

# Pattern and Management of Traumatic Dental Injuries in Children

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## Abstract

**Background:** Traumatic dental injuries (TDIs) are a significant concern in pediatric dentistry due to their impact on oral function, aesthetics, and long-term dental health. Early diagnosis and appropriate management are essential to prevent complications.

**Methods:** This descriptive cross-sectional study was conducted in the Department of Dentistry at Bangladesh Shishu Hospital & Institute, Dhaka, over a 12-month period from January to December 2024. A total of 50 children aged 1 to 14 years presenting with TDIs to either primary or permanent teeth were selected using purposive sampling. Children with systemic illnesses or incomplete records were excluded. Data were collected through clinical examination and follow-up assessments.

**Results:** Of the 50 children included, 60% were male and the most affected age group was 6–10 years (46%). Falls from height (44%) were the leading cause of injury, followed by sports-related trauma (20%) and road traffic accidents (14%). Luxation injuries were the most common (26%), followed by enamel-dentin fractures (22%) and enamel fractures (16%). Maxillary central incisors were most frequently affected (56%). Regarding treatment, the most common interventions included restoration with composite or glass ionomer cement (28%), observation and follow-up (20%), and pulp therapy (16%). Other treatments included splinting (14%), replantation (8%), and extraction (10%). On follow-up, 72% showed no complications. The most frequent complication was pulp necrosis (12%), followed by tooth discoloration (8%), root resorption (6%), and ankylosis (2%).

**Conclusion:** TDIs were more common in male children and frequently resulted from falls. Maxillary central incisors were the most affected, with luxation being the most frequent injury. Early intervention minimized complications in most cases.

**Keywords:** Traumatic dental injury, pediatric dentistry, dental trauma, luxation, pulp necrosis, maxillary incisors.

## 1. INTRODUCTION

Traumatic dental injuries (TDIs) are a common occurrence in the pediatric population and represent a significant public health concern due to their impact on the functional, aesthetic, and psychological well-being of children [1]. These injuries can affect both primary and permanent dentitions and may result from various causes including falls, sports-related accidents, road traffic collisions, physical abuse, or collisions during play [2]. The anterior teeth, particularly the maxillary central incisors, are the most frequently affected due to their prominent position in the dental arch and exposure to

external forces [3].

The incidence and pattern of TDIs vary globally and are influenced by factors such as age, gender, socioeconomic status, environment, and behavior [4]. Boys tend to be more frequently affected than girls, possibly due to greater participation in physical activities. Younger children are more prone to injuries due to poor motor coordination and increased risk of falling, while older children may sustain injuries from sports or road traffic accidents [5].

The types of injuries range from simple enamel fractures to complex injuries involving luxation,

avulsion, or root fractures, each requiring specific clinical approaches and varying levels of urgency [6].

Prompt and appropriate management of dental trauma is critical to preserve the affected tooth, maintain oral health, and minimize complications such as pulp necrosis, root resorption, ankylosis, and tooth loss [7]. Management may include conservative treatment, restorative procedures, pulp therapy, splinting, replantation of avulsed teeth, or extraction, depending on the type and severity of injury [8]. The long-term prognosis of traumatic dental injuries is highly dependent on timely diagnosis, appropriate intervention, and regular follow-up care [9].

In Bangladesh, data regarding the prevalence, types, causes, and management outcomes of traumatic dental injuries in children are limited, especially in specialized pediatric hospitals [10]. Understanding the local pattern of dental trauma can help in developing preventive strategies, improving clinical protocols, and raising awareness among parents, caregivers, and school authorities [11]. Moreover, documenting the treatment outcomes and complications of various management approaches provides valuable insight into optimizing care for pediatric dental trauma cases [12].

This descriptive cross-sectional study was conducted in the Department of Dentistry at Bangladesh Shishu Hospital & Institute to assess the pattern and management of traumatic dental injuries in children. The objective of this study was to determine the common causes and types of TDIs, identify the most frequently affected teeth, and evaluate the treatment modalities employed and their associated outcomes. The findings of this study aimed to contribute to the existing body of knowledge, enhance pediatric dental trauma care, and support evidence-based decision-making in clinical settings.

### 3. RESULTS

**Table 1.** Age and Gender Distribution of Study Population (n = 50)

Age Group (years)	Male (n)	Female (n)	Total (n)	Percentage (%)
1–5	8	5	13	26
6–10	14	9	23	46
11–14	8	6	14	28
Total	30	20	50	100

Table 1 presents the age and gender distribution of the 50 children included in the study. The majority of injuries occurred in the 6–10 years

### 2. METHODOLOGY & MATERIALS

This descriptive cross-sectional study was conducted in the Department of Dentistry at Bangladesh Shishu Hospital & Institute, Dhaka, over a period of 12 months, from January 2024 to December 2024. A total of 50 children presenting with traumatic dental injuries were included in the study using purposive sampling. Children aged between 1 and 14 years who sustained dental trauma to either primary or permanent teeth and attended the dental outpatient department during the study period were eligible for inclusion. Patients with systemic illnesses or incomplete records were excluded.

After obtaining informed consent from the parents or guardians, detailed clinical examinations were carried out for each patient. Data were collected using a pre-designed structured questionnaire that included demographic information (age, gender), cause of trauma, type of injury, affected teeth, and time elapsed since injury. The etiology of trauma was classified based on patient or guardian history. Clinical examination was performed under adequate lighting using mouth mirrors and explorers, and radiographs were taken when necessary to confirm diagnosis and assess the extent of injury.

Traumatic dental injuries were classified according to the Andreasen and WHO classification systems, categorizing them into fractures (enamel, enamel-dentin, enamel-dentin-pulp, root), luxation injuries (concussion, subluxation, extrusion, lateral luxation, intrusion), and avulsion. Management strategies were recorded, including conservative treatment, restorative procedures, pulp therapy, splinting, replantation, and extraction. Follow-up visits were conducted to assess complications such as pulp necrosis, root resorption, ankylosis, and tooth discoloration. Data were analyzed using Statistical Package for the Social Sciences (SPSS) software, version 25.0.

age group (46%), followed by 11–14 years (28%) and 1–5 years (26%). Males (60%) were more commonly affected than females (40%).

**Table 2.** *Etiology of Dental Trauma (n = 50)*

Cause of Injury	Frequency (n)	Percentage (%)
Fall from height	22	44
Sports-related injury	10	20
Road traffic accident	7	14
Collision during play	6	12
Physical assault/violence	3	6
Other	2	4
Total	50	100

Table 2 shows the etiology of dental trauma among the study population. Falls from height were the most common cause (44%), followed by sports-related injuries (20%) and road traffic

accidents (14%). Less frequent causes included collisions during play (12%), physical assault (6%), and other unspecified factors (4%).

**Table 3.** *Type of Traumatic Dental Injuries (n = 50)*

Type of Injury	Frequency (n)	Percentage (%)
Enamel fracture	8	16
Enamel-dentin fracture	11	22
Enamel-dentin-pulp fracture	6	12
Root fracture	2	4
Luxation (subluxation, intrusion, etc.)	13	26
Avulsion	6	12
Combination injuries	4	8
Total	50	100

Table 3 outlines the types of traumatic dental injuries observed in the study. Luxation injuries were the most common (26%), followed by enamel-dentin fractures (22%) and enamel

fractures (16%). Enamel-dentin-pulp fractures and avulsions each accounted for 12%, while combination injuries and root fractures were less frequent, comprising 8% and 4% respectively.

**Table 4.** *Affected Teeth (n = 50)*

Tooth Type	Frequency (n)	Percentage (%)
Maxillary central incisors	28	56
Maxillary lateral incisors	10	20
Mandibular incisors	5	10
Canines	4	8
Molars	3	6
Total	50	100

Table 4 shows the distribution of affected teeth among the injured children. Maxillary central incisors were the most commonly involved (56%), followed by maxillary lateral incisors

(20%) and mandibular incisors (10%). Less frequently affected were canines (8%) and molars (6%).

**Table 5.** *Management Approach Used (n = 50)*

Treatment Provided	Frequency (n)	Percentage (%)
Observation and follow-up	10	20
Restoration (composite/GIC)	14	28
Pulp therapy (pulpotomy/pulpectomy)	8	16
Splinting for luxation/root fracture	7	14
Replantation (for avulsed teeth)	4	8
Extraction	5	10
Total	50	100

Table 5 summarizes the management approaches used for traumatic dental injuries. The most common treatment was restoration with composite or GIC (28%), followed by

observation and follow-up (20%) and pulp therapy (16%). Splinting was performed in 14% of cases, while extraction and replantation were required in 10% and 8% of cases, respectively.

**Table 6.** *Complications Observed on Follow-Up (n = 50)*

Complication	Frequency (n)	Percentage (%)
No complication	36	72
Pulp necrosis	6	12
Root resorption	3	6
Tooth discoloration	4	8
Ankylosis	1	2
Total	50	100

Table 6 presents the complications observed during follow-up. The majority of cases (72%) showed no complications. Pulp necrosis was the most common complication (12%), followed by tooth discoloration (8%) and root resorption (6%). Ankylosis was observed in a small percentage of cases (2%).

#### 4. DISCUSSION

This study assessed the etiology, types, management, and complications of traumatic dental injuries (TDIs) in children, with a sample size of 50. The findings offer valuable insights into the patterns and clinical outcomes of dental trauma in a pediatric population in Bangladesh.

In our study, the majority of participants were aged between 6 and 10 years (46%), with a male predominance (60%). These demographic findings are consistent with previous studies indicating that dental trauma is more prevalent in school-aged children, particularly boys, due to greater involvement in physical activities [13, 14].

Falls from height were identified as the leading cause of injury (44%), followed by sports-related trauma (20%) and road traffic accidents (14%). Similar etiological patterns have been reported in both national and international studies, where falls and sports injuries are the most frequent contributors to TDIs in children [13-15]. A study by Mahmoodi et al., also found falls to be the predominant cause, highlighting the need for improved supervision and safer play environments [13].

The most commonly observed injuries in our study were luxation injuries (26%) and enamel-dentin fractures (22%). These findings align with the results of other epidemiological studies, such as those by Singaram et al., and Zaror et al., which emphasize the high incidence of luxation and crown fractures in young individuals [15, 16]. The prevalence of luxation may be attributed to the pliability of the alveolar bone in children, making it more susceptible to displacement injuries than fractures [17].

Maxillary central incisors were the most affected teeth (56%), which is well-documented in the

literature [13, 16]. The prominence and positioning of these teeth in the arch, coupled with underdeveloped motor coordination in younger children, make them particularly vulnerable during trauma.

The most frequent management approach in our study was restoration using composite or glass ionomer cement (28%), followed by observation and follow-up (20%) and pulp therapy (16%). These treatment preferences are consistent with those reported in similar studies [17, 18]. Restorative treatments are often favored for uncomplicated crown fractures, while pulp therapy becomes necessary when the pulp is involved, particularly in enamel-dentin-pulp fractures.

Splinting (14%) and replantation (8%) were employed for more severe injuries such as luxation and avulsion. According to Krastl et al., immediate and appropriate management of avulsed and luxated teeth significantly impacts long-term prognosis, reinforcing the importance of early intervention [17].

At follow-up, 72% of patients showed no complications, while pulp necrosis was observed in management is inadequate 12%, followed by tooth discoloration (8%) and root resorption (6%). Ankylosis was the least common complication (2%). Delayed complications such as pulp necrosis and resorption have been well-documented, particularly when initial or delayed [19, 20]. Abdulazeez et al., reported similar findings, stressing the need for timely and appropriate care to minimize long-term sequelae [20].

The occurrence of discoloration and ankylosis, although lower, further emphasizes the importance of follow-up in traumatic cases. According to Andreasen and Kahler, pulpal and periodontal responses vary depending on the severity and type of trauma, and some complications may not become clinically evident until months later [19].

Socioeconomic and environmental factors often influence both the incidence and outcomes of TDIs. Studies by Da Rosa et al., and Chaffee et

al., highlight the relationship between lower socioeconomic status and increased risk of dental injuries, often due to inadequate supervision, lack of protective equipment, and limited access to dental care [14, 21]. Improving awareness, incorporating dental trauma management into school health programs, and providing parental education can significantly mitigate these risks.

Furthermore, child abuse and neglect have been identified as less common but serious causes of orofacial trauma [22, 23].

## 5. LIMITATIONS OF THE STUDY

This study was limited by its small sample size and single-center design, which may affect the generalizability of the findings. Also, recall bias and variability in injury-to-treatment intervals may have influenced the outcomes.

## 6. CONCLUSION

Our findings underscore that dental trauma in children is predominantly caused by falls, with luxation and enamel-dentin fractures being the most common injuries. Maxillary central incisors are frequently affected, and while many cases resolve without complications, timely and appropriate treatment is crucial in reducing long-term adverse outcomes. Emphasis should be placed on preventive strategies, public awareness, and improving access to prompt dental care.

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## CONFLICTS OF INTEREST

There are no conflicts of interest.

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