

Blindness to the Dental Needs of Children with Visual Impairments: Caregiver's Perspectives on Traumatic Dental Injuries

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ABSTRACT

Aim: To evaluate the prevalence of traumatic dental injuries (TDIs) among children with visual impairment in residential schools of Bengaluru, Karnataka, and the dental perceptions of parents/caregivers on its management.

Materials and methods: Two-hundred and twenty-one children with visual impairments within 8–14 years of age were randomly selected from three schools for the visually impaired in Bengaluru, Karnataka, and were examined clinically. Dental perspectives of the parents/care providers of these children with tooth fractures were conducted through a brief, unstructured, and an informal in-depth interview.

Results: 36 among the 221 children had characteristic TDIs. Crowding, spacing, and diastema were observed in only 1 child (2.78%) and increased overjet was observed in 23 children (63.89%). 23 (63.89%) children had class I and 13 (36.11%) had class II malocclusions, respectively. The most affected teeth by dental trauma were the maxillary incisors. 13 (36.11%) children had class I fractured teeth, 16 (44.44%) had class II, 5 (13.9%) had class III, and only 2 (5.56%) had class IV type of fractured teeth. Of the 36 children who had dental fractures, 29 (80.55%) had fractured their teeth due to fall, 2 (5.56%) due to collision, and 5 (13.89%) did not know the cause for their fractured teeth. The parents and caregivers could not give an adequate dental history for their child's traumatized teeth; wherever they could, the parents and caregivers were not willing to provide prompt dental treatments, stating the child's blindness as a reason for their avoidance of dental treatments.

Conclusion: In the present study, none of the children received any form of treatment for their fractured teeth and malocclusion. The parents and caregivers of the children were of the popular opinion that the dental treatments were not a priority since the child is visually impaired.

Clinical significance: Adequate oral care specifications and preventive procedures are of prime concern which should be instituted early on, with the dental health professionals providing coaching to the school employees and the parents/care providers to encourage quality oral hygiene and guide them in gaining admittance to adequate and timely dental aid.

Keywords: Dental neglect, Dental trauma, Prevalence, Qualitative interview, Visual impairment.

World Journal of Dentistry (2020): 10.5005/jp-journals-10015-1746

INTRODUCTION

An individual with a handicap or disability is someone who, over an appreciable time, is prevented by a physical or mental condition from full participation in the normal activities of his/her age group, including those of a social, recreational, educational, and vocational nature.¹ The term "disability" has recently been defined as just any impairment that restricts or limits daily activity in some manner.² Children with special needs experience lower degree of care and higher amount of dental disease^{3,4} and are more susceptible to TDIs when compared to their normal counterparts.^{5,6}

In India, around 200,000 children have greatly reduced vision and roughly around 15,000 live in residential blind schools, according to World Health Organization (WHO).^{7,8} Increased prevalence of oro-facial trauma, dental caries, and periodontal diseases are the oral health-related issues many of these children suffer from.⁹

Children who are at a higher risk to TDI with prevalence of 2.6–50% fall in the age group between 7 and 15 years.¹⁰ Among children with visual impairment percentage of TDI ranges from 27.4% to 36.4%.^{5,11}

There are multiple and variable causes of TDI: injuries caused while playing and injuries due to sports, fall, and accidents are the most likely reasons. Increased overjet and inadequate lip coverage are the prime possible elements for the damage to dental structures. Changes seen in facial mien, speaking disorders, disfluency, and

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How to cite this article: Bhandary S, Suresh LR, Shetty UA, *et al.* Blindness to the Dental Needs of Children with Visual Impairments: Caregiver's Perspectives on Traumatic Dental Injuries. *World J Dent* 2020;11(4):323–327.

Source of support: Nil

Conflict of interest: None

the mental/intellectual influences are the few outcomes of incisal trauma which affect the child's well-being in addition to the pain and possible infection.¹²

Supervising and maintaining their young children's oral hygiene and dietary routines are parents' responsibilities. Reports suggest that parents with good oral health knowledge play a better role

in maintaining good oral health in their children. Oral health knowledge is of greater importance among parents/caregivers of children with special healthcare needs.¹³

Blindness as a disability seems to produce difficulties to achieve an ideal oral health status. Various studies have shown that challenges to oral health are more complex for disabled children, who are often unable to adequately apply the techniques necessary to control plaque.¹⁴

Children with disabilities ought to have the same opportunities as their normal healthy counterparts regarding oral health and hygiene. Unfortunately, oral healthcare is one of the highest unattended health needs of the disabled children including visually impaired children.¹⁵ Hence, we have carried out a study with a primary objective to evaluate the prevalence of TDIs and its risk factors among visually impaired children in South Karnataka and a secondary objective to assess the attitude of the parents/care providers concerning their child's oral problems through a brief, unstructured, and an informal interview to promote their awareness and emphasize the significance of treating dental injuries and malocclusion.

MATERIALS AND METHODS

Administrative authorities of three residential schools for the visually impaired in Bengaluru, South Karnataka, were approached for obtaining consent to conduct dental screening and oral health program at their centers and enrolling the students as participants in this study. After obtaining approval from the authorities in school, letters of invitation were given to the parents through their class teachers to report on the day of oral examination. Ethical clearance was obtained from the institutional ethical committee of NITTE deemed to be university.

8–14-year-old children with visual impairment and who were inclined to take part in the examination with written informed consent from their parents/care providers were included in the study. A brief medical/dental history was recorded and maintained for all children. Children suffering from any other handicapping or systemic conditions and children who were undergoing orthodontic treatment or had undergone similar corrections of malocclusion were excluded from the study.

Oral examination of these children was done at their respective schools/centers, seated on an ordinary chair, under good illumination, either natural light or hand torch using a sterile mouth mirror, and community periodontal index (CPI) probe while taking protective cross-infection control measures using disposable gloves and masks.

The following findings were assessed as part of dental examination:

- Lip coverage: The anterior teeth was examined for lip coverage for every child when at rest. The lip coverage was considered sufficient if the lip covered the maxillary incisors at rest, and if the crown length was seen, it was considered deficient.
- Overjet: An overjet of more than or equal to 3 mm was considered significant.
- Occlusal disturbances: crowding, spacing, and diastema were recorded using WHO Oral Health Assessment Form (1997).¹⁶
- TDI: All upper and lower anterior teeth were inspected for dental injury due to trauma. Ellis and Davey classification (1960)¹⁷ was used to record the fractured teeth of all the children. Examination was done to know the class of fracture, origin/source of trauma, and site of trauma.

- Molar relationship: It was recorded according to Angle's System of Classification for Malocclusion (1899).¹⁸

Attitude of the parents/care providers of these children regarding their child's dental problems was also assessed through a brief, unstructured, and an informal interview to meet the secondary objective of the study and to prepare them for the dental education and raise their awareness and highlight the importance of treating dental injuries and malocclusion in their children.

All examinations were conducted by a single examiner to eliminate interexaminer variability and bias.

Descriptive analysis was performed after tabulating the results. Chi-square test was used to determine the association with the level of significance at 5%. Prevalence risk ratio (PRR) was calculated for risk factors that showed significant association with dental trauma.

RESULTS

A total of 221 children with visual impairments were clinically examined in this study. The mean age of the children was 10.46 (± 1.74) years. Among the children, 36 (16.3%) had sustained dental trauma to their maxillary anterior teeth. This put the mean age of the study group of children at 10.61 (± 1.67) years. Among the risk factors for TDI, the presence of adequate lip coverage, increased overjet (>3 mm), and the type of malocclusion (molar relationship) were found to have significant association with TDI (Table 1).

The assessment of PRRs was calculated for the risk factors that were found to be significant (Table 2). Thus, in our study, it was found that children with visual impairments who had inadequate lip coverage, increased overjet (>3 mm), and had Class II molar relationship were 17.99, 12.19, and 8.32 times more likely to be present with TDI than those without these risk factors, respectively.

Table 1: Prevalence of various predisposing factors to TDI

Characteristic		Among all children (%)	Among children with TDI (%)	Chi-squared test (p value)
Gender	Male	97 (43.89)	14 (38.89)	0.061 (0.804)
	Female	124 (56.11)	21 (61.11)	
Crowding	Present	8 (3.62)	1 (2.78)	0.000 (1)
	Absent	213 (96.38)	35 (97.22)	
Spacing	Present	5 (2.26)	1 (2.78)	0.000 (1)
	Absent	216 (97.74)	35 (97.22)	
Diastema	Present	2 (0.9)	1 (2.78)	0.017 (0.894)
	Absent	219 (99.1)	35 (97.22)	
Lip coverage*	Inadequate	36 (16.29)	28 (77.78)	59.341* (<0.001)
	Adequate	185 (83.71)	8 (22.22)	
Overjet ≥ 3 mm*	Present	28 (12.67)	23 (63.89)	47.888* (<0.001)
	Absent	193 (87.33)	13 (36.11)	
Molar relationship*	Class I	206 (93.21)	23 (63.89)	29.276* (<0.001)
	Class II	14 (6.34)	13 (36.11)	
	Class III	1 (0.45)	0 (0)	

*Chi-squared test: parameters were statistically significant ($p < 0.05$)

The types of TDI sustained and the traumatic incident leading to it, as elicited from the children during their clinical examination and brief dental history recording, are summarized in Table 3.

Interview of the parents and caregivers showed that they knew the presence of TDI in their children; however, only 4 of the 28 parents interviewed (14.3%) were able to give a good history of the dental injury. This was also the case with the caregivers of the children, where only 1 of the 8 caregivers interviewed (12.5%) could give an adequate history for the dental trauma sustained by their ward.

It was interesting to note that the parents of all the children who gave a positive history for dental trauma also reported that their children had other dental needs, such as dental caries, pain, swelling, and so on, at some point of time in their life; however, only 3 of the 36 (8.3%) had been to a dentist prior to this study. Among these three children, two had visited the dentist with the dental complaint of pain but not for the traumatic injury or malocclusion. Only one of all the 36 had visited the dentist for pain due to dental trauma (class III dental fracture), and even in this case, dental treatments were not sought beyond symptomatic relief of pain through medications.

When the parents and caregivers were asked why dental treatments such as “fillings,” “caps,” or “root canal treatments”

were not carried out for the broken teeth of their children, they responded by saying that:

- “It was not a big problem”
- “Other problems are also there. This is ok”
- “(He/She) cannot see. It will be ok”
- “It is not making problem. (He/She) can eat”
- “Need to go (to the dentist), but later. Now other things (medical and financial issues) are there. (He/She) is ok now”
- “(He/She) did not say anything”

An analysis of the themes identified and derived from these opinions are summarized and presented in Table 4.

DISCUSSION

Most body functions are taken for granted as long as they function normally; however, it is when these normal body functions are interrupted by illnesses, medications, anomalies, or disabilities that we begin to understand their relative importance in determining our quality of life. Our senses help determine and form a larger aspect of our way of perceiving the environment and the world we live in. Therefore, we come to understand that the development of a child with one or more of these senses was compromised, maybe severely altered.

Among those individuals with sensory impairments, children with visual impairments deal with a unique set of problems that are of concern to the pediatric dentist. For one, their lack of visual impulses put them at greater risk for falls and accidents while performing day-to-day activities, which in-turn predisposes them

Table 2: PRR for children with visual impairments presenting with dental trauma from risk factors

Risk factors [#]	Exposure condition	Traumatic dental injuries		PRR calculated (95% CI)
		Present	Absent	
Lip coverage	Inadequate	28	8	17.99 (0.596, 0.873)
	Adequate	8	177	
Overjet ≥ 3 mm	Present	23	5	12.19 (0.608, 0.900)
	Absent	13	180	
Molar relationship	Class II	13	1	8.32 (0.675, 0.959)
	Class I	23	183	

[#]PRR was calculated only for those risk factors that were found to be significantly associated with TDIs in the children, using Chi-squared test (Table 1)

Table 3: Among those with TDIs

Characteristic	Numbers	Percentage	
Fracture type ¹⁷	Class I	13	36.11
	Class II	16	44.44
	Class III	5	13.89
	Class IV	2	5.56
Type of Injury ⁺	Fall	29	80.55
	Collision	2	5.56
	Don't know/don't remember	5	13.89

⁺History was elicited from the children. This was later attempted to be corroborated with the parents/caregivers

Table 4: Dental perceptions among parents and caregivers of the children with visual impairments

Opinions on child's TDI	Theme Identified	Area of focus for dental education
“Not a big problem”, “it is ok”	Dental needs are of low priority.	Possible outcome: decreased care and delayed presentation Sequelae of dental trauma Awareness of resources
“Other problems are also there (medical and financial issues)”	Dental needs are of low priority in light of other burdens.	
“Cannot see...will be ok.”	Esthetic concerns are of low priority in light of the visual sensory deficit in the child.	Sequelae of dental trauma
“It is not making problems.”	Absence of symptoms.	Understanding of dental disease and treatment
“(He/She) can eat”	Functional needs are prioritized	Dental health literacy
“...(will) go (for dental treatment)...later.”	Dental avoidance	Sequelae of dental trauma; Awareness of resources
“(He/She) did not say anything.”	Dependence on child's perception of needs.	Understanding of dental disease and treatment; dental health literacy

to oro-facial trauma and TDI. Their impairment further detracts the performance of oral healthcare measures, as a larger part of our dental health education imparted to children employs conventional teaching-learning methods. These conventional strategies are heavily reliant on the children's visual assessment and the imitation of techniques taught to them through demonstrations. Dental trauma is often an emergency situation that can benefit greatly from public awareness and early dental care. Thus, an intimate knowledge of the circumstances surrounding the dental needs of these children becomes paramount in the development of future dental health programs and strategies.

With respect to the prevalence of anterior tooth fractures among children with visual impairments in our study, it was seen to be 16.3% (36 of total 221 surveyed). This was similar to a study conducted by Al-Shareed et al.¹⁹ in 2003, where they reported a prevalence of 14.2%. Other studies conducted by Odonell (36.4%),¹¹ Shyam et al. (24.6%),²⁰ and Bhat et al. (24.5%)²¹ showed higher percentage of teeth fracture. Of the 36 children, female children (61.11%) had higher incidence of fractured teeth than male children (38.89%). Literature stipulates that the reason for this high prevalence of TDIs among children with visual impairments could be primarily attributed to their relative lack of visual cues that neither suggest the presence of obstacles to prevent a fall nor the availability of support mechanisms to impede the impact of their falls. Intuitively, many children with visual impairments resort to less social interactions and outdoor activities, especially to unknown areas and layouts. This could act as a protective mechanism, thereby reducing traumatic incidents, which would consequently reduce their TDIs as well.

Observations from this research disclosed that the most prevalent teeth to be affected were the upper incisors (63.89%). Since upper incisors take a forward position in the face of an individual, they normally are prone to sustain greater impacts from traumatic incidents such as falls and collisions than do the laterals or any other teeth in the oral cavity. In normal occlusion, these upper incisors are forwardly placed than the lower incisors and hence are more prone to sustain a direct hit causing injury. Also, the maxilla is anchored to the skull making it inflexible than the mandible which is flexibly joined to the skull through the temporomandibular joint that adds to the cushioning effect of impact forces directed toward it.²⁰

Our study revealed that majority of the fracture took place because of accidental falls (80.55%) in our study population. This observation was similar with Odennell¹¹ and Bhat et al.²¹ Traumatic dental injuries were also reported to have occurred due to collision impact against a wall in 5.56% of the children. This could again be due to their reduced visual perception.

This study also exhibited that an increased overjet (≥ 3 mm) had higher prevalence of TDIs (63.89%). Nguyen et al.,²² Zaragoza et al.,²³ and Bhat et al.²¹ in their studies also arrived at a similar declaration. The current investigation also disclosed that children with insufficient lip coverage had more chances of sustaining anterior tooth fracture, which was in concurrence to a study carried out by Marcanes et al.²⁴ Adequate lip coverage offers upper anterior teeth a protective cushion against traumatic impacts and support against injuries. Thus, inadequate lip closure, coupled with increased interlabial distance, leaves maxillary incisors susceptible and vulnerable to TDIs.

The pattern of trauma in this study showed that Ellis class II fracture involving enamel and dentine was the most common

(44.4%), followed by class I fracture involving dental enamel only (36.11%). Only 5 of the children had class III fracture (13.89%) with enamel, dentine, and pulp involvement, and 2 showed class IV trauma (5.56%) where the tooth was rendered nonvital. This pattern is in discordance with the studies conducted by Munot et al., in children from Chhattisgarh,²⁵ and Ramaiah and Maraiiah, in children from Shimoga (also in Karnataka),²⁶ where class II fractures were most common, followed by class I and class III. No case of tooth avulsion was reported or observed in our study population.

None of the children in our present study received any form of treatment for their fractured teeth or malocclusion though all their parents and caregivers knew about the same. This is evident of a lack of prioritization of dental needs and thereby a level of dental neglect in these children. The themes identified from the interview conducted with the parents and caregivers of these children reflect these inferences. Among other concerns that lead to a decreased care and delayed presentation of teeth with TDIs to the dentists' are the parent/caregivers' reliance on the children's perceived dental needs and symptomatic dental concerns. Children with visual impairments are relatively unaware of minor orthodontic problems such as increased overjet and asymptomatic dental fractures (such as class I, class IV, and even some class II fractures). Esthetic problems that would normally concern their counterparts without visual deficits also receive low priority. The parents/caregivers' lack of understanding of the need for timely dental management of TDIs and its predisposing factors through early orthodontic interventions contribute to the problem further. Dental treatment is an added burden for these children and their families, adding to the already strained emotional and financial limitations imposed by their disability.²⁷

Even though the dental profession wants to serve this group, capacity is sometimes restricted because of the lack of knowledge and experience and a constrained work environment. Thus, the identification of areas to focus for imparting dental health education could go a long way in increasing the acceptance of preventive and public health measures, which are often the most readily available, feasible, and cost-effective solution for the dental concerns of this population.

It is our suggestion that joint ventures of the healthcare organization targeting children with visual impairments should include oral health education programs with emphasis on the management of dental trauma. These programs should cater to creating and raising dental awareness to the parents and caregivers and the children with visual impairments separately, in their preferred formats (such as pamphlets in braille or audio recordings for the children, audio/visual programs for their parents/caregivers). The areas of focus identified in this study could help give a starting point to such educational efforts.

LIMITATIONS

A key limitation of this study is that it was conducted in three residential schools for the visually impaired in a key metropolitan city of Karnataka, South India. The inclusion of a more mixed crowd from various schools in the location would have made the results more generalizable. Also, the final sample of children with visual impairments, who had suffered TDIs, was, fortunately or unfortunately, less; any results drawn from this subset should be viewed cautiously. Further, as with all opinion surveys and qualitative studies, it must be noted that the recollection of

information by the parents and caregivers is subject to bias. The low dental awareness evident in them is also expected to have added to this bias in their opinions. Therefore, while their opinions do ring true to the purpose of this study, they severely limit the degree of insight that they could have provided, if the same were replicated in a more selective set of participants. Still, with the definite paucity of studies in dental literature that have explored the perspectives of this subset of children with special needs and their caregivers, our study may be considered an invaluable addition to their management in dentistry.

CONCLUSION

There is a definite requirement to strengthen the dental health programs which will guarantee the participation of parents/caregivers of children with visual impairments and the children themselves. Adequate oral care specifications and preventive procedures are of prime concern which should be instituted early on, with the dental health professionals providing coaching to the school employees, parents/care providers to encourage quality oral hygiene and guide them in gaining admittance to adequate and timely dental aid. Collaborative initiatives between community service workers and oral well-being providers should be fortified to warrant that these children are sufficiently served by our profession.

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