

Traumatic Injuries to the Anterior Teeth among Children of Jazan, Kingdom of Saudi Arabia: A Screening Study

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ABSTRACT

Aim: Fracture of one or more anterior teeth results in pain, loss of function, poor esthetics, and psychological trauma. It is a true emergency and warrants immediate assessment and management. Hence, the aim of the present study was to assess the traumatic injuries to anterior teeth in children, seeking treatment at the teaching clinics of the Department of Pediatric Dentistry, Jazan University, from January 2016 to June 2016.

Materials and methods: Information concerning age, sex, cause of trauma, place of trauma, and the type of the teeth was recorded in a close-ended pro forma. Garcia Godoy's classification was used to assess the traumatic dental injuries (TDIs) to the primary dentition, whereas Ellis and Davey's classification was used to assess TDIs to the permanent dentition.

Results: The prevalence of TDI was recorded as 9.79%. Males experienced more TDI as compared with females. Falls (62.4%) were the most important cause of TDI and the home (54.1%) was the predominant location where the injury occurred. Luxation injury was the most common type of injury seen in primary dentition, whereas enamel dentin fracture involving the pulp was the frequently observed injury in the permanent dentition.

Conclusion: The prevalence of TDI in our study was 9.79%. Males were affected more than females. Luxation injuries were commonly seen in the primary dentition and enamel dentin fracture with pulp exposure was the common type of injury seen in the permanent dentition.

Clinical significance: The data obtained give us the baseline information about the prevalence of traumatic injuries to anterior teeth in this southern Saudi Arabian population of Jazan. More longitudinal studies over a longer period of time should be done which will help us to plan and implement preventive strategies.

Keywords: Anterior teeth, Dental trauma, Epidemiology, Luxation.

How to cite this article: Gupta M, Apathsakayan R, Abhishek. Traumatic Injuries to the Anterior Teeth among Children of Jazan, Kingdom of Saudi Arabia: A Screening Study. *World J Dent* 2018;9(3):192-196.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Traumatic dental injury is an impact injury to the teeth and/or other hard and soft tissues within and around the vicinity of the mouth and oral cavity.^{1,2} Traumatic dental injuries are an irreversible pathology commonly seen in children affecting both the primary and the permanent dentition and is associated with significant morbidity. One-third of the preschool children and one-quarter of all schoolchildren suffer from TDIs during the primary and permanent dentition stage respectively.³ These injuries are associated with significant functional, esthetic and psychological disturbances in a growing child. The economic costs of treatment and its impact on the oral health-related quality of life have made TDIs a serious public dental health problem in children.⁴

The prevalence of TDIs to anterior teeth among schoolchildren has been studied in different parts of the world by many researchers, and a wide range of variation has been found between and within the countries, as well as across different age groups.⁵ In Asia and Africa, the prevalence of TDI to anterior teeth among adolescents ranges from 4 to 35% and 15 to 21% respectively. In America and Europe, the prevalence varied from 15 to 23% and 23 to 35% respectively.⁶

The knowledge about the prevalence of TDI is important to establish preventive strategies and to identify the treatment needs in a given population.⁷ The data would provide understanding of the associated risk factors and help for the comparison with the results of other studies conducted throughout the world.

There is paucity in literature about the epidemiological data of the prevalence of TDIs in Kingdom of Saudi Arabia. Hence, this study was conducted to assess the prevalence of traumatic injuries to anterior teeth, in children of Jazan province, Kingdom of Saudi Arabia.

MATERIALS AND METHODS

Study Population and Design

The study was carried out on the children who visited the Pediatric Dental Clinics, at the College of Dentistry, Jazan University from January 2016 to June 2016. The study protocol was presented to the institutional research committee and ethical review board, following which the clearance to conduct the study was obtained (Institutional

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Review Board IRB 2016-13). All the work was conducted in accordance with the Declaration of Helsinki (1964).

Normal, healthy, and cooperative children were included in the study. The following children/subjects were excluded from the study:

- Uncooperative children
- Children who were undergoing or just had finished orthodontic treatment
- Children in whom the primary/permanent anterior teeth had not yet erupted
- Children in whom the primary/permanent anterior teeth were lost due to caries
- Children having partial/complete anodontia
- Children with neurological disorders like mental retardation
- Children visiting the outpatient clinics but were not the residents of Jazan province

Thus, 868 children including boys and girls, aged 3 to 13 years formed the study group. Parents of all the children were informed of the nature of investigation. Prior to examination, written informed consent was obtained from them. The information pertaining to demographics was obtained from the hospital records. A closed-ended pro forma was prepared to collect the data. It included information about when, where, and how the injury occurred. For the purpose of standardization, the pro forma was similar to that used in other studies.⁸

Every family was assured of the confidentiality of the data obtained and that the resultant information would be used only for research purposes.

Examination of Children

Oral examination was carried out strictly in the presence of parents/guardian. Only upper and lower anterior teeth (central incisor, lateral incisor, and canine) were examined using mouth mirror and dental probe. Digital palpation with gloved finger was used to examine the alveolus for any fractures. In case of suspicion of root fracture/alveolus fracture, radiographic examination was done. Trauma to the primary anterior teeth was recorded according to Garcia-Godoy⁹ classification. Ellis and Davey¹⁰ classification was used to record the TDIs to the permanent teeth.

Training and calibration for examination for dental trauma was carried out in the Department of Pedodontics, College of Dentistry. An intraexaminer consistency test was performed by examining 20 children on two different occasions, 1 week apart. The obtained results were subjected to kappa statistics, which was 0.85. Hence, the examination procedure was validated.

Data Analysis

The data were coded and entered into the computer. The collected data were analyzed with Statistical Package

for the Social Sciences statistics software 23.0 version. Frequency analysis and percentage analysis were used for descriptive data analysis.

RESULTS

Total 868 patients were examined, out of which 420 were males and 448 were females. Their distribution by age and gender is given in Table 1.

Out of 868 children, 85 (9.79%) had TDIs. Hence, the prevalence of dental trauma in our study was 9.79% (Graph 1). Thirty children (35.29%) suffered injury in the primary dentition and 55 (64.71%) suffered from injury in the permanent dentition.

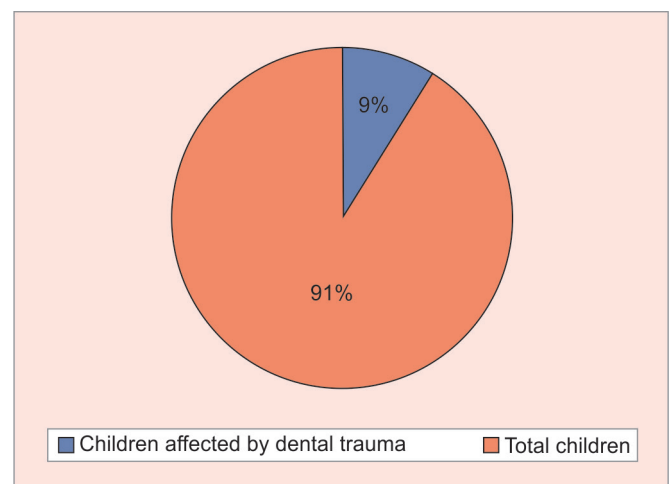
Fifty-two (61.17%) males and 33 (38.82%) females were affected by dental trauma. So, overall, males experienced more TDIs than females, with the male:female ratio of 1.6:1.

Table 2 shows the causes of injury to the primary and permanent dentition. Falls were the most common cause of traumatic injury to the primary (70%) as well as permanent dentition (58.1%). Table 3 shows the distribution of the place of injury in the primary and permanent dentition. Home was the most common place of injury, for both groups of children.

Luxation (50%) was the most common type of injury seen in the primary dentition, followed by avulsion. Fracture of the enamel and dentin involving the pulp (Ellis class III) (29%) was the most common type of injury to

Table 1: Sample distribution by age and sex

| Age (years) | Male (n = 420) | Female (n = 448) | Total |
|-------------|----------------|------------------|-------|
| 3–5 | 74 (17.6%) | 88 (19.64%) | 162 |
| 5–7 | 85 (20.23%) | 71 (15.84%) | 156 |
| 7–9 | 85 (20.23%) | 94 (20.98%) | 179 |
| 9–11 | 90 (21.42%) | 98 (21.87%) | 188 |
| 11–13 | 86 (20.47%) | 97 (21.65%) | 183 |
| Total | 420 | 448 | 868 |



Graph 1: Distribution of children affected by dental trauma

Table 2: Causes of injury

| <i>Cause of injury</i> | <i>Primary dentition</i> | <i>Males (n)</i> | <i>Females (n)</i> | <i>Permanent dentition</i> | <i>Males (n)</i> | <i>Females (n)</i> |
|------------------------|--------------------------|------------------|--------------------|----------------------------|------------------|--------------------|
| Falls | 21 | 14 | 7 | 32 | 17 | 15 |
| Impact/collision | 5 | 4 | 1 | 7 | 4 | 3 |
| Biting hard food | – | | | 2 | 1 | 1 |
| Sports | – | | | 4 | 4 | – |
| Road traffic accidents | – | | | 5 | 3 | 2 |
| Violence | – | | | | | |
| Cannot recollect | 4 | 2 | 2 | 5 | 3 | 2 |

Table 3: Place of injury

| <i>Place of injury</i> | <i>Primary dentition</i> | <i>Males (n)</i> | <i>Females (n)</i> | <i>Permanent dentition</i> | <i>Males (n)</i> | <i>Females (n)</i> |
|------------------------|--------------------------|------------------|--------------------|----------------------------|------------------|--------------------|
| Home | 17 | 10 | 7 | 29 | 15 | 14 |
| School | – | | | 13 | 7 | 6 |
| Playground | – | | | 9 | 9 | – |
| Caretaker/crèche | 8 | 6 | 2 | – | | |
| Cannot recollect | 5 | 4 | 1 | 4 | 1 | 3 |

Table 4: Type of TDI in the primary dentition

| <i>Type of injury</i> | <i>Male (n)</i> | <i>Female (n)</i> | <i>Total n (%)</i> | <i>Age 3</i> | <i>Age 4</i> | <i>Age 5</i> | <i>Age 6</i> |
|--|-----------------|-------------------|--------------------|--------------|--------------|--------------|--------------|
| Enamel fracture | 2 | 1 | 3 (10) | – | 1 | 1 | 1 |
| Enamel dentin fracture without pulp exposure | 2 | 1 | 3 (10) | – | 2 | 1 | – |
| Enamel dentin fracture with pulp exposure | 3 | – | 3 (10) | – | 1 | 2 | – |
| Luxation | 9 | 6 | 15 (50) | 9 | 4 | 1 | 1 |
| Avulsion | 4 | 2 | 6 (20) | 4 | 2 | – | – |
| Total | 20 | 10 | 30 | 13 | 10 | 5 | 2 |

Table 5: Type of TDI in the permanent dentition

| <i>Type of injury</i> | <i>Male (n)</i> | <i>Female (n)</i> | <i>Total n (%)</i> | <i>Age 7–9</i> | <i>Age 9–11</i> | <i>Age 11–13</i> |
|-----------------------|-----------------|-------------------|--------------------|----------------|-----------------|------------------|
| Ellis class I | 5 | 4 | 9 (16.36) | 2 | 5 | 2 |
| Ellis class II | 7 | 6 | 13 (23.63) | 2 | 8 | 3 |
| Ellis class III | 9 | 7 | 16 (29) | 8 | 5 | 3 |
| Ellis class IV | 8 | 5 | 13 (26.63) | 2 | 8 | 3 |
| Ellis class V | 3 | 1 | 4 (9.09) | 3 | 1 | – |
| Total | 32 | 23 | 55 | 17 | 27 | 11 |

the permanent teeth. Enamel dentin fracture and nonvital teeth due to injury were the second most common type of injuries to the permanent dentition, each being 23.6%. However, we did not observe any cases of root or alveolar bone fracture in the primary or permanent dentition (Tables 4 and 5).

DISCUSSION

Jizan is the capital of Jazan Province, situated in the southwestern region of the Saudi Arabian Peninsula. Jazan region is the second smallest (after Al Baha) region of Kingdom of Saudi Arabia. Jizan city is currently witnessing tremendous economic, educational, cultural, and health care development. However, the data pertaining to the prevalence and etiology of dental trauma in this region are sparse. Hence, this study is important as it provides baseline information about the prevalence and etiology of TDIs in Jazan province, Kingdom of Saudi Arabia.

The College of Dentistry at Jazan University provides comprehensive dental care for all the children visiting the center. Our study included patients aged 3 to 13 years visiting the pediatric dentistry clinics at the College of Dentistry. Mentally retarded individuals and epileptic patients have poor motor coordination, so they are more prone to dental injuries. Hence, these children were excluded from the study.¹¹

The prevalence of dental trauma in our study was 9.79% (males 12.4%, females 7.4%). A recent review stated the prevalence of TDI to be wide, ranging from 6 to 59%.¹² An earlier study reported the prevalence of 33% in 5- to 6-year age group and 34% in 12- to 14-year age group respectively, in Riyadh city, Kingdom of Saudi Arabia.¹³ The last decade has witnessed tremendous increase in the use of iPad, mobile phones, television, and other electronic gadgets, especially in children of developed economies. The decreased prevalence in our

study may be due to overindulgence in indoor activities in the present times which have become a choice over the outdoor sports among children. The other factors could be different study designs, various diagnostic criteria, and behavioral and geographic differences between various sites of researches.^{4,14}

A high male:female ratio (1.6:1) for TDI was seen in our study, which is in accordance with the other studies.^{15,16} The recent literature shows that male:female ratio for TDI varies from 1.4:1 to 3:1.^{17,18} Boys are more energetic and choose more active, vigorous outdoor activities which are obviously associated with a higher trauma risk than the girls.¹⁹ Another factor is that because of cultural restrictions, there is less scope of outdoor activities for females compared with males in Kingdom of Saudi Arabia.

It is widely accepted that TDIs mostly occur in 1- to 3-year age group in the primary dentition and 8- to 11-year age group in the permanent dentition.^{20,21} The present study also showed that traumatic injuries to the primary teeth were highest in the 3 years age group (43.3%), whereas for the permanent teeth, it was seen in 9- to 11-year age group (49%).

The predominant location where trauma occurred was home (54.1%), whereas falls (62.4%) were the most frequent cause of trauma. These results are in harmony with other studies conducted recently.²²⁻²⁴ Since young children spend a significant part of their time at home, special safety measures should be emphasized for houses in which families live with young children.

We also noted that nearly 10.6% of patients/parents were not able to give a proper history of either the cause or place of the TDI. The likely cause for this could be that the children and parents could not recall the origin of their traumatic event when they were interviewed.²⁵ This also shows that parents often delayed the visit to the dentist after a traumatic event.

There are over 50 classification systems for dental trauma.²⁶ These classification systems have differences in definition, scope, and inclusion criteria. Use of a simple classification of Garcia-Godoy⁹ and Ellis and Davey¹⁰ was preferred over other classifications, as it was easy and allowed the rapid recording of reliable data.²⁵ The most prevalent dental trauma type in the primary dentition in our study was luxation injuries representing 50% of the sample. This is in agreement with the findings of several authors^{27,28} who have suggested that the resilient nature of the supporting structures favors dislocation rather than fracture.

Crown fractures are the most common type of injury seen in permanent dentition.^{27,29} The most common dental trauma to permanent dentition in our study was Ellis class III (extensive crown fracture involving dentin with pulp exposure). This deserves special attention

because it has not been the most common sequelae to dental traumatic injury so far conducted in children. The suggested reason may be the greater force and impact of the traumatic events recorded in this study. Al-Majed et al,¹³ in their study on 12- to 14-year-old children in Riyadh, found that enamel fracture (74%) was the most common type of dental injury in the permanent dentition, followed by fracture of the enamel and dentin (15%). Sari et al,³⁰ in a recent study on Turkish children, found enamel fracture to be the most common type of TDI to the anterior permanent teeth.

Our study provided an overview of burden of the TDI among children aged 3 to 13 years in Jazan and it can be a benchmark for future comparisons by the public health personnel and health authorities in the country. All the examinations and recordings of data in our study were done by a pediatric dentist (and not any auxiliary staff) who is specialized in diagnosing as well as treating dental problems in children. The public health care clinics at Jazan University offer all types of dental treatment to children free of cost and hence they receive a good patient inflow from all the neighboring regions. The only limitation of the study could be its duration and limited sample size. Hence, further studies involving a larger population needs to be done for a longer time period.

CONCLUSION

Traumatic dental injuries affect the primary as well as the permanent dentition in children. The prevalence of TDI in our study was 9.79%. Males were affected more than females. Luxation injuries were commonly seen in the primary dentition and enamel dentin fracture with pulp exposure was common type of injury seen in the permanent dentition. Hence, oral health education should be given to the parents, caretakers, and school teachers about TDI and the need to seek early dental treatment should also be emphasized.

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