

Prevalence of permanent anterior tooth fracture due to trauma in South Indian population

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ABSTRACT

Aim: The aim of the study is to determine the prevalence of permanent anterior teeth fracture due to trauma in South Indian population. **Materials and Methods:** After formal consent, study was conducted on 2000 patients reporting for treatment in A B Shetty Memorial Institute of Dental Sciences and Rural Satellite Centers from June to December 2013. They were examined under good illumination using sterilized mouth mirror, explorer and cotton rolls. Results were evaluated using Pearson Chi-square test.

Results: Of 2000 patients, overall prevalence of anterior teeth fracture due to trauma was 14.85%, 53.9% cases were noticed in the age group of 15–30 years, 20.2% cases in an age group of 12–15 years. Of 14.85% (297) cases, 53.9% males and 46.1% females had anterior teeth fracture, 88.67% cases were with respect to maxillary arch and 11.33% cases were with respect to mandibular arch. 43.9% patients had enamel and dentin fracture, only enamel fracture was seen in 31.6% patients and the least was 6.01% which showed displacement of tooth without crown or root fracture, 67% were because of falls and rest of the 33% of patients had anterior tooth fracture because of violence, sports and traffic accidents, 71.42% cases had fracture with maxillary central incisor. Furthermore, 59.6% cases were seen with Class II Division I malocclusion. **Conclusions:** In the present study we noticed that fall was the most frequent cause and are seen more in males with an increased prevalence in 15–30 years of age. Furthermore, fracture of maxillary central incisor was most common and among all, fractures involving enamel and dentin were most common.

Key words

Falls, tooth fracture, trauma

INTRODUCTION

Traumatic dental injuries are due to the physical impact on a tooth and its surrounding tissues, which may be direct or indirect.^[1] Trauma to the teeth may result either in injury of the pulp, with or without damage to the crown or root or in displacement of the tooth from its socket.^[2] It is a dental emergency situation in young patients and requires immediate assessment and management because many permanent teeth continue their development in those ages.^[3-5] The objective of this study was to analyze the prevalence of anterior teeth fracture due to trauma in South Indian population.

MATERIALS AND METHODS

Study was conducted on 2000 patients over the period of 6 months from June 2013 to December 2013, to collect information on the prevalence of permanent anterior tooth fracture due to trauma in the patients reporting for 1st time to the out-patient department of A B Shetty Memorial Institute of Dental Sciences, Nitte University and to the rural satellite centers, Mangalore. Patients having anterior caries were excluded from the study. Patients under the age group of 14–70 years of age were included in the study. All patients examined were informed about the study and were asked to sign the consent form. WHO Oral Health Survey 2013 format was used for questionnaire of examined patients^[6] and based on the same format dental trauma was classified as follows:

- Score 0 = No sign of injury
- Score 1 = Treated injury
- Score 2 = Enamel fracture only
- Score 3 = Enamel and dentin fracture
- Score 4 = Pulp involvement
- Score 5 = Missing tooth due to trauma
- Score 6 = other damage

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- Score 7 = Nonvital tooth
- Score 8 = Displacement of the tooth without the fracture of crown or root
- Score 9 = Excluded tooth.

The patients were examined under artificial illumination using the mouth mirror, explorer and cotton rolls. Sterilized instruments were used, and a questionnaire was used to collect data for the study. The prevalence of anterior tooth fracture was evaluated using Pearson Chi-square test.

RESULTS

Anterior tooth fracture due to trauma from June 2013 to December 2013 in South Indian population was seen in 297 (14.85%) cases [Table 1]. As per the geographical location, the South Indian population was further classified as urban and rural population. The prevalence of anterior tooth fracture in urban population was 53.9% and in a rural population was 46.1% where $P > 0.001$ which is not statistically significant [Table 2]. 53.9% males and 46.1% females had anterior tooth fracture where $P < 0.001$ which is statistically significant [Table 3]. Statistical analysis showed 53.9% of anterior tooth fracture due to trauma in age group of 15–30 years of age, followed by 20.2% cases in age group of ≤ 15 where $P < 0.001$ which is statistically significant [Table 4]. Most frequent etiology was falls, that is, 67% and 33% included violence, sports and traffic accidents with slight variation in frequency and percentage [Table 5]. Among the type of tooth fracture, 43.9% of teeth showed enamel and dentin fracture, followed by 31.6% of enamel fracture only and the least was 6.01%, which showed displacement of tooth without fracture of crown or root [Table 6]. Discoloration was observed in 25.9% of cases with fracture of the anterior tooth [Figure 1]. Maxillary arch showed 88.67% of anterior tooth fracture while 11.33% were seen in the mandibular arch [Table 7]. Maxillary central incisor showed the maximum frequency of anterior tooth fracture, that is, 71.42% and least frequent was maxillary canine that is, 5.65% [Figure 2]. Among the patients with anterior tooth fracture, 20.2% had undergone treatment [Figure 3]. Angle's Class II Division I showed 59.6% of anterior tooth fracture where $P > 0.001$ which is not statistically significant [Table 8].

DISCUSSION

In the present study, it was observed that the overall prevalence of anterior tooth fracture was 14.85% in 2000 patients of South Indian population [Table 1]. In a study conducted by Hegde and Shabin in the same geographical location during the year 2010–2011, the overall prevalence was about 11.5%, which shows an increase in the prevalence of anterior tooth fracture due to trauma.^[1] On comparing the society in which they live, the urban population showed higher prevalence of

Table 1: Overall prevalence of anterior tooth fracture due to trauma

Overall prevalence	
Anterior tooth fracture	Frequency (%)
Yes	297 (14.85)
No	1703 (85.15)
Total	2000 (100.0)

Table 2: Anterior tooth fracture in urban and rural population

Location	Frequency (%)
Urban	160 (53.9)
Rural	137 (46.1)
Total	297 (100.0)
χ^2	1.449
P	0.229 > 0.001

Table 3: Anterior tooth fracture in males and females

Gender	Frequency (%)
Male	160 (53.9)
Female	137 (46.1)
Total	297 (100.0)
χ^2	6.020
P	0.014 < 0.001

Table 4: Anterior tooth fracture in different age groups

Age group	Frequency (%)
12-15 years	60 (20.2)
15-30 years	160 (53.9)
30-45 years	20 (6.7)
45-60 years	38 (12.8)
>60 years	19 (6.4)
Total	297 (100.0)
χ^2	450.36
P	< 0.001

Table 5: Etiology of anterior tooth fracture

Cause	Frequency (%)
Falls	199 (67.0)
Sports accident	60 (20.2)
Automobile accident	19 (6.4)
Violence	19 (6.4)
Total	297 (100.0)

anterior tooth fracture than the rural population that is, 53.9%, where $P > 0.001$ which is not statistically significant [Table 2]. The prevalence of anterior tooth fracture in urban population is less compared to the previous study conducted by Hegde and Shabin^[1] in the year 2010–2011 which was 58%. From the case history

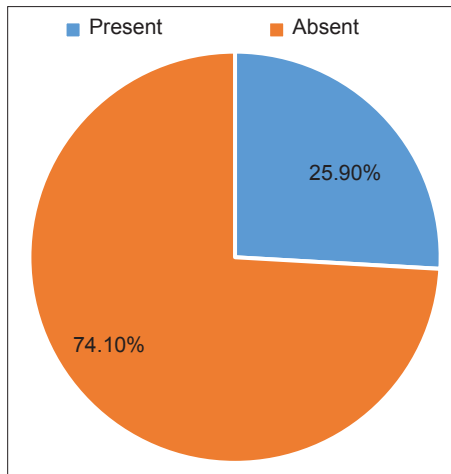


Figure 1: Discoloration of fractured anterior tooth due to trauma

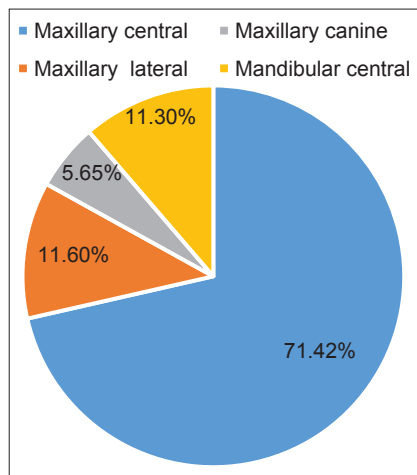


Figure 2: Fracture due to trauma among different anterior teeth

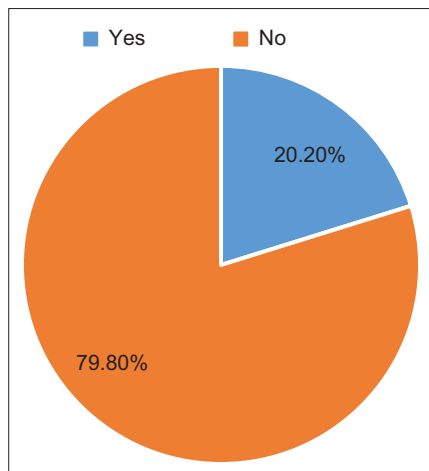


Figure 3: Patients undergoing treatment after anterior teeth fracture

recorded from patients, it could be said that urban population have more chance of accidents from work centers, road traffic accidents than the rural population. A study was done by Punja *et al.* concluded that there was no difference in the loss of anterior teeth due to caries

Table 6: Type of anterior tooth fracture

	Frequency (%)
Score 2	106 (31.64557)
Score 3	148 (43.98734)
Score 4	21 (6.329114)
Score 7	41 (12.02532)
Score 8	20 (6.012658)
Total	336 (100)

Table 7: Anterior tooth fracture frequency in both arches

Arch	Frequency (%)
Maxillary	298 (88.67)
Mandibular	38 (11.33)
Total	336 (100.0)

Table 8: Anterior tooth fracture frequency as per Angle's molar relationship

Malocclusion	Frequency (%)
Class I	120 (40.4)
Class II Division I	177 (59.6)
Total	297 (100.0)
χ^2	0.355
P	0.552 > 0.001

among males and females.^[7] However, the prevalence of anterior tooth fracture with respect to gender was found to be greater in males (53.9%), females (46.1%), where $P < 0.001$ which is statistically significant [Table 3]. Similar result was found by Hegde and Shabin in her study in the same population^[1] and in different geographical location by Glendor,^[8] Castro *et al.*,^[9] Caldas and Burgos^[10] Andrade *et al.*,^[11] Levin *et al.*,^[12] Hecova *et al.*,^[13] Lam *et al.*,^[14] Zuhail *et al.*,^[15] in their study. Males showed higher prevalence of anterior tooth fracture due to trauma that could be attributed to occupational accidents, road traffic accidents, sports injuries, violence. Maximum prevalence of fracture of anterior tooth was seen in the age group of 15–30 years that is, 53.9% and, followed by the age group of ≤ 15 years, that is, 20.2%, where $P < 0.001$ which is statistically significant [Table 4]. The high prevalence in these age groups could be due to the active participation of the individuals of these age groups in extra-curricular activities and the general tendency of taking greater risks.^[9] However, it is not similar to the results of previous study conducted by Hegde and Shabin in the same population, which showed the maximum prevalence of anterior tooth fracture in the age group of 41–50 years.^[1] Among the different etiologic factors, prevalence of anterior tooth fracture occurred mostly because of falls (67%). Similar findings were observed by Hegde and Shabin^[1] Caldas and Burgos^[10] Levin *et al.*,^[12] Lam *et al.*,^[14] Zuhail *et al.*,^[15] Bücher *et al.*,^[16] Adekoya-Sofowora *et al.*,^[17] but not in accordance with the study conducted by Marcenes *et al.*^[18] among the school

children aged between 9 and 12 years and observed that it was common for a child to be pushed against another child or an object, and he recorded it as violence rather than collisions. Thus, violence was the major reason for traumatic dental injuries in his study. Other etiologies such as sports accident (20.2%), automobile accident (6.4%), violence (6.4%) also contributed for anterior tooth fracture due to trauma [Table 5]. Majority of traumatic dental injury is seen in the age group of 15–30 years, which could be because of individuals usually involved in many sports activity, dangerous work practices and road traffic. This may involve hustling, stumbling as well as falling during sports or violence. When different types of fractures in the teeth were compared, fracture involving enamel and dentin (43.9%) was the most common, followed by only enamel fracture (31.6%) which is in accordance with the studies by Brunner *et al.*;^[19] Bücher *et al.*;^[16] Zuhail *et al.*;^[15] Bauss *et al.*;^[20] and not corroborating with the studies by Caldas and Burgos^[10] Navbazam and Farhani^[21] Adekoya-Sofowora *et al.*^[17] where only enamel fracture was most common. Variation in the diagnostic criteria between different studies may be the reason for differences in findings. Individuals with only enamel fracture might not opt for treatment as they don't have any complaints or sometimes they might not be aware of it. This might be the reason why it is recorded higher in these studies. Almost similar prevalence of fracture involving pulp and displacement of the tooth without the fracture of crown and root were recorded [Table 6]. Discoloration was observed in 25.9% of patients with fracture of the anterior tooth, which can be as a result of reduced prevalence of fracture of the tooth leading to nonvitality [Figure 1]. Maxillary arch was the most commonly affected arch (88.67%), and maxillary central incisor was the most commonly fractured tooth (71.42%) due to trauma [Table 7 and Figure 2]. This is in accordance with the findings by Hegde and Shabin^[1] Castro *et al.*;^[9] Lam *et al.*;^[14] Andrade *et al.*;^[11] Zuhail *et al.*;^[15] Kania *et al.*^[22] A study conducted by Hegde *et al.* also concluded that among all the anterior teeth prevalence of caries was maximum in maxillary central incisor.^[23] The fracture of maxillary central incisor could be because of more number of people having prognathic maxilla. Another factor might be the most labial position of the maxillary central incisors in the arch, thus whenever any individual falls or collides with any object; they have high chances to fracture. Furthermore for its high incidence of getting fractured would be, since they are the first teeth to erupt in the oral cavity, they will be present when the child begins to play or participate in any activity. Bozabadi *et al.* concluded in his study that mandible has a nonrigid connection with the cranial base, and Class III malocclusion dissipates the blows to mandible and offers natural protection to mandibular incisors.^[24] Among the patients with anterior tooth fracture, only 20.2% had undergone treatment, rest of them did not take any kind of treatment [Figure 3]. On the contrary, a study done by Punja *et al.* observed

that there was a high rate of replacement of the missing anterior tooth.^[7]

This can be because the individuals may have given low priority to their dental injuries as they might not have any pain and aesthetic problems. Lack of awareness can also be one of the major reason for the decrease in the number of patients undertaking treatment. In different types of occlusion, prevalence of anterior tooth fracture occurred most frequently in patients with angle's Class II molar relationship (59.6%), where $P > 0.001$ which is not statistically significant and all of them were Angle's Class II Division I [Table 8]. This observation was similar with the findings of the study by Hegde and Shabin^[1] in the same population. Patients are having Class II Division I malocclusion suffered with more anterior tooth fracture, may be because of increased overjet.

CONCLUSIONS

In the present study, we noticed that urban population was more prone to anterior teeth fracture due to trauma than the rural population. Fall was the most frequent cause of teeth fracture that is more seen in males with an increased incidence in 15–30 years of age. Among the anterior teeth, fracture of maxillary central incisor was most common and among all the fractures, the one involving enamel and dentin was most common. Furthermore, individuals with Angle's Class II molar relationship showed higher prevalence of anterior tooth fracture due to trauma. Furthermore, we noted that traumatic dental injury is a serious public dental health problem and preventive educational campaigns should be introduced, to educate people about the problems of dental trauma and the importance of immediate treatment would minimize the sequelae of these traumatic injuries. The immediate treatment should include first aid, useful for management of fractured and avulsed tooth and should be included in the first aid kits.

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