

## Comparison of the traumatic dental injuries between visually impaired and their peer sighted children in Kerman, Iran

*Hamidreza Poureslami DDS, MSc<sup>1</sup>, Mohamad Nazarian DDS<sup>2</sup>,  
Azadeh Horri DDS, MSc<sup>3</sup>, Hamid Sharifi DVM, PhD<sup>4</sup>, Hamideh Barghi DDS<sup>5</sup>*

### Original Article

#### Abstract

**BACKGROUND AND AIM:** Trauma is a common problem among blindness and visually impaired children. The purpose of the current study was the assessment of the prevalence of traumatic dental injuries and the enamel defects resulted from these injuries among 6-12 years old blind children in comparison to the sighted children in Kerman.

**METHODS:** In this cross-sectional study, sample size was considered as census. All of 80 blind elementary school children that lived in Kerman, Iran, were examined and 80 sighted students were examined as control group. Data were collected by clinical examination of the permanent incisor teeth and a valid check list. Data was analyzed by SPSS software version 16 and chi-square statistical test.

**RESULTS:** Regarding the history of trauma to the incisor primary teeth, there was statistically significant difference between the two groups. The blind children had significantly higher percentage of traumatic injuries to their incisor permanent teeth than the sighted children. There was a statistically significant difference regarding the prevalence of the enamel defects on labial surface between the two groups.

**CONCLUSION:** Blind children are at risk of multiple traumatic dental injuries and subsequently the enamel defects. So they need more attentions and care for preventing this type of morbidity.

**KEYWORDS:** Blindness, Trauma, Hypoplasia, Dental Injuries

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Severe low vision or blindness is a disability resulting from causes or factors before or after birth. The occurrence of this disability for any reason may cause frequent hospitalization, separation from family and slow social development. Sometimes parents feel guilty and have their child excessive support which all leads to the lack of development in self-reliance skills such as maintaining good oral hygiene and removing bacterial plaque from

the tooth surface. As a result, tooth decay and periodontal disease are more likely to occur.<sup>1</sup>

Also blind children during the first years of life, besides acquisition of movement skills, they like to move and play as healthy children, but during these activities, they are more prone to the accidents, such as collisions and falls, in comparison to sighted children. As a result, they experience more dental and jaws traumas and probably in later years they would have more enamel

1- Associate Professor, Kerman Oral and Dental Diseases Research Center AND Kerman Social Determinants on Oral Health Research Center AND Department of Pedodontics, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

2- Health Center, Kerman University of Medical Sciences, Kerman, Iran

3- Assistant Professor, Department of Pedodontics, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

4- Assistant Professor, Research Center for Modeling in Health, Institute for Futures Studies in Health, Kerman University of Medical Sciences AND Department of Food Hygiene and Public Health, School of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

5- Resident, Department of Pedodontics, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

Correspondence to: Hamidreza Poureslami DDS, MSc

Email: hamid42pour@yahoo.com

defects on the surface of permanent teeth.<sup>1</sup> Close anatomic relation between the root apex of anterior primary teeth with substitute permanent teeth (placing the labial surface of crown of permanent tooth buds near to palatal or lingual surface of primary tooth roots), explains why the damages to primary teeth and their movement or the infection of their pulp due to the impact may affect their permanent teeth substitute. Many of these traumas may not cause any serious and observable problem for primary teeth during the occurrence and the primary teeth does not show any important sign. But these traumatic injuries can leave short-term or long-term chronologic lesions from the enamel defects, on the labial surface of permanent incisors.<sup>2</sup> In vitro experimental studies on animals have clearly shown such damages.<sup>1</sup>

Traumas to the primary anterior teeth can cause defect in formation and evolution of a part of enamel directly (through aggressing the root of traumatized primary teeth to the labial surface of permanent teeth crown and damaging some Ameloblasts) or indirectly at first cause the death and infection of the pulp of primary tooth and then over time it will cause the death of some enamel forming cells and defects formation of a part of labial surface enamel of permanent teeth.<sup>1,2</sup> This enamel defect is called Turner's hypoplasia which includes a small area of labial surface of permanent anterior teeth, it has abnormal color different from the color of healthy enamel and may indicate a small notch due to reducing the enamel thickness.<sup>3</sup> Children with severe low vision or blind are training in special schools and are also helped to get more proficiency in movement skills.

The aim of this study was evaluation of the dental trauma among 6-12 years old low vision or blind students, both girls and boys, in Kerman and also evaluation of the enamel defects due to these traumas in their permanent incisors comparing with the students at the same age but blind. This study is probably the first study of its kind

among blind students in Iran. However, in other countries few studies were done about the prevalence of dental trauma among blind children, but no study is available regarding enamel defects due to trauma to the blind children primary teeth.

## Methods

In this cross sectional study the sample size was considered as census including all 80 low vision and blind students 6-12 years old in Kerman Special Education School (in academic years 2006-2007). The students were educating in the learning and training center for the blinds in Kerman. They were all examined for their teeth and mouth. The same number of sighted students which were similar with blind children in relation of age, gender, educational level, social and economic conditions, were selected randomly from the second level of public elementary school of boys and girls in Kerman as control group for studying on incisors teeth. Selection of the students in the control group was done via documents in their educational files. Before the examinations, the parents of students gave their written consent according to ethical code K/85/29. Examination of all the permanent incisor teeth of both groups of students were done by the probe and disposable dental mirror, under the direct light of a 100W lamp in the location of health room of schools and by only one examiner (dental student) that his training was according to the observation of different types of dental injuries in dental traumatology books. There was a short interview with students' parents in case of the children anterior teeth status in order to gain required information especially about the history of trauma to the child primary incisor teeth in previous years. At the end of visiting children, required training was provided to children and their parents in case of how to maintain oral hygiene and a package including toothbrush and toothpaste for children was given for appreciating of their contribution. Information gained from

each child examining was registered in his/her related check list. This information was: registering history of trauma to the child primary teeth in previous years based on memory and mental information of child parent. Registering presence or absence of enamel lesions as Turner's hypoplasia on the labial surface of the child permanent incisor teeth and registering the presence or absence of traumatic lesions to permanent incisor teeth according to one of the mentioned lesions in classification of Hargreaves.<sup>4</sup>

In this study, a tooth was considered as traumatized tooth in which trauma had caused injuries and the decay was not the etiologic factor for fracture or discoloration. In this case, the primary incisor teeth were not examined. In case of diagnosing dental injuries of permanent incisor teeth, classification of Hargreaves was used, because its application in epidemiological studies is practical and easier in comparison to classification of WHO.<sup>4</sup> Due to observing ethical issues and also the number of samples, we were notable to do radiography examination. So instead of "root fracture resulting from trauma" which was mentioned in classification of Hargreaves, "crown discoloration due to trauma" was used. This classification includes six classes from crown fracture limited to enamel (class I) to avulsion of tooth (class VI).

During examining the students, if each of the six classes (whether treated or untreated) was observed in permanent incisor teeth of a student, it was registered as a traumatic injury in its check list. In case of hypo plastic lesions

caused by trauma or Turner's hypoplasia, observing limited lesion with white to yellow colors and distinctive from the color of healthy enamel located on the labial surface of permanent incisor teeth (which neither of them were observed on the surfaces of the posterior teeth) was registered as a case with hypo plastic lesion caused by trauma. In order to analyze the data, SPSS software version 16 and Chi-Square statistical test at a significance level of  $P < 0.001$  were used.

## Results

From the 80 students with severe low vision or blind, according to their parents' reports, 25% of them (20 patients) at least had one history of trauma to the primary anterior teeth in their preschool ages. This ratio for 80 sighted students was just 6.25.00% (5 patients). Hence, a significant difference was observed between two groups of blind and healthy children ( $P < 0.001$ ) (Table 1). About 4% of sighted students ( $n = 3$ ) had at least one of the types of the dental injuries in their permanent incisor teeth. This percentage among blind children was 35.00% ( $n = 28$ ). In this relation, a significant statistical difference between two groups was observed ( $P < 0.001$ ) (Table 2). In case of existing hypo plastic lesions (Turner's hypoplasia) on labial surface of permanent incisor teeth, 32.00% of blind students (26 patients) had these lesions, while only 13.75% of sighted students (11 patients) showed these lesions and difference between the two groups of students was significant in case of hypo plastic lesions frequency on

**Table 1.** Frequency of trauma history to the primary incisor teeth of blind and sighted children based on the mental information of their parents

Trauma history to the teeth	Blind children [Number (%)]	Sighted children [Number (%)]	P
Yes	20 (25)	5 (6.25)	< 0.001
No	60 (75)	75 (93.75)	
Total	80 (100)	80 (100)	

**Table 2.** Frequency of trauma to permanent incisor teeth of blind and sighted children

Condition of incisor teeth	Blind children [Number (%)]	Sighted children [Number (%)]	P
With trauma	28 (35.00)	3 (3.75)	< 0.001
Without trauma	52 (65.00)	77 (96.25)	
Total	80 (100)	80 (100)	

Table 3. Frequency of hypo plastic defects (Turner's hypoplasia) in permanent incisor teeth of blind and sighted children

Condition of incisor teeth	Blind children [Number (%)]	Sighted children [Number (%)]	P
With hypo-plastic defect	26 (32.50)	11 (13.75)	< 0.001
Without hypo-plastic defect	54 (67.50)	69 (86.25)	
Total	80 (100)	80 (100)	

labial surface of permanent incisor teeth ( $P < 0.001$ ) (Table 3).

### Discussion

In this study, the frequency of dental injuries due to trauma was observed among 35.00% of 6-12 years blind students and 3.75% of sighted students. In two studies which was done among 8-18 years old normal students in Kerman, frequency in traumatic injuries of anterior teeth among about 3500 girls was reported 4.70% and among about 3300 boys was reported 4.00% based on Hargreevs index<sup>4,5</sup> but some studies in Mashhad and Tehran reported this frequency in normal student about 8.00%.<sup>6,7</sup> Andreasen et al. has described this frequency in the permanent teeth of healthy school children in range of 4%-19% (girls) and 12%-33% (boys).<sup>8</sup> Two studies have also reported this frequency among 12-15 and 3-13 years old girls and boys 9.16% and 10.13% respectively.<sup>9,10</sup> Another study in Iraq has reported the frequency of dental traumatic injuries among 6-12 years old 6.10%.<sup>11</sup> There was just one study which had investigated the frequency of these kinds of injuries in blind students that the rate in 38 students of 12-15 years old was 32.50%.<sup>9</sup> The reason of differences in statistics relating to the frequency of traumatic injuries of permanent incisor teeth among students can be due to differences in sampling methods, age ranges of the samples, differences in indicators used for identifying injuries to the teeth and also differences in socio-cultural communities. In comparison it seems that the frequency of these injuries in normal students of Kerman was lower than other cities in Iran and other places of the world. Perhaps the differences in climate, culture and society of Kerman with other cities is indirectly involved in this case. In other words, perhaps

fewer students in Kerman take part in the collective games which imposed them to the risk of trauma to the teeth. However, there is no scientific evidence available in this case and it requires further studies. Another finding of this study regarding the frequency in permanent teeth traumatic injuries of blind students was consistent with a study which was done in this case and reported this frequency as 32.50%.<sup>9</sup> Another study reported the frequency 16.90% among disabled school children and adolescents in Kuwait. But in that study, goal population was considered all of the disabled students attending the special needs. They were in the age groups of 3-20 years, who had visual impairment, hearing impairment, physical handicaps, or developmental disorders. The authors resulted that increasing age is a significant risk factor for occurrence of traumatic injuries.<sup>12</sup> In the present study, prevalence of dental injuries was not evaluated according to different ages. O'Donnell study showed fractures of anterior teeth are significantly more among totally blind children than in the partially blinds.<sup>13</sup> In our study, frequency of traumatic dental injuries was not evaluated according to severity of blindness.

It seems that unfortunately, blind students in comparison to the normal students are more exposed to dental injuries caused by trauma. Surely these defective teeth have further problems in terms of pain and discomfort, eating disorder, esthetic defect and imposing exorbitant fees for their treatment.

There are not many studies about frequency of permanent teeth enamel defects due to traumas to primary teeth. One study on 213 teeth showed that more than 40.00% of young patients had some changes on the

surface of their permanent teeth that the changes were follow-able to harming the primary teeth patients had previously.<sup>1</sup> A study among 538 children of 8-9 years old in Rasht showed that 23.40% of children had enamel defect at least in one tooth (12.80% of children had at least one molar tooth with enamel defect and 10.60% of them had at least one permanent anterior tooth with enamel defect).<sup>14</sup> Another study in Tehran among 1400 normal students of 8-9 years old indicated that 4.64% of them had enamel defect on their permanent anterior teeth.<sup>15</sup> Comparison between the findings of this study regarding the frequency of permanent incisor teeth enamel defect of normal students and the mentioned studies done in Rasht and Tehran indicates that frequency of enamel defects in permanent anterior teeth of normal children in Kerman is fairly close to the frequency of this defect among children in Rasht but is less than the frequency of this defect among children in Tehran. The reason of differences in results of these three studies can be due to the difference in age range of the children. In this study, the sample size was less than two other studies but the age range of children (6-12 years) was wider. The other two studies had investigated the age group of 8-9 years old. Some children, especially boys aged 8-9 years old, yet their maxillary lateral incisors may have not fully erupted,<sup>1</sup> so their enamel defects are not considerable well.

On the other side, another study in Tehran has mentioned the frequency of Hypoplasia 15.4% in permanent anterior teeth of healthy children following trauma to their primary anterior teeth. The reason for this high frequency is said to have a wide age range of sample (all elementary school levels).<sup>16</sup> No studies were available about investigating the frequency of enamel defects on the surface of

permanent incisor teeth of blind students, so in this regard, it was not possible to compare the results of this research with other researches. In this study, the frequency of enamel Hypoplasia on labial surface of permanent incisor teeth was more than the frequency of traumas to their primary incisor teeth. This could be for two reasons: first, the frequency of traumas to the children primary incisor teeth is registered based on their parents mind and memories, so parents may forget some traumas to their children teeth especially some traumas that were not sever in their mind. Second, some hypo plastic defects of children permanent incisor teeth may have some reasons other than trauma to their primary teeth such as root infection of primary teeth due to their decay, presence of excess fluoride in drinking water while formation and development of their permanent incisor teeth enamel.<sup>1</sup> These factors have led to the total increase of the frequency of these defects on the surface of the samples incisor teeth (false positive data). This study had some limitations such as the small sample size, cross sectional nature, therefore more studies in relation to these issues is necessary.

### Conclusion

The frequency of dental injuries and enamel Hypoplasia due to these injuries has a high rate among blind children in Kerman and this requires a greater attention to their teeth and in some circumstances they may be recommended to use mouth guards.

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### Conflict of Interests

Authors have no conflict of interest.

## References

1. Dean JA, Avery DR, Avery RE. McDonald and Avery dentistry for the child and adolescent. 9<sup>th</sup> ed. Philadelphia, PA: Elsevier Health Sciences; 2010. p. 97, 481.
2. Koch G, Poulsen S. Pediatric dentistry: A clinical approach. 2<sup>nd</sup> ed. New Jersey, NJ: John Wiley & Sons; 2009. p. 264-82.
3. Damm DD, Bouquot JE, Neville BW, Allen C. Oral and maxillofacial pathology. 3<sup>rd</sup> ed. Philadelphia, PA: Saunders/Elsevier; 2009. p. 56-8.
4. Raof M. Prevalence of traumatic injuries to the teeth in the 8-18-year-old girl students in Kerman, Iran. [DDS Thesis]. Kerman, Iran: Faculty of Dentistry, Kerman University of Medical Sciences; 2002. p. 13-21. [In Persian].
5. Abtehi M. Prevalence of traumatic injuries to the teeth in the 8-18-year-old boy students in Kerman, Iran. [DDS Thesis]. Tehran, Iran: Faculty of Dentistry, Kerman University of Medical Sciences; 2002. p. 8-17. [In Persian].
6. Ansari Gh, Mobini M. Epidemiologic assessment of traumatic injuries to the teeth in children referred to paedodontic dept. of Tehran and Beheshti Universities, 1997-1999. J Dent Sch 2001; 18(4): 287-96. [In Persian].
7. Farokh E. Prevalence of traumatic dental injuries and associating factors in the 7-14- year-old students in Mashhad, Iran. [Thesis]. Mashhad, Iran: Dental School, Mashhad University of Medical Sciences; 1999. p. 15-25. [In Persian].
8. Andreasen JO, Andreasen FM, Andreasen L. Textbook and color atlas of traumatic injuries to the teeth. 4<sup>th</sup> ed. New Jersey, NJ: Wiley; 2013. p. 244.
9. Bhat N, Agrawal A, Nagrajappa R, Roy SS, Singh K, Chaudhary H, et al. Teeth fracture among visually impaired and sighted children of 12 and 15 years age groups of Udaipur city, India-a comparative study. Dent Traumatol 2011; 27(5): 389-92.
10. Govindarajan M, Reddy VN, Ramalingam K, Durai KS, Rao PA, Prabhu A. Prevalence of traumatic dental injuries to the anterior teeth among three to thirteen-year-old school children of Tamilnadu. Contemp Clin Dent 2012; 3(2): 164-7.
11. Noori AJ, Al-Obaidi WA. Traumatic dental injuries among primary school children in Sulaimani city, Iraq. Dent Traumatol 2009; 25(4): 442-6.
12. Shyama M, al-Mutawa SA, Honkala S. Malocclusions and traumatic injuries in disabled schoolchildren and adolescents in Kuwait. Spec Care Dentist 2001; 21(3): 104-8.
13. O'Donnell D. The prevalence of nonrepaired fractured incisors in visually impaired Chinese children and young adults in Hong Kong. Quintessence Int 1992; 23(5): 363-5.
14. Vojdani J, Kaboudian M. Prevalence of enamel defects and associating factors in permanent incisors and first molars in 8-9 years-old children. J Guilan Univ Med Sci 2010; 19(27): 13-9. [In Persian].
15. Mehran M, Jalayer Naderi N, Hosseini M. The prevalence of enamel defects and its influencing factors among incisors and permanent first molars in 8-9 year - old children of Tehran in 2004. Majallah-I-Dandanpizishki 2006; 17(4): 114-20. [In Persian].
16. Mousavi M. The prevalence of enamel hypoplasia subsequent dental trauma among elementary student in Tehran. [DDS Thesis]. Tehran, Iran: Faculty of Dentistry, Shahed University; 1993. p. 27. [In Persian].