

# Prevalence of Traumatic Injuries to Anterior Teeth in 9–14 Year School-going Children in Mumbai, India

Kishor Dighe<sup>1</sup>, Adesh Kakade<sup>2</sup>, Vilas Takate<sup>3</sup>, Sachin Makane<sup>4</sup>, Dimple Padawe<sup>5</sup>, Rupali Pathak<sup>6</sup>

## ABSTRACT

**Aim:** The aim of this study is to assess the prevalence and causes of traumatic dental injury (TDI) in 9–14 year school-going children in Mumbai, Maharashtra, India.

**Materials and methods:** A cross-sectional study consisting of 2,055 primary and secondary school-going children aged between 9 and 14 years, from 20 municipal corporation schools of Mumbai city, was selected through a stratified random sampling technique. Children were examined clinically for any signs of TDI in the permanent anterior teeth in their respective schools by two examiners trained in using WHO criteria for oral and dental examination. Data analysis involved descriptive statistics including a frequency distribution.

**Results:** The prevalence of TDI to anterior teeth in school children of Mumbai was 16.3%. The commonest cause of trauma was fall followed by sports activities, collision, and road traffic accidents.

**Conclusion:** The occurrence and various etiologies of traumatic injuries to maxillary anterior teeth in school children of Mumbai were approximately the same as found in other countries.

**Clinical significance:** The present study gives a bird's eye view on the prevalence and common etiology of TDI in school children of Mumbai.

**Keywords:** Mumbai, Prevalence, School children, Traumatic injuries.

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## INTRODUCTION

Traumatic dental injuries (TDIs) are often associated with facial fractures in road traffic accidents whereas exclusive dental injuries are often due to minor accidents, such as fall or contact with blunt objects while playing.<sup>1</sup> Children with injuries to their anterior teeth and concerned parents present a challenge to dentists. Trauma to the tooth is followed by pulpal hyperemia, alteration in the blood flow in the pulp, and over time can cause pulpal necrosis. The damaged apical vessels interfere with the reparative process and the prognosis of such tooth depends on the rapidity with which it is treated.<sup>2</sup>

There is a high unmet treatment need due to high prevalence of the damage that exceeds the percentage of those seeking treatment.<sup>3</sup> A difficult therapeutic problem raised by traumatic loss of the anterior teeth and the socioeconomic consideration will stress the need for collecting valuable data dealing with the cause and types of teeth injuries. It is also paramount importance to find ways of preventing these traumas and procedures for appropriate emergency management be instituted.<sup>4</sup>

Literature search shows very few studies, with respect to the occurrence and etiology of dental trauma in Mumbai. Hence, the aim of the present study is to assess the occurrence and causes of TDIs in 9- to 14-year school-going children in Mumbai, India.

## MATERIALS AND METHODS

The present study was conducted in the Department of Pediatric and Preventive Dentistry, Nair hospital Dental College, Mumbai. A cross-sectional study consisting of 2,055 primary and secondary school-going children aged between 9 years and 14 years, from 20 municipal corporation schools of Mumbai city, was selected through a stratified random sampling technique. Twenty schools including 10 primary schools and 10 secondary schools

<sup>1,3,5</sup>Department Pedodontics and Preventive Dentistry, Government Dental College and Hospital, Mumbai, Maharashtra, India

<sup>2</sup>Department Pedodontics and Preventive Dentistry, Nair Hospital Dental College, Mumbai, Maharashtra, India

<sup>4</sup>Rural Hospital, Ghoti, Nashik, Mumbai, Maharashtra, India

<sup>6</sup>Mumbai, Maharashtra, India

**Corresponding Author:** Kishor Dighe, Department Pedodontics and Preventive Dentistry, Government Dental College and Hospital, Mumbai, India, Phone: +91 9004891359, e-mail: kd2467@gmail.com

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from different areas of Mumbai were chosen by random selection in the first stage sampling. The second stage involved the selection of 9- to 14-year-old children from four academic classes (classes IV to IX). The school administrators provided the list of names that was subjected to random sampling, consisting of 30 students from each class for a total of 2,055 children (1,124 boys and 931 girls). The present study was approved by the Ethical Committee at Nair Hospital Dental College, Mumbai. A written consent was taken from all principals of schools and parents of selected students. The sample size was calculated using the following formula:<sup>4–8</sup>

$$n = 4pq/l^2$$

where  $p$  is the positive character (assumed prevalence) = 20%;  $q = 100 - p = 80$ ;  $l$  is the allowable error, i.e., 10% of  $p = 2$ .

The inclusion criteria included children aged between 9 years and 14 years irrespective of sex, race, or socioeconomic status;

children who were cooperative; and schools with a minimum student population of 50. The exclusion criteria included children with any communicable or systemic diseases.

Children were examined clinically for any signs of TDI in the permanent anterior teeth in their respective schools by two examiners trained in using WHO criteria for oral and dental examination.<sup>9</sup> Infection control measures as per WHO recommendations were adopted.<sup>9</sup> Two students in each school were examined twice to check for intra-examiner reliability. Examination was carried out during school hours of children. Participants were examined with natural light using mouth mirrors and explorers under visual examination (Fig. 1). A tooth crown was scored as fractured when some of its surface was missing as a result of trauma and there was no evidence of caries using Ellis classification.<sup>1</sup> Teeth which exhibited both trauma and caries were included in the caries category. Teeth with dark discoloration, presence of swelling or fistula adjacent to an otherwise healthy tooth, and teeth missing due to trauma were also registered as traumatized. Neither vitality tests nor radiographs were used to assess the extent of the fractured teeth furthermore; root fractures' injuries were not recorded.

During the dental examination, children with positive findings of TDIs (Figs 2 to 8) were further evaluated using structured questionnaires (Annexure I) regarding the time, place, and cause of TDIs by a single examiner. The choice of answers to the questions was fixed (close ended). The interviewer read the questions and the relevant options exactly as they appeared in the questionnaire format. The children were asked to select a relevant option and that option was marked by the examiner in the questionnaire format.

## STATISTICAL ANALYSIS

The prevalence of TDIs was evaluated according to sex, age, tooth, injury type, and cause. The Statistical Package for Social Sciences (SPSS) Software version 15 and Sigmaplot Version 11 were used to analyze the data. Statistical significance for the association between the occurrence of dental trauma and gender was carried out using the Chi-square test. The level of significance was set at 5%.

## RESULTS

Association of prevalence of traumatic injuries among boys and girls (Table 1 and Graph 1) shows that among the 335 reported



Fig. 1: Examination and recording of TDIs in children



Fig. 2: Subject with clinical presentation of Ellis class I trauma i.r.t. 21



Fig. 3: Subject with clinical presentation of Ellis class II trauma i.r.t. 21



Fig. 4: Subject with clinical presentation of Ellis class III trauma i.r.t. 11

cases of traumatic injuries, 228 (20.28%) boys and 107 (11.49%) girls had TDIs which were statistically significant (Chi-square = 28.847,  $p < 0.001$ ); this meant that boys experienced more traumatic injuries compared to girls. The boys to girls ratio is 3.13:1.

Association of TDIs among different age groups (Table 2 and Graph 2) shows the distribution of TDIs among different age groups. In the age group of 9 years, the prevalence of TDIs is 11.03%; in the age group of 10 years, the prevalence of TDIs is 15%; in the age group of 11 years, the prevalence of TDIs is 16.18%; in the age group of 12 years, the prevalence of TDIs is 17.03%; in the age group of 13 years, the prevalence of TDIs is 18.92%; in the age group of 14 years, the prevalence of TDIs is 18.36%; the peak prevalence of TDIs was 13–14 years of age with a prevalence



**Fig. 5:** Subject with clinical presentation of Ellis class IV trauma and gingival abscess i.r.t. 21



**Fig. 8:** Subject with clinical presentation of Ellis class VIII trauma i.r.t 21



**Fig. 6:** Subject with clinical presentation of Ellis class V trauma i.r.t. 11



**Fig. 7:** Subject with clinical presentation of Ellis class VII trauma i.r.t. 21 and 22

of 18.92% at 13 years of age, and in 18.36% at 14 years of age, a statistically significant difference was seen in different age groups (Chi-square = 7.958,  $p = 0.0048$ ), this meant that the prevalence of TDIs increases with age.

The distribution of traumatic injuries according to the tooth type involved in trauma (Table 3 and Graph 3) shows the distribution of traumatic injuries according to the tooth involved in trauma, a total of 355 individuals with 411 teeth were reported with trauma, the most commonly involved teeth were maxillary central incisors, maxillary right central incisor 43.55%, and maxillary left central incisor 41.11% followed by maxillary lateral incisors, maxillary left lateral incisor 5.1%, and maxillary right lateral incisor 4.62%.

This distribution of the type of tooth was found to be statistically significant (Chi-square test = 1450.5, degrees of freedom = 11,  $p$  value is 0.0001).

The distribution of TDIs according to the arch (Table 4 and Graph 4) shows the distribution of traumatic injuries according to the arch involved, the prevalence of 94.89% for the maxillary arch being involved in injury, and 5.59% for the mandibular arch involved in injury.

The distribution of tooth involved in traumatic injury according to the type of trauma (Table 5 and Graph 5) shows that this distribution of the type of traumatic injury was found to be statistically significant (Chi-square: 1765.0, degrees of freedom: 7, the  $p$  value is  $< 0.0001$ ). Out of 411 teeth reported, 308 (74.93%) teeth belong to Ellis class I (enamel fracture), 17.76% to Ellis class II (enamel and dentin fracture), 3.4% to Ellis class IV (discolored teeth), and Ellis class V and Ellis class VIII constitute 1.21%.

The distribution of children with traumatized anterior teeth according to the cause of sustained trauma (Table 6 and Graph 6) shows the cause of trauma with the prevalence of traumatic injuries in both boys and girls. About 67.76% got injured because of fall, 22.39% due to sports activity, and 4.17% due to road traffic accidents and collision, 1.45% with violence, this frequency distribution for the cause of trauma was found to be statistically significant (Chi-square = 548.42,  $p < 0.0001$ ).

The distribution of children with traumatized anterior teeth according to the place of occurrence of trauma (Table 7 and Graph 7) shows descriptive statistics of the place of injury with the prevalence of traumatic injuries in both boys and girls. From 335 cases reported, 46.56% were injured at home, 22.36% were injured at playground, 19.1% were injured at school, and 11.34% were injured outside on streets. This frequency distribution for the place of trauma was found to be statistically significant (Chi-square = 123.36,  $p < 0.0001$ ).

## DISCUSSION

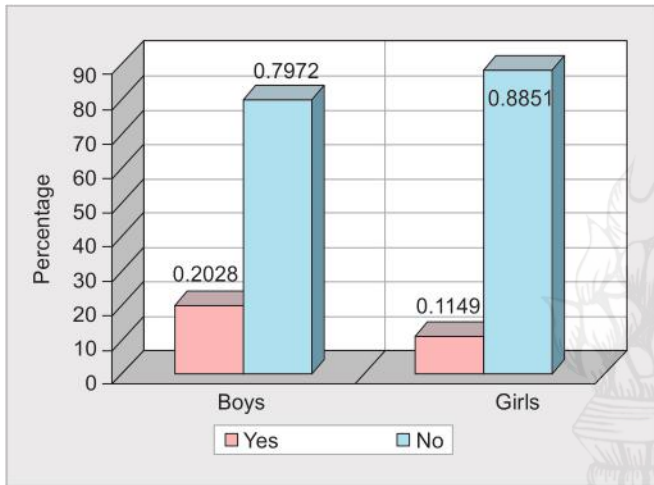
Various factors have influenced the prevalence of TDIs in various countries, such as classification for trauma used, research methodology, consideration of diagnostic criteria, number of patients, method of patient examination, and cultural and behavioral differences between the study location and countries.<sup>10,11</sup> The majority of the studies of TDIs to permanent teeth in adolescents were conducted in Europe or America. The prevalence of TDIs among adolescents in the Americas and Europe ranged from 15 to 23% and 23 to 35%, respectively.<sup>12-14</sup> Corresponding prevalence rates among adolescents in Asia and Africa ranged from 4 to 35% and

**Table 1:** Association of prevalence of traumatic injuries among boys and girls

Sex		No. of children with fractured teeth			Boys:girls ratio
		Yes	No	Total	
Boys	Count	228	896	1124	3.13:1
	Percent	20.28	79.72	100.00	
Girls	Count	107	824	931	
	Percent	11.49	88.51	100.00	
Total	Count	335	1720	2055	
	Percent	16.30	83.70	100.00	

Chi-square test	Value	Degree of freedom	p value	Association is
Pearson's Chi-square	28.847	1	<0.001	Significant
Fisher exact			<0.001	Significant



**Graph 1:** Comparison of prevalence of traumatic injuries between boys and girls

15 to 21%.<sup>10,15,16</sup> Trauma to anterior teeth in the Asia-Pacific region ranged from 6 to 19%.<sup>5,6,7,11,17</sup>

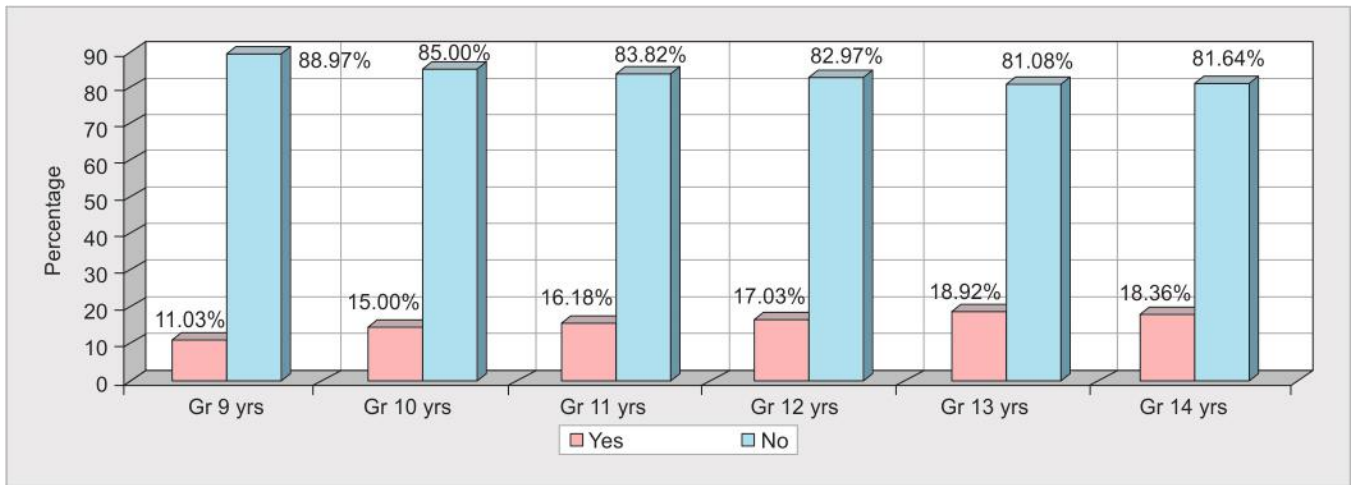
A total of 2,055 children's were examined and interviewed in the cross-sectional survey: 54.6% of them were boys and 45.4% of them were girls. The present study identifies the prevalence of 16.3% of TDI among 9- to 14-year old school children in Mumbai. Previous studies carried out in India reported a prevalence of 5.29%, Rai and Munshi;<sup>7</sup> 13.8%, Gupta et al.;<sup>18</sup> 14.9%, Baldava and Anup;<sup>5</sup> 6%, Jamil et al.;<sup>19</sup> 9.6%, Bhat et al.;<sup>20</sup> 4.15%, Gupta et al.;<sup>21</sup> 14.4%, Kumar et al.;<sup>22</sup> 8.79%, Patel and Sujjan;<sup>23</sup> and 10.13%, Mohan et al.<sup>24</sup> Two hundred twenty-eight boys had fractured teeth among 1,124 boys examined, and 107 girls had fractured teeth among 931 girls examined. In the present study, it was found that the boys were more affected by trauma than girls, which corroborates the findings of other studies by Cortes et al.,<sup>6</sup> Gupta et al.,<sup>18</sup> Traebert et al.,<sup>25</sup> Traebert et al.,<sup>26</sup> Rocha and Cardoso,<sup>27</sup> and Kumar et al.<sup>22</sup> This could be due to the fact that boys engage in leisure activities or sports of a generally more aggressive nature or with a greater accident risk than the girls do, and that they have delayed maturation rates. 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.

**Table 2:** Association of TDIs among different age group

Age (years)		No. of children with fractured teeth		
		Yes	No	Total
9 years	Count	32	258	290
	Percent	11.03	88.97	100.00
10 years	Count	48	272	320
	Percent	15.00	85.00	100.00
11 years	Count	55	285	340
	Percent	16.18	83.82	100.00
12 years	Count	63	307	370
	Percent	17.03	82.97	100.00
13 Years	Count	70	300	370
	Percent	18.92	81.08	100.00
14 years	Count	67	298	365
	Percent	18.36	81.64	100.00
Total	Count	335	1720	2055
	Percent	16.30	83.70	100.00

Chi-square test	Value	Degrees of freedom	p value	Association is
Pearson's Chi-square test for trend	7.958	1	0.0048	Significant



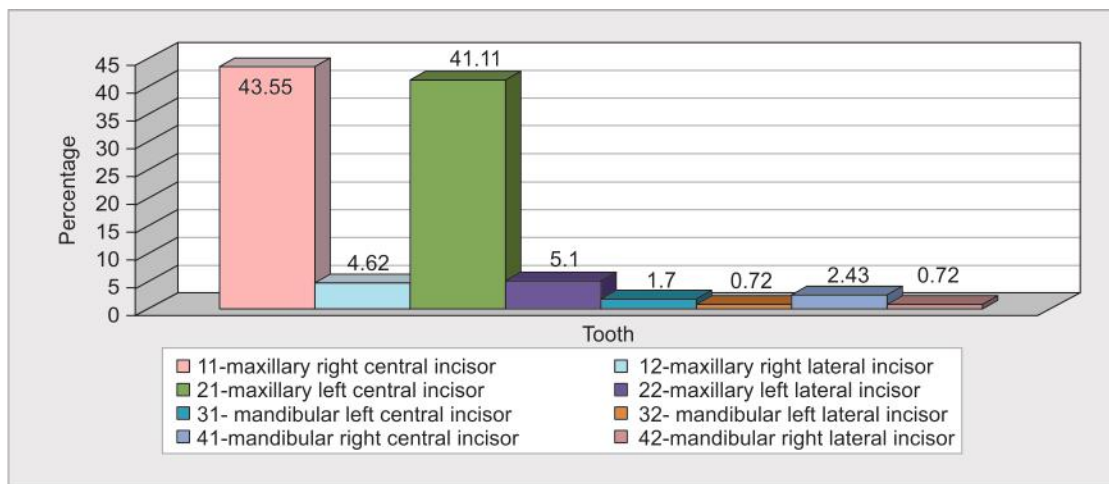
**Graph 2:** Association of TDIs among different age groups (Gr, groups)

The prevalence of dental injuries increases with age and statistically significant differences were observed ( $p < 0.001$ ). In the present study, the peak prevalence of dental traumatic injuries

was 13 to 14 years of age. The fact that the prevalence of dental injury increased with age did not mean that the oldest were the most vulnerable.<sup>27-30</sup>

**Table 3:** Distribution of traumatic injuries according to tooth type involved in trauma

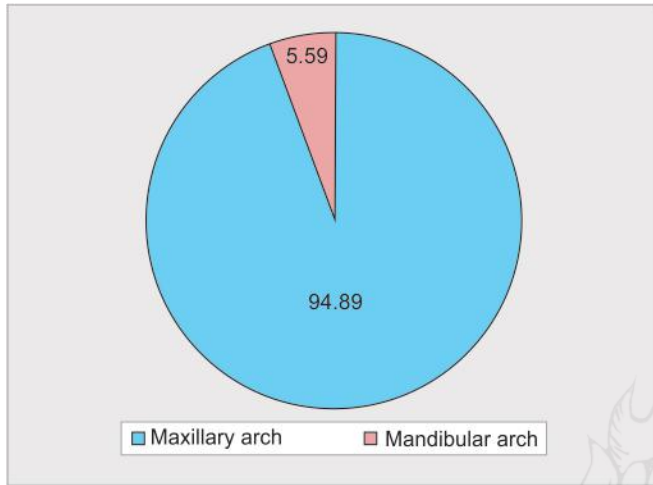
Tooth	Boys with injured teeth		Girls with injured teeth		Children's with injured teeth	
	No	%	No	%	No	%
11-Maxillary right central incisor	122	42.95	57	44.88	179	43.55
12-Maxillary right lateral incisor	12	4.22	7	5.51	19	4.62
13-Maxillary right canine	0	0	0	0	0	0
21-Maxillary left central incisor	118	41.54	51	40.15	169	41.11
22-Maxillary left lateral incisor	15	5.28	6	4.72	21	5.1
23-Maxillary left canine	0	0	0	0	0	0
31-Mandibular left central incisor	4	1.4	3	2.36	7	1.7
32-Mandibular left lateral incisor	3	1.05	0	0	3	0.72
33-Mandibular left canine	0	0	0	0	0	0
41-Mandibular right central incisor	7	2.46	3	2.36	10	2.43
42-Mandibular right lateral incisor	3	1.05	0	0	3	0.72
43-Mandibular right canine	0	0	0	0	0	0
Total	284	100	127	100	411	100



**Graph 3:** Distribution of traumatic injuries according to the type of tooth involved in trauma

**Table 4:** Distribution of TDIs according to arch

Arch	Boys with injured teeth		Girls with injured teeth		Children's with injured teeth	
	No	%	No	%	No	%
Maxillary arch	267	94.01	121	95.27	390	94.89
Mandibular arch	17	5.98	6	4.72	23	5.59
Total	284		127		411	



**Graph 4:** Distribution of TDIs according to the arch

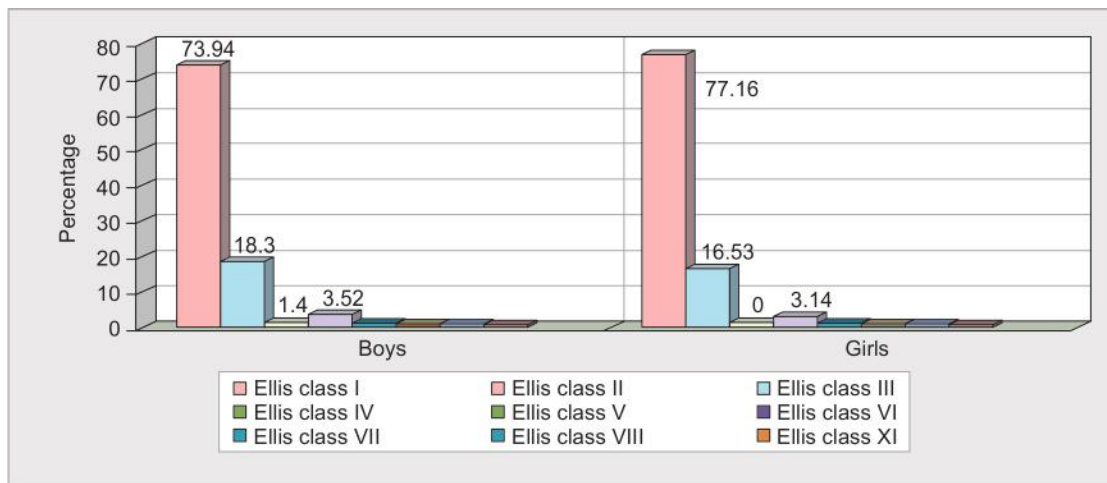
In the present study, it was found that the prevalence of traumatic injuries was significantly higher in the maxillary arch (94.89%) compared to that in the mandibular arch (5.59%). There was no difference in the prevalence of injuries between the left and the right side of the mouth, which is in agreement with the earlier findings of Garcia-Godoy.<sup>31</sup> Because of their exposed position in the dental arch, upper central incisors are affected by traumatic injury at significantly higher rates than other teeth. Of the injured teeth evaluated in this study, 84.66% were central upper incisors. This rate is comparable with the rates reported in the literature.<sup>28,30,32</sup> 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. Within the arch, the proclination of central incisors

**Table 5:** Distribution of children with traumatized anterior teeth according to type of trauma

Type of trauma	Boys		Girls		Total	
	No	%	No	%	No	%
Ellis class I	210	73.94	98	77.16	308	74.93
Ellis class II	52	18.3	21	16.53	73	17.76
Ellis class III	4	1.4	0	0	4	0.97
Ellis class IV	10	3.52	4	3.14	14	3.4
Ellis class V	3	1.05	2	1.57	5	1.21
Ellis class VI	0	0	0	0	0	0
Ellis class VII	2	0.7	0	0	2	0.49
Ellis class VIII	3	1.05	2	1.57	5	1.21
Ellis class XI	0	0	0	0	0	0
Total	284	100	127	100	411	100

and their forward placement in the vertical plane also make them more prone to the injury.<sup>1</sup> 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.

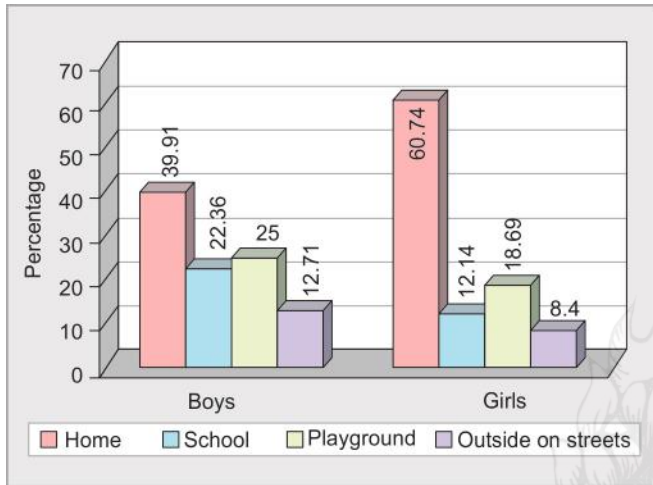
The present study found that most common injuries were of enamel fracture (74.93%), followed by the fracture involving enamel and dentin (17.76%), and followed by discolored tooth which had lost its vitality (3.4%), this finding is similar to other studies by Andreasen et al.,<sup>32</sup> Rai and Munshi,<sup>7</sup> Gupta et al.,<sup>18</sup> 14.9% Baldava and Anup,<sup>5</sup> 6% David et al.,<sup>19</sup> 9.6% Bhat et al.,<sup>20</sup> 4.15% Gupta et al.,<sup>21</sup> and 14.4% Kumar et al.<sup>22</sup> The most common cause of traumatic injuries in the present study was fall (67.76%) followed by sports activities (22.39%), road traffic accidents (4.17%), collision (4.17%), and violence (1.45%). This finding is similar to that reported in previous studies by Marcenes et al.,<sup>33</sup> Traebert et al.,<sup>25,26</sup> Malikaew et al.,<sup>34</sup> and Sudeshni et al.<sup>35</sup> First, "falls" is a broad category that includes many causes of TDIs, fall due to pushing is also a minor form of violence. Fall had been reported to be the major cause of TDIs in children, majority of falls reported in this study occurred when children's were running or walking and playing. Sports activity is the second most common cause of injuries, as children tends to play in an unsafe environment. Females reported a higher prevalence of injuries at home (60.74%) compared to boys with 39.91% because they spend more time at home rather than



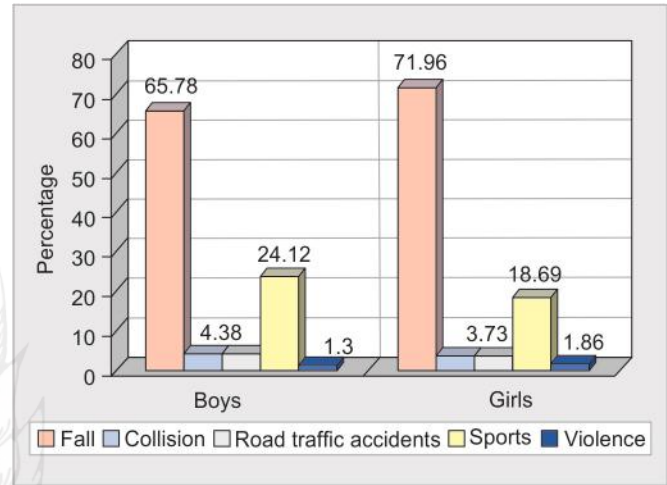
**Graph 5:** Distribution of children with traumatized anterior teeth according to the place of occurrence of trauma

**Table 6:** Distribution of children with traumatized anterior teeth according to the cause of sustain trauma

Cause	Boys		Girls		Total		Chi-square test
	No	%	No	%	No	%	
Fall	150	65.78	77	71.96	227	67.76	548.42  p value <0.0001 Significant
Collision	10	4.38	4	3.73	14	4.17	
Road traffic accidents	10	4.38	4	3.73	14	4.17	
Sports	55	24.12	20	18.69	75	22.39	
Violence	3	1.31	2	1.86	5	1.45	
Total	228	100	107	100	335	100	



**Graph 6:** Distribution of children with traumatized anterior teeth according to the place of occurrence of trauma



**Graph 7:** Distribution of children with traumatized anterior teeth according to the cause of sustain trauma

**Table 7:** Distribution of children with traumatized anterior teeth according to the place of occurrence of trauma

Place	Boys		Girls		Total		Chi-square test
	No	%	No	%	No	%	
Home	91	39.91	65	60.74	156	46.56	123.36
School	51	22.36	13	12.14	64	19.1	p value
Playground	57	25	20	18.69	77	22.98	<0.0001
Outside on streets	29	12.71	9	8.4	38	11.34	Significant
Total	228	100	107	100	335	100	

at school and play ground or may be the injuries have occurred during the vacation time. Similar observations were made in studies of Malikaew et al.,<sup>34</sup> Traebert et al.,<sup>25</sup> and Gupta et al.<sup>18</sup> The present study supports the findings of Marceses and Murray, where TDIs seem to be a serious dental public health problem among children in deprived areas, such as overcrowding and unsafe playgrounds.<sup>36</sup>

Recommended prevention methods include childproofing the home, orthodontic treatment of protruding teeth, and education of the public regarding the management of luxated/exfoliated teeth and where to seek care following injury to the teeth. To understand the complexities of dental trauma epidemiology and implement preventive strategies that can help reduce the frequency of trauma, more epidemiological studies with representative populations using standardized trauma classifications are required.

**CONCLUSION**

The following conclusions can be drawn from the present study:

The prevalence of TDI to anterior teeth in school children of Mumbai was 16.3%.

- Boys experienced 3.13-fold greater trauma compared to girls. The prevalence of TDIs in boys was 20.28% and in girls was 11.49%.
- The prevalence of TDI increases with age and the peak prevalence of TDIs was 13 to 14 years of age with a prevalence of 18.92% at 13 years of age, and 18.36% at 14 years of age.
- The commonest cause of trauma was fall followed by sports activities and collision and road traffic accidents.

**REFERENCES**

- Andreasen JO, Andreasen FM, et al. Traumatic injuries to the teeth. 4th ed. Denmark: Blackwell Publishing Ltd; 2007.
- Ralph EM, David RA, et al. Dentistry for children and adolescent 8th ed. Missouri: Elsevier Publishing Ltd; 2006.
- Javinen S. Incisal overjet and traumatic injuries to upper permanent incisors: a retrospective study. Acta Odontol Scand 1978;36(6):359-362.



4. Kahabuka Fk, Plasschaert A, et al. Prevalence of teeth with untreated dental trauma among nursery and primary school pupils in dare s salaam, Tanzania. *Dent Traumatol* 2001;17(3):109–113.
5. Baldava P, Anup N. Risk factors for traumatic dental injuries in an adolescent male population in India. *J Contemp Dent Pract* 2007;8(6):35–42.
6. Cortes MIS, Marcenes W, et al. Prevalence and correlates of traumatic injuries to the permanent teeth of school-children aged 9 to 14 years in Belo Horizonte, Brazil. *Dent Traumatol* 2001;17(1):22–26.
7. Rai SB, Munshi AK. Traumatic injuries to the anterior teeth among south Kanara school children—a prevalence study. *J Indian Soc Pedod Prev Dent* 1998;16(2):44–51.
8. Kirby A, GebSKI V, et al. Determining the sample size in a clinical trial. *Med J Aust* 2002;177:256–257.
9. WHO, Oral health surveys, basic methods. 4th ed. India; AITBS Publishers, 1997.
10. Lam R, Abbott P, et al. Dental trauma in an Australian rural center. *Dent Traumatol* 2008;24:663–670. DOI: 10.1111/j.1600-9657.2008.00689.x.
11. Lin S, Levin L, et al. Dentoalveolar and maxillofacial injuries: a 5-year multi-center study. Part 1: General vs facial and dental trauma. *Dent Traumatol* 2008;24:53–55. DOI: 10.1111/j.1600-9657.2006.00510.x.
12. Glendor U. Epidemiology of traumatic dental injuries – a 12 year review of the literature. *Dent Traumatol* 2008;24:603–611. DOI: 10.1111/j.1600-9657.2008.00696.x.
13. Locker D. Prevalence of traumatic dental injury in grade 8 children in six Ontario communities. *Can J Public Health* 2005;96:73–76.
14. Hamilton FA, Hill FJ, An investigation of dento-alveolar trauma and its treatment in an adolescent population. Part 2: Dentists' knowledge of management methods and their perceptions of barriers to providing care. *Br Dent J* 1997;182:129–133.
15. Kahabuka Fk, Plasschaert A, et al. Prevalence of teeth with untreated dental trauma among nursery and primary school pupils in dare s salaam, Tanzania. *Dent Traumatol* 2001;17(3):109–113.
16. Nik-hussein NN. Traumatic injuries to anterior teeth among school children in Malaysia. *Dent Traumatol* 2001;17(4):149–152.
17. Hamdan MA, Rajab LD. Traumatic injuries to permanent anterior teeth among 12-year-old schoolchildren in Jordan. *Community Dent Health* 2003;20:89–93.
18. 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.
19. David J, Astrøm AN, et al. Factors associated with traumatic dental injuries among 12-year old schoolchildren in south India. *Dent Traumatol* 2009;25:500–505. DOI: 10.1111/j.1600-9657.2009.00807.x.
20. Bhat N, Agrawal A, et al. Teeth fractured among visually impaired and sighted children of 12 and 15 years age groups of Udaipur city, India—a comparative study. *Dent Traumatol* 2011;27(5):389–392. DOI: 10.1111/j.1600-9657.2011.01007.x.
21. Gupta S, Kumar Jindal S, et al. Prevalence of traumatic dental injuries and role of incisal overjet and inadequate lip coverage as risk factors among 4 to 15 years old government school children in Baddi-Barotiwala Area, Himachal Pradesh, India, *Med Oral Patol Oral Cir Bucal* 2011;16(7):e960–e965.
22. Kumar A, Bansal V, et al. Prevalence of traumatic dental injuries among 12 to 15 years old schoolchildren in Ambala district Haryana, India. *Oral health Prev Dent* 2011;9(3):301–305.
23. Patel MC, Suján SG. The prevalence of traumatic dental injuries to permanent anterior teeth and its relation with predisposing risk factors among 8–13 years school children of Vadodara City: an epidemiological study. *J Indian Soc Pedod Prev Dent* 2012;30(2): 151–157. DOI: 10.4103/0970-4388.99992.
24. Mohan G, Venugopal NR, et al. Prevalence of traumatic dental injuries to the anterior teeth among three to thirteen-year-old school children of Tamil Nadu. *Contemp Clin Dent* 2012;3(2):164–167. DOI: 10.4103/0976-237X.96819.
25. TraeBERT J, Peres MA, et al. Prevalence of traumatic dental injury and association factors among 12-year-old school children in Floriano Polis Brazil. *Dent Traumatol* 2003;19(1):15–18.
26. TraeBERT J, Bittencourt DD, et al. Aetiology and rates of treatment of traumatic dental injuries among 12-year old school children in a town in southern Brazil. *Dent Traumatol* 2006;22(4):173–178. DOI: 10.1111/j.1600-9657.2006.00359.x.
27. Rocha MJ, Cardoso M. Traumatized permanent teeth in Brazilian children assisted at the Federal University of Santa Catarina, Brazil. *Dent Traumatol* 2001;17:245–249.
28. Saroglu I, Sonmez H. The prevalence of traumatic injuries treated in the Pedodontic Clinic of Ankara University, Turkey, during 18 months. *Dent Traumatol* 2002;18:299–303.
29. Zuhail K, Semra OE, et al. Traumatic injuries of the permanent incisors in children in southern Turkey: a retrospective study. *Dent Traumatol* 2005;21:20–25. DOI: 10.1111/j.1600-9657.2004.00265.x.
30. Soriano EP, Caldas Jr AF, et al. Prevalence and risk factors related to traumatic dental injuries in Brazilian school children. *Dent Traumatol* 2007;23(4):232–240. DOI: 10.1111/j.1600-9657.2005.00426.x.
31. 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):136–139.
32. Andreasen JO, Andreasen FM. Textbook and colour atlas of traumatic injuries to teeth, 3rd ed. Copenhagen: Munksgaard; 1994.
33. Marcenes W, Beiruti N, et al. Epidemiology of traumatic dental injuries to permanent incisors of school children aged 9 to 12 in Damascus, Syria. *Endod Dent Traumatol* 1999;15(3):117–123.
34. Malikaew P, Watt RG, et al. Prevalence and factors associated with traumatic dental injuries (TDI) to anterior teeth of 11 to 13 year old Thai children. *Community Dent Health* 2006;23:222–227.
35. Sudeshni N, Aubrey S, et al. Traumatic dental injuries of permanent incisors in 11 to 13 year-old south African schoolchildren. *Dent Traumatol* 2009;25:224–228. DOI: 10.1111/j.1600-9657.2008.00749.x.
36. Marcenes W, Murray S. Social deprivation and traumatic dental injuries among 14-year-old schoolchildren in Newham, London. *Dent Traumatol* 2001;17:17–21.



**ANNEXURE 1:**

**DATA SHEET**

Age/sex:

Student's name:

School name:

Date:

• Have you ever had an accident that involved your mouth/teeth?

a) Yes ..... b) no .....

• If yes, which teeth were effected by accident

.....

• When did the accident that damaged your tooth/teeth happen?

month...../year.....

• Describe in detail about accident

.....  
.....

Cause of the trauma?

- a) fall
- b) collusion
- c) traffic accident
- d) sports accident
- e) violence
- f) unknown

Place of injury

- a) home
- b) school
- c) playground
- d) outside on street

Type of treatment provided

- a) No treatment provided
- b) Restoration
- c) Dentures

• As a result of the accidental damage of your tooth/teeth did you have to take any time off school?

(a) Yes (b) No

If yes, How much time? .....

• Intra oral examination

13	12	11	21	22	23
43	42	41	31	32	33

• Classification by Ellis and Davey (1960)

		Code
Class 1	Enamel fracture	1
Class 2	Enamel and dentine fracture	2
Class 3	Dentinal fracture involving pulp	3
Class 4	Non-vital tooth with or without crown fracture	4
Class 5	Teeth lost as a result of trauma	5
Class 6	Root fracture with or without crown fracture	6
Class 7	Displacement of tooth without fracture of tooth	7
Class 8	Fracture of crown en masse	8
Class 9	Traumatic injuries to primary teeth	9

• Type of treatment needed

- No treatment needed
- Restoration
- Endodontic treatment and restorations
- Endodontic treatment and restoration and bleaching
- Dentures
- Others

