

RESEARCH PAPER

Prevalence of anterior teeth fracture among visually impaired individuals, India**Anil Agrawal, Nagesh Bhatt, Karanprakash Singh, Harshvardhan Chaudhary, Prashant Mishra, Kailash Asawa, Santanu Eem Roy****Abstract**

Aim: The aim of the study was to determine the prevalence of anterior teeth fracture among visually impaired individuals. **Materials and methods:** A cross sectional study was carried out among 103 blind individuals (70 males and 33 females), with age ranges from 10 to 29 years. The survey was carried out according to WHO criteria and by using WHO classification for teeth fracture. All the subjects were divided in to two groups on the basis of whether they are partially sighted or totally blind. Data were analyzed using chi- square test, with keeping level of significance at $p < 0.05$. **Results:** An overall prevalence of 34.95 % of traumatic injuries to anterior teeth was found in the study population with no significant difference between both the groups ($p < 0.05$). Female were having significantly more fracture than males ($p < 0.005$). Fall being indoor was the most common cause. Permanent maxillary central incisors were most commonly injured with injuries involving enamel and dentin being the most frequently observed. Increased overjet and inadequate lip coverage were significantly associated with the occurrence of trauma ($p = 0.0001$). **Conclusion:** The prevalence of dental injuries in a group of individuals with blind. This should alert caregivers to carry out a profound investigation of the events and suggest methods to reduce this type of morbidity.

Key words: Teeth fracture; Prevalence; Visually impaired individuals.

Received on: 12/10/2010 Accepted on: 12/11/2010

Introduction

The world health organization defines an individual with handicap as one 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) Previous studies have noted that children with disabilities have higher levels of dental disease and lower levels of care. (3,4) Traumatic injuries are more prevalent in children with disabilities compared with normal children. (5,6)

Blindness is one of the most prevalent handicap conditions worldwide, it occurs mainly in low income or developing countries like India, than in high income countries. According to WHO estimates, approximately 314 million people worldwide live with low vision and blindness, of these, 45 million people are blind and 269 million have low vision. Of which about 5 million resides in India and it is estimated that at least 200000 children in India have severe visual impairment or blindness and approximately 15000 are in schools for the blind, main causes of blindness includes corneal scarring and inadequate sanitations. (7,8) Blind individuals suffer from many health problems including oral health, which consist of mainly orofacial trauma, dental caries and periodontal diseases, of this

orofacial trauma consist of main health hazards for visually impaired individuals. (9)

School age children are considered to be at higher risk (7- 15 years) to traumatic injuries. The percentage presented in the literature ranges from 2.6% to 50% (10) and among visually impaired it ranges from 27.4% to 36.4%. (5,11) Incisors have an important role in esthetics, phonation, and psychological aspects and in functional activities; upper incisors are the most frequently affected teeth by trauma, over 90% according to Sarghou et al. (10) The etiology of teeth injuries are variable and multiple, the dominant factors most likely to cause the trauma are fall, sports injuries and accidents met at home or outside. The major risk factor for dental injuries is increased over jet and inadequate lip coverage. In addition to pain and possible infection, the consequences of incisal trauma include alteration in physical appearance, speech defects and psychological/emotional impacts, thus affecting the child's quality of life. (12) The prevalent nature of incisal trauma, its substantial impact on quality of life. (12)

Hence, a study was carried out with the aim to find out the prevalence of anterior teeth fracture among blind individuals in Udaipur city and the objective was to know the probable cause and risk factors of anterior teeth trauma and to suggest preventive measures and to create awareness of traumatic injuries among blind individuals.

Materials and methods

This cross sectional study was conducted among 103 visually impaired individuals who were recruited from all the available blind schools of Udaipur city, Rajasthan, India, which includes one Government and one Private blind school. All the subjects available at the time of study were included. Study was conducted on month of 5 - June and 30-July. Informed consent taken from all the participants. The approval for the study was obtained from the ethical committee of pacific dental college and hospital and before commencement of study from both the blind school authorities.

Inclusion criteria

1. Individuals those who were willing to participate in the study.
2. Individual's not undergone or undergoing orthodontic treatment.

Exclusion criteria

1. Individuals undergoing or undergone orthodontic treatment.
2. Supernumerary teeth.
3. Restored teeth.

All the subjects were divided on the basis of whether they are partially sighted or totally blind. Partially sighted individuals were further not divided on the basis of type of partial sightness to prevent more complications. The Performa was pilot tested on 20 subjects before starting of main study and those did not participated in the final study.

A type III examination was carried out by one examiner. A single examiner, trained and calibrated for the criteria used, conducted both the interview and the clinical examination. The clinical examination was carried out under natural daylight conditions with subjects seated on a chair with a high backrest and the examiner standing behind the subject. The standard conditions for examination, infection control, and data recording were followed according to the World Health Organization (WHO) Basic Oral Health Survey Guidelines (1997). (13) A sufficient number of plane mouth mirrors, Community Periodontal Index (CPI) probes, and gauze pads were packed for each day of work. Each subject was then examined for the measurement of maxillary incisor overjet using the CPI probe as described by the 1997 WHO Basic Oral Health Survey Guideline. (13) Prior to the intraoral examination and without the subject being aware of being observed, the lip coverage of the incisor teeth was assessed for each child. If the lips covered the upper incisors in the rest position the lip coverage was considered to be adequate. If however, the lips failed to cover the upper incisors, and the majority of their crown height was exposed the lip coverage was recorded as inadequate.

Next, all maxillary and mandibular anterior teeth from canine to canine were examined for traumatic injury. Trauma was scored according to

WHO classification (1993) 873.60 Enamel fracture, 873.61 Enamel and dentine fracture without pulp exposure, 873.62 Enamel and dentine fracture with pulp exposure, 873.63 Root fracture, 873.64 Crown-root fracture, 873.66 Concussion, luxation, 873.67 Intrusion, extrusion, 873.68 Avulsion, 873.69 Soft tissue injuries

All mentioned teeth were examined to know the type of fracture, cause of trauma, and place of trauma.

Analysis

Data analysis was done using SPSS version 11.5 (SPSS, Inc., Chicago, IL, USA) and included descriptive statistics (frequency distribution and cross tabulation). Statistical significance for the association between occurrence of dental injuries and lip coverage, and maxillary overjet among both the partially sighted and totally blind individuals adjusted with age and sex was carried out using the Chi-square test. The level of significance set was $p < 0.05$.

Results

A total of 103 subjects formed the study sample: 70(68%) males and 33(33%) were females. Of them 73.8% were partially sighted and 26.2% were totally blind.

Prevalence and Distribution of Anterior Tooth Injuries

It was found that the overall prevalence of teeth fracture was 34.95% with prevalence of fracture

Gender	No. of teeth not fractured (%)	No. of teeth fractured (%)	TTotal (%)	² value
Female	51(72.9)	19 (27.1)	70(100)	.86*
Male	16(48.5)	17(51.5)	33(100)	

Table 1: Distribution of total teeth in population and sex.
* $p=0.015$; statistically significant at $p < 0.05$

of teeth among males was 27.1% and females was 51.5% which is statistically significant at $p < 0.05$ (Table1).

Fracture of anterior teeth tends to correspond to certain age group and growth phases (14). The blind individuals were divided in two groups on basis of fracture of their anterior teeth, 10 to 19 years in which 71.4% were partially blind and 66.7% were totally blind, and 20 to 29 years in which 28.6% were partially blind and 33.3% were totally blind, it was found that totally blind were having statistically significant difference between both the age group ($p < 0.05$) and partially sighted group was not significant (at $p < 0.05$) (Table 2).

All the subjects were having single tooth fracture, with right and left central incisors as most

common teeth to be fractured [right central incisors 52.8% and left central incisor 13.9%] and overall central incisors accounted for about 24(66.7%) of fracture teeth, it was observed that partially blind subjects were having more fracture 58.3%,out of which right central incisor 61.9% was most common tooth to be fractured followed left central incisors and left lateral incisor, among totally blind individuals it was found that 41.7% had fracture of their teeth with 40% was right central incisors and 20% had left central incisors, followed by left and right lateral incisors. It was found that only one-one maxillary canine was fractured in both the groups with only one mandibular canine was fractured in partially blind individuals, it was statistically not significant between partially sighted and totally blind individuals. (Table3).

	10 - 19 yrs (%)	20 - 29 (%)	X ² value
Partially sighted	15(71.4)	6(28.6)	1.66**
Totally blind	10(66.7)	5(33.3)	3.85*

Table 2: Distribution of subjects with fracture teeth by visual impairment and age.
*p= 0.05 (significant at p< .05), ** not significant

It was seen that most of teeth having fracture were involving enamel and dentine in both the groups [52.3% among partially sighted and 60% among totally blind individuals] with fractures involving only enamel was 33.3% among totally blind and 38.09 % among partially sighted subjects. Fracture involving pulp was very less with only one-one in both groups, which was found to statistically not significant between both the groups. (Table 3).

	11*	12*	21*	22*	23	43*	Total
Totally blind	2	0	1	1	1	0	5
873.60							
873.61	3	2	2	2	0	0	9
873.62	1	0	0	0	0	0	1
Total for totally blind	6	2	3	3	1	0	15
Partially sighted	3	1	1	2	1	1	9
873.60							
873.61		0	1	1	0	0	11
873.62	1	0	0	0	0	0	1
Total for partially sighted	13	1	2	3	1	1	21
X ² value	.72**	3**	.13**	.41**	NA	NA	

Table 3: Fracture of individual teeth by type of visual impairment.
*FDI notation of teeth and included only the teeth which had fracture.
** not significant at p< 0.05, NA not applicable.

Risk Factors

It has also been found over jet of more than 3.5 mm have increased risk of sustaining traumatic injuries to teeth 24 (85.7%) with only 16% of teeth having normal over jet were fractured which was statistically significant (p= 0.0000). 81.3% of the adequate lip coverage blind individuals not having teeth fracture, with 78.6% of the non adequate lip coverage blind individuals having teeth fracture. (Table 4).

Overjet	No. of teeth without injury (%)	No. of teeth with injury (%)	Total (%)	X ² value
Normal over jet	63(84%)	12(16%)	75(72.8)	43.58*
Increased incisor over jet(>3.5mm)	4(14.3%)	24(85.7%)	28(27.2)	

Table 4: Relation of anterior tooth fracture with maxillary over jet.
*p value=0 .0001; highly significant at p < 0.05

Cause of Injuries

52.8% injury to teeth was due to fall in both the groups followed by collision against object which accounted about 22.2%, sports 19.4% and unknown 2.8%, which was found to be statistically not significant (p value = 0.66) between both the groups, with 61.1 % of injury were indoor for both the group followed by 30.6% for outdoor and 8.3% unknown, which statistically not significant.

Discussion

This cross sectional study evaluated the prevalence of anterior teeth trauma among visually impaired individuals, the overall prevalence of teeth fracture among both partially sighted and totally blind individuals was found to be 34.95%, of them partially sighted individuals was 58.33% which had sustained fracture of an anterior teeth and 41.67% of totally blind had fracture of anterior teeth in the present study, which was also similar to other study reported by 36.4% by Odonell in 1992 (11), 27.4% by Greeley et al in 1976 (5), and 24.6% by Maddi Shyam in 2001 among blind individuals. (15)

In this study it was found that females were having significantly more teeth fracture than males (p<0.05), which was contrast to other studies in which males than in females in the sighted population about 1.2-2.3 times more and about 4: 1 in attention-deficit/ hyperactivity disorder patients. (16-19)

Prevalence of traumatic injuries incidence rate fall during adolescence, adolescent do continue to experience dental injuries most often because of sports related accidents among sighted individuals

(20,21) among totally blind individuals there was statistically difference between 10 to 19 years age group and 20 to 29 years (more among 10 to 19 age group) but no substantial difference was found between partially sighted and totally blind individuals, similar findings were found in study done by Odennell in 6-14 years and 15-24 years of blind individual. (11)

In the present study trauma was found more often in maxilla and in the central incisor and in the both partially sighted and totally blind individuals, which is quite consistent with the findings of other studies of sighted individuals (22,23) and disabled children. (15) The reason being its venerable position in oral cavity, frequent protrusion of incisors and inadequate lip coverage hence reducing the cushioning effect. In the present study, injury involving enamel and dentine was found to be most common in both the groups independent of type of blindness, which is similar to studies conducted by Pavan Baldava (9), unlike other studies conducted by Pettit in which enamel was most commonly fractured. (24)

The most common cause and place of traumatic injuries to anterior tooth has been shown to vary between population and across age groups, falls that in indoor was most common cause and place of injury irrespective of type of blindness in our study, similar finding were reported by study conducted in cerebral palsy patient (25) unlike other studies reported in sighted individuals were sports related injuries were most common (24,26) this can be explained by the children with visual impairment spent most of their time inside their homes or institutions.

As seen with several studies of sighted individuals the risk of injury to anterior teeth trauma increased significantly with increase in incisal overjet by more than 3-4 mm (27,28) and inadequate lip coverage (26) which is also found statistically significant factor in present study for occurrence of trauma to anterior tooth among blind individuals.

The sample size of this present study was less, so the findings cannot be generalized to whole blind population. Hence, more studies in this field is required with increased sample size to find the more accurate findings, as our findings indicate that there is an very high prevalence of fracture teeth among visually impaired individuals than the other studies conducted in sighted individuals. Moreover there are very few studies on dental trauma among visually impaired and only one study on prevalence of anterior tooth fracture among this population (5,11,15) so the findings of our study has been compared with individuals from sighted, disabled,

handicapped, and attention-deficit/hyperactivity disorder populations.

Conclusion

Although a higher prevalence along with more severe traumatic injuries to anterior teeth were found in the present study among blind individuals and they receive less oral health care as compared to similar subjects from the general population.

So, there is distinct need for the strengthening of advocacy programs that will ensure the availability of comprehensive preventive and oral health care for this group. It is important for preventive measures and instruction to be institutionalized at an early age. The Ministry of Health should provide in-service training to institutional staff, and to parents to promote good oral health in children and adults with visual impairment, to help them access care. Coordinated efforts between social services and oral health care providers should be strengthened to ensure that the profession adequately serves these children. Screening programs could be conducted for blind children to identify those with high anatomic and behavioural risk for occurrence of traumatic injury to the anterior teeth, so appropriate preventive measures such as preventive orthodontic treatment and use of mouth guards can be implemented.

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