ORIGINAL ARTICLE

ETIOLOGY OF TRAUMATIC INJURIES TO THE TEETH; A CROSS-SECTIONAL STUDY

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ABSTRACT

Different etiological factors cause different forms of injuries to the dental tissues.Determining the etiology is not only crucial for correct diagnosis, it is also central in devising and implementing the appropriate treatment plan.This study identifies& assesses etiologic factors for dental traumatic injuries and correlates with the tooth / teeth involved, type of trauma & clinical findings.

A self-constructed questionnaire was used to obtain information from a total of 44 patients that presented to Islamic International Dental Hospital, Islamabad with dental trauma. The information acquired included the history of the traumatic incident, the teeth involved, the type of injury and the vitality status of the tooth.

The results show that dental trauma was more common in males as compared to females with a ratio of 2.4:1.0. Road traffic accidents (RTAs) and falls were the most frequent causes of traumatic injuries to the teeth in men (70%) whereas among women, falls were the most common (61.5%). The teeth most frequently affected by all forms of injury were the maxillary central incisors followed by maxillary lateral incisors. The most prevalent form of injury was the enamel-dentin fracture accounting for 38% of all injuries, followed by complicated crown fractures that made up for 16%. Of all the teeth affected by trauma, more than half (54.60%) were non-vital.

Key Words: *Etiology, Traumatic Injuries, Dental Tissues*

INTRODUCTION

'Dental Trauma' refers to injury, but is not limited entirely to the tooth. It may involve the tooth, the periodontium and the surrounding oral structures.[1] Dentoalveolar traumatic injuries pose a threat to the overall health of the oral tissues and are considered a serious dental health problem around the globe. Of all the injuries to the human body, dental traumatic injuries account for approximately 5%, however, they tend to occur more frequently in the younger population, reaching up to 17% among those aged 0-6 years.[2] The etiology of trauma influences the impact on the affected oral tissues, the site of injury, the amount of damage and the selection of a treatment approach. The increased prevalence of dental traumatic injuries in the anterior teeth compared to that in the posterior teeth or that of the permanent dentition rather than the deciduous dentition is also related to the source of the said injuries.[3] The frequency of oral trauma is also different for males and females, with males suffering traumatic injuries twice as frequently as females.[4,5,6]

Dental traumatic injuries can occur due to direct impact or indirect impact, leading to different consequences. The type of injury depends on the cause and the extent of damage is dictated by a number of factors including; energy and direction of impact, sharpness, shape and resilience of the impacting object, and the health and response of the nearby oral tissues.[7,8] Anatomical features e.g increased overjet and incompetency of the lips, active participation in sports, and physical violence are among the many factors that predispose to orofacial trauma.[9,10,11]

Traumatized teeth are not only complicated to manage, the trauma may have detrimental effects on the teeth in the years to follow. Dental trauma may be associated with pulp exposure, pulp necrosis, apical periodontitis, tooth discoloration and root resorption.[12,13] It is, therefore, of prime importance to determine the cause of the trauma in order to reach the correct diagnosis, to provide the appropriate treatment and to avoid future complications.

The aim of this study is to identify and assess the various causes of dental traumatic injuries, followed by a correlation of the etiological factors with the type of teeth involved, the type of injury and the associated clinical findings. This can help optimize and expedite treatment planning and prevent complications.

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METHODOLOGY

A cross-sectional study was conducted, using a self-structured questionnaire, in the Operative Department of Islamic International Dental Hospital, Islamabad. The survey was completed over a period of six months. The study was approved by the Ethical Review Committee of Riphah International University and informed verbal and written consent was acquired from all the patients prior to participation. All subjects entered the survey voluntarily and were assured of complete confidentiality. The sample size was calculated to be 44. Non-probability purposive sampling technique was used to collect the data. All the traumatized permanent teeth, including recently injured teeth as well as teeth that had suffered trauma in the past, reporting to the Outpatient Department of Islamic International Dental Hospital were included in the study. Teeth that were affected by any pathology other than trauma were excluded. Data was obtained from the selected candidates by taking their medical history, dental history and the history of the trauma. The Universal tooth numbering system was used to designate the affected teeth. Information was derived both subjectively and objectively and the various types of dental injuries were then classified using the classification proposed by Andreasen1. Subjective information included different demographics regarding the patient including age, gender, social status and living environment. The Questionnaire also covered different subjective aspects of the traumatic event such as force of impact, direction of impact, location and date of occurrence of the traumatic incident etc. Objective information was acquired using different tests which included Visual examination; for assessment of the extent of damage, Sensitivity testing including cold test and electric pulp testing; to determine the vitality status of the affected teeth, and Periodontal examination including mobility testing and percussion testing; to assess the periodontal health of the teeth. Periapical radiographs were used to rule out root fractures and alveolar bone fractures and for the evaluation of the periapical bone health. The collected data was analyzed using SPSS version 19. Different statistical tests were applied for qualitative comparison of data.

RESULTS

Out of 44 patients with dental traumatic injuries, 70.5% were observed to be males whereas 29.5% were females (Table 1). Among male patients 35.5% injuries were caused by RTAs and falls each, 3.2% injuries occurred during sports, 19.4% as a result of violence and 6.5% due to other causes. In case of female patients, the predominant cause of trauma was observed to be fall occurring in 61.5% of cases followed by violence in 15.4%. RTA, sports and other causes account for 7.7% each (Table 2).

Among the types of injury, enamel infractions accounted for 9%, enamel fractures for 19%, enamel-dentin fractures for 38%, complicated crown fractures for 16%, root fractures 3%, concussion 1%, subluxation 3%, extrusive luxation 3%, lateral luxation 4%, and avulsion for 4% of the injuries. (Table 3)

Among all the types of dental injuries, enamel infraction was common among cases of violence(71%),enamel fracture with RTA(43%), enamel-dentine fracture among RTA (38%) and Fall(45%), whereas complicated crown fractureswere most commonly associated with fall (58%).(Table 4)

Out of the 75 teeth affected by trauma, 34 (45.30%) showed positive response to the various vitality tests, whereas 41 (54.60%) showed no response. (Table 5)

TABLE 1. FREQUENCY DISTRIBUTION OF DENTAL TRAUMATIC INJURIES IN MALES AND FEMALES.

Gender	Frequency	%age
Male	31	70.5%
Females	13	29.5%

TABLE 2. FREQUENCY DISTRIBUTION OF DENTAL TRAUMATIC INJURIES IN MALES AND FEMALES BASED ON ETIOLOGY.

ETIOLOGY	MALE		FEMALE	
	NO.	%AGE	NO.	%AGE
RTA	11	35.5%	1	7.7%
FALL	11	35.5%	8	61.5%
SPORTS	1	3.2%	1	7.7%
VIOLENCE	6	19.4%	2	15.4%
OTHERS	2	6.5%	1	7.7%

TABLE 3. FREQUENCY DISTRIBUTION OF THE TYPES OF INJURIES OCCURRING DUE TO DENTAL TRAUMA.

TYPE OF INJURY	Total Prevalence	
	NO.	%age
Enamel Infraction	7	9%
Enamel Fracture	14	19%
Enamel- Dentin Fracture	29	38%
Complicated Crown Fracture	12	16%
Root Fracture	2	3%
Concussion	1	1%
Subluxation	2	3%
Extrusive Luxation	2	3%
Lateral Luxation	3	4%
Avulsion	3	4%
Total	75	

TABLE 4. FREQUENCY DISTRIBUTION OF THE TYPES OF DENTAL INJURIES DUE TO VARIOUS ETIOLOGICAL FACTORS.

TYPE OF INJURY	RTA		FALL		SPORTS		VIOLENCE		OTHERS	
	Freq	Freq%	Freq	Freq%	Freq	Freq%	Freq	Freq%	Freq	Freq%
Enamel Infraction	1	14%	1	14%	0	0%	5	71%	0	0%
Enamel Fracture	6	43%	5	36%	1	7%	1	7%	1	7%
Enamel- Dentin Fracture	11	38%	13	45%	0	0%	4	14%	1	3%
Uncomplicated Crown Fracture	2	22%	4	44%	0	0%	3	33%	0	0%
Root Fracture	0	0%	1	50%	0	0%	1	50%	0	0%
Concussion	0	0%	0	0%	1	100%	0	0%	0	0%
Subluxation	1	50%	0	0%	0	0%	1	50%	0	0%
Extrusive Luxation	1	50%	0	0%	0	0%	1	50%	0	0%
Lateral Luxation	1	30%	2	70%	0	0%	0	0%	0	0%
Avulsion	1	30%	0	0%	0	0%	2	70%	0	0%

TABLE 5. FREQUENCY DISTRIBUTION OF VITAL AND NON-VITAL TEETH.

VITALITY	NO.	%age
Vital Teeth	34	45.30%
Non Vital Teeth	41	54.60%
Total Teeth Injured	75	

DISCUSSION

This study was conducted on a group of people presenting to Islamic International Dental Hospital, Islamabad with dental traumatic injuries caused by a variety of factors including road traffic accidents, falls, sports, violence and other causes including child abuse etc. The number of male patients suffering from dental trauma was noticed to be much higher as compared to the female patients with a male to female ratio of 2.4:1.0. (Table 1)This is in correspondence with similar studies conducted in different countries where the male to female ratio varied from 1.5:1.0 to 2.5:1.0.[2,3,5,14,15] Among men, the major causes of dentoalveolar injuries were found to be road traffic accidents and falls, occurring with the same frequency and were collectively responsible for about 70 percent of all reported cases. For women, the major etiological factor was fall (61.5%). About 35.5% of men encountered road traffic accidents, whereas only 7.7% women suffered dental trauma as a result of road traffic accidents. (Table 2) This disparity may be attributed to the societal difference in the role of different genders in our culture. The incidence of motor cycle accidents was the highest among road traffic accidents. Another research study conducted in Spain revealed the main cause of dental trauma to be games and sports.[16] It can, therefore, be concluded that the etiology of trauma varies according to the surroundings and social environment. The fact that men are more prone to traumatic dental injuries is related to their involvement in contact sports, fights and accidents more frequently than women.[17,18,19] Determination of the type of tooth injury is mandatory in devising a suitable treatment plan. In this study, the most prevalent type of injury occurring as a result of trauma was found out to be Enamel-Dentine fracture occurring in about 38% of the cases, followed by complicated crown fractures, which occurred in 16% (Table 3). This differs from results obtained from other studies in which enamel fracture was the most prevailing (63.7-80%).[20] Occasionally, it can be difficult to categorize the type of injury that a tooth has undergone and that can negatively affect the subsequent treatment. In our current study, we also evaluated the vitality of the teeth affected by trauma. More than half of the teeth (54.60%) had become non-vital due to either direct or indirect impact on the dental pulp. However, 45.30% teeth were found to be vital (Table 5). Studies conducted around the globe show varying results in this regard. With pulp survival rate following complicated crown fractures ranging from 63% to 94%.[21,22] The fracture lines can act as a pathway for bacteria to gain access to the dental pulp and cause inflammation. This may be one of the reasons why the complications of trauma can manifest months or years after the injury has occurred. It can, henceforth, be concluded that it is a challenge for the dentist to manage a case of dental trauma because not only is the diagnosis difficult, the prognosis is also unpredictable.

The short comings of this study involve the fact that not everyone seeks treatment following a dental injury. So the people who do not present to the hospital are overlooked. Also, patients do not hail from a demarcated geographical area. The traumatic injuries to the dentition and associated structures were presented at various time intervals from the actual traumatic incident. (12 hours to 40 years) This may lead to some form of bias. The reliance on patient reports may also be one of the confounding factors. During this study, we attempted to overcome these shortcomings by careful data collection and analysis.

CONCLUSION

Different etiological factors cause different forms of injuries to the dental tissues. The cause of trauma

can affect not only the form of injury but also the teeth involved, the extent of damage and the vitality of the teeth. It can, therefore, be said that determining the etiology is not only crucial for a correct diagnosis, it is also central in devising and implementing the appropriate treatment plan.

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CONTRIBUTIONS BY AUTHORS
All authors contributed substantialy.