Prevalence of Traumatic Dental Injuries among Visually, Speech and Hearing-Impaired Children Attending the Special Schools of Nizamabadh City, Telanganastate, India.

Kola Srikanth **REDDY*,** Challagulla **ANUSHA*,** Nandini **BIRADAR**,** Sukka **BHAVANI*,** Pushpalatha **HALMATH***, Manda **ARAVIND*.**
*Department of Paedodontics & Preventive Dentistry, Meghana Institute of Dental Sciences, Nizama Badh, Telangana State, India.
**Department of Conservative Dentistry & Endodontics, S.B Patil Dental College & Hospital, Bidar, Karnataka State, India.

Correspondence
Dr. Kola Srikanth Reddy

Department of Paedodontics & Preventive Dentistry, Meghana Institute of Dental Sciences, Nizama Badh, Telangana State, India.
Email Address: kolasrikanthreddy@gmail.com

ABSTRACT

Background: Studies on dental trauma of the non-disabled population have been carried out in the past, but limited data are available on dental trauma of the visually, hearing and speech impaired children, especially in Nizamabadh, Telangana State, India.
Objective: To determine the prevalence of traumatic injuries (TDI) among visual, speech and hearing-impaired children in Nizamabadh, Telangana State.
Materials and methods: An epidemiological study in the form of a school dental check-up was carried out among 134 children aged 6 to 15, of whom sixty (60) and seventy-four (74) were visually and speech/hearing impaired, respectively. The survey was carried out with the use of the WHO classification for traumatic dental injuries. All the subjects were divided into 2 groups. Data were analysed using Fisher's Exact test, and the level of significance was set at $p<0.05$.
Results: The results showed that 17.91% of the study population had one form of traumatic injury or another to their anterior teeth. Among the visually impaired group, 23% had TDI, while those with speech and hearing impairment had 5.4% TDI. There was a statistically significant association between visual impairment and TDI (p-value = 0.0011), and the odds of experiencing dental trauma are approximately 5 times higher in visually impaired children compared to children with speech and hearing impairments.
Conclusion: There is a moderate prevalence of TDI. While a higher moderate prevalence of TDI was seen among the visually impaired, a low prevalence was seen among the speech and hearing-impaired children. Children living with disabilities are at risk of multiple TDIs; thus, the need for awareness creation, health education and periodic screening cannot be overemphasized.
Key words: Disabled children, Prevalence, Traumatic dental injuries

Kola S. Reddy
https://orcid.org/
Challagulla Anusha
https://orcid.org/
Nandini Biradar
https://orcid.org/
Sukka Bhavani
https://orcid.org/
Pushpalatha Halmath
https://orcid.org/
Anusha Challagulla
https://orcid.org/
Manda Aravind
https://orcid.org/
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INTRODUCTION

Disability is an umbrella term, covering impairments, activity limitations and participation restrictions. Impairments are problems in body functions or structures, while activity limitations are difficulties encountered by an individual in executing tasks or actions.[1] Among the various challenging conditions, visual impairment is highly prevalent, particularly in low- and middle-income countries, and especially among older populations.[2] According to the World Health Organization (WHO), at least 2.2 billion people globally have a vision impairment or blindness (WHO, 2021). Conditions such as uncorrected refractive errors and cataracts are leading causes and are often preventable or treatable.[2] It is estimated that in India, 200,000 children suffer from severe visual impairment, out of which only 15,000 are enrolled in schools for blind children, [3] with corneal scarring and inadequate sanitation accounting as the main causes of blindness.

Children with hearing and speech impairments have been reported to have poorer oral health compared to their normal counterparts.[4,5] Despite a high prevalence of dental caries, gingival diseases, and dental traumatic injuries, these issues often remain neglected. This is primarily due to their inability to understand oral health instructions, difficulty in expressing their problems to dental practitioners, and the lack of proper training or reluctance among dental practitioners to manage such children.[6] Visual, speech and hearing-impaired children suffer from a variety of health problems, including orofacial trauma, dental caries, and periodontal diseases. Among these problems, orofacial trauma is the most common health hazard.[7]

Limited data exist in the literature as regards anterior teeth trauma among sensory-impaired children, and our literature search did not reveal any published study on the prevalence of dental trauma among the visual, speech and hearing-impaired and institutionalized individuals in Telangana state. Hence, the present study assessed the prevalence of dental trauma among institutionalized visually impaired and hearing-impaired children aged 6-15 in Telangana state.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted to assess the prevalence of TDIs in children attending various special schools for the visually, speech and hearing-impaired children aged 6-15 from Nizamabadh, Telangana state, India. A total of one hundred and thirty-four institutionalised sensory-impaired children without other systemic impairment participated in the study. Sixty were visually impaired, while seventy-four had speech and hearing impairments. Excluded were children undergoing orthodontic treatment, those who declined examination, had developmental tooth defects, and those with tooth loss due to reasons other than traumatic dental injuries. The study was explained to the school authorities, and permission was obtained. Details of the examination to be carried out were explained to the legally accepted representative of the child, informed consent was obtained, and strict confidentiality was maintained throughout the study. The approval was granted by the Institutional Human Ethics Committee.

A schedule for data collection, along with a clinical examination, was prepared. The examinations were carried out in the institution after having obtained the demographic details of the study participants from the school records. Visual, hearing and speech-impaired children were gathered in a well-lit class with sufficient natural daylight and asked to sit on a comfortable chair. Each child was then examined individually for trauma to anterior teeth by a single examiner with the use of hand gloves, face masks, mouth mirrors and community periodontal index of treatment need probes. TDIs were recorded based upon the field screening for epidemiological classification of TDIs, including codes of the WHO International Classification of Diseases to Dentistry and Stomatology[8] (Appendix I). The detailed examination records included aged groups, presence or absence of trauma to the hard tissue and where present, the type of trauma to the tooth. Statistical analysis was done using Statistical Package for Social Sciences version 17, Chicago Inc., USA (IBM Corp). Test of significance was done using Fisher's Exact test, with a level of significance set at $p<0.05$.

RESULTS

A total of one hundred and thirty-four special health care needs children, with the age range of 6 to 15, with sixty visually impaired and seventy-four with speech and hearing impairment. Of the sixty (60) visually impaired sample population participants, 14 children had one form of traumatic dental injury or the other, accounting for a prevalence of 23.33%. Those aged 9–11 had a higher percentage of traumatic dental injuries (31.25%), followed by 6 to 8 and 12- to 15-year-old children (22.73%). The relationship between the aged group and trauma

was not statistically significant, with p=0.440. [Figure 1]

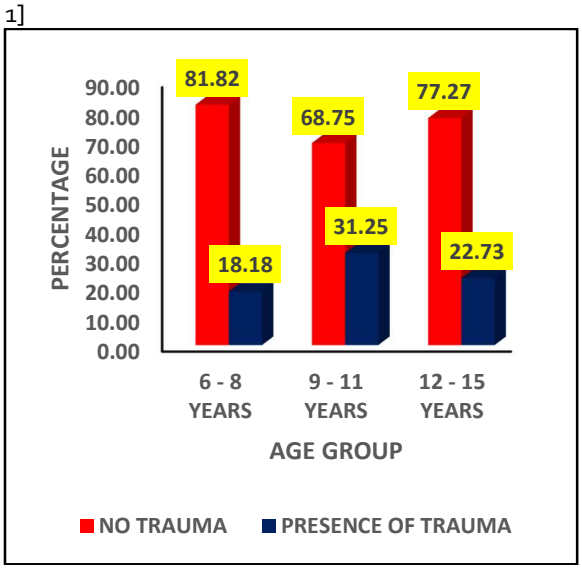


Figure 1. Prevalence of TDI among the visually impaired children

Out of a total of 74 subjects that formed the study sample population with speech and hearing impairment, 4 subjects had one form of traumatic dental injury or the other, accounting for a prevalence of 5.4% among the hearing and speech-impaired population. Those aged 12–15 years had a higher percentage of traumatic dental injuries (8.0%), followed by 6 to 8 and 9- to 11-year-old children (4.0%). The relationship between the aged group and trauma was not statistically significant, with p=0.456. [Figure 2]

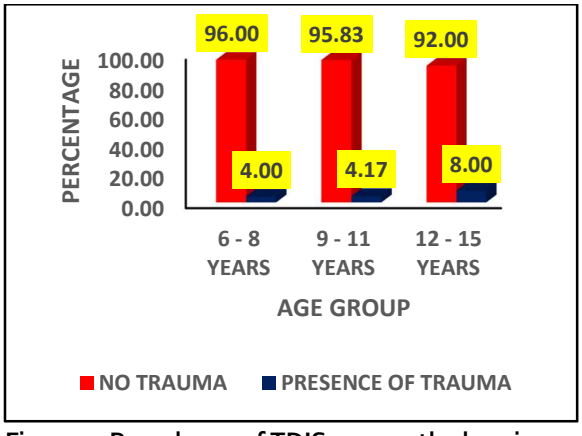


Figure 2: Prevalence of TDIS among the hearing and speech-impaired children.

The overall prevalence of traumatic dental injury for the sensory-impaired population in this study is 13.4%. Those aged 12–15 had the highest prevalence, and the lowest was among those aged 6 to 8. The relationship between the aged group and trauma prevalence was not statistically significant, with p=0.48. [Figure 3]

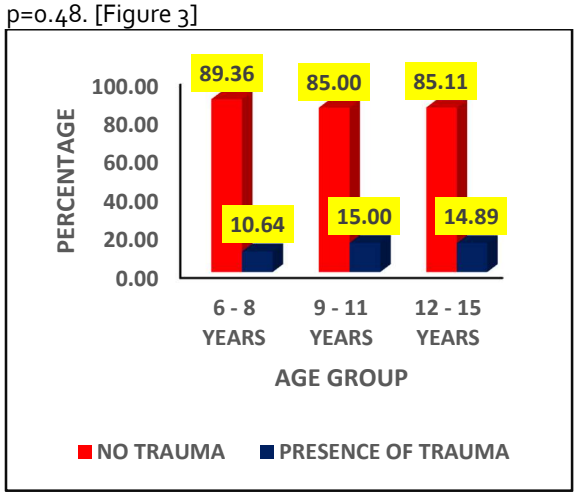
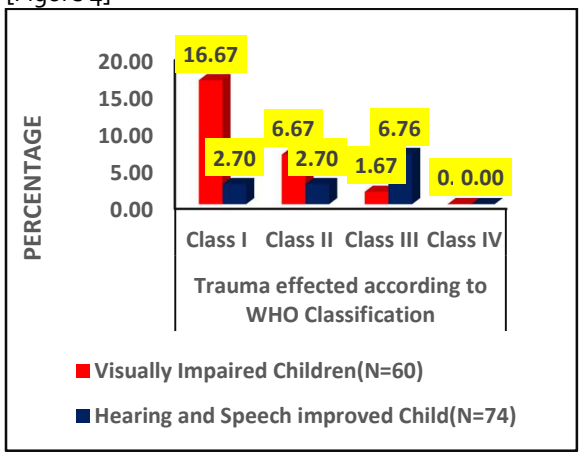


Figure 3: Prevalence of TDIS Among the visually, Speech & Hearing disabilities children.

Between the two groups in the study population, enamel fracture (Code 2) was the most common injury in both groups, particularly among the visually impaired (16.7%) vs. 2.7% in the speech/hearing impaired. More severe injuries, such as enamel-dentine fracture and pulp involvement, were rare but occurred at similar low frequencies across both groups. A much higher percentage of speech and hearing-impaired children had no reported trauma (94.6%) compared to visually impaired children (76.7%). The p-value (0.0011) is statistically significant, indicating a significant association between visual impairment and dental trauma. [Figure 4]



Fischer's exact test :(p = 0.0011)

Figure 4: Type of Traumatic dental injury in the two study groups according to the W.H.O.

The odds of trauma dental injury in the visually impaired group were 0.304, while that in the speech and hearing-impaired group were 0.057, giving an odds ratio of approximately 5.33. [Table 1]

Table 1: Odds of experiencing traumatic dental injury (TDI) among the two groups

Group	With Trauma	No Trauma	Total
Visually Impaired	14	46	60
Speech & Hearing Impaired	4	70	74

Odds Ratio ≈ 5.33

DISCUSSION

Children with special health care needs are those who have or are at increased risk for a chronic physical, developmental, behavioural, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally.[9] Blindness presents as a visual acuity of less than 3/60 (20/400) in the better eye with the best possible correction, or a corresponding visual field loss to less than 10 degrees from the point of fixation.[2] Speech impairment refers to any condition that affects a person's ability to produce sounds that create words, including articulation disorders, voice disorders, and fluency disorders (e.g., stuttering),[10] and hearing impairment is the partial or total inability to hear.[11] Hearing loss is measured in decibels (dB) and classified based on severity: mild (26–40 dB), moderate (41–60 dB), severe (61–80 dB), and profound (>81 dB) hearing loss in the better ear. The fact that a child has one form of disability or the other will no doubt predispose such a child to one form of trauma or the other, including traumatic dental injury.

This study assessed the prevalence of traumatic dental injury not only for the visually impaired but also for those with hearing and speech impairment. The overall prevalence of traumatic dental injury among the study population was 13.4%. This finding agrees with the worldwide prevalence range of (4.13–68.2%), according to a recent meta-analysis,[12] and also agrees with the Indian prevalence of traumatic dental injury ranges from 12% and 40.5%.[13]Regarding the prevalence of TDI among the visually impaired participants, this study reported a prevalence of 23.3%, slightly less than that reported by Gidwani et al.,[14] and Harsha et al., [15]. The difference in prevalence may be connected to the relatively lower sample size in this study population.

The prevalence of TDI among hearing-impaired children was 5.41%, which was very less when compared with the visually impaired individuals and with a statistically significant relation indicating a significant association between visual impairment and dental trauma. This finding agrees with studies by Harsha Munot et al. [15] and Agrawal et.al[16] report that the prevalence of TDIs in visually impaired children was higher than that of sighted children. This study reported that the odds of experiencing dental trauma are approximately five times higher in visually impaired children compared to children with improved hearing and speech. Compatibility is the major reason behind the high prevalence of tooth fractures among visually impaired children, coupled with the increased risk of accidents or falls due to limited spatial awareness, difficulty navigating environments, as well as challenges in coordinating movements. There is also a lack of support or increased chances of collision against an object during a fall in visually impaired children.[17] The prevalence among the hearing-impaired in this study is relatively low compared to a similar study by Rajeswary et al.,[18] which reported a prevalence of 12.8%. The fact that their study was hospital-based, with an overwhelming sample size and possibly limited care attendants, may have contributed to the difference in prevalence.

The age-wise relation to the prevalence of TDI in this study was not statistically significant, but there was an increase in prevalence with increased with age. The delay in the developmental milestone seen in children with special health care needs, with the attendant restrictive movement at an earlier age, plus the increase in physical activities with increased age, as well as their involvement in multiple outdoor activities, may have contributed to the increase in prevalence of TDIs with increased age. This finding is similar to a previous study by Martin et al.[13]

This present study revealed that injury involving enamel fracture was the most common type of injury. In the primary dentition, the alveolar bone is indeed more cancellous (spongy) and less mineralised than in permanent dentition and with thinner cortical plates, and a greater marrow space, resulting in a lower overall density. This anatomical

characteristic results in greater plasticity of the alveolar bone in young children. Due to this bone structure, luxation injuries (including subluxation, lateral luxation, extrusion, and avulsion) are more likely than crown fractures in young children. Considered in this study were children in the mixed dentition stage who had erupted their permanent teeth, who were prone to one form of trauma or another, which accounted for the more crown fractures, especially those of the enamel fracture. This finding is similar to the studies by Ramaiah and Maraiah,[19] in blind children and by Patel and Sujan in sighted children.[20]

CONCLUSION

There is a moderate prevalence of TDI among the study population. While a higher moderate prevalence of TDIs was seen among the visually impaired, a low prevalence was seen among the speech and hearing-impaired children. Children living with disabilities are at risk of multiple TDIs; the need for awareness creation, health education and periodic screening cannot be overemphasized.

Source of support
Nil
Conflict of interest
None declared

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21. .

Appendix 1

Epidemiological classification of Traumatic Dental Injuries (TDIs), including codes of the WHO International Classification of Diseases to Dentistry and Stomatology

CODE	INJURY	CRITERIA
Code 0	No injury	No evidence of treated or untreated dental injury
Code 1	Treated dental injury	Composite restoration, bonding of the tooth fragment, crown, denture or bridge pontics replacing missing teeth due to TDI, restoration located in the palatal/ lingual surface of the crown, suggesting endodontic treatment and no evidence of decay, or any other treatment provided due to TDI Note: Composite restorations may be difficult to recognize
Code 2 (N 502.50)	Enamel fracture only	Loss of a small portion of the crown, including only the enamel
Code 3 (N 502.51)	Enamel/dentin fracture	Loss of a portion of the crown, including enamel and dentin without pulp exposure
Code 4 (N 502.52) (N 502.53) (N 502.54) (N 503.20) (N 503.21)	Pulp injury	Signs or symptoms of pulp involvement due to dental injury. It includes fractures with pulp exposure, dislocation of the tooth, presence of sinus tract and/or swelling in the labial or lingual vestibule without evidence of caries and discolouration of the crown. The examiner must check if pulp involvement was due to caries (presence of treated or untreated caries lesion), and ask the subject whether they have a history of a harmful incident involving the front teeth/mouth
Code 5	Missing tooth due to trauma	Absence of the tooth due to a complete avulsion. Code 5 should be used only for teeth judged to be missing due to trauma. A positive history of trauma is needed to record missing due to trauma, and the examiner must ask the subject if the avulsion was due to a harmful incident involving the front teeth/mouth or if teeth have been extracted due to caries
Code 9	Excluded tooth	Signs of traumatic injury cannot be assessed, i.e., presence of appliances or all permanent incisors missing due to caries