

Traumatic Dental Injuries and their Association with Demographics and Other Predisposing Risk Factors in School Children Aged between 8-13 Years: A Descriptive, Cross-Sectional Study

Pavani Bellamkonda, Eby Varghese¹, Asim Nasser Alasabi², Nasser Mohammed Alshehri³, Srikala Bhandary⁴, Ramesh Krishnan⁵, Suresh Babu J⁶, Swarnalatha C⁶, Abhishek S. Nayyar⁷

Department of Public Health Dentistry, Sathyabama Dental College and Hospital, Chennai, Tamil Nadu, India, ¹Department of Paediatric Dentistry, Manipal University College Malaysia, Jalan Batu Hampar, Bukit Baru, Melaka, Malaysia, ²Dental Department, ³Department of Endodontics, Armed Forces Hospital- Southern Region, Khamis Mushayt, Kingdom of Saudi Arabia, ⁴Department of Paediatric and Preventive Dentistry, NITTE (Deemed to be University), AB Shetty Memorial Institute of Dental Sciences, Mangaluru, Karnataka, India, ⁵Department of Paediatric and Preventive Dentistry, Vinayaka Mission's Sankarachariyar Dental College, Vinayaka Mission's Research Foundation (Deemed to be University) Salem, Tamil Nadu, India, ⁶Department of Preventive Dental Sciences, Division of Periodontology, College of Dentistry, University of Ha'il, Ha'il, Kingdom of Saudi Arabia, ⁷Department of Oral Medicine and Radiology, Saraswati Dhanwantari Dental College and Hospital and Post-Graduate Research Institute, Parbhani, Maharashtra, India

Abstract

Background: Traumatic dental injuries are most commonly seen in school age children. This not only affects physical, but, also, the psychological and social well-being of a child. The aim of the present study was to assess the prevalence of traumatic dental injuries in school children aged between 8 and 13 years and their association with the demographics and other predisposing risk factors. **Materials and Methods:** The present study was conducted as a cross-sectional study design on 1500 school children aged between 8 and 13 years. Apart from clinical examination, all the participants were asked to complete a questionnaire related to the injuries sustained. Statistical analysis was conducted using Statistical Package for Social Sciences (SPSS) version 21.0 (IBM, Chicago). Pearson's Chi-square (X^2) test was used for categorical data analysis and distribution to determine the association between categorical variables, while $P < 0.05$ was considered statistically significant. **Results:** The prevalence of traumatic dental injuries in the present study was calculated at 9.7%. Also, the occurrence of such injuries was found to be higher in the age group of 8–11 years with 10 years being the peak age of incidence for sustaining such injuries. Again, crown fracture involving enamel was found to be the most common type of injury sustained, while proclination observed in relation to upper anterior teeth, and incompetent lips were found to be the independent, significant risk predictors associated with the frequency and severity of such injuries. **Conclusions:** The results obtained in the present study suggested a high prevalence of traumatic dental injuries in school children aged between 8 and 13 years highlighting the need for conducting educational programs, for increasing knowledge and awareness of parents, school children and school faculty in this regard to save the affected child patients from the more dreaded sequelae including complete loss of tooth structure, and social and emotional trauma.

Keywords: Cross-sectional study, demographics, predisposing risk factors, traumatic dental injuries

INTRODUCTION

Apart from dental caries, traumatic dental injuries in the primary and permanent dentition are the most prevalent dental health concerns in school children.^[1,2] Traumatic dental injuries not only affect the teeth but, also, the supporting dental structures including the maxilla, the mandible, and other facial structures.^[3] Moreover, such injuries can directly or, indirectly affect the quality of life (QoL) of the affected children by having an impact on the facial appearance, mastication, speech as well as the alignment of teeth by disturbing the developing

Address for correspondence: Dr. Abhishek S. Nayyar,

Department of Oral Medicine and Radiology, Saraswati Dhanwantari Dental College and Hospital and Post-graduate Research Institute, Parbhani, Maharashtra, India.
E-mail: singhabhishekndls@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Bellamkonda P, Varghese E, Alasabi AN, Alshehri NM, Bhandary S, Krishnan R, *et al.* Traumatic dental injuries and their association with demographics and other predisposing risk factors in school children aged between 8-13 years: A descriptive, cross-sectional study. *Indian J Community Med* 2024;49:512-8.

Received: 27-06-23, **Accepted:** 06-12-23, **Published:** 24-05-24

Access this article online

Quick Response Code:



Website:
www.ijcm.org.in

DOI:
10.4103/ijcm.ijcm_423_23

permanent tooth buds located in the jaws since the children at this age are in their mixed dentition stage wherein the deciduous or, primary teeth are in various stages of exfoliation and succedaneous or, permanent teeth are in formative stages. Thus, this not only affects physical, but, also, the psychological and social well-being of a child.^[4,5] In schools, children actively take part in various physical activities including outdoor games and sports. Despite the fact that these activities enhance the physical and psychological development of a child, reckless and unsupervised activities can increase the risk of such injuries. Furthermore, these injuries can have sequelae that are morphologically evident in permanent teeth due to the impact of trauma which can be borne either by the hard tissues in the form of fractures or, by the soft tissues including the pulp and the peri-apical tissues or, both. Such teeth are often seen to go for devitalization of the pulp tissue and subsequent changes in the color of the tooth as well. Fractured anterior teeth have a great impact on the psychology of the affected children and parents due to an obvious reason of compromised esthetics.^[5] According to Andreasen and Andreasen,^[1] the incidence of traumatic dental injuries has been seen to show an increase over the past decades, and it is expected to surpass the incidence rates of dental caries and periodontitis in the near future. In such circumstances, educating the parents, school children, and school faculty becomes all the more essential as these traumas, if reported and attended early, can have better prognosis for the teeth that have been impacted with trauma, saving the affected children from more severe morbidities including tooth loss and other sequelae. Also, with proper education, parents, teachers and caregivers of the affected children would be in a better position to act immediately after the trauma.^[6] These dental educational programs should emphasize the significance of prompt treatment in case of any such untoward incident, and in the first place, prevention of dental trauma. Such educational programs, however, need relevant data in this context including the prevalence and risk factors associated with such injuries.^[7] The present study was planned with a similar intent. The aim of the present study was to assess the prevalence of traumatic dental injuries in school children aged between 8 and 13 years and their association with the demographics and other predisposing risk factors.

MATERIALS AND METHODS

The present study was conducted in a cross-sectional study design between October 2022 and December 2022 on 1500 school children aged between 8 and 13 years. For the present study, 1500 school children, of both genders, aged between 8 and 13 years, and attending primary and secondary schools were enrolled. Multistage sampling technique was used to select school children for the present study. The map of the region, in which the study was planned, was derived from the concerned authorities, while it was divided into five zones, namely, the east, west, north, south, and central zones. The list of all the schools including government, government-aided, and private in each zone was prepared. One school from each

zone was selected randomly and an equal probability technique was used to ensure that the sample was representative, and proportional to the school strength. In the second stage, children were selected from the previously listed schools. At least 300 children including equal number from both the genders were selected randomly from each school. For the present study, school children, of both the genders, aged between 8 and 13 years, with full set of completely erupted permanent anterior teeth were included, while children with ongoing or, recent history of orthodontic treatment, unerupted permanent anterior teeth and anterior teeth missing due to reasons other than trauma were excluded. The children were helped to answer the questions asked in a closed-ended proforma made in English Language containing the socio-demographic data including age at the time of inclusion into the study, gender, cause of trauma, place where trauma was sustained, along with age when the injury occurred, and the type of injury sustained. After the self-administered questionnaire was completed, the children were subjected to a detailed clinical examination wherein information on dentition including bilateral molar relation, incisal overjet, overbite, anterior open bite and cross-bite, and lip competency were recorded. Incisal overjet was measured using the Community Periodontal Index of Treatment Needs (CPITN) probe introduced by the World Health Organization (WHO) in 1983.^[8] Also, Andreasen and Andreasen's^[1] epidemiological classification of traumatic injuries to the anterior teeth was used to evaluate the injuries clinically as follows:

Code 0: No injury;

Code 1: Treated dental injury;

Code 2: Enamel fracture only (N 502.50);

Code 3: Enamel/dentin fracture (N 502.51);

Code 4: Pulp injury (N 502.52, N 502.53, N 502.54, N503.20, N 503.21);

Code 5: Missing tooth due to trauma (N 503.22);

Code 9: Excluded tooth.

Statistical analysis used

The data obtained including responses of the questionnaire related to the injuries sustained were entered in Microsoft Excel software, while the data was subjected to statistical analysis. Statistical analysis was conducted using Statistical Package for Social Sciences (SPSS) version 21.0 (IBM, Chicago). Non-parametric test, Pearson's Chi-square (X^2) test (Chi-square test of independence, also, known as Chi-square test of association) was used for categorical data analysis and distribution to determine the association between categorical variables. $P < 0.05$ was considered statistically significant.

RESULTS

Among the total 1500 school children examined for the present study, 89 (11.8%) male and 57 (7.6%) female children were impacted by traumatic dental injuries that had led to fractured anterior teeth ($P = 0.0097$) making it to a total of 146 children who reported with such injuries.

In the present study, the prevalence of traumatic dental injuries leading to fracture of anterior teeth was calculated at 9.7% [Table 1]. Also, the occurrence of such injuries was found to be higher in the age group of 8–11 years with 10 years being the age of peak incidence as 25 (28.1%) male and 17 (29.8%) female children were impacted by traumatic dental injuries that had led to fractured anterior teeth at the age of 10 years [Table 2]. Maxillary central incisors were the most commonly impacted teeth with a prevalence rate reported at 78.8%, while the results were found to be statistically highly significant when compared between maxillary and mandibular teeth ($P = 0.0001$) [Table 3]. Furthermore, the prevalence of such injuries was found to be lesser when the lip coverage was adequate (7.2%) than when compared to the children having incompetent lips with the prevalence reported at 18.9%. Also, the highest numbers of traumatic dental injuries were sustained in children with Angle's

Class II Division 1 malocclusion (12.1%), while the lowest prevalence was recorded in children with Angle's Class II Division 2 malocclusion (2.6%). Similarly, the prevalence of such injuries was found to be more in children with an incisal overjet of >5.5 mm (22.2%). Regarding the place where such injuries were sustained, most of the injuries occurred at the playground (45.9%), followed by schools (28.1%), and home (15.8%), while the results in this case, as well, were found to be statistically significant ($P = 0.0282$) [Table 4]. Also, fall (42.5%) was the most common reported cause for traumatic dental injuries as was seen in the present study to be followed by collision (28.1%), and sports (12.3%) and road traffic accidents (8.2%) with the results being statistically highly significant ($P = 0.0001$) [Table 5]. The findings of the present study, also, suggested crown fracture involving enamel to be the most common type of injury sustained for both male and female subjects, while the next in order was

Table 1: Prevalence of traumatic dental injuries according to gender

Gender	Number of child patients examined ($n=1500$)				Total	Chi-square (χ^2) value	P
	Child patients examined with fractured anterior teeth		Child patients examined with no evidence of fracture				
	(n)	(%)	(n)	(%)			
Male	89	11.80	665	88.20	754	6.6778	0.0097*
Female	57	7.64	689	92.36	746		
Total	146	9.73	1354	90.27	1500		

* $P < 0.05$ - Statistically significant

Table 2: Age- and gender-wise prevalence of traumatic dental injuries

Age (in years)	Male		Female		Total		Chi-square (χ^2) value	P
	(n)	(%)	(n)	(%)	(n)	(%)		
8 years	19	21.35	12	21.05	31	21.23	1.0560	0.9579
9 years	21	23.60	14	24.56	35	23.97		
10 years	25	28.09	17	29.82	42	28.77		
11 years	14	15.73	10	17.54	24	16.44		
12 years	6	6.74	4	7.02	10	6.85		
13 years	4	4.49	0	0.00	4	2.74		
Total	89	100.00	57	100.00	146	100.00		

Table 3: Frequency distribution of traumatic dental injuries between maxillary and mandibular teeth

Tooth injured	Number of child patients examined ($n=1500$)				Total	Chi-square (χ^2) value	P
	Child patients examined with evidence of fracture		Child patients examined with no evidence of fracture				
	(n)	(%)	(n)	(%)			
Maxillary central incisor	115	24.52	354	75.48	469	155.8248	0.0001**
Maxillary lateral incisor	14	4.44	301	95.56	315		
Maxillary canine	2	0.78	254	99.22	256		
Mandibular central incisor	12	3.87	298	96.13	310		
Mandibular lateral incisor	3	2.40	122	97.60	125		
Mandibular canine	0	0.00	25	100.00	25		
Total	146	9.73	1354	90.27	1500		

** $P < 0.001$ - Statistically highly significant

crown fracture involving enamel and dentin for both male and female subjects. Again, crown fracture involving enamel, dentin and pulp, and discoloration of teeth, indicative of pulp devitalization, were seen with lesser prevalence, while mobility and avulsion of the tooth were the least common injuries sustained as reflected from the results obtained in the present study ($P = 0.0535$) [Table 6].

DISCUSSION

Based on the findings of the present study, the prevalence of traumatic dental injuries was calculated as 9.7%, while other similar studies have reported the prevalence rates from as low as 4.1% to as high as 52.3% as reported in the literature.^[9-15] In a recent meta-analysis conducted by Petti *et al.*,^[16] the prevalence of traumatic dental injuries was reported to be 22.7% in the primary and 15.2% in permanent dentition across the world. Epidemiological studies conducted in this regard have, also,

indicated that the annual incidence of dental trauma globally is about 4.5% as reported in the literature review conducted by Lam.^[17] The variations in the prevalence rates among the mentioned studies could be due to differences in the selection of study subjects and variable age groups included or, as a result of the differences in the sample size included or, the classification systems used for the categorization of injuries, the frequency, and the type. In similar context, Lenzi *et al.*^[18] conducted a systematic review to seek scientific evidence in the literature that trauma in the primary dentition causes sequelae in the developing permanent successors and that whether there was a relation between the presence and type of sequelae in permanent teeth with the child's age at the time of injury and type of trauma, and concluded that individuals with trauma in their primary dentition have more developmental disorders in the permanent successors than individuals without trauma. Furthermore, it was, also, suggested that, the younger the child is, at the time of injury, the more frequent and more severe are the sequelae, to the permanent successors.

On further observation, it was found that the prevalence of traumatic dental injuries was found to be more in the male subjects (11.8%) as compared to the females (7.6%) in the present study in accordance with the findings of the study conducted by Rouhani *et al.*^[10] A recent systematic review and meta-analysis conducted by Corrêa-Faria *et al.*^[19] to evaluate the clinical factors and socio-demographic characteristics associated with dental trauma in children, also, confirmed similar finding with an increased prevalence reported for male subjects. Also, the occurrence of such injuries was found to be higher in the age group of 8–11 years with 10 years being the age of peak incidence for sustaining such injuries as 28.1% male and 29.8% female children were impacted by such injuries at the age of 10 years in accordance with the findings of the study conducted by Lexomboon *et al.*^[20] wherein the authors found that a total of 2.2% of the 21,721 children had experienced at least one episode of trauma in the age group of 8–10 years in the mentioned study. Similarly, in the meta-analysis conducted by Petti *et al.*,^[16] the 12-year-olds prevalence rate of traumatic dental injuries was reported to be 18.1% across the world making this age group more susceptible to sustain such injuries.

The findings of the present study, also, suggested playground to be the most common place where most of the injuries

Table 4: Frequency distribution of traumatic dental injuries according to place of occurrence of trauma

Place of occurrence of trauma	Frequency		Chi-square (χ^2) value	P
	(n)	(%)		
Playground	67	45.89	10.8555	0.0282*
Schools	41	28.08		
Home	23	15.75		
Roadside	11	7.53		
Any other	4	2.74		
Total	146	100.00		

* $P < 0.05$ - Statistically significant

Table 5: Frequency distribution of traumatic dental injuries according to the most common reported etiology

Etiology	Frequency		Chi-square (χ^2) value	P
	(n)	(%)		
Fall	62	42.47	30.0911	0.0001**
Collision	41	28.08		
Sports	18	12.33		
Road traffic accident (RTA)	12	8.22		
Violence	4	2.74		
Can't recollect	9	6.16		
Total	146	100.00		

** $P < 0.001$ - Statistically highly significant

Table 6: Frequency distribution of traumatic dental injuries according to type of injury

Type of injury	Male		Female		Total		Chi-square (χ^2) value	P
	(n)	(%)	(n)	(%)	(n)	(%)		
Discoloration of teeth	5	0.66	1	0.13	6	0.40	1.7524	0.1855
Crown fracture involving enamel	42	5.57	29	3.89	71	4.73	1.2033	0.2726
Crown fracture involving enamel and dentin	29	3.85	20	2.68	49	3.27	0.8335	0.3612
Crown fracture involving enamel, dentin and pulp	11	1.46	7	0.94	18	1.20	0.4738	0.4912
Mobility/Tooth avulsion	2	0.27	0	0.00	2	0.13	1.9854	0.1588
Total	89	11.80	57	7.64	146	9.73	3.7254	0.0535*

* $P < 0.05$ - Statistically significant

were sustained (45.9%) followed by schools (28.1%), and home (15.8%) in decreasing order of the new incidences of such trauma in accordance with the findings of the study conducted by Lexomboon *et al.*^[20] wherein the authors observed that dental trauma occurred most often outdoors, followed by sports arenas/sports fields, and more often at schools than at home in the mentioned study. In similar studies conducted by Traebert *et al.*,^[21] Malikaew *et al.*^[22] and Marcenes *et al.*,^[23] the occurrence of such injuries was seen to be the highest in schools, while on the contrary, Bastone *et al.*^[24] reported home to be the most common place where most of the injuries were sustained in accordance with the study conducted by Rouhani *et al.*^[10] which reported that majority of such traumas happened at home (46.8%) followed by schools (29.9%). A shocking revelation in this was that 39.7% of the children in the mentioned study did not receive any dental or, medical care after the injury. Similar observation was made in the study conducted by ElKarmi *et al.*^[12] wherein the authors reported that only 25.3% of the children who sustained traumatic dental injuries visited a dentist following trauma. Also, fall (42.5%) was the most common reported cause for traumatic dental injuries as was seen in the present study to be followed by collision (28.1%), and sports (12.3%) and road traffic accidents (8.2%) in close accordance with the findings of the study conducted by Rouhani *et al.*^[10] wherein the authors reported fall (42.9%) to be the most common cause of traumatic dental injuries followed by fights (34.0%) in their study. Similar observation was made in the literature review conducted by Lam^[17] who reported falls at home in toddlers, while contact sports in adolescents in the outdoors to be the most common cause of traumatic dental injuries sustained in the mentioned age groups.

On further analysis, the findings of the present study suggested a higher prevalence of such injuries (18.9%) in children having incompetent lips, while comparatively lesser prevalence of such injuries (7.2%) was reported when the lip coverage was found to be adequate in agreement with the findings of the earlier studies conducted by ElKarmi *et al.*^[12] and Agostini *et al.*^[25] wherein the authors reported lip competency and soft tissue coverage to be the independent, significant risk predictors associated with the frequency and severity of such injuries in relation to anterior teeth with the odds ratio that suggested, that the risk of dental trauma was 1.89 times greater if the overjet was >3 mm, 1.93 times greater if the child had an anterior open bite, and 2.56 times greater if the child had inadequate lip coverage in the study conducted by ElKarmi *et al.*^[12] In this context, it was proposed that in presence of normal occlusion, adequate lip closure will offer a protective effect by reducing the impact of trauma. In the systematic review and meta-analysis conducted by Corrêa-Faria *et al.*,^[19] as well, the authors reported that males, older children, and those with inadequate lip coverage, overbite or, overjet were more likely to sustain traumatic dental injuries in the primary dentition.

Likewise, overjet remained positively associated with severe trauma in the multivariate analysis corresponding to an

absolute increase in the likelihood of trauma per millimeter of overjet in the study conducted by Born *et al.*^[14] making the authors conclude that children with increased overjet of >3 mm were 3.8 times as likely to have experienced severe trauma compared with those with ≤3 mm and that overjet was a strong, independent risk factor for such injuries in the primary dentition. This, however, was contradicted in the studies conducted by Rouhani *et al.*^[10] and Traebert *et al.*^[21] wherein no significant association was found between lip coverage and the occurrence of such injuries, though, a significant correlation was observed between such injuries and overjet in permanent teeth in the study conducted by Rouhani *et al.*^[10] Similar observation was, also, made in the study conducted by Antunes *et al.*^[26] wherein the authors reported that children with malocclusion had a 64.0% higher chance of suffering dental trauma, while increased overjet was the type of malocclusion related to a higher incidence of such injuries, with the subjects having increased overjet suffering three times more often than subjects with other malocclusions from such injuries. In the meta-analysis conducted by Petti^[27] as well, the fraction of traumatic dental injuries attributable to increased overjet globally was estimated to be as high as 21.8%. In the present study as well, highest numbers of traumatic dental injuries were sustained in children with Angle's Class II Division 1 malocclusion (12.1%) in close accordance with the findings of the mentioned studies. In the present study, the prevalence of traumatic dental injuries was found to be more in children with increased incisal overjet of >5.5 mm (22.2%).

Also, the most common type of injury sustained was crown fracture involving enamel for both male and female subjects in the present study, while the next in order was crown fracture involving enamel and dentin. Again, crown fracture involving enamel, dentin and pulp, and discoloration of teeth, indicative of pulp devitalization, were seen with lesser prevalence, while mobility and avulsion of the tooth were the least common injuries sustained as reflected from the results obtained in the present study ($P = 0.0535$). The above reported findings were, again, found to be in accordance with the findings of the studies conducted by Nik-Hussein^[9] and Agostini *et al.*^[25] In the studies conducted by Rajab,^[4] Norton and O'Connell,^[28] Kargul *et al.*,^[29] Saroğlu and Sönmez^[30] and Díaz *et al.*,^[31] though, crown fracture involving enamel and dentin was reported to be the most prevalent injury sustained.

The findings of the present study, also, suggested maxillary central incisors to be the most common teeth impacted with trauma with a prevalence of 78.8% in accordance with the findings of the earlier studies conducted by Andreasen and Andreasen,^[1] Nik-Hussein,^[9] and Ellis.^[32] Similar observation was made in the study conducted by Rouhani *et al.*^[10] wherein the authors reported that maxillary central incisors were the most commonly affected teeth (84.0%), while a total of 46.1% of children experienced luxation injuries of permanent teeth, 37.0% had crown fractures, and 16.9% experienced avulsion of anterior teeth in the mentioned study. Likewise, in the study conducted by ElKarmi *et al.*,^[12] the authors concluded

that upper incisors were more likely to sustain dental trauma (91.7%), while the most common type of dental trauma sustained was enamel fracture (43.1%) followed by pulp injury (39.7%). In another similar study conducted by Berti *et al.*,^[15] the authors concluded based on the observations made in their study that, primary maxillary central incisors were the most common teeth affected, while enamel fracture (63.4%) was the most frequently observed sign of traumatic dental injuries sustained. The above-mentioned observation could be explained on the basis of an early eruption of maxillary central incisors with a specific proclination making them more prone to sustain injuries as compared to the other teeth. Also, impact to the mandibular teeth is subdued because of them being placed behind the maxillary teeth, while the impact energy is dispersed for the mandible having a flexible connection to the cranial base making the mandibular anterior teeth less prone to injuries compared to the maxillary teeth.

A major concern regarding such injuries was reported in the studies conducted by Cortes *et al.*^[33] and Awooda and Ali^[34] to determine the social attributes of the children who sustained such injuries wherein the authors observed that children with untreated traumatic dental injuries of permanent teeth had a detrimental impact on their life than children without such injuries, while the prevalence of negative impact on the oral health-related quality of life (OHRQoL) including domains like functional limitation, emotional-, and social-well-being of children, in children with severe trauma was reported to be as high as 55.9% in the study conducted by Freire-Maia *et al.*^[35] Proper diagnosis, treatment planning and follow-up always play a significant role for improving favorable outcomes in such instances. Guidelines should assist dentists and patients in decision making and for providing the best care effectively and efficiently. In similar context, the International Association of Dental Traumatology (IADT) has, also, developed a consensus statement on this after a review of the dental literature and group discussions wherein the primary goal of these guidelines is to delineate an approach for the immediate or, urgent care of these injuries.^[36]

Limitations of present study

The major limitation of the present study was that it considered trauma classification based solely on the clinical findings without including radiographic examinations, while since there was unavailability of radiographs, root fractures were not included in the present study. Also, a significant percentage of children (6.2%) were not able to recollect the cause of trauma in the present study which could have resulted in the underreporting of the other etiologic factors responsible for such injuries.

CONCLUSIONS

From the findings of the present study, it could be concluded that children in the mixed dentition period and in that age group were more prone to sustain traumatic dental injuries. It, thus, becomes all the more important to improve the knowledge and

awareness on managing such injuries in the first responders to save the affected child patients from the more dreaded sequelae including complete loss of tooth structure, and social and emotional trauma. Also, there is a need to standardize research with a consistent approach to reporting, classification, and methodology used for reporting such injuries. This will not only help in improving the research layout, but, will, also, form a better ground for predicting prognosis, and clinical management, in case such injuries are reported, in first hands.

Ethical approval

The present study was conducted in a cross-sectional study design as a part of school dental health education program to procure the data on prevalence of traumatic dental injuries in school children. The objectives and need for the study were approved by the Institutional Ethics and Review Board via. Letter approval no. SDDC/IERB/01-57-2022 before the start of the study. Also, prior permission was obtained from the concerned school/administrative authorities to conduct the study.

Acknowledgement

To all the participants who contributed in the study without whom this study would not have been feasible.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Andreasen J, Andreasen A. Textbook and Colour Atlas of Traumatic Injuries to the Teeth. 3rd ed. Copenhagen: Munksgaard; 1994.
2. Gassner R, Tuli T, Hächl O, Moreira R, Ulmer H. Craniomaxillofacial trauma in children: A review of 3,385 cases with 6,060 injuries in 10 years. *J Oral Maxillofac Surg* 2004;62:399-407.
3. Andreasen JO. Etiology and pathogenesis of traumatic dental injuries: A clinical study of 1,298 cases. *Scand J Dent Res* 1970;78:329-42.
4. Rajab LD. Traumatic dental injuries in children presenting for treatment at the Department of Pediatric Dentistry, Faculty of Dentistry, University of Jordan, 1997-2000. *Dent Traumatol* 2003;19:6-11.
5. Rocha MJ, Cardoso M. Traumatized permanent teeth in Brazilian children assisted at the Federal University of Santa Catarina, Brazil. *Dent Traumatol* 2001;17:245-9.
6. McIntyre JD, Lee JY, Trope M, Vann WF Jr. Effectiveness of dental trauma education for elementary school staff. *Dent Traumatol* 2008;24:146-50.
7. Kahabuka FK, Plasschaert A, van't Hof M. Prevalence of teeth with untreated dental trauma among nursery and primary school pupils in Dar es Salaam, Tanzania. *Dent Traumatol* 2001;17:109-13.
8. World Health Organization. Oral Health Surveys: Basic Methods. 4th ed. Geneva: World Health Organization; 1997.
9. Nik-Hussein NN. Traumatic injuries to anterior teeth among schoolchildren in Malaysia. *Dent Traumatol* 2001;17:149-52.
10. Rouhani A, Movahhed T, Ghodduji J, Mohiti Y, Banihashemi E, Akbari M. Anterior traumatic dental injuries in East Iranian school children: Prevalence and risk factors. *Iran Endod J* 2015;10:35-8.
11. Soriano EP, Caldas Ade F Jr, Diniz De Carvalho MV, Amorim Filho Hde A. Prevalence and risk factors related to traumatic dental injuries in Brazilian school children. *Dent Traumatol* 2007;23:232-40.
12. ElKarmi RF, Hamdan MA, Rajab LD, Abu-Ghazaleh SB, Sonbol HN. Prevalence of traumatic dental injuries and associated factors among

- preschool children in Amman, Jordan. *Dent Traumatol* 2015;31:487-92.
13. Goettems ML, Brancher LC, da Costa CT, Bonow MLM, Romano AR. Does dental trauma in the primary dentition increase the likelihood of trauma in the permanent dentition?: A longitudinal study. *Clin Oral Investig* 2017;21:2415-20.
 14. Born CD, Jackson TH, Koroluk LD, Divaris K. Traumatic dental injuries in preschool-age children: Prevalence and risk factors. *Clin Exp Dent Res* 2019;5:151-9.
 15. Berti GO, Hesse D, Bonifácio CC, Raggio DP, Bönecker MJ. Epidemiological study of traumatic dental injuries in 5- to 6-year-old Brazilian children. *Braz Oral Res* 2015;29:1-6.
 16. 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;34:71-86.
 17. Lam R. Epidemiology and outcomes of traumatic dental injuries: A review of the literature. *Aust Dent J* 2016;61:4-20.
 18. Lenzi MM, Alexandria AK, Ferreira DM, Maia LC. Does trauma in the primary dentition cause sequelae in permanent successors?: A systematic review. *Dent Traumatol* 2015;31:79-88.
 19. Corrêa-Faria P, Martins CC, Bönecker M, Paiva SM, Ramos-Jorge ML, Pordeus IA. Clinical factors and socio-demographic characteristics associated with dental trauma in children: A systematic review and meta-analysis. *Dent Traumatol* 2016;32:367-78.
 20. Lexomboon D, Carlson C, Andersson R, von Bultzingslowen I, Mensah T. Incidence and causes of dental trauma in children living in the county of Värmland, Sweden. *Dent Traumatol* 2016;32:58-64.
 21. Traebert J, Almeida IC, Marcenes W. Etiology of traumatic dental injuries in 11 to 13-year-old school children. *Oral Health Prev Dent* 2003;1:317-23.
 22. 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;23:222-7.
 23. Marcenes W, Zobot NE, Traebert J. Socio-economic correlates of traumatic injuries to the permanent incisors in schoolchildren aged 12 years in Blumenau, Brazil. *Dent Traumatol* 2001;17:222-6.
 24. Bastone EB, Freer TJ, McNamara JR. Epidemiology of dental trauma: A review of the literature. *Aust Dent J* 2000;45:2-9.
 25. Agostini BA, Pinto LT, Koehler M, Emmanuelli B, Piovesan C, Ardenghi TM. Trend of traumatic crown injuries and associated factors in preschool children. *Braz Oral Res* 2016;30:e112. doi: 10.1590/1807-3107BOR-2016.vol30.0112.
 26. Antunes LA, Gomes IF, Almeida MH, Silva EA, Calasans-Maia Jde A, Antunes LS. Increased overjet is a risk factor for dental trauma in preschool children. *Indian J Dent Res* 2015;26:356-60.
 27. Petti S. Over two hundred million injuries to anterior teeth attributable to large overjet: A meta-analysis. *Dent Traumatol* 2015;31:1-8.
 28. Norton E, O'Connell AC. Traumatic dental injuries and their association with malocclusion in the primary dentition of Irish children. *Dent Traumatol* 2012;28:81-6.
 29. Kargul B, Çağlar E, Tanboga I. Dental trauma in Turkish children, Istanbul. *Dent Traumatol* 2003;19:72-5.
 30. Saroğlu I, Sönmez H. The prevalence of traumatic injuries treated in the pedodontic clinic of Ankara University, Turkey, during 18 months. *Dent Traumatol* 2002;18:299-303.
 31. Díaz JA, Bustos L, Brandt AC, Fernández BE. Dental injuries among children and adolescents aged 1-15 years attending to public hospital in Temuco, Chile. *Dent Traumatol* 2010;26:254-61.
 32. Ellis RG. *The Classification and Treatment of Injuries to the Teeth of Children*. 5th ed. Chicago: Year Book Medical Publishers; 1970. p. 56-199.
 33. Cortes MI, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12-14-year-old children. *Community Dent Oral Epidemiol* 2002;30:193-8.
 34. Awooda EM, Ali YA. Social judgments made by children (10-15 year old) in relation to visible incisors trauma: School-based cross-sectional study in Khartoum state, Sudan. *J Int Soc Prev Community Dent* 2015;5:425-31.
 35. Freire-Maia FB, Auad SM, Abreu MH, Sardenberg F, Martins MT, Paiva SM, *et al.* Oral health-related quality of life and traumatic dental injuries in young permanent incisors in Brazilian school children: A multilevel approach. *PLoS One* 2015;10:e0135369. doi: 10.1371/journal.pone.0135369.
 36. Diangelis AJ, Andreasen JO, Ebeleseder KA, Kenny DJ, Trope M, Sigurdsson A, *et al.* Guidelines for the management of traumatic dental injuries: 1. Fractures and Luxations of permanent teeth. *Pediatr Dent* 2017;39:401-11.