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Prevalence and Risk Factors of Dental Trauma in Pediatrics and Adolescents: A Retrospective Study in Ilam, Iran

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ABSTRACT

Objectives: This study aimed to determine the prevalence of dental trauma (DT) in pediatrics and adolescents in Ilam.
Methods: This retrospective study was conducted in Ilam (Iran) on a group of pediatric and adolescent patients with DT between 2017 and 2021. The researchers reviewed patient records from hospital-based specialty clinics providing DT treatment. Using a predefined checklist, they extracted the relevant data from the patients' medical files.
Results: In this study, 246 pediatrics and adolescents were examined, including 144 (58.5%) boys and 102 (41.5%) girls. Regarding age distribution, 104 (42.3%) patients were in the pediatric age group (mean age: 7.1±3.2 years) and 142 (57.7%) were adolescents (14.8±5.1 years). A significant relationship was found between place of occurrence with sex (OR=0.77; 95% CI=0.64-0.93; p=0.008) and age group (OR=0.73; 95% CI=0.6-0.89; p=0.002). Additionally, the type of trauma showed a significant association with sex (OR=1.24; 95% CI=1.08-1.43; p=0.002), while the treatment provided was significantly associated with school type (OR=0.79; 95% CI=0.65-0.96; p=0.02). In addition, there was no significant relationship between the demographic variables and dental injury-related factors (p>0.05).
Conclusion: The present study found a higher prevalence of DT in boys than in girls. However, this trend reversed in the adolescent age group. In addition, public schools had a higher rate of DT, which influenced the types of treatments provided.

Keywords: Dental injuries, Pediatrics, Adolescents, Prevalence.

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Introduction

The health of children and adolescents, as future builders of society, affects both individual and societal well-being and enhances a nation's future. On the other hand, children are considered one of the vulnerable groups of society, facing various life-threatening injuries and health risks [1].

Childhood and adolescence represent one of the most critical periods of human development, marked by numerous life changes. These changes include personal, social, physiological, and behavioral transformations, each significantly affects children's and adolescents' lives [2, 3].

Trauma is one of the leading causes of illness and hospital admission. It can affect various body parts, such as the head, extremities, thorax, spinal system, and teeth [4-6]. Dental trauma (DT) is one of the most important types of trauma, typically occurring suddenly, unexpectedly, and accidentally. Compared to other traumas, DT requires more time and financial resources for treatment, imposing a considerable physiological burden on individuals. On the other hand, DT management varies significantly, presenting different challenges for individuals and families in different age groups [7-9].

Unlike other body tissues, traumatized teeth cannot undergo physiological self-repair and require dental intervention. When DT occurs, physiological changes will occur in the patient's body, including changes in blood pressure, pulse, and other physiological indicators [10, 11].

Children are more susceptible to DT due to natural physical activity and mobility, which can result in partial or complete tooth loss, creating aesthetic, physiological, social, and treatment-related challenges for patients. Indeed, DT impacts oral health function and quality of life, leading to financial burdens, social consequences, physiological effects, and school absenteeism among children and adolescents [12-14].

Various factors contribute to DT in children and adolescents, including sports injuries, falls, and fights, with maxillary incisors being most frequently affected. To prevent further complications and achieve pain relief, functional improvement, and aesthetic restoration, prompt diagnosis and treatment of DT must be essential [15-17].

Considering the importance of comprehensive health data for children and adolescents, this study aimed to determine the prevalence of DT among this population in Ilam.

Materials and Methods

This retrospective study examined pediatric and adolescent DT cases in Ilam between 2017 and 2021. The inclusion criteria for the study included documented DT in patient records matching our checklist criteria, age between 2-12 years (pediatric) and 12-21 years (adolescents). Files with incomplete clinical data were excluded. The sample size was determined based on previous studies [18-20], ultimately including 246 patients.

In this study, the researchers reviewed patient records from Imam Khomeini Hospital in Ilam, examining files of patients who visited specialty clinics for DT treatment. Using an established checklist, they extracted relevant data from clinical files and dental radiographs. To complete data collection, a researcher-made demographic profile form and checklist were designed and compiled in collaboration with experts and based on published literature [21, 22]. Researchers utilized this checklist (Attachment 1) to complete data collection.

The demographic form collected data on sex, age group, school type, location, and mean age. The checklist comprised four dimensions, including cause of trauma, place of occurrence, type of trauma, and treatments provided (see attachment).

Patient confidentiality was strictly maintained throughout file review, data reporting, and clinical record preservation. The data related to DT were analyzed using SPSS software (version 16), employing both descriptive statistics, such as frequency and percentages, and analytical statistics, including regression analysis. All study data showed normal distribution, with statistical significance set at $p<0.05$. For regression analysis, binary logistic regression was specifically applied.

Results

This study examined 246 pediatric and adolescent patients, comprising 144 (58.5%) boys and 102 (41.5%) girls. By age group, 104 participants (42.3%) were pediatrics (mean age=7.1±3.2 years) and 142 (57.7%) were adolescents (mean age=14.8±5.1 years) (Table 1).

The most common causes of DT were assaults, with a rate of 29.2% in boys, and traffic accidents, with a rate of 37.3% in girls. Regarding the injury locations, 27.8% of boys experienced DT in parks, while 25.5% of the girls experienced it on streets (Table 2).

Table 1. Demographic characteristics of pediatrics and adolescents

Variable		Sex n (%)		Total n (%)
		Boy n=144 (58.5)	Girl n=102 (41.5)	246 (100)
Age group	Pediatrics (2-12 years)	75 (72.1)	29 (27.9)	104 (42.3)
	Adolescents (13-21 years)	69 (48.6)	73 (51.4)	142 (57.7)
School type	Public	114 (55)	93 (45)	207 (84.1)
	Private	30 (77)	9 (23)	39 (15.9)
Location	Urban	88 (62)	54 (38)	142 (57.7)
	Rural	56 (53.8)	48 (46.2)	104 (42.3)

Table 2. Comparison of the cause of trauma and place of occurrence by sex

Variable		Sex n (%)		Total n (%)
		Boy	Girl	
Cause of Trauma	Falls (domestic)	13 (9)	22 (21.6)	35 (14.2)
	Falls (outdoors)	20 (13.9)	9 (8.8)	29 (11.8)
	Assaults	42 (29.2)	5 (4.9)	47 (19.1)
	Recreation accident	26 (18.1)	9 (8.8)	35 (14.2)
	Sport accident	21 (14.6)	18 (17.6)	39 (15.9)
	Traffic accident	9 (6.3)	38 (37.3)	47 (19.1)
	Other cause	13 (9)	1(1)	14 (5.7)
Place of occurrence	Home	12 (8.3)	14 (13.7)	26 (10.6)
	Street	31 (21.5)	26 (25.5)	57 (23.2)
	School	27 (18.8)	29 (28.4)	56 (22.8)
	Parks	40 (27.8)	20 (19.6)	60 (24.4)
	Clubs	22 (15.3)	8 (7.8)	30 (12.2)
	Other places	12 (8.3)	5 (4.9)	17 (6.9)

Enamel-dentin fractures were the most frequent DT type, occurring in 26.4% of boys and 19.6% of girls. For treatments, sutures were performed in 18.8% of boys, while antibiotics were prescribed for 31.4% of girls (Table 3).

This study found significant associations between place of occurrence with sex (OR=0.77; 95% CI=0.64-0.93; p=0.008) and age group (OR=0.73; 95% CI=0.6-0.89; p=0.002). There was also a significant relationship between the type of trauma and sex (OR=1.24; 95% CI=1.08-1.43; p=0.002). Moreover, a significant relationship was observed between treatments provided and school type (OR=0.79; 95% CI=0.65-0.96; p=0.02). However, no significant relationship was detected between demographic variables and dental injury-related factors (p>0.05) (Table 4).

Discussion

This study aimed to determine the prevalence and associated factors of DT in pediatrics and adolescents. The findings showed a higher prevalence of DT in boys than in girls. In a study by Goettems and colleagues, in the age range of 8-12 years, the prevalence of DT was 14.3% in boys and 11.2% in girls [23]. Damé-Teixeira and colleagues conducted a cross-sectional study of 12-year-old patients,

Table 3. Comparison of the type of trauma and Treatments provided by sex

Variable		Sex n (%)		Total n (%)
		Boy	Girl	
Type of trauma	Enamel fracture	23 (16)	6 (5.9)	29 (11.8)
	Enamel–dentin fracture (uncomplicated crown fracture)	38 (26.4)	20 (19.6)	58 (23.6)
	Complicated crown fracture	24 (16.7)	15 (14.7)	39 (15.9)
	Root fracture	23 (16)	19 (18.6)	42 (17.1)
	Uncomplicated crown–root fracture	15 (10.4)	17 (16.7)	32 (13)
	Complicated crown–root fracture	11 (7.6)	12 (11.8)	23 (9.3)
	Concussion and subluxation, and avulsion	6 (4.2)	9 (8.8)	15 (6.1)
	Intrusive luxation and extrusive luxation, and lateral luxation	4 (2.8)	4 (3.9)	8 (3.3)
Treatments provided	Temporary filling	9 (6.3)	6 (5.9)	15 (6.1)
	Suture	27 (18.8)	15 (14.7)	42 (17.1)
	Extraction	24 (16.7)	23 (22.5)	47 (19.1)
	Trepanation	16 (11.1)	2 (2)	18 (7.3)
	Prescription of antibiotics	24 (16.7)	32 (31.4)	56 (22.8)
	Splinting	25 (17.4)	13 (12.7)	38 (15.4)
	Prescription of analgesics	17 (11.8)	10 (9.8)	27 (11)
	Other	2 (1.4)	1 (1)	3 (1.2)

Table 4. Prediction of dental injury based on binary logistic regression.

Variable		OR	95% CI		*p* value
			Lower	Upper	
Cause of trauma	Sex	1.13	0.98	1.3	0.07
	Age group	1.09	0.95	1.26	0.18
	School type	0.89	0.73	1.07	0.23
	Location	1.06	0.93	1.22	0.34
Place of occurrence	Sex	0.77	0.64	0.93	0.008
	Age group	0.73	0.6	0.89	0.002
	School type	1.22	0.96	1.57	0.10
	Location	1.08	0.9	1.3	0.36
Type of trauma	Sex	1.24	1.08	1.43	0.002
	Age group	1.05	0.92	1.21	0.4
	School type	0.99	0.83	1.19	0.98
	Location	0.94	0.83	1.08	0.44
Treatments provided	Sex	1.00	0.87	1.15	0.96
	Age group	0.06	0.99	1.31	1.14
	School type	0.79	0.65	0.96	0.02
	Location	1.02	0.89	1.17	0.76

reporting DT prevalence of 40.8% in boys and 28.6% in girls [24]. In the study by Eslamipour and colleagues, using a cross-sectional method and in the age range of 9-14 years, the prevalence of DT was reported as 29.9% in boys and 18.8% in girls [25], which was consistent with the findings of the present study regarding the higher prevalence of DT in boys than girls.

The findings showed that most hospitalized patients attended public schools. Regarding school status, Arheiam *et al.,* reported that 10.3% of patients with traumatic dental injuries attended public schools [26]. Similarly, Malak and colleagues found higher rates of DT in public (12.1%) than in private schools (9.1%) [27]. DT may occur in any school setting, and managing its complications depends on the knowledge and attitudes of students, parents, and teachers [19, 28].

The main causes of DT in the studied population were assaults, traffic accidents, and sports incidents. Thelen and colleagues reported the following causes of DT among urban adolescents: traffic accidents(4.7%), collisions (27.5%), falls (13.4%), fights/violence (4%), swimming/diving (9.1%), cycling (6.9%), biting hard food (8%), unknown causes (10.5%), and missing data (1.8%) [29]. Ain and colleagues conducted a study which involved 1,600 school children, and identified falls (42.2%) as the most common cause, followed by sports (22.81%), unknown causes (16%), accidents (10.06%), collisions (4.69%), violence (2.01%), and biting (2.01%) [30]. Similarly, Soriano *et al.,* found sports (8.2%), road accidents (2.7%), leisure activities (9.1%), violence (6.4%), falls (27.3%), collisions (18.2%), and unspecified accidents (22.7%) as DT causes [31].

The findings indicated that antibiotic prescription was the most common treatment provided. Al-Ansari and colleagues conducted a cross-sectional study on individuals with an average age of 14.29 years and found that 7.2% of patients used self-care/self-medication for DT treatment, 1.1% visited hospital emergency departments, 3.6% attended public dental clinics, and 7.2% visited private dental clinics [32]. Additionally, Chopra and colleagues found that only 3.5% of children aged 2-15, who had experienced DT trauma, sought treatment. The most common treatments included adhesively luted restorations, acid-etched restorations, and crowns [33]. The differences between the findings of this study and other studies could be attributed to the lack of an appropriate guideline for antibiotic prescription [34, 35] and differences in study methodology. While this study employed a retrospective review of hospitalized patients' medical records, the compared studies used cross-sectional descriptive methods.

The findings showed that parks were the most common location for trauma in boys (27.8%), and schools were the most frequent for girls (28.4%). Schuch *et al.,* found that among 8-12-year-olds, trauma incidents occurred at home (55%), school (18%), on streets (15%), and other locations (12%) [36]. Similarly, Teixeira *et al.,* reported trauma occurrences at home (22.32%), school (8.52%), and other locations (15.5%) [37]. These studies collectively indicated that schools and homes were among the most significant places for trauma incidents.

This study represented the first investigation of children's DT during the COVID-19 pandemic in Iran. Given that parks, schools, and streets, particularly in Ilam, are important places for DT occurrence, it is essential to enhance safety measures in these environments and provide children and adolescents with proper trauma prevention education. However, the same as other studies, this research had limitations inherent to its retrospective design. The potential for human error in medical records and incomplete data must be acknowledged. We recommend future cross-sectional or prospective studies to address

these limitations. Importantly, while this study was conducted during the COVID-19 pandemic, when routine oral health services were reduced (especially during lockdown periods), potentially affecting our sample size, multiple studies unanimously reported that the pandemic did not significantly alter DT incidence rates [38, 39].

According to the findings of the present study, it is recommended to implement preventive measures against DT and conduct further research to enhance knowledge and attitudes regarding DT among students and teachers. This study revealed that the rate of DT in boys was higher than in girls. However, this trend reversed in adolescence. In addition, public schools had a higher rate of DT, which could affect treatment approaches.

Declaration

Ethics approval and consent to participate: The study was approved by the Ethics Committee of Ilam University of Medical Sciences (IR.MEDILAM.REC.1404.010)

Consent for publication: All authors expressed their consent to the publication of this study.

Conflict of Interest: The authors declared that there was no conflict of interest.

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Authors' Contribution: All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed, and a draft of the manuscript was written, based on previous versions of the manuscript. All authors read and approved the final manuscript.

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Attachment 1 (Checklist):

Variable		Yes	No
Type of trauma	Enamel fracture		
	Enamel–dentin fracture (uncomplicated crown fracture)		
	Complicated crown fracture		
	Root fracture		
	Uncomplicated crown–root fracture		
	Complicated crown–root fracture		
	Concussion and subluxation, and avulsion		
	Intrusive luxation and extrusive luxation, and lateral luxation		
Treatments provided	Temporary filling		
	Suture		
	Extraction		
	Trepanation		
	Prescription of antibiotics		
	Splinting		
	Prescription of analgesics		
	Other		
Cause of trauma	Falls (domestic)		
	Falls (outdoors)		
	Assaults		
	Recreation accident		
	Sport accident		
	Traffic accident		
	Other causes		
Place of occurrence	Home		
	Street		
	School		
	Parks		
	Clubs		
	Other places		