for TDI among children and adolescents in Panchkula. A safe environment at home, in schools and the community, including safer playgrounds, can help minimize the risks. Interceptive orthodontic treatment in this age group would be beneficial to reduce the risk of TDI in those children with excessive overjet.

**CONCLUSION**

The results of this study showed that the prevalence of TDI to permanent anterior teeth in 12-15 year-old Panchkula schoolchildren was relatively high. The main causes related to the occurrence of TDI were falls and playing sport. TDI was associated with gender, overjet and lip closure competence. There was a great unmet treatment need.

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| **Table 1- Traumatic dental injuries classified according to causes of injuries** |
| **Cause of injury** | **Frequency** | **Percentage** |
| **Fall** | 44 | 51.2 |
| **Violence/ fight in school** | 3 | 3.4 |
| **Domestic violence** | 2 | 2.3 |
| **Playing sports** | 36 | 41.9 |
| **Others** | 1 | 1.2 |

**Table 2- Mantel–Haenszel common odds ratio estimate and statistical significance of Gender, Overjet and lip coverage**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Children Characteristics**  | **N**  | **No injuries**  | **With injuries**  | **Chi square value**  | **P value**  | **Odds ratio (CI)**  |
| Gender  | Boys  | 415  | 355  | 60  | 13.22  | 0.000  | **-0.875**(-1.358--0.392)  |
|  | Girls  | 395  | 369  | 26  |  |  |
| Overjet  | Normal  | 552  | 535  | 17  | 103.75  | 0.000  | **2.441** (1.885-2.997)  |
|  | Increased  | 258  | 189  | 69  |  |  |
| Lip Coverage  | Adequate  | 684  | 657  | 27  | 201.13  | 0.000  | **3.065**(2.545-3.585)  |
|  | Inadequate  | 126  | 67  | 59  |  |  |
| Total  |  | 810  | 724  | 86  |  |  |  |

**Table 3- Comparative prevalence of current study with previous studies**

|  |  |  |  |
| --- | --- | --- | --- |
| **Author (Year of study)** | **Place**  | **Age Group (years)**  | **Prevalence (%)**  |
| Patel MC et al (2012)  | Vadodra  | 8-13  | 8.79  |
| Nik Hussein (2001)  | Malaysia  | 16  | 4.1  |
| Malikaew et al. (2005)  | Thailand  | 11-13  | 35  |
| A rtun et al. (2005)  | Kuwait  | 13-14  | 14.5  |
| Shulman & Peterson (2004)  | U.S.A.  | 6-20  | 16  |
| Marcenes et al. (2001)  | Brazil  | 12  | 58.6  |