*Ministry of Higher Education &*

*Scientific Research University of Babylon*

*College of Dentistry*

# *Prevalence of dental truma and associated factors in children age 8_12 years old*

***A Project***

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# إهداء

"وَآخِرُ دَعْوَاهُمْ أَنِ الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ"

لم تكن الرحلة قصيرة ولا ينبغي لها ان تكون ,لم يكن الحلم قريباً ولا الطريق كان محفوفاً بالتسهيلات' ,لكنَّنا فعلناها و نلناها.

الحمدلله حباً و شكراً و امتناناً، الذي بفضله ها نحن اليوم ننظر الى حلمٍ طال انتظاره و قد اصبح واقعاً افتخرُ به .

الى ملاكي و قوتي بعد الله أُمي اهديكِ هذا الإنجاز الذي لولا تضحياتكِ لما كان لهُ وجود،

إلى من دعمني و أعطاني بلا مقابل'أبي '

و إلى السادة الكِرام التدريسيين مُشرفي بحث التخرج الذين خُتِمَ هذا الطريق بجهودهم و وجودهم بجانبنا.

# *Prevalence of dental truma and associated factors in children age 8_12 years old*

## *Introduction*

Traumatic dental injuries (TDI) is an important public health problem because of its frequency, occurrence at a young age and the high cost treatment follow-up procedures reason for continuing forward in the life of the patient's [1]. Most dental injuries involve the anterior teeth, which may lead to restriction in biting, difficulty in speaking clearly, and embarrassment while showing teeth [2]. On the other hand, the public is unaware of the risks and does not have enough information to avoid traumatic injuries. However, some health professionals, including dentists, underestimate the incidence of dental trauma and concentrate on the treatment rather than prevention of traumatic injuries [3].

Epidemiological data provide a basis for evaluating the concepts of effective treatment, resource allocation and planning within any health environment[4]. The prevelance of dental trauma in various epidemiological studies differs considerably[4;5]. This variation has been related to several factors such as type of study, trauma classification, differences in methodology, limited age groups and geographic and behavioral differences between study locations and countries [6]. Nevertheless, there are few studies of the prevalence of traumatic injury to permanent dentition in children in Turkey [7;8]; the data of these reports were all gained from stomatology hospitals.

To gain more accurate data, this study investigates the prevalence of traumatic dental injuries directly in public primary schools. Traumatic dental injuries are associated with biological, socio-economic, psychological and behavioural factors and predisposing factors which include increased incisal overjet, open bite, protrusion and lip incompetence [9]. As accidents are the main cause of dental injuries, one might expect a similar association between dental injuries and socio-economic background. However, very few studies have included socio-economic status in their reports and, among those that have, there are conflicting results. These discrepancies are likely due to methodological differences among studies and the few papers published on this issue, which underline the need for further investigation into the

association between socioeconomic status and TDI [10]. Therefore, studies aiming to investigate the social determinants of trauma are needed to inform health promotion strategies to prevent its occurrence. This study was carried out to assess the prevalence of traumatic injuries to the permanent incisors in public primary school children from both genders and aged between 8-12 years in Hillah City .

# Literature view

# Over view

## Types of Dental Trauma

Traumatic dental injuries are best classified with their description (Table 1) [11].

**TABLE 1: Types Of Tooth Trauma (Andreasen 2007 )**

| Score | Criteria | Description |
|---|---|---|
| Code0 | No truma | No observed injury to the incisors |
| Code 1 | Discoloration due trauma | Discoloration ranging from yellow to dark grey when compared to the other teeth. |
| Code 2 | Enamel crack | An incomplete fracture of the enamel without loss of tooth substance |
| Code 3 | Enamel fracture | Loss of a small portion of the crown, including only the enamel |
| Code 4 | Enamel and dentine fracture | Loss of enamel and dentine without pulp exposure |
| Code 5 | Fracture with pulp exposure | Loss of enamel and dentine and/or cementum, exposing the pulp |
| Code 6 | Missing tooth due to trauma | Absence of the tooth due to a complete ex-articulation |
| Code 7 | Composite restoration | Restoration provided due to crown fracture and/or located in the palatal surface of the crown |
| Code 8 | Bonded fragment | Bonding of the tooth fragment due to crown fracture |
| Code 9 | Permanent crown provided | Jacket or post crown or any kind of restoration involving all the whole crown |
| Code 10 | Semi-permanent crown provided | Any kind of crown or denture or bridge (pontic) placed provisionally |
| Code 11 | Denture or bridge provided (pontic) | Denture or bridge (pontic) provided |
| Code 12 | Fistulous tract and/or presence of swelling | Presence of fistula and/or swelling in the labial or lingual vestibule without evidence of caries |
| Code 99 | Signs of trauma cannot be assessed due to appliances or | |

## Symptoms to Identify and Possible Sequelae

Children reporting with TDIs may present with moderate to severe symptoms affecting the oral and maxillofacial region.

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TDI should be considered as an emergency in case of exposure of the dental pulp, tooth avulsion, concussion, luxation and sub-luxation injuries [14]. However, in case of any episodes of amnesia, unconsciousness, drowsiness, vomiting or headache indicating cerebral involvement, the appropriate medical treatment should be rendered before looking into management of traumatic injuries to teeth [14–16].

The injury to the upper anterior tooth may or may not be accompanied with swelling and lacerations of the adjacent soft tissues and lips, depending upon the impact and the type of the injury [11] . The crown fracture is the most common clinical feature of dental trauma and sometimes, it may be accompanied with changes in the tooth color due to pulpal hemorrhage [14]. These injuries, if painless, often remain untreated, but they can be restored to appropriate esthetics and function with conventional composite materials. Sometimes, the tooth may not break but gets discolored in few weeks to months after TDI.This should be regarded as a sign of tooth losing pulp vitality and urgent referral to the dentist must be made [17] . The prognosis of crown fractures, luxation injuries and dentoalveolar fractures is affected by treatment delay[13].

The tooth avulsions are best managed by replanting the tooth back to its socket and seeking dental treatment as soon as possible . In case of inability to replant, it should be preserved in media as patient's saliva, bovine milk, oral rehydration solution (ORS) or egg white before emergency care is being sought at dentist's clinic [15]

Extra-oral wounds on face, usually present in cases from traffic accidents, can be accompanied by dental injuries [11]. A site-specific examination of hard tissues and teeth must be done for complete evaluation. Oral mucosa/lip and gingival should be examined for any tooth fragment buried in laceration wounds [14–16]. Such embedded fragments can cause acute or chronic infection and disfiguring fibrosis.Sometimes, these embedded fragments may require careful radiographic examination of the soft tissues [11].

The possibility of aspiration or swallowing of tooth or fragments at the time of injury should always be considered, when there is crown fracture or missing teeth. A radiographic examination of chest and abdomen must be taken in this situation[11,16] .

If tooth displacement takes place in the deciduous dentition, it is important to rule out any impingement an subsequent damage to the developing permanent tooth. The teeth not causing any damage can be left to erupt on their own [11,18] .

## *Treatment of the Injury*

### ❖ *Enamel Fracture*

In small enamel fractures—rough enamel margins can be disked and smoothened. In large enamel fractures—the tooth may be restored using an acid etch composite resin restoration

### ❖ Enamel and Dentin Fractures

Exposed dentin should be covered with a layer of calcium hydroxide or glass ionomer cement to prevent pulpal irritation. The tooth is then restored with acid etch composite resin restoration

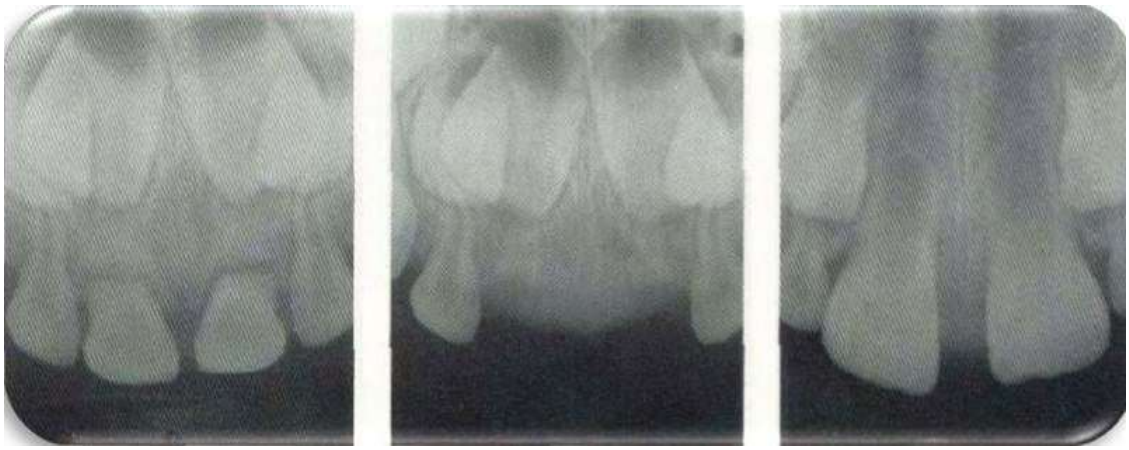
### ❖ Fracture Involving the Pulp

Usually such injuries are rare in primary dentition. Treatment depends upon the vitality of the tooth. If the tooth is vital the treatment option formacresol pulpotomy. If the tooth is nonvital, pulpectomy is the choice. Final restoration is done with a celluloid crown matrix or a stainless steel crown

### ❖ Root Fracture:

In a primary tooth with root fracture without dislocation and excessive mobility, normal exfoliation may be anticipated. Extraction is preferred if the tooth is very mobile as it is associated with increased risk of aspiration. Treatment depends on the level of fracture

Apical 1/3rd fracture—is associated with good prognosis. The tooth usually maintains its vitality and normal root resorption occurs. Middle 1/3rd and coronal 1/3rd fractures—



advised extraction.

### ❖ Concussion

The tooth should be made free from occlusion and is kept under observation.

### ❖ Mobility

Patient is instructed to avoid eating with involved teeth and follow-up examination should occur. The bone can be remodelled around the teeth with gentle finger pressure sufficient to hold the teeth in a fairly stable position as the bone is very spongy and malleable. No splint should be placed and prognosis is good.

### ❖ Intrusion

It is one of the most dangerous injuries to the developing permanent tooth bud. If the intruded deciduous tooth is contacting the permanent tooth bud, the deciduous tooth must be extracted. If it is not contacting and is placed labially, the intruded tooth is allowed to re-erupt. 90% of the teeth reerupt in 2-6 months. The tooth is kept under observation. Extraction of the intruded tooth is indicated if a fistula or a periapical radiolucency develops or does not erupt after 3-4 weeks.

### ❖ Extrusion and Lateral Luxation Injuries

Most of the deciduous teeth injuries result in luxation or avulsion due to the resilient bone surrounding them. In these injuries, serious damage to the PDL usually occurs. Some clinicians recommend splinting these teeth with sutures until periodontal ligament attachment occurs, which takes approximately 2 weeks. While few others prefer extraction because of the potential for aspiration of the mobile teeth or subsequent damage to developing permanent tooth bud.

### ❖ Splinting of Luxated Primary Teeth is not Preferred

• Cooperation is often a problem

• Bonding of the splint is difficult due to short clinical crowns and associated gingival bleeding.

### ❖ Avulsion

• Primary teeth that have avulsed should not be reimplanted. The lost tooth is replaced by an artificial substitute.

## *Trauma to the Permanent Tooth*

- ***Crown Craze or Crack*:** These are minute cracks extending throughout the labiolingual surface, usually resulting from direct trauma to a tooth. These crazed areas may involve enamel alone or both enamel and dentin.

- ***enamel fracture:*** A trauma to a tooth that causes a loss of only a small portion of enamel should be treated as carefully as one in which greater tooth structure is lost

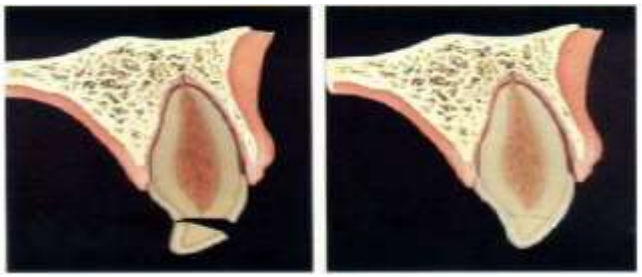
- ***Fractures Involving Enamel***

Treatment consists of smoothening the jagged edges if there is only slight chipping of the enamel. Restoration of the fractured fragment is made using acid etch composite resin restoration. The tooth should be kept under observation for 6-8 weeks for any changes in the pulp or periapical region that may occur due to deleterious effects of concussion on pulp.

- ***Fractures Involving Enamel and Dentin***

Although pulp is not visibly exposed, emergency treatment is necessary to protect the already traumatized pulp from further insult from excessive thermal, bacterial and chemical stimuli and to hasten the formation of a layer of secondary dentin in the fractured area. Dentin thickness of 2 millimeters is needed to shield the pulp. Dentinal tubules closer to the pulp are wider, therefore making it easier for the penetration of microorganisms or noxious substances. Thus deep fractures will allow more microorganisms or other substances in higher concentrations to permeate through the dentinal barrier and provoke and inflammatory response in the pulp. The traditional approach recommended includes placement of calcium hydroxide over the exposed dentin, followed by acid etch composite resin restoration.

- **Reattachment of the fractured fragment:**



It is possible to successfully reattached the teeth fragment using resin and bonding technique. These fragments serve as esthetically perfect temporary restorations that may be retained for a long time and also no mechanical tooth preparation is needed, as the fragments are retainedby enamel etch technique. If a considerable portion of dentin is exposed, modification of the fragment is done to provide space for the dressing material by removing a portion of dentin using a bur.

## *Fracture Involving the Pulp" Enamel–dentine–pulp (complicated) crown fracture"*

Treatment depends upon following factors:

1. Size of pulpal exposure: Small pulp exposures can be managed by direct pulp caping or Cvek pulpotomy

2. Stage of development of root apex: The treatment procedure should be aimed at maintaining the pulp vitality.

3. Vitality of the pulp: Vital procedures such as direct pulp capping or pulpotomy are preferred.

4. Time lapse: Shorter time lapse after trauma is favorable to initiate any vital procedures. Thus prognosis of direct pulp capping is good when done immediately than done after few days.

## *Usual treatment modalities*

1. Pulp capping : is a technique used in dental restorations to prevent the dental pulp from necrosis, after being exposed, or nearly exposed during a cavity preparation, from a traumatic injury, or by a deep cavity that reaches the center of the tooth causing the pulp

to die. There are two type of dental pulp of dental pulp capping procedures : indirect pulp caps and direct pulp caps

2. Pulpotomy : removal of the coronal pulp with the intent of maintaining the vitality of the remaining radicular pulp tissue.

3. Pulpectomy : procedure involves removing the nerve and pulp of a tooth. The inside of the tooth is then cleaned and sealed. The nerves are in the roots or “legs” of the tooth.

4. Apexification : is a procedure for treating and preserving immature permanent teeth that have lost pulp vitality

5. Extraction

# Materials and Methods

## 2.1. Ethical Approval

Institutional ethical clearance for the study was obtained, formal letters were sent to the selected schools, and the approval of the school authorities was obtained. School directors and teachers have been informed of the curriculum for the support and collaboration. All parents or guardians were asked to sign a written informed consent form outlining the study's aims, characteristics, and significance.

## 2.2. Study Design and Population

A cross-sectional study was conducted using a questionnaire and clinical examination among 8–12-year-old children who regularly attend public schools in Al-Hilla city, and the study period was conducted 2023 to 2024.

## 2.3 Data Collection

The study included children whose permanent anterior teeth had erupted, or at least 3/4 of the crown had penetrated the oral cavity, and in the 8–12-year age group. Children with a history of dental trauma who had not sustained an injury more than once were included in the study. Students who had lost an anterior tooth due to dental caries, broken roots, severe dental fluorosis, and children with physical, mental, or medical disabilities were excluded from the study. Children who received or had undergone orthodontic treatment were excluded from the study.

## 2.4. Diagnostic Criteria of Traumatic Dental Injury

The children were seated in a chair, and the ADA type III assessment was performed using a disposable oral mirror and a Vernia under natural source (sun light). Strict infection control measures have been applied. Four trained paediatric dentists collected all information on standardized trauma assessment forms according to the diagnostic criteria. Additional details such as the cause and place of injury were noted for the children who

underwent dental trauma. The teeth were examined by the direct vision. Neither vitality nor radiographs were used to assess the extent of the fractured teeth. The examination was uniformly performed from the maxillary right quadrant to the mandible in a clockwise direction using Andreasen classification [19].

The overjet was measured with a Vernia which was dichotomized between 3 mm , <3 and >3 mm during the analysis. The overjet was calculated from the lingual incisal line angle of the most prominent upper incisor to the buccal aspect of the corresponding lower incisors. The lip covering was measured using the standards established by burden. If the lip covered the upper incisors at rest, the lip coverage was rated as sufficient. The lip coverage was rated insufficient if most upper incisors were exposed or the lip strain was evident upon closure.

## Results

Six hundred(600) male and female students from grade 8_12 participated in the study with the mean age 9.98 ±1.34 years for (yes) group and 9.9 ± 1.4 for (No) group . About more than half of the participants (69.2%) belonged to low-income families (monthly family income equal to >500 $(654000); one thousand dinar (1000DI) is equivalent to 0.67$US ). Having dental trauma was reported by (60.3%) male and (39.7%) female of the participants.

| *PARAMETERS* | | *TDI* | |
|---|---|---|---|
| | | YES no. (%) | NO no. (%) |
| **Sex** | **male** | 47(60.3%) | 260(49.8%) |
| | **Female** | 31(39.7%) | 262(50.2%) |
| **Family income \ $** | **< 500** | **54 (69.2%)** | **298 (57.1% )** |
| | **500-1000** | **19 (24.4%)** | **202 (38.7%)** |
| | **1000-2000** | **5 (6.4%)** | **22 (4.2%)** |
| **Parent education** | **> 8 years** | 51(65.4%) | 285(54.6%) |
| | **< 8 years** | 27 (34.6%) | 237(45.4%) |
| ***no. of resident in household*** | **< 4** | 48 (61.5%) | 277(53.1%) |
| | **> 4** | 30(38.5%) | 245(46.9%) |
| **Over jet** | **> 3mm** | **47(60.3%)** | **285(54.6%)** |
| | **< 3mm** | **31(39.7%)** | **237(45.4%)** |

T – test

| *PARAMETERS* | *TDI* Yes | No |
|---|---|---|
| | Mean ± SD | Mean ± SD |
| Age | **9.987 ±1.3435** | **9.900 ± 1.4052** |

*independent sample

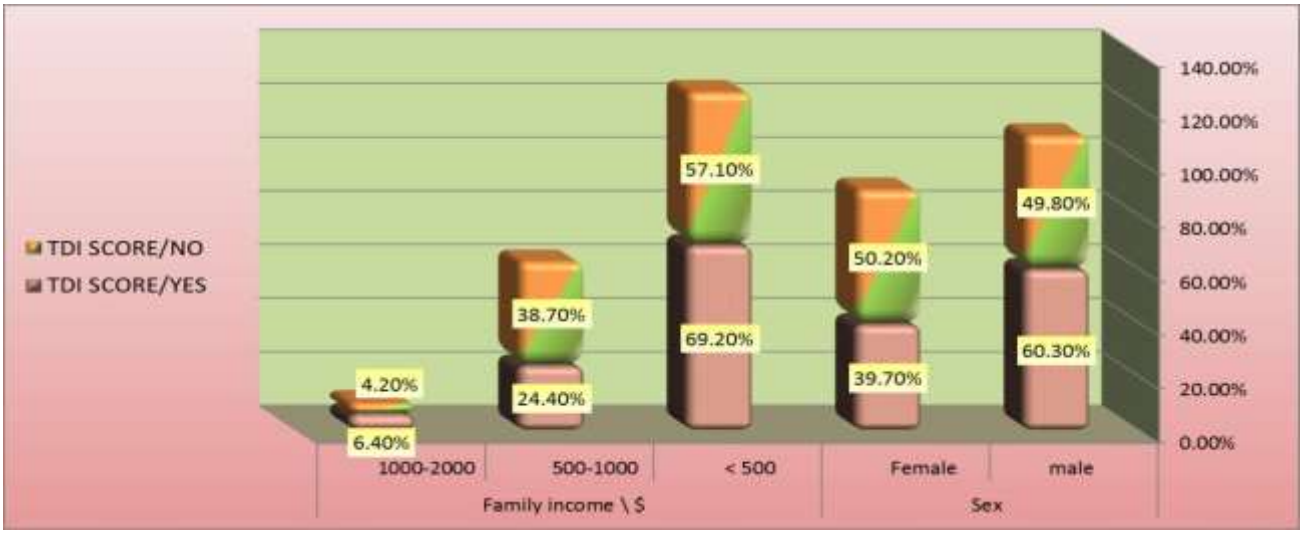



Figure 1: *TDI ( Yes , No ) With Family Income and sex*

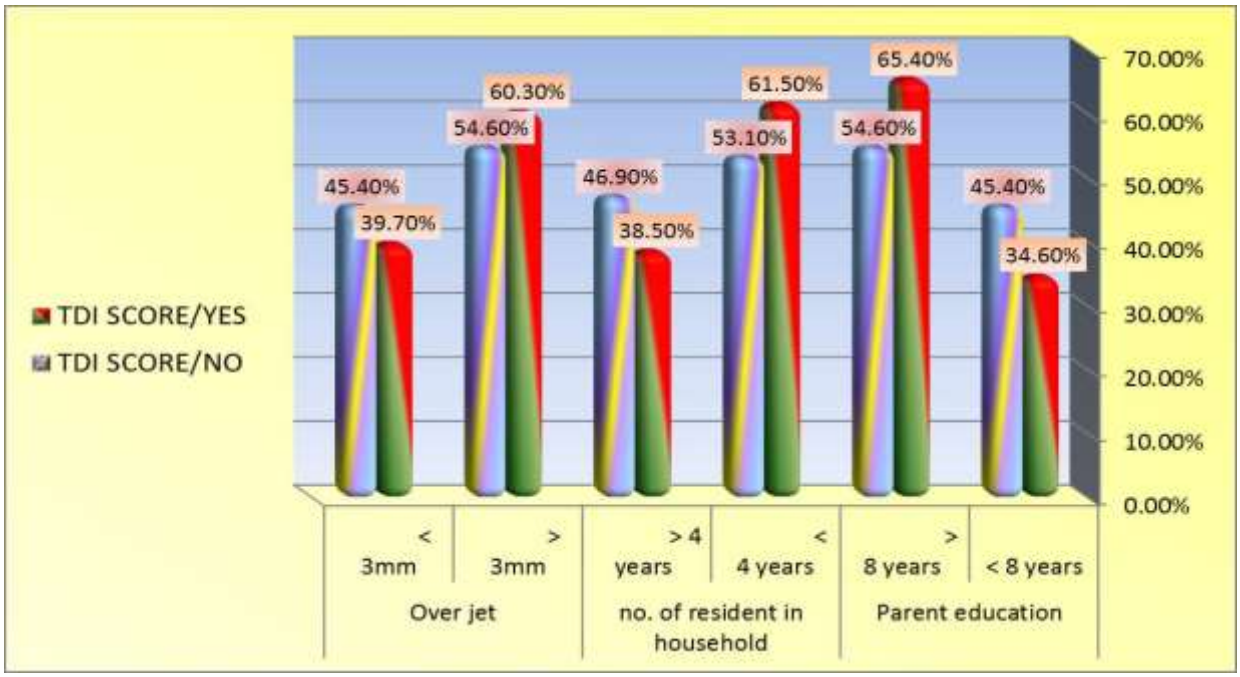



Figure 2: *TDI (Yes , No ) With (**Parent education , no. of resident in household , Over jet )***


Figure 3: ***TDI ( Yes , No ) With age***

# Discussion

The study identified that60.3% male and39.7%female of adolescents had dental trauma to their permanent anterior teeth. This finding is higher than what was reported in previous studies in Saudi Arabia which showed that the prevalence of dental trauma ranged from 31.4% to 34% in adolescents [20, 21]. Globally, the distribution of dental trauma among adolescents varies in different countries. For instance, dental trauma was reported in 9.1% of Nigerian [22], 10.9%–14.4% of Indian [23, 24], 16.5%–34.79% of Brazilian [25, 26], 35.0% of Thai [40], 36% of Iranian [39], 18.5% of Canadian [41], and 43.8% of British school children [38]. These dental trauma inequalities in different parts of the world can be explained by the differences in study designs, sample size estimates, sampling techniques, inclusion/exclusion criteria, and measurement methods. In addition, variations in behavioral, cultural, and environmental factors in different geographic locations predispose children to varying degrees of dental trauma [28 ] .

In the present study, no one of the participants received dental care for dental trauma. A previous study of Brazilian school children reported that 27.6% of teeth with dental trauma received dental care [29]. Another study from Brazil showed that 26% of teeth with dental trauma were restored [25]. On the other hand, Hamdan and Rajab observed that only 3.1% of traumatized teeth were treated in Jordanian school children [30]. Al-Majed et al. reported dental treatment in 2.4% of 12–14-year-old boys in Saudi Arabia [31]. Our study showed that no one of the participants visited a dental clinic, and no one received dental treatment immediately. In addition to various aspects of poor quality of life, dental trauma can lead to clinical complications such as external root resorption, ankylosis, and pulp necrosis [32]. Nevertheless, a low prevalence of treatment for dental trauma in our study could be related to low priority for oral health, lack of awareness about the availability of dental care, and expensive dental trauma treatment in addition to sociodemographic variables.

Fall and caries was the most common reason for dental trauma in the present study. Several previous studies locally and globally reported similar findings [33, 23, 34, 21, 32, 35]. In addition, accidental hit by fall was the second most common reason for dental trauma in the present study. The school was the most frequently reported place of dental trauma in the present study. As in this study, an analysis of the factors related to dental injury was conducted and summarized in a statistical work, as shown in the previous tables.

The analysis of sociodemographic factors on dental trauma and the receipt of dental treatment was performed in the present study. The multiple logistic regression analysis showed lower odds of dental trauma among children from high-income families than low- and middle-income families. Similarly, Årtun and Al-Azemi demonstrated a reduced risk of dental trauma among adolescents from high-income families in Kuwait [36]. Our study also demonstrated reduced odds of dental trauma among children with high paternal education, though the relationship was not significant. Damé-Teixeira demonstrated significantly greater likelihood of dental trauma to at least one tooth among children from low socioeconomic status [37]. Low and middle socioeconomic status school children which increase their chances of experiencing dental trauma. Conversely, high parental education results in increased awareness about the prevention of dental trauma and reduced incidence of dental trauma [37, 38]. These explain the reasons behind reduced likelihood of dental trauma among adolescents from high-income and high-educated families in the present study. On the contrary, Hamdan and Rajab showed no significant association between socioeconomic factors and dental trauma [30].

The study evaluated different factors related to dental trauma and the receipt of dental treatment in adolescents and added valuable information to the available body of evidence on this topic. However, there are certain limitations to this study. Despite the measures to obtain valid data in the present survey, self-reported responses are subject to biases such as recall bias and social desirability bias. In addition, clinical examination of dental traumatic injuries provides more accurate information than self-reported data [39]. Furthermore, a cross-sectional study design cannot be used to infer the associations reported in the present study as causal relationships. Children were recruited from public

schools in few cities of the Eastern Province, and the conclusions regarding generalizability should be drawn carefully. Large prospective studies are required to understand various epidemiological features related to dental trauma.

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