ORIGINAL ARTICLE

A retrospective evaluation of traumatic dental injury in children who applied to the dental hospital, Turkey

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Abstract

Objective: The purpose of this study was to analyze traumatic dental injuries in children visiting the dental hospital emergency department in Samsun of Turkey, in the period from 2007 to 2011.

Materials and Methods: Data of age, gender, causes of dental trauma, injured teeth, type of dental injuries, the application period, the dental treatments, and traumatic dental injuries according to the seasons were obtained from the records at dental hospital.

Results: Of all 320 patients with traumatic dental injury, 205 were boys and 115 were girls with a boys/girls ratio 1.78:1. Traumatic dental injury was observed more frequently in the 7-12 age groups: 52.5% in girls and 67.8% in boys. Falls are the major cause of traumatic dental injury in the age group 6-12 (51.4%). Sport activities are a common cause of traumatic dental injury in the 7-12 age group (34.2%). Patients visited a dentist within approximately 2 h (57.1%). The upper anterior teeth were subjected to trauma more frequently than the lower anterior teeth. The maxillary central incisors were the most commonly affected teeth, and the mandibular canins were the least affected teeth. In primary teeth, avulsion was the most common type of dental injury (23%); on the other hand, enamel fractures were the most common type of dental injury (30.6%) observed in permanent teeth. In the primary dentition, the most commonly performed treatments were dental examination and prescribing (70%). The most common treatment choices in permanent teeth were restoration and dental examination (49.7 and 15.8%, respectively).

Conclusion: The results of the study show that the emergency intervention to traumatized teeth is important for good prognosis of teeth and oral tissues. Therefore, the parents should be informed about dental trauma in schools, and dental hospital physicians should be subjected to postgraduate training.

Key words: Classification, emergency treatment, teeth, trauma

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Introduction

After the tooth decay, dental injuries are the second important issue in dentistry.[1]

Trauma to the oral region may damage teeth, lips, cheeks, tongue, and temporamandibular joints.[2]

Traumatic injuries incidence show differences according to gender groups and seasons. Almost all studies on this topic reveal that boys undergo trauma more than girls with a proportion of 1.5:1. Especially in spring seasons, trauma frequencies increase due to children's increased physical activity.[3]

In the early years of life, dental trauma is rare. Although children grow up, they become more snappy and careless. There is a direct relationship between the children's increased physical activity and dental injury frequency.

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Traumatic injuries occur mostly at 1-3 years in a primary dentition and 8-11 years in permanent dentition.[4-7] In preschool period, fallings and crashing can be seen frequently. In preschool children, dental injuries make up 18% of all injuries that need treatment.[2] In children between 6-12 years, sport accidents, falling off bicycle, and crashing may cause dental injury. At adolescence, people who are interested in boxing, skiing, riding, and swimming are more prone to facial trauma. Mentally retarded people and epileptic patients have motor coordination deficiency so they often fall down during the attacks.[8] In the primary dentition, luxation injuries are the most common traumatic dental injuries, whereas crown fractures are more commonly reported for the permanent dentition.[9-11] The injuries of anterior teeth may result into phonetic, functional, and aesthetic problems in children and also disrupt occlusion. Consequently, children's psychological development can be affected.[2] After an injury, an appropriate and immediate treatment is important for a good prognosis of treated tooth.

Oral and dental health centers are the first choice for emergency dental treatment in Turkey. Because they are open 24 h throughout the year, especially in the city center. Therefore, the aim of the retrospective study was to analyze records of patients seen in the emergency clinic of a dental hospital in Samsun, Turkey, between 2007 and 2011, and assess the treatment approaches of the dentists.

Materials and Methods

The research protocol was accepted by the Ondokuz Mayis University Medical Research Ethics Commission (2011/852).

This retrospective study was based on an analysis of patient records obtained at initial diagnosis and treatment methods of children subjected to dental trauma at a dental hospital. Out of the 148160 patients, 320 children between 2-18 years with dental trauma were evaluated from 2007 to 2011.

The patient documents (dental records and radiographs) were analyzed in dental hospital: age, gender, causes of dental trauma, the number of teeth injured, type of dental injuries, the application period, the dental treatments, and traumatic dental injuries according to the seasons. Dental trauma was classified according to the criteria published by Andreasen and Andreasen. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) statistical software program version 17, and the results were evaluated by Chi-square test (χ^2).

Results

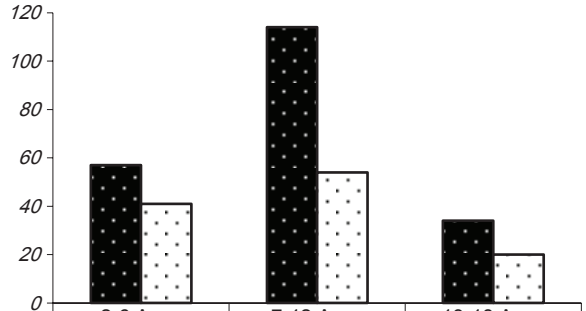
Out of the 320 examined dental trauma patients, 115 were females (35.9%) and 205 males (64.0%). The ages of the subjects ranged from 2 to 18 years. It was observed that a large number of dental traumas occurred in patients aged between 7 and 12 years (52.5%), followed by the 2-6-years age group (30.6%). In all age groups, males were injured more frequently than females with the ratio of (1.78:1). As to gender, a statistically significant difference was found among male and female in the groups of 7-12 and 13-18 years of age ($P < 0.05$). Statistically, there was no significant gender difference in the age intervals of 2-6-years old ($P < 0.05$).

The sample in this study included 504 teeth injured. The highest frequency of teeth injuries occurred among 7-12-year-old children. In children of this age group, a total of 328 teeth (65.0%) were registered as injured [Table 1].

Among 2-6 years age groups, the most frequent cause of dental injuries was falls (32.8%). In other age groups, it was sporting activities (66.6%), bicycling (38.9%), and falls (39.8%) that caused dental injuries. The falls were statistically significant for the 2-6-years age groups ($P < 0.05$). Sport activities were statistically significant for the 7-12 and 13-18-year-old groups ($P < 0.05$) [Table 2].

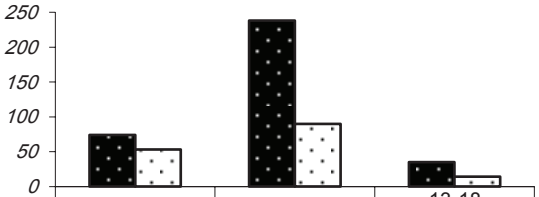
In 2-6-years age group, the maxillary right primary central incisor injuries had the highest percentage (25.0%), followed by the maxillary left primary central incisor (24.0%).

Table 1a: Distribution of dental injuries according to sex and age of patients



	2-6 Ages	7-12 Ages	13-18 Ages
Male	57	114	34
Female	41	54	20

Table 1b: Distribution of teeth according to sex and age of patients



	2-6 Ages	7-12 Ages	13-18 Ages
Male teeth	74	238	35
Female teeth	53	90	14

In 7-12 and 13-18-year-old groups, the maxillary right central incisor injuries were the highest in percentage terms (28.2%; 41.5%), followed by the maxillary left central incisor (27.5%; 39.8%) [Table 3].

The most traumatized teeth in both dentitions were the maxillary central incisors [Table 3].

Table 4 shows that in primary teeth, avulsions were the most frequent form of injury (23.0%), followed by intrusion (18.0%) and luxation (17.0%). In permanent teeth, the most frequent injuries were enamel fractures (30.6%), followed by enamel-dentin fractures (25.0%).

According to the time elapsed until the first emergency attention, a high percentage of patients received their initial care within 2 h (86.7%), as shown in Table 5.

Table 6 shows the treatment for the reported injuries. The treatment preferred mostly was determined as examination and prescription for primary teeth (70.0%), whereas it was applied as restoration in permanent teeth (49.7%).

October-December and July-September were the periods during which dental trauma was more prevalent as shown in [Table 7] ($P < 0.05$).

Discussion

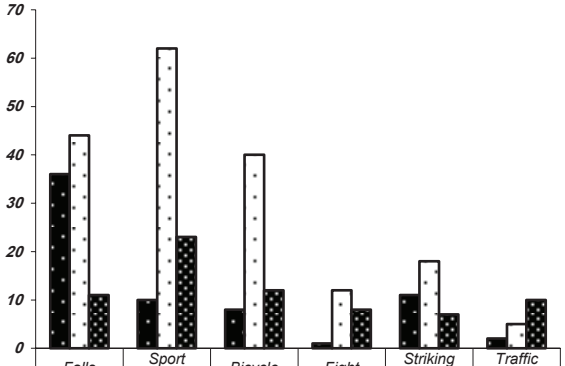
It was observed that previous studies were carried out by considering various factors such as age, gender, classification of the trauma, and methods of treatment.[3,12-15] In this study, the scope of the study has been enlarged and new study design has been developed. Although many methods are used for the classification of dental trauma,[16] we have chosen the most commonly used classification (Andreasen and Andreasen).[17,18]

Previous studies reported that boys are more exposed to dental trauma.[19-21] The results presented in the recent literature show that male/female ratio varies from 1.4:1 to 3:1.[3,11] According to the results of the present study, boys are more prone to traumatic dental injuries. In this study, the male/female ratio is 2:1.1. The connection between the age and the etiology of dental injuries can be explained by age-related activities and the characteristics of motor coordination development.[13,21,22]

According to this study, the connection between trauma and sex showed no differences in 2-6-years age groups. The reason for this is that both boys and girls aged 2-6 years are exposed to the same risk factors, as they have similar social activities and there is no difference between the games and sports they play. As to gender, a statistically significant difference was found among boys in the groups of 7-12 and 13-18 years of age ($P < 0.05$). We believed that boys in 7-12-years age group are more exposed to dental trauma because they are more energetic and more involved in sports activities.[23]

The most common etiological reasons were reported as falls, automobile-bicycle accidents, collisions, and sports activities in the previous studies.[14,19,22,23] In the present study, the most common dental injuries occurred because of falls and sporting activities, such as riding. Falls and striking objects were found out as the main causes of traumatic dental injuries in patients with the age group between 2 and 6 years, which disagrees with the findings of García-Godoy *et al.*,[24] who

Table 2: Causes of traumatic injuries, stratified for age groups

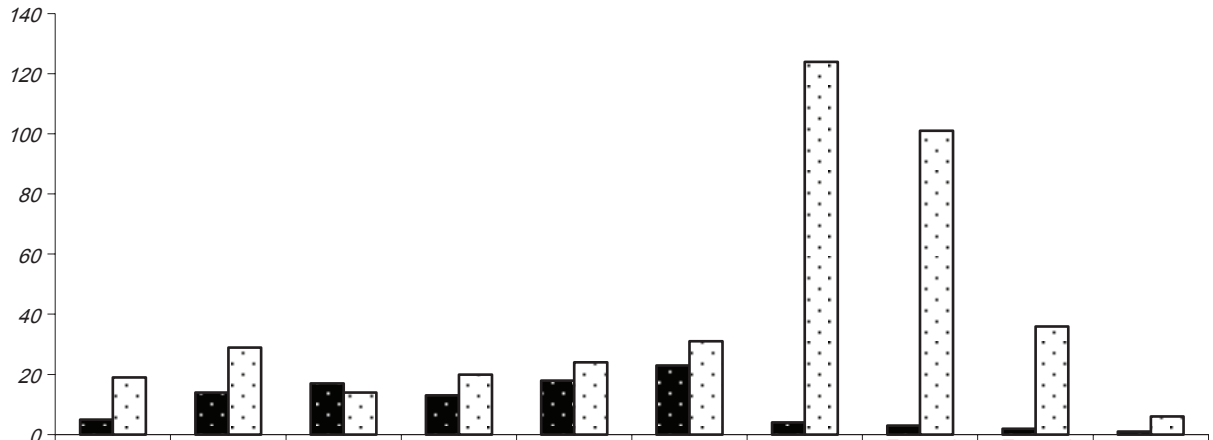


	Falls	Sport activites	Bicycle	Fight	Striking objects	Traffic accidents
2-6 Ages	36	10	8	1	11	2
7-12 Ages	44	62	40	12	18	5
13-18 Ages	11	23	12	8	7	10

Table 3: The distribution of the number of injured teeth

Tooth number	Ages (%)		
	2-6	7-12	13-18
52	17 (17.0)	0 (0.0)	0 (0.0)
51	25 (25.0)	0 (0.0)	0 (0.0)
61	24 (24.0)	0 (0.0)	0 (0.0)
62	18 (18.0)	0 (0.0)	0 (0.0)
71	8 (8.0)	0 (0.0)	0 (0.0)
72	3 (3.0)	0 (0.0)	0 (0.0)
81	3 (3.0)	0 (0.0)	0 (0.0)
82	2 (2.0)	0 (0.0)	0 (0.0)
13	0 (0.0)	1 (0.29)	0 (0.0)
12	0 (0.0)	57 (16.7)	3 (4.8)
11	0 (0.0)	96 (28.2)	26 (41.5)
21	0 (0.0)	94 (27.5)	25 (39.8)
22	0 (0.0)	52 (15.2)	2 (3.1)
23	0 (0.0)	1 (0.29)	0 0.0
31	0 (0.0)	0 (0.0)	0 0.0
32	0 (0.0)	7 (2.0)	2 (3.1)
33	0 (0.0)	14 (4.1)	2 (3.1)
41	0 (0.0)	14 (4.1)	2 (3.1)
42	0 (0.0)	5 (1.4)	1 (1.5)
43	0 (0.0)	0 (0.0)	0 (0.0)
Total	100	341	63

Table 4: The type of dental injuries



	Concussion	Subluxation	Luxation	Extrusion	Intrusion	Avulsion	Enamel fracture	Enamel-Dentin fracture (Without pulp expose)	Enamel-Dentin fracture (Pulp exposed)	Crown-Root fracture
Primary teeth	5	14	17	13	18	23	4	3	2	1
Permanent teeth	19	29	14	20	24	31	124	101	36	6

Table 5: The visiting period to the dentist for children with traumatic dental injuries

	<60 min	60-120 min	120-180 min	180 min-24 h	>24 h	Total
Patient number (%)	95 (29.6)	183 (57.1)	14 (4.3)	16 (5.0)	12 (3.7)	320 (100.0)

Table 6: The distribution of treatment methods

Methods of treatment	Primary teeth (%)	Permanent teeth (%)	Total
Examination or prescription	70 (70.0)	64 (15.8)	134 (26.5)
Restoration	0 (0.0)	201 (49.7)	201 (37.6)
Reposition	0 (0.0)	12 (2.9)	12 (2.4)
Pulpectomy	3 (3.0)	11 (2.7)	14 (2.7)
Root canal treatment	4 (4.0)	32 (7.9)	36 (7.14)
Reimplantation	0 (0.0)	25 (6.1)	25 (4.9)
Splint	0 (0.0)	42 (10.3)	42 (8.3)
Extraction	23 (23.0)	17 (4.2)	40 (7.9)
Total	(100)	404	504

Table 7: The distribution of traumatic dental injuries according to the seasons

	January-March	April-June	July-September	October-December	Total
Patient number (%)	22 (4.3)	38 (7.5)	112 (22.2)	148 (29.3)	504 (100.0)

reported that falling against an object was the most frequent cause of dental injuries. Since children start walking alone when they are 2 or 3-years-old, the risks of exposure to trauma in these patients is higher than for all age groups.[25,26] In 7-12 and 13-18-years age groups, sports activities, bicycle accidents, and falls were the main etiological factors.[12,26]

In this study, it was observed that traumatized maxillary anterior primary teeth were affected equally in 2-6-years age group. The reason could be their being located close to each other in a smaller area of primary teeth. In other age groups, maxillary central and lateral teeth were affected, respectively. In general, high percentage of traumatic dental injuries takes place in the maxillary teeth; it is because of the fact that these teeth are situated in front of the dental arch. The maxillary central incisors are sometimes in a protrusive position and often inadequately covered by the upper lips, which could possibly amortize the strike,[27,28] unlike the lower teeth and the canines that are usually better protected by the lips and not so prone to injury. [28,29] Moreover, the upper jaw is rigid and the lower jaw is movable, which additionally contributes to the predisposition of certain teeth to injury.[27-29]

In this study avulsions, subluxations, and luxations were the most frequently occurring injuries, particularly in the primary dentition (2-6 years of age). Likewise, intrusion, luxation, and avulsion are more common injuries in other studies.[22,23,26] Besides, the root and alveolar bone support of the primary teeth is minimal, and it may predispose the primary dentition to avulsion and luxation injuries.[13,14,18,26] It was reported in many studies that in permanent teeth the most frequent injuries are enamel fracture, noncomplicated enamel-dentin fracture, and luxation.[12,27,28] The most frequent injury in permanent dentition was enamel fracture (30.9%) and enamel-dentin fracture, which is in agreement with the previous reports.[22,23] Enamel fracture or enamel-dentin fracture was mostly seen in both dentitions compared with the frequency of other types of trauma. The range of enamel-dentine fractures without involvement of the pulp range between 20.2 and 50.5% in the previous reports.[12,17-19,27,-28]

In this study, the percentage of patients who attended first aid in 2 h was higher (86, 7%) when compared with previous studies.[6,26] The time elapsed before attending the dentist after the injury range from 24 h to a week in several studies.[12,30] Rajab[31] reported that 17.1% of trauma patients visited the hospital for treatment the same day or the next day after the injury. Jorge *et al.*,[32] showed that 4.1% of patients visited the dentist within the first day after the event.

Examination and dental extraction were the main treatment choice for primary dentition. Other studies indicated the same type of treatment.[8,33] This treatment method is preferred in order to prevent damage to the underlying permanent teeth. Restoration and pulpectomy were mostly applied for permanent teeth. The distribution of traumatic dental injuries according to the seasons was the highest in October-December and July-September. Dental traumatic injuries may increase due to falls and collisions in October-December when schools open. This increase in the incidence in July-September results from intense sporting activities and riding bicycle.

Conclusion

The results of the study show that the emergency intervention to traumatized teeth is important for good prognosis of teeth and oral tissues. Therefore, the parents should be informed about dental trauma in schools and dental hospital physicians should be subjected to postgraduate training.

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