

Impact on Quality of Life and Risk Factors Associated with Visible Maxillary Incisors Trauma among Young Children in Faridabad, Haryana

Siji Elizabeth¹, Shalini Garg², Bhavna G Saraf³, Neha Sheoran⁴, Saumya Paul⁵, Megha Chawla⁶

ABSTRACT

Aim: To assess the impact of upper incisor trauma on the quality of life (QoL) in young children studying between the age group 8 and 13 years in Faridabad, Haryana.

Materials and methods: A cross-sectional, prospective study was conducted to assess the visible permanent maxillary incisor traumas according to the classification of traumatic dental injuries (TDI) and to determine the predisposing risk factors that affect TDI and their impact on QoL in children aged 8–13 years. Questionnaires were made to gather information on demographic and socioeconomic characteristics like age, gender, and the father's and mother's education. Data on dental caries in anterior teeth were also collected using current World Health Organization criteria.

Result: There were a total of 66 males and 24 females. The total decayed, missing, and filled permanent teeth (DMFT) prevalence observed was 8.9%. The main reason for trauma was found to be an accident or accidental fall (36.7%). The most common place for trauma followed by road (21.1%). Time lapsed from the injury reported was >1 year in males (34.8%), while it was within 1 year (41.7%) in females ($p = 0.014$). The most prevalent and impacted performance was smiling (80.0%; $m = 8.7778 \pm 8.658$), and the least affected was speaking (4.4%; $m = 0.5111 \pm 3.002$).

Conclusion: A number of risk factors need to be considered when assessing TDIs, as TDIs can have a negative impact on the functional, social, and psychological well-being of young children. As they are frequent in children, affecting teeth, their supporting structures, and adjacent soft tissues, they may cause both functional and esthetic problems.

Clinical significance: When injuries to incisor(s) produce pain, disfigurement, poor aesthetics, or other psychological effects, children may avoid laughing or smiling, and this can affect their social relationships. So, it is important to address the risk factors that predispose upper front teeth to TDIs.

Keywords: Aesthetics, Child-oral impacts on daily performances, Dental trauma, Traumatic dental injury.

International Journal of Clinical Pediatric Dentistry (2022); 10.5005/jp-journals-10005-2433

INTRODUCTION

Traumatic dental injury (TDI) is a serious problem affecting young children, and by time, its incident will exceed that of dental caries.¹ Traumatic injury of permanent incisors and their supporting structures, which occur because of different reasons, constitute a true dental emergency and require immediate assessment and management because many young, permanent teeth continue their development at those ages.² In addition to pain and possible infection, the consequences of incisal trauma include alteration in physical appearance, speech defects, and psychological/emotional impacts, thus affecting the child's QoL.³

Traumatic dental injuries (TDIs) were found to be related to gender and socioeconomic indicators (preschool type and parent's education level), to evaluate the effect of overjet, overbite, and lip coverage as risk factors, and finally to assess the treatment provided for injured teeth and treatment needs.⁴

It has been shown that the appearance and position of the anterior teeth have psychological and social impacts on children. Consequently, injuries produced by dental trauma can produce significant emotional and social costs for children and their families. When injuries to incisor(s) produce pain, disfigurement, poor aesthetics, or other psychological effects, children may avoid laughing or smiling, and this can affect their social

^{1,3–6}Department of Pedodontics and Preventive Dentistry, Sudha Rustagi College of Dental Sciences & Research, Faridabad, Haryana, India

²Department of Pedodontics & Preventive Dentistry, Faculty of Dental Sciences, Shree Guru Gobind Singh Tricentenary University, Gurugram, Haryana, India

Corresponding Author: Siji Elizabeth, Department of Pedodontics and Preventive Dentistry, Sudha Rustagi College of Dental Sciences & Research, Faridabad, Haryana, India, Phone: +91 9654578760, e-mail: sijielizabetsaji@gmail.com

How to cite this article: Elizabeth S, Garg S, Saraf BG, *et al.* Impact on Quality of Life and Risk Factors Associated with Visible Maxillary Incisors Trauma among Young Children in Faridabad, Haryana. *Int J Clin Pediatr Dent* 2022;15(6):652–659.

Source of support: Nil

Conflict of interest: None

relationships.⁵ Thus, the study aimed to assess the impact of upper incisor trauma on the QoL in young children studying in public and private schools between the age group of 8 and 13 years in Faridabad city; to evaluate the risk factors of visible upper incisors trauma and its association to demographic and socioeconomic characteristics and type of occlusion involved.

MATERIALS AND METHODS

A prospective cross-sectional study was conducted to assess the visible permanent maxillary central or lateral incisor traumas according to the classification of TDI, and to determine the predisposing risk factors that affect the TDI like overjet and overbite, lip coverage, whether treatment sought or not, type of occlusion, presence of protrusion, etc. and their impact on QoL in public and private school children from standard three to standard eight using Oral Impacts on Daily Performances (OIDP) and social impacts of dental diseases (SIDD) index.

Sample size estimation was done by using nMaster software (version 1.1) for the estimation of the prevalence of the impact of dental trauma on the QoL among children. The sample size for the present study was estimated by anticipating the prevalence of the impact of dental trauma on QoL as 45%. A minimum total sample size of 90 was found to be sufficient for an anticipated prevalence of 45%, 5% α with a 10% margin of error. Children within the age group of 8–13 years were screened for visible trauma, and 90 children were assessed for variables like risk factors and QoL by the principal investigator. The study was limited to the anterior teeth as other teeth are seldom traumatized.

For data collection, questionnaires were made to gather information on demographic and socioeconomic characteristics like age, gender, father's and mother's education, and body-mass index (BMI). The education of the parents was categorized according to Kuppuswamy 2019 scale. Data on dental caries in anterior teeth were also collected using current World Health Organization criteria.

Ethical Review Committee approval was obtained prior to the initiation of the trial prior to the onset of the study. The purpose of the study was informed and explained to the volunteer participants and their parents.

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences version 21. Categorical variables were summarized as frequencies. Interval or ratio-based variables were summarized as means and standard deviations (SD). Continuous data were tested for normality by using Shapiro–Wilk test. As the data could not satisfy the requirement of normality, thus, nonparametric tests were used for inferential statistics. Mann–Whitney *U* test and Kruskal–Wallis tests were used for continuous variables. Categorical variables were compared using the chi-squared test. The level of statistical significance was set at 0.05.

RESULTS

There was a total of 66 males and 24 females with mean ages of 11.42 ± 1.570 and 11.46 ± 1.933 years, respectively. The total DMFT prevalence observed was 8.9%, with maximum prevalence in the age group of 10 (20.0%), followed by 13 (12.8%) and 11 years (5.3%). A maximum number of fractured teeth was noted in the age group of 11 ($M-1.58 \pm 0.507$) followed by 13 ($M-1.33 \pm 0.478$), 10 (1.30 ± 0.483), 12 (1.29 ± 0.488), 9 (1.22 ± 0.441), and least in 8 years (1 ± 0.000). Most cases reported time lapsed from the trauma to be >1 year (33.3%) and within 1 year (22.2%) at 13 years old and 11 years, respectively. The findings of the study were noted to be significant ($p = 0.0001$). A statistically significant difference ($p = 0.014$) was noted among males and females and the time lapsed from the injury reported was >1 year in males (34.8%) while it was within 1 year (41.7%) in females. The main reason for trauma was found to be an accident

or accidental fall (36.7%), followed by sports or games (25.6%), hit by an object (17.8%), fighting (11.1%), unknown reasons (6.7%), eating hard food items (2.2%). A statistically significant difference ($p = 0.023$) was noted among males and females, and the most common reason for trauma reported was an accident or accidental fall (40.9%) in males, while "sports" (29.2%) and "hit by an object" (29.2%) was the cause of injury among females. The most common place for trauma followed by road (21.1%), playground/park (15.6%), unknown reasons (6.7%), school (3.3%), and other crowded places (2.2%). The home was the common place for injury in 8–11 years, whereas, in 12 years group (42.9%), the park/playground was commonplace. A statistically significant difference was noted among the findings ($p = 0.038$). A maximum number of male patients (66.7%) opted for the treatment of fracture, while the majority of female patients (62.5%) opted for no treatment for trauma ($p = 0.016$). The most common fracture that is the enamel and dentin fracture (48.8%), was seen more among children whose fathers' education was till diploma or graduation (62.5%), followed by graduate fathers (60%), fathers with middle school certificates (50%), fathers with high school certificate (30.8%), illiterate fathers (28.6%), and lastly by fathers with honors degree (20%). The findings were seen to be statistically significant ($p \leq 0.0001$). The most common fracture that is the enamel and dentin fracture (48.8%), was seen more among children whose mothers were illiterate (75%), followed by graduate mothers (56.5%), mothers with honors (50%), mothers with diploma (44.4%) and mothers with middle school certificate (28.6%). While comparing the complexity of fractures, the complicated fractures fell under the category of education till middle school (42.9%). The findings were seen to be statistically significant ($p = 0.013$). The most common fracture, that is, enamel and dentin fracture, occurred in children who belonged to rural areas (73.7%), followed by peri-urban (44.7%), while urban areas noted comparatively fewer fractures (33.3%). The findings noted were statistically significant ($p = 0.005$). Most of the trauma occurred in healthy children ($n = 74$), followed by fewer traumas in obese children ($n = 7$) and underweight children ($n = 4$). It was noted that the most common fracture, that is, enamel and dentin fractures occurred in overweight children (57.1%), followed by healthy (48.6%), and none in underweight children. Uncomplicated type of trauma (75%) was more commonly found among underweight children as compared to healthy and overweight children. Hence, the findings of the study were statistically significant ($p = 0.011$). The most common type of occlusion observed was Angle's class I bilateral ($n = 33$; $p = 0.246$). Figure 1 shows the impact of the severity of trauma on QoL (OIDP). Table 1 depicts the distribution of severity of trauma in the study sample based on overjet, overbite, and lip coverage. Table 2 represents the impact of time and cause of injury on QoL (OIDP). The mean prevalence of impact on QoL-based on OIDP performances is represented by Tables 3 and 4 shows the gender-wise distribution of the study sample based on the prevalence of SIDD.

DISCUSSION

Traumatic dental injury (TDI) is a common condition in children. TDI can cause esthetic and functional alterations, such as fractures, discoloration, mobility, and pain. Oral health care for children with TDI should not be restricted to local damage and should include an analysis of the impact of this condition on QoL. The present study elaborates on the impact of visible upper incisor trauma on the QoL in 8–13 years old school children. The results revealed a statistically significant association between

TDI and the QoL in school children in Faridabad. ODP and SIDD-based oral health-related QoL were used to assess the impact on the QoL of school children due to visible permanent maxillary incisors trauma. The interviewer-administered questionnaire method was used for the assessment of children's responses. This method has been used in other studies.⁶⁻⁸ and resulted in a high response rate, reduced respondent bias, and ensured greater participation.

Age-wise Prevalence of Trauma

The maximum number of fractured teeth reported was in the age group of 11 years and the least in 8 years. The difference between

the mean ages was nonsignificant. Similar findings were noted in a study done by Dharmani et al.,⁹ in which the maximum number of children with dental trauma belonged to the 11-year age group (19.1%). Male children (14.5%) sustained more injuries as compared to female children (8.4%).

Caries Prevalence

The total DMFT prevalence observed was 8.9%, with maximum prevalence in the age group of 10 years which was not significant. The total prevalence of DMFT was very less, that is, 4.4% and 4.5% in males and females, respectively. Thus, indicating that caries has no association as a predisposing factor for TDI. Its prevalence among males may be due to the increased male ratio in Haryana. Malikaew et al.,¹⁰ in their study, observed that the prevalence of TDIs is about 15–20% in children in countries with moderate to low levels of caries.

Time Lapsed from the Trauma

The time of trauma among different age groups was found to be significantly different. Injury among 8 and 12-year-old children was reported early, that is, within 1 month, as compared to other age groups. The time of injury among males and females was found to be significantly different. A statistically significant difference ($p = 0.014$) was noted among males and females and the time lapsed from the injury reported was >1 year in males (34.8%) while it was within 1 year (41.7%) in females. Zuhail et al.² says that the percentage of the patients who visited a dental clinic in the first 3 days after the trauma occurred (22.8%) was less than the percentage of the patients who applied after 3 months and more time period (45.1%) and 4.7% of the children were not aware of the trauma and their injured teeth.

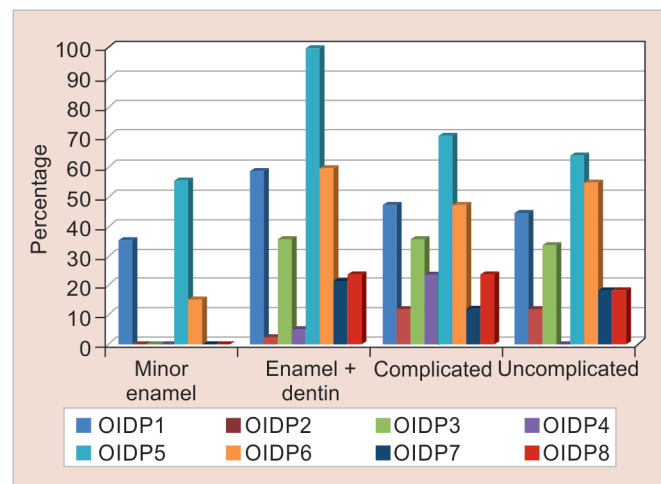


Fig. 1: Impact of severity of trauma on QoL (OIDP)

Table 1: Distribution of severity of trauma in study sample based on overjet, overbite, and lip coverage

		Severity of trauma					
			Minor enamel	Enamel + dentin	Complicated	Uncomplicated	Total
Overjet	<3 mm	<i>n</i>	13	21	12	10	56
		%	23.2%	37.5%	21.4%	17.9%	100.0%
	>3 mm	<i>n</i>	7	21	5	1	34
		%	20.6%	61.8%	14.7%	2.9%	100.0%
Total		<i>n</i>	20	42	17	11	90
		%	22.2%	46.7%	18.9%	12.2%	100.0%
<i>p</i> -value					0.069, NS*		
Overbite	<3 mm	<i>n</i>	13	28	10	9	60
		%	21.7%	46.7%	16.7%	15.0%	100.0%
	>3 mm	<i>n</i>	7	14	7	2	30
		%	23.3%	46.7%	23.3%	6.7%	100.0%
Total		<i>n</i>	20	42	17	11	90
		%	22.2%	46.7%	18.9%	12.2%	100.0%
<i>p</i> -value					0.625, NS*		
Lip coverage	Inadequate	<i>n</i>	4	19	12	4	39
		%	10.3%	48.7%	30.8%	10.3%	100.0%
	Adequate	<i>n</i>	16	23	5	7	51
		%	31.4%	45.1%	9.8%	13.7%	100.0%
Total		<i>n</i>	20	42	17	11	90
		%	22.2%	46.7%	18.9%	12.2%	100.0%
<i>p</i> -value					0.02, S**		

*NS, nonsignificant; **S, significant; Chi-squared test



Table 2: Impact of time and cause of injury on QoL (OIDP)

<i>Time of Injury</i>		<i>OIDP1</i>	<i>OIDP2</i>	<i>OIDP3</i>	<i>OIDP4</i>	<i>OIDP5</i>	<i>OIDP6</i>	<i>OIDP7</i>	<i>OIDP8</i>
Unknown	<i>n</i>	6	0	0	2	4	0	0	0
	%	14.0%	0.0%	0.0%	33.3%	5.6%	0.0%	0.0%	0.0%
Within 1 week	<i>n</i>	7	1	8	0	10	7	2	2
	%	16.3%	25.0%	33.3%	0.0%	13.9%	16.7%	15.4%	12.5%
Within 1 month	<i>n</i>	2	0	2	0	2	1	0	2
	%	4.7%	0.0%	8.3%	0.0%	2.8%	2.4%	0.0%	12.5%
Within 3 months	<i>n</i>	4	1	2	0	5	2	0	2
	%	9.3%	25.0%	8.3%	0.0%	6.9%	4.8%	0.0%	12.5%
Within 6 months	<i>n</i>	6	0	4	0	10	8	5	5
	%	14.0%	0.0%	16.7%	0.0%	13.9%	19.0%	38.5%	31.3%
Within 1 year	<i>n</i>	8	0	5	4	14	10	2	1
	%	18.6%	0.0%	20.8%	66.7%	19.4%	23.8%	15.4%	6.3%
>1 year	<i>n</i>	10	2	3	0	27	14	4	4
	%	23.3%	50.0%	12.5%	0.0%	37.5%	33.3%	30.8%	25.0%
Total	<i>n</i>	43	4	24	6	72	42	13	16
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<i>p</i> -value		0.198, NS	0.456, NS	0.002, S	0.025, S	0.061, NS	0.084, NS	0.104, NS	0.035, S
<i>Cause of injury</i>									
Unknown	<i>n</i>	4	0	0	2	4	0	0	0
	%	9.3%	0.0%	0.0%	33.3%	5.6%	0.0%	0.0%	0.0%
Playing	<i>n</i>	16	2	8	2	18	12	2	4
	%	37.2%	50.0%	33.3%	33.3%	25.0%	28.6%	15.4%	25.0%
Fighting	<i>n</i>	9	1	5	2	7	9	0	1
	%	20.9%	25.0%	20.8%	33.3%	9.7%	21.4%	0.0%	6.3%
Accident	<i>n</i>	8	1	7	0	28	12	7	6
	%	18.6%	25.0%	29.2%	0.0%	38.9%	28.6%	53.8%	37.5%
Hit	<i>n</i>	4	0	4	0	15	9	4	5
	%	9.3%	0.0%	16.7%	0.0%	20.8%	21.4%	30.8%	31.3%
Biting	<i>n</i>	2	0	0	0	0	0	0	0
	%	4.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	<i>n</i>	43	4	24	6	72	42	13	16
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<i>p</i> -value		<0.0001, S	0.704, NS	0.221, NS	0.019, S	0.039, S	0.005, S	0.276, NS	0.53, NS

NS, nonsignificant; S, significant; Chi-squared test

Cause of Trauma

In the present study, the main reason for trauma was found to be an accident or accidental fall (36.7%), followed by sports or games, being hit by an object, fighting, for unknown reasons, and eating hard food items. A statistically significant difference ($p = 0.023$) was noted among males and females, and the most common reason for trauma reported was an accident or accidental fall in males, while "sports" and "hit by an object" was the cause of injury among females. Silva-Oliveira et al.,¹¹ from their study, observed that falls, collisions, sports, and recreational activities are recognized as important etiological factors of TDI.

Place of Trauma

Home (51.1%) was found to be the most common place for trauma, followed by roads, playgrounds/parks, unknown reasons, schools, and other crowded places with a statistically significant difference ($p = 0.038$). Dharmani et al.⁹ in their study quoted that the most

common place where dental injuries occurred was home (45.2%), followed by the school (32.1%) 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 falls and fighting among friends.

Willingness for Treatment

It was found that the maximum number of male patients opted for the treatment of fracture, while the majority of female patients opted for no treatment for trauma. The result was statistically significant ($p = 0.016$). According to Traebert et al.,¹² children with an untreated TDI were 1.4 times more likely to report impact on the item "avoided smiling/laughing" than those without TDI, whereas children with a treated TDI were twice as likely to report impacts on the item "other children asked questions" than those without TDI. Thus, willingness for treatment played a major role in impacting the QoL in children.

Table 3: Mean prevalence of impact on QoL-based on OIDP performances

	Prevalence of impact		Descriptives of performance score	
	n	%	Mean	SD
Eating	43	47.8	4.2444	5.93658
Speaking	4	4.4	0.5111	3.00279
Cleaning teeth	24	26.7	3.1778	5.80309
Sleeping	6	6.7	0.5778	3.01672
Smiling	72	80.0	8.7778	8.65802
Emotional stability	42	46.7	6.9889	9.74448
Major role	13	14.4	2.2333	6.14808
Contact with people	16	17.8	2.3146	6.42544

Table 4: Gender-wise distribution of study sample based on prevalence of SIDD

		n	Prevalence of SIDD			
			SIDD1	SIDD2	SIDD3	SIDD4
Gender	M	n	38	21	52	56
		%	57.6%	31.8%	78.8%	84.8%
	F	n	10	4	15	22
		%	41.7%	16.7%	62.5%	91.7%
Total		n	48	25	67	78
		%	53.3%	27.8%	74.4%	86.7%
p-value			0.504, NS	0.191, NS	0.171, NS	0.234, NS

NS, nonsignificant; Chi-squared test

Prevalence of Social Impacts (SIDD)

Gender-wise distribution of prevalence of social impacts on dental disease scale measuring the impact on QoL due to the trauma showed that "esthetics" under the functional category "self-image" got more positive response followed by "pain and discomfort," "eating," and "communication." Both males and females showed similar prevalence of SIDD, with "esthetics" being the most affected category followed by "pain and discomfort," "eating," and "communication," although the difference between the functions impacted was not found to be significant. No significant difference was noted among males and females in the total SIDD scale impacted by trauma based on its prevalence. Traebert et al.,¹² in their study, noticed that dental appearance and dental health-related problems could affect psychological and social well-being, leading to harmful complications to children's well-being that impact the QoL.

Impact of Number of Fractured Teeth on QoL

The prevalence of the impact of the number of fractured teeth on QoL was correlated using the OIDP scale. The most affected performance found was "smiling," followed by the performance category "eating," "emotional stability," "cleaning of teeth," "contact with people," "major role," "sleeping," and "speaking." There was no significant difference noted between the impact score based on the number of fractured teeth, and the samples with single and double fractured teeth were noted to be more affected in their daily performance scale of smiling, while the least affected performance was "speaking" in single fractured teeth whereas both "speaking" and "sleeping" were least affected in children with fracture of two teeth.

Gender-wise Severity of Trauma

Enamel and dentin fracture (46.7%) was seen to be the most common trauma reported in most males and females, followed by only enamel fracture (19.7%), complicated fractures (16.7%), and uncomplicated fractures (13.6%) in males whereas enamel fractures (29.2%), complicated fractures (25%), and uncomplicated fractures (8.3%) in females. The findings were nonsignificant. Similar findings were noted by ElKarmi et al.,⁴ in which more boys than girls sustained TDIs; however, the difference was not statistically significant ($p > 0.05$).

Father's Education

The most common fracture, that is, the enamel and dentin fracture, was seen more among children whose fathers' education was till diploma and least by fathers with honors degrees. The findings were seen to be statistically significant ($p < 0.0001$). Dame-Teixeira et al.¹³ Observed in their study that individuals with parents having higher education were less likely to experience TDI, which was somewhat similar to the present study.

Mother's Education

The most common fracture was seen more among children whose mothers were illiterate. While comparing the complexity of fractures, the complicated fractures fell under the category of education till middle school. The findings were seen to be statistically significant ($p = 0.013$). Jorge et al.¹⁴ reported that children of mothers with low levels of schooling (0–6 years) had a greater prevalence of TDI. Therefore, mothers need to be educated more in this aspect to remove the lack of awareness among them.

Correlation of Severity of Trauma with Location

The most common fracture, that is, enamel and dentin fracture, occurred in children who belonged to rural areas, followed by peri-urban, while urban areas noted comparatively fewer fractures (33.3%). The findings noted were statistically significant ($p = 0.005$).

Correlation of Severity of Trauma with Tooth Involved

The most inflicted tooth with trauma was the central incisor, followed by a combination of both central and lateral incisor trauma. While most complicated fractures involved a combination of both central and lateral incisors (28.6%) followed by single tooth fractures (18.1%), which is in line with a similar study by Anegundi et al.¹⁵ The findings were insignificant. The reason probably is due to the central positioning of the teeth and the direct assault that affects the teeth in front.

Correlation of Severity of Trauma with BMI

A significant difference was found as an uncomplicated type of trauma was more commonly found among underweight subjects as compared to healthy and overweight subjects. While, enamel + dentine type of fractures was more commonly found among healthy and overweight subjects as compared to underweight subjects. Thus, the study indicates that obesity has no known association with the occurrence of TDI. In contrast, a study done by Dharmani et al.,⁹ stated that the prevalence of TDI in children who were overweight was found to be 11.5% as compared with the prevalence of 10.7% in children who were obese. Although the relationship between obesity and TDIs was found to be statistically insignificant ($p = 0.807, p > 0.05$).

Correlation of Severity of Trauma with Time of Injury Reported

Most of the children with the trauma of teeth reported in a time >1 year to the dentist. Children with the most common fracture, that is, the combination of enamel and dentin fractures, reported within 6 months, while children with complicated fractures reported within one month with statistically significant results ($p < 0.0001$). Vanka et al.¹⁶ noticed the number of devitalized teeth (Ellis class IV) is unusually high in the current study and is in contrast to studies that have reported that injuries to enamel only or enamel and dentin were most frequently observed.

Correlation of Severity of Trauma with Cause of Injury

Most of the children with trauma of teeth mentioned accident/accidental falls as a cause of injury. Children with the most common fracture, that is, the combination of enamel and dentin fractures, mentioned: "hit by an object" as a reason for the injury, while children with complicated fractures mentioned "sports" as the cause of trauma. Aneundi et al.¹⁵ evaluated the etiological factors of trauma and categorized them into play, fights, and accidents, out of which play was found to be the most common cause (girls = 24.5% and boys = 35.60%), followed by accidents (girls = 9.10% and boys = 14.79%), and then fights (girls = 5.85% and boys = 10.08%).

Correlation of Severity of Trauma with Place of Injury

Most of the trauma occurred at home, followed by roads, parks/playgrounds, unknown, schools, and other crowded places. The commonest trauma was associated with other crowded places, while complicated trauma was found to be associated with parks/playgrounds. The findings of the study were statistically significant ($p \leq 0.0001$). Similarly, Chan et al.¹⁸ did a study in which the predominant locations where accidents occurred were at home (31%) and at school (19%). The other main places were in the street (11.0%).

Correlation of Protrusion of the Teeth with the Severity of Trauma

The protrusion was a factor associated with the majority of the trauma of teeth. Simple fractures like enamel fractures were not associated, while complicated fractures and most common fractures, that is, enamel and dentin fractures, were found to be associated with the protrusion factor.

Correlation of Occlusion Types with the Severity of Trauma

The study analyzed the association of malocclusion as a risk factor. The most common type of occlusion observed was Angle's class I bilateral. The type of occlusion associated with enamel fractures was Angle's class I bilateral and class II division I, while enamel and dentin fractures were Angle's class II division I, whereas complicated and uncomplicated fractures were Angle's class I bilateral. A study by Aneundi et al.¹⁵ discussed that class II type of trauma was the most common type of traumatic injury observed. Gupta et al.¹⁷ observed that in both age groups, class I fractures were most common, followed by class II and class III, with significantly lesser involvement of class V type. When an overall comparison was made, the second age group (11–14 years) was found to be highly significant.

Correlation of Lip Coverage with the Severity of Trauma

Most of the trauma was associated with inadequate lip coverage; enamel fractures alone and enamel + dentin fractures had adequate lip coverage, while complicated traumas were seen to be associated with inadequate lip coverage. The findings were noted to be statistically significant ($p = 0.02$). Similar findings of a study by Gupta et al.¹⁹ states that children with inadequate lip coverage were 3.4 times more likely to suffer from a TDI than children with adequate lip coverage. Inadequate lip coverage was considered when the upper lip did not completely cover the upper incisors in the resting position, thus exposing the upper front teeth to trauma directly.

The Correlation of Overjet with the Severity of Trauma

Enamel and complicated fractures were associated with overjet upto 3 mm, and enamel and dentin fractures with overjet of >3 mm. The findings of the study were not significant ($p = 0.069$). Gupta et al.¹⁷ discussed in their study that the percentage of subjects involved in fractures that showed a normal overjet of 2 mm was 47.94%, with most cases being in the class I category (125 cases) followed by class II (82 cases) and class III type (13 cases). Patients with 6, 8, and 10 mm overjet were usually afflicted by class II followed by class I type of fracture.

The Correlation of Overbite with the Severity of Trauma

All types of fractures were associated with overbites of >3 mm. The findings of the study were not significant ($p = 0.625$). In contrast, the study by Sulieman and Awooda²⁰ showed that there was no statistically significant difference between the size of overjet and overbite with the occurrence of TDI, indicating that TDI was not associated with an increase in overbite or overjet as a predisposing factor.

The Teeth Involved in Trauma

In all the age groups central incisor was found to be the most fractured tooth compared to the lateral incisor and the combination of both central and lateral incisor teeth. The findings of the study were not significant ($p = 0.053$). Males were mostly affected by fractures of the central incisor compared to fractures of both central and lateral incisors. Females were also mostly affected by the trauma of central incisor than combination. The findings of the study were nonsignificant ($p = 0.097$). A similar study was done by Aneundi et al.¹⁵ in which the most commonly involved tooth was the maxillary right central incisor at 47%, followed by the maxillary left central incisor at 24%, and none of the lower right lateral incisors was involved.

Location Wise SIDD Impact

Aesthetics was the commonly affected function in urban and peri-urban areas, while in rural areas, "eating" and "pain and discomfort" was the most affected function. The most commonly affected function was esthetics, followed by "pain and discomfort" and "eating," which were significantly affected, followed by communication. The findings were similar to the study done by Aneundi et al.¹⁵ in which a significant number affected the rural population (girls = 29.26 and boys = 30.89%) as compared to the urban population (girls = 10.24 and boys = 29.59%). The intercomparison between the location and the class of trauma was

significant; that is, the class II type of trauma in the rural population was most common as compared to the others.

Impact on QoL (OIDP)

Impact of Time of Injury on QoL (OIDP)

The impact of time of injury on QoL using OIDP was noted with smiling ($n = 72$) as the most commonly affected performance among children due to trauma. The prevalence of impact on cleaning teeth, sleeping, and contact with people were found to be significantly different among subjects according to time of injury. The reason can be accounted to the fact that lack of awareness regarding oral health and TDI among people can lead to further severity of the trauma, thus affecting their daily activities like cleaning, sleeping, and contact with people.

Impact of the Cause of Injury on QoL (OIDP)

Impact of the cause of injury on QoL using the OIDP scale noted that the prevalence of impact on eating, sleeping, smiling, and emotional stability was found to be significantly different among subjects according to the cause of injury. The reason can be accounted to the different factors involved in different causes of trauma, like intensity, direction, and direct or indirect trauma, thus affecting the functional and physical appearance of children.

Impact of Severity of Trauma on QoL (OIDP)

While using the OIDP scale found that impacts on cleaning, sleeping, smiling, and emotional stability were found to be significantly different among subjects according to the severity of trauma. Depending on the extent of the trauma, a child's QoL may be affected. The minor enamel fractures were seen not to affect the appearance, whereas complicated and uncomplicated trauma involving pulp affected the daily activities of children along with esthetics.

Mean Prevalence of OIDP

The most prevalent and impacted performance was smiling, followed by eating, emotional stability, cleaning teeth, contact with people, major role, sleeping, and speaking. In contrast, Agrawal et al.²¹ concluded from their study that eating was the most affected performance in all the studies using child OIDP in a general population. With growing age, appearance becomes an important factor. TDIs involving fracture of upper front teeth thus impact the performance of children. The study is novel as this the first study which correlates TDI involving upper front teeth with QoL in young children. The study is limited to the anterior teeth, as posterior teeth are seldom traumatized.

CONCLUSION

The present study concluded that TDIs could have a negative impact on the functional, social, and psychological well-being of young children. As they are frequent in children, affecting teeth, their supporting structures, and adjacent soft tissues, they may cause both functional and esthetic problems. It may also have an impact on speaking, eating, and other day-to-day activities, thereby affecting the QoL, which is a multidimensional concept. While assessing TDI, a number of risk factors need to be considered. Incompetent lips, increased incisal overjet, overbite, and malocclusion are important predisposing factors contributing to TDIs. Other socioeconomic factors like parents' education and the location of children may also affect the frequency and intensity of

TDI in children. Thus, there is a need for greater awareness among children and parents regarding dental trauma.

ORCID

Siji Elizabeth  <https://orcid.org/0000-0001-8440-8625>

Shalini Garg  <https://orcid.org/0000-0001-5931-0693>

REFERENCES

1. Glendor U. Epidemiology of traumatic dental injuries—a 12 year review of the literature. *Dent Traumatol* 2008;24(6):603–611. DOI: 10.1111/j.1600-9657.2008.00696.x
2. Zuhail K, Semra ÖE, Hüseyin K. Traumatic injuries of the permanent incisors in children in Southern Turkey: a retrospective study. *Dent Traumatol* 2005;21(1):20–25. DOI: 10.1111/j.1600-9657.2004.00265.x
3. Alonge OK, Narendran S, Williamson DD. Prevalence of fractured incisal teeth among children in Harris County, Texas. *Dent Traumatol* 2001;17(5):214–217. DOI: 10.1034/j.1600-9657.2001.170506.x
4. Elkarmi RF, Hamdan MA, Rajab LD, et al. Prevalence of traumatic dental injuries and associated factors among preschool children in Amman, Jordan. *Dent Traumatol* 2015;31(6):487–492. DOI: 10.1111/edt.12183
5. Fakhruddin KS, Lawrence HP, Kenny DJ, et al. Impact of treated and untreated dental injuries on the quality of life of Ontario school children. *Dent Traumatol* 2008;24(3):309–313. DOI: 10.1111/j.1600-9657.2007.00547.x
6. Gherunpong S, Tsakos G, Sheiham A. Developing and evaluating an oral health-related quality of life index for children; the CHILD-OIDP. *Community Dent Health* 2004;21(2):161–169.
7. Bernabé E, Sheiham A, Tsakos G. A comprehensive evaluation of the validity of child-OIDP: further evidence from Peru. *Community Dent Oral Epidemiol* 2008;36(4):317–325. DOI: 10.1111/j.1600-0528.2007.00398.x
8. Castro RA, Cortes MI, Leão AT, et al. Child-OIDP index in Brazil: cross-cultural adaptation and validation. *Health Qual Life Outcomes* 2008;6(1):68. DOI: 10.1186/1477-7525-6-68
9. Dharmani CK, Pathak A, Sidhu HS. Prevalence of traumatic dental injuries to anterior teeth in 8–12-year-old schoolchildren of Patiala city, Punjab, India: an epidemiological study. *Int J Clin Pediatr Dent* 2019;12(1):25. DOI: 10.5005/jp-journals-10005-1583
10. Malikaew P, Watt RG, Sheiham A. Prevalence and factors associated with traumatic dental injuries (TDI) to anterior teeth of 11–13 year old Thai children. *Community Dent Health* 2006;23(4):222.
11. Silva-Oliveira F, Goursand D, Ferreira RC, et al. Traumatic dental injuries in Brazilian children and oral health-related quality of life. *Dent Traumatol* 2018;34(1):28–35. DOI: 10.1111/edt.12358
12. Traebert J, de Lacerda JT, Foster Page LA, et al. Impact of traumatic dental injuries on the quality of life of schoolchildren. *Dent Traumatol* 2012;28(6):423–428. DOI: 10.1111/j.1600-9657.2012.01114.x
13. Damé-Teixeira N, Alves LS, Susin C, et al. Traumatic dental injury among 12-year-old South Brazilian schoolchildren: prevalence, severity, and risk indicators. *Dent Traumatol* 2013;29(1):52–58. DOI: 10.1111/j.1600-9657.2012.01124.x
14. Jorge K, Moyses S, Ferreira E, et al. Prevalence and factors associated to dental trauma in infants 1–3 years of age. *Dent Traumatol* 2009;25:185–189. DOI: 10.1111/j.1600-9657.2008.00730.x
15. Aneundi R, Trasad V, Ballal R. Traumatic injuries to anterior teeth in school children of Southern India. *Indian J Dent Educ* 2012;5:71–78.
16. Vanka A, Ravi KS, Roshan NM, et al. Analysis of reporting pattern in children aged 7 to 14 years with traumatic injuries to permanent teeth. *Int J Clin Pediatr Dent* 2010;3(1):15. DOI: 10.5005/jp-journals-10005-1048
17. Gupta K, Tandon S, Prabhu D. 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.

18. Chan YM, Williams S, Davidson LE, et al. Orofacial and dental trauma of young children in Dunedin, New Zealand. *Dent Traumatol* 2011;27(3):199–202. DOI: 10.1111/j.1600-9657.2011.00989.x
19. Gupta S, Kumar-Jindal S, Bansal M, et al. Prevalence of traumatic dental injuries and role of incisal overjet and inadequate lip coverage as risk factors among 4–15 years old government school children in Baddi-Barotiwala area, Himachal Pradesh, India. *Med Oral Patol Oral Cir Bucal* 2011;16(7):e960–e965. DOI: 10.4317/medoral.17265
20. 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;2018(1):2135381. DOI: 10.1155/2018/2135381
21. Agrawal N, Pushpanjali K, Gupta ND, et al. Child-Oral impacts on daily performances: a socio dental approach to assess prevalence and severity of oral impacts on daily performances in South Indian school children of Bangalore city: a cross-sectional survey. *J Indian Assoc Public Health Dent* 2014;12(2):88. DOI: 10.4103/2319-5932.140258