

Evaluation of primary school pupils with traumatized anterior permanent incisors in relation to different variables in Mosul city (Comparative study)

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ABSTRACT

Aims: To assessing and comparing the prevalence of fractured permanent incisors between pupils of age (6–15 years) for the right and left banks of Mosul Province **Materials and Methods:** A cross-sectional survey carried out through clinical examination of upper and lower permanent incisors for ten thousand and 915 children and teenagers between the age 6–15 years of old, who enrolled in the public primary schools of both right and left banks of Mosul city. All the pupils examined at their schools. The diagnosis and recording of the permanent teeth crown fracture registered according to Ellis classification. **Results:** The most frequent traumatized teeth occurred among pupils aged 8–9 years old in both banks (49.4%). Boys demonstrated more crown fractures than girls (6.4%, 4.2% respectively), at $P \leq 0.001$. Statistically; Pupils with class II division 1 malocclusion, inadequate upper lip coverage were significantly more affected with crown fractures (70.5% for boys, and 58.6% for girls). The most common type of the fracture was the fracture that involve the enamel–dentin with out pulpal involvement (46.7%). The aggressive and the hyperactive behaviours of the pupils significantly showed more crown fractures, and were more common in pupils of the right bank as compared with the pupils of the left bank ($P \leq 0.001$). While no significant difference found between pupils of both banks concerning season of the crown trauma occurrence **Conclusions:** The prevalence of the crown fracture was 5.4% for the total sample, while the prevalence of the crown fractures for pupils of the right bank was statistically highly significant (6.7%) than the prevalence for pupils of the left bank (4.3%).

Key words: Crown, fracture, Behaviour problems, Prevalence, Occlusion.

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INTRODUCTION

Dental trauma is a public health problem in all societies that reaches a large number of people.^(1,2)

In the early nineties, Andreasen and Andreasen⁽³⁾ hypothesized that the dental trauma in the foreseeable future will probably exceed dental caries and periodontal diseases, since a remarkable decline in the prevalence and severity of dental caries and periodontal diseases have been documented in many countries.^(4,5)

Despite the importance of this subject, there were few reports available on the epidemiology of injuries to the teeth of children in developing and industrialized countries, particularly when compared to the epidemiological data on dental caries

and periodontal diseases.^(6,7) Tooth injury is the damage to the tooth when an excessive force is placed on it.⁽⁸⁾

The crown fracture in children is the most frequent type of trauma, it's attributed to the sport injuries, playground injuries or to those injuries related to the bicycling, or roller blade accidents.⁽⁹⁾

Incisal fracture of one or more teeth may result with pain, disfigurement, poor esthetics, speech, functional and psychological disturbances that accompanied by great concern from the child, the parents and dentist.⁽¹⁰⁾

The prevalence of dental trauma in various epidemiological studies had also been found to differ considerably, this great variation may be due to a number of

different factors such as^(11,12):

1. The trauma classification and the studied dentition.
2. Limited age groups and differences in methodology.
3. Geographical and behavioural differences between the studied locations and countries.

The aims of the study, include: Comparing the differences in the prevalence of crown fracture between pupils of the right and left banks concerning certain factors such as types of occlusion, lip position, size of over jet and overbite, behaviour problems, nutritional status, dental visit options after traumatic injury, number of child's family members, parental level of education, causes, settings and season of crown's fracture occurrence.

MATERIALS AND METHODS

The sample size estimated after consultation with a statistician. A twenty one primary schools, were randomly selected to represent Mosul province. A ten thousand and 915 pupils between the age of 6–15 years of old, were participated in this study; After careful examination 589 pupils had sustained traumatic crown fracture for their permanent incisors, 370 (62.8%) were boys, 219 (37.1%) were girls, furthermore, out of the 589 traumatic subjects, 300 pupils were selected randomly for behaviour problems determination (who equally distributed among both banks as well as both genders). A letter sent to the

parents of the selected children explaining the aims of the study. Oral examination performed in classrooms, according to the recommendations of the WHO.⁽¹³⁾ Diagnosis and recording of permanent teeth crown fracture registered according to Ellis classification.⁽¹⁴⁾ A tooth scored to have untreated fractured crown if it was broken. While there was no sign that dental caries had caused the fracture.⁽¹⁵⁾

The incisal relationship was recorded in accordance with the British Standard Classification.⁽¹⁶⁾ The tooth to–lip relationship followed in the current study⁽¹⁷⁾, if the upper lip coverage was equal to/or more than 2/3 of the crown's length, so it considered adequate lip protection, but if the coverage was less than 2/3 of the crown's length it is considered inadequate lip protection. By using of special questionnaire chart that concerning the degree of aggression and activity, which based on the American Association Test for Special Educational Program⁽¹⁸⁾; the followings were carried out:

1. By interview: The child's teacher replayed to the items of the questionnaire chart.

Child's behaviour: After collecting the data, the mid class estimated which based on curve of normal frequency distribution⁽¹⁹⁾, to decide the type of child's behaviour in relation to the aggression and activity (Figure 1) .

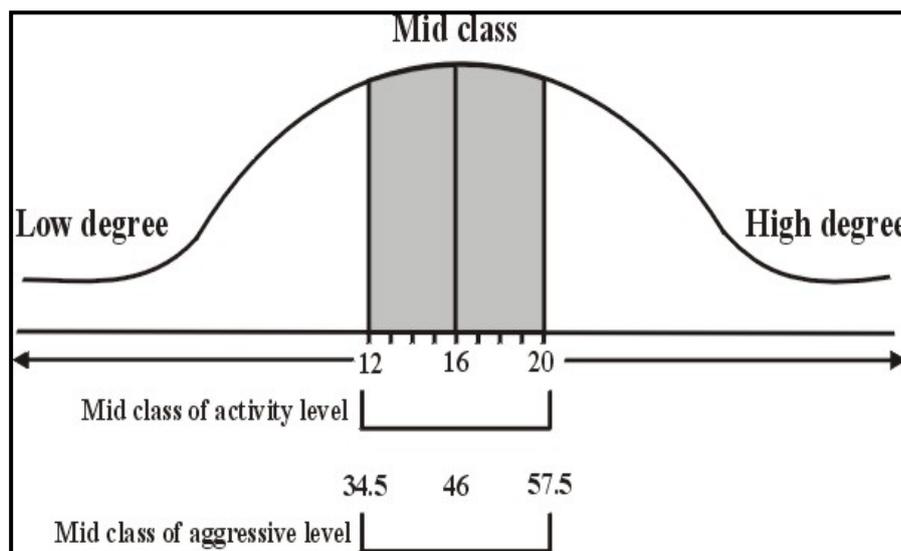


Figure (1): Curve of Normal Frequency Distribution for Activity and Aggression of the Tested Children⁽¹⁹⁾

- Level of activity: If the mark of mid class ranged between/or equal to 12–20, the child considered within normal level of activity, if the mark is more than 20 the child considered hyperactive (high degree of activity), while if the mark is less than 12 the child referred to as inert (low degree of activity).
- Level of aggression: If the mark ranged between/or equal to 34.5–57.5 the child assumed normal behaviour's feature, if the mark is more than 57.5 the child documented reversible aggressive personality (high degree of aggression); Markedly less than 34.5, the child grouped as peaceful (low degree of aggression).

Data analysis included: Descriptive statistics, such: Frequency distribution, statistical tables; And inferential statistics: T-test, Z-test and Chi-square to test the significance differences between the percentage of each groups.

RESULTS AND DISCUSSION

The prevalence of dental injury in the current study was reported to be about 5.4%, Table (1). This was higher than that recorded by Skaare and Jacobsen⁽²⁰⁾ that equal to 3.3%, and lower than that documented by AL-Hayali⁽²¹⁾ which was 30%, this might be due to the devoted of this study only with the type of crown

fracture (i.e., complicated /uncomplicated) rather than taking other types of tooth injury like luxation, concussion and intrusion; And also the age range which involved in this study was between 6–15 years old, rather than younger age groups of the other previous studies.

At the age 8 to 9 years of old, traumatic coronal fracture was most frequent for both genders (49.4%) at Table (2), this was in line with Garcia-Godoy.⁽²²⁾ It may be related to a different life styles at the school age, as they spend more years with more friends accompanied when compared with 6–7 years of old as a stage of life. Results also showed the prevalence of the traumatized children found to be higher with class II malocclusion particularly division 1 (70.5%) compared to class I occlusion (25.3%), Table (3). This was in line with Kania.⁽²³⁾ It may be due to that: In cases with class II malocclusion, the presence of protruded teeth can increases the risk of being traumatized in children with class II malocclusion. A clear effect of the upper lip on the prevalence of crown fracture was recorded (58.6%), this was in agreement with Celenk⁽²⁴⁾, because inadequate lip coverage may provide less protection to the maloccluded incisors, Table (4).

Table (1): Prevalence of traumatized children in the study area.

| Subjects | Number | Prevalence (%) | Significances |
|---------------------|------------|----------------|---------------------|
| Boys | 370 | 6.4 | Z = 23.05, |
| Girls | 219 | 4.2 | p<0.001** |
| Right bank | 320 | 6.8 | Z = 24.7, p<0.001** |
| Left bank | 269 | 4.3 | |
| Total sample | 589 | 5.4 | |

** = High significant difference.

Table (2): Distribution of children with traumatized teeth by age.

| Gender | Bank | Age (year) | | | | | | | | | | Total | Significances |
|--------------------|-------|------------|------|-----|------|-------|------|-------|------|-------|-----|-------|---------------|
| | | 6-7 | | 8-9 | | 10-11 | | 12-13 | | 14-15 | | | |
| | | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| Boys | Right | 19 | 9.3 | 133 | 64.9 | 45 | 22.0 | 5 | 2.4 | 3 | 1.5 | 205 | p>0.05 |
| | Left | 27 | 16.4 | 81 | 49.1 | 51 | 30.9 | 4 | 2.4 | 2 | 1.2 | 165 | (NS) |
| Girls | Right | 21 | 18.3 | 39 | 33.9 | 38 | 33.0 | 10 | 8.7 | 7 | 6.1 | 115 | p>0.05 |
| | Left | 18 | 17.3 | 38 | 36.5 | 29 | 27.9 | 11 | 10.6 | 8 | 7.7 | 104 | (NS) |
| Total Boys | | 46 | 12.4 | 214 | 57.8 | 96 | 26.0 | 9 | 2.4 | 5 | 1.4 | 370 | p ≤ 0.01* |
| Total Girls | | 39 | 17.8 | 77 | 35.2 | 67 | 30.6 | 21 | 9.6 | 15 | 6.8 | 219 | |
| Total | | 85 | 14.4 | 291 | 49.4 | 163 | 27.7 | 30 | 5.1 | 20 | 3.4 | 589 | |

NS: Not significant; * = Significant difference; No.: Number; %: Percentage.

Table (3): Distribution of children with traumatized teeth in relation to type of occlusion.

| Gender | Bank | Type of occlusion | | | | | | | | Total | Significances |
|-------------|-------|-------------------|------|----------------------------------|------|----------------------------------|-----|------------------------|-----|-------|--------------------|
| | | Class I occlusion | | Class II division 1 malocclusion | | Class II division 2 malocclusion | | Class III malocclusion | | | |
| | | No. | % | No. | % | No. | % | No. | % | | |
| Boys | Right | 30 | 14.6 | 170 | 82.9 | 4 | 2.0 | 1 | 0.5 | 205 | $p \leq 0.01^{**}$ |
| | Left | 67 | 40.6 | 89 | 54.0 | 6 | 3.6 | 3 | 1.8 | | |
| Girls | Right | 12 | 10.4 | 98 | 85.2 | 5 | 4.4 | 0 | 0.0 | 115 | $p \leq 0.01^{**}$ |
| | Left | 40 | 38.5 | 58 | 55.7 | 5 | 4.8 | 1 | 1.0 | | |
| Total Boys | | 97 | 26.2 | 259 | 70.0 | 10 | 2.7 | 4 | 1.1 | 370 | $p > 0.05$ (NS) |
| Total Girls | | 52 | 23.7 | 156 | 71.2 | 10 | 4.6 | 1 | 0.5 | 219 | |
| Total | | 149 | 25.3 | 415 | 70.5 | 20 | 3.4 | 5 | 0.8 | 589 | |

NS: Not significant; ** = High significant difference; No.: Number; %: Percentage.

Table (4): Distribution of children with traumatized teeth, according to upper lip position.

| Gender | Bank | Lip position | | | | Total | Significances |
|-------------|-------|--------------|------|----------|------|-------|---------------------|
| | | Inadequate | | Adequate | | | |
| | | No. | % | No. | % | | |
| Boys | Right | 145 | 70.7 | 60 | 29.3 | 205 | $p \leq 0.001^{**}$ |
| | Left | 90 | 54.5 | 75 | 45.5 | | |
| Girls | Right | 75 | 65.2 | 40 | 34.8 | 115 | $p \leq 0.001^{**}$ |
| | Left | 35 | 33.7 | 69 | 66.3 | | |
| Total Boys | | 235 | 63.5 | 135 | 36.5 | 370 | $p \leq 0.01^*$ |
| Total Girls | | 110 | 50.2 | 109 | 49.8 | 219 | |
| Total | | 345 | 58.6 | 244 | 41.4 | 589 | |

*: Significant difference; **: High significant difference; No.: Number; %: Percentage.

Fracture of enamel–dentin without pulpal involvement found to be the most frequent type of permanent incisors injury in the current study (46.7%), Table (5); Similar to that reported by Kargul and Tanbogal.⁽²⁵⁾ The prevalence of coronal fracture registered the highest percentage at the high levels of aggression (36.7%) and activity (35.4%) for the total sample, Tables (6,7). This was in agreement with McMunn⁽²⁶⁾, moreover; The children of the right bank recorded higher levels of aggression and activity (47.3% for boys, and 46% for girls), than children of the left bank (22.6% for boys and 24.6% for girls). This can be explained, that human being posses aggressive behaviour as agenium nature.⁽²⁷⁾ The result of this study showed a trend for dental trauma to occur more frequently during summer (57.6%) as showed with Table (8). This agreed with Kargul and Tanbogal.⁽²⁵⁾ One of the possible reasons for this result that the hot climate of

Mosul city which draws children out doors as well as may be due to a lower degree of vigilance on the part of parents and teachers.

CONCLUSIONS

The prevalence of children with traumatized crown fracture was 5.4% of the examined subjects with high significant differences presented in the prevalence between traumatized children of the right and left banks as well as between the two genders. An enamel–dentin fracture found to be the most common type of coronal injury. The number of injured children was higher with class II division 1 malocclusion and short upper lip. Results showed a significant difference among children of the right and left banks regarding occlusal features and behaviour problems while no significant difference was found among subjects of both banks regarding season of trauma occurrence.

Table (5): Distribution of traumatized teeth according to levels of crown fracture.

| Gender | Bank | Level of crown fracture | | | | | | Total | Significances |
|--------------------|-------|---------------------------------|------|------------------------------------|------|--|------|-------|-----------------|
| | | Teeth with enamel fracture only | | Teeth with enamel– dentin fracture | | Teeth with enamel– dentin fracture and pulp exposure | | | |
| | | No. | % | No. | % | No. | % | | |
| Boys | Right | 71 | 28.6 | 128 | 51.6 | 49 | 19.8 | 248 | $p > 0.05$ (NS) |
| | Left | 74 | 35.7 | 91 | 44.0 | 42 | 20.3 | 207 | |
| Girls | Right | 46 | 29.3 | 79 | 50.3 | 32 | 20.4 | 157 | $p > 0.05$ (NS) |
| | Left | 61 | 41.8 | 56 | 38.3 | 29 | 19.9 | 146 | |
| Total Boys | | 145 | 31.9 | 219 | 48.1 | 91 | 20.0 | 455 | $p > 0.05$ (NS) |
| Total Girls | | 107 | 35.3 | 135 | 44.6 | 61 | 20.1 | 303 | |
| Total | | 252 | 33.2 | 354 | 46.7 | 152 | 20.1 | 758 | |

NS: Not significant; No.: Number; %: Percentage.

Table (6): Distribution of children with traumatized teeth in relation to activity behaviour.

| Gender | Bank | Activity behaviour | | | | | | Total | Significances |
|--------------------|-------|--------------------|------|--------|------|-----|------|-------|---------------------|
| | | High | | Normal | | Low | | | |
| | | No. | % | No. | % | No. | % | | |
| Boys | Right | 39 | 52.0 | 21 | 28.0 | 15 | 20.0 | 75 | $p \leq 0.001^{**}$ |
| | Left | 18 | 24.0 | 24 | 32.0 | 33 | 44.0 | 75 | |
| Girls | Right | 30 | 40.0 | 28 | 37.3 | 17 | 22.7 | 75 | $p \leq 0.05^*$ |
| | Left | 19 | 25.3 | 27 | 36.0 | 29 | 38.7 | 75 | |
| Total Boys | | 57 | 38.0 | 45 | 30.0 | 48 | 32.0 | 150 | $p > 0.05$ (NS) |
| Total Girls | | 49 | 32.7 | 55 | 36.7 | 46 | 30.6 | 150 | |
| Total | | 106 | 35.4 | 100 | 33.3 | 94 | 31.3 | 300 | |

NS: Not significant; *: Significant difference; **: High significant difference; No.: Number; %: Percentage.

Table (7): Distribution of children with traumatized teeth in relation to aggressive behaviour.

| Gender | Bank | Aggressive behaviour | | | | | | Total | Significances |
|--------------------|-------|----------------------|------|--------|------|-----|------|-------|---------------------|
| | | High | | Normal | | Low | | | |
| | | No. | % | No. | % | No. | % | | |
| Boys | Right | 39 | 52.0 | 21 | 28.0 | 15 | 20.0 | 75 | $p \leq 0.001^{**}$ |
| | Left | 18 | 24.0 | 24 | 32.0 | 33 | 44.0 | 75 | |
| Girls | Right | 32 | 42.6 | 26 | 34.7 | 17 | 22.7 | 75 | $p \leq 0.05^*$ |
| | Left | 16 | 21.3 | 29 | 38.7 | 30 | 40.0 | 75 | |
| Total Boys | | 57 | 38.0 | 45 | 30.0 | 48 | 32.0 | 150 | $p > 0.05$ (NS) |
| Total Girls | | 48 | 32.0 | 55 | 36.7 | 47 | 31.3 | 150 | |
| Total | | 110 | 36.7 | 100 | 33.3 | 90 | 30.0 | 300 | |

NS: Not significant; *: Significant difference; **: High significant difference; No.: Number; %: Percentage.

Table (8): Distribution of children with traumatized teeth in relation to seasons of trauma occurrence.

| Gender | Bank | seasons of trauma occurrence | | | | | | | | Total | Significances |
|--------------------|-------|------------------------------|------|--------|------|--------|------|--------|------|-------|-----------------|
| | | Summer | | Autumn | | Winter | | Spring | | | |
| | | No. | % | No. | % | No. | % | No. | % | | |
| Boys | Right | 118 | 57.6 | 20 | 9.7 | 39 | 19.0 | 28 | 13.7 | 205 | $p > 0.05$ (NS) |
| | Left | 90 | 54.5 | 22 | 13.3 | 35 | 21.2 | 18 | 11.0 | 165 | |
| Girls | Right | 69 | 60.0 | 8 | 7.0 | 21 | 18.3 | 17 | 14.7 | 115 | $p > 0.05$ (NS) |
| | Left | 62 | 59.6 | 11 | 10.6 | 21 | 20.2 | 10 | 9.6 | 104 | |
| Total Boys | | 208 | 56.2 | 42 | 11.4 | 74 | 20.0 | 46 | 12.4 | 370 | $p > 0.05$ (NS) |
| Total Girls | | 131 | 59.8 | 19 | 8.7 | 42 | 19.2 | 27 | 12.3 | 219 | |
| Total | | 339 | 57.6 | 61 | 10.4 | 116 | 19.7 | 73 | 12.3 | 589 | |

NS: Not significant; No.: Number; %: Percentage.

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