<Original Article>

Oral Health Status of Deaf and Mute Children Attending Special School in Anand-Wan, Warora, India

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• Abstract

Aim : This study was conducted to assess the oral health status of deaf and mute children attending special school.

Materials and Methods : A cross-sectional descriptive survey was conducted among 137 deaf and mute children with ages ranging from 7 to 18 years. A total of 76 males (55.47%) with mean age of 14.2 ± 4.5 and 61 females (44.53%) with mean age of 13.8 ± 4.2 years and studying in a school for deaf and mute children in Warora were considered. Data were collected using a standard method recommended by WHO for the oral health survey in 1977. Oral health status was assessed using OHIS, Loe and Sinless, and CPI Index along with DMFT and DMFS Index. Gingival position was considered for measuring attachment loss. Statistical analysis was performed using the SPSS software package (version 17.0).

Results : The mean DMFT was found to be 2.53 ± 1.72, and mean DMFS, 3.37 ± 3.16. The prevalence of dental caries was pegged at 35.32%, with mean OHIS score at 1.49 ± 0.76. Overall gingival index among deaf and mute children was 0.81 ± 1.46, whereas that for the upper arch and lower arch was 0.92 ± 0.84 and 1.19 ± 0.95, respectively. The mean score for the CPI Index among deaf and mute children was found to be 0.42 ± 0.32. Gingival clinical attachment loss was found to be 0.26 ± 0.15mm.

Conclusion : These findings suggest that children with hearing disabilities can also have good oral hygiene comparable to normal individuals of the same age group. These results may be attributed to the fact that the study sample was taken from a single school of a private organization with a well-equipped dental setup.

• Key word : deaf and mute, dental caries, oral health, periodontal status

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Introduction

The disabled form a substantial part of the community. All over the world, there are an estimated 500 million people with disabilities. Enhanced survival, more sophisticated medical care, and increased longevity contribute to the increase in the number of disabled individuals[1]. The greatest challenge that people with disability have to face is societal misconception, i.e., that they are a "breed apart." Therefore, historically, they have been pitied, ignored, vilified, or even hidden away in institutions. Providing special health care services for these children continues to be a challenge in the 21st century[2].

Until the second half of the 20th century, it was rare for society to recognize that -- apart from the specific impairment -- people with disability have the same abilities, needs, and interests as the rest of the population. Nevertheless, discrimination continued to exist in certain important areas such as educational opportunities, health care services, etc. In recent decades, however, this situation has undergone some positive changes thanks to adjustments in legislation and public attitude[3].

In addition, people with disability have lobbied for their rights as full citizens and productive individuals. In spite of the high level of dental disease, individuals with disability or illness receive less oral care compared to the normal population. Characteristically, the fact that "dental treatment is the greatest unattended health need of the disabled[3]" has been reported.

There is also a need to distinguish between the terms disability and handicapped. Handicap is the loss or limitation of opportunities to take part in the normal life of the community on an equal level with others due to physical and social barriers[4].

The term disability has recently been defined as any impairment that restricts or limits daily activity in some way. Disability is the functional limitation within the individual caused by physical, mental, or sensory impairment and can be developmental in origin or acquired[5].

Individuals with disability -- according to the definition given by WHO -- have a disadvantageous condition arising from deficiency or disability, restricting their fulfillment of a role that is normal or within the normal limit of a human being[6]. Hearing loss can result from prenatal and postnatal infections, anoxia, prematurity, and exposure to ototoxic agents and trauma. Hearing impairment primarily influences communication, which in turn can have a devastating effect on the individual[7].

As the degree of loss increases, psychological, emotional, and social disturbances generally become more pronounced. The extent of disturbance also depends on the age of onset, training, and acceptance of disability. Dental health affects the general health and quality of life among elders. Self-assessed masticatory disability has been linked to lower quality of life and higher mortality rate[8].

The 2006 data from the National Sample Survey Organization estimate that about 0.3 million children in the age group of 0 ~ 6 years have hearing impairment in India.

In addition to this, over 21,000 children are born deaf every year, suggesting that 1 child per 1,000 live births has hearing impairment. About 75% of this population live in rural areas, 36% of whom live below the poverty line (BPL) and 34.6% of whom come from illiterate families. There is a paucity of literature on the oral health status of persons who are deaf in India. This study was designed to determine the oral health status in a group of children and adolescents with hearing impairment and studying at a special school in Warora, India.

Materials and methods

A cross-sectional descriptive survey was conducted among 137 deaf and mute children, 76 of whom were male (55.47%) and 61 of whom were female (44.53%) having ages ranging from 7 to 18 years and studying at a school for deaf and mute children in Warora, Maharashtra, India. Conducted in the first week of July 2009, this study was approved by the intuitional ethical committee of the Datta Meghe Institute of Medical Sciences University.

Clinical examination was performed by a single trained examiner at the dental unit available in the organization hospital with standard sterilized explorer, mouth mirror, and Community Periodontal probe. Type III examination procedure was used. The help of trained teachers was sought for communication with the students.

The prevalence of dental caries was determined using DT; the scores for DMFT and DMFS index were calculated to assess the oral health status. The oral hygiene variable of each subject was assessed using the Simplified Oral Hygiene Index (OHI-S). A total of 137 hearing-impaired

school children were assessed for their oral hygiene status.

OHI-S has two components - Debris Index (DI) and Calculus Index (CI). The average individual debris score and calculus score were determined and added to obtain OHI-S for each subject. Based on the OHI-S score, oral hygiene status was categorized as good (0-1.2), fair (1.3-3), and poor (3.1-6.0). Loe and Sillness and CPI index were used to record the periodontal condition; note, however, that we could only obtain score 0 (healthy), score 1 (bleeding), and score 2 (calculus) for children; score 3 (shallow periodontal pockets) and score 4 (deep periodontal pockets) were not noted, and there were no subjects with periodontal pockets. Gingival position was considered for measuring attachment loss.

The data obtained were computed, and the mean values of DMFT, DMFS, OHI-S, CPI, attachment loss, and Loe & Sillness index and its component were estimated. Data was analyzed using the statistical software SPSS, (Windows version 17). The independent-Samples t-test was used to test the difference by gender.

Results

This study targeted 137 deaf and mute children, 76 of whom were male (55.47%) and 61 of whom were female (44.53%) with ages ranging from 7 to 18 years. All the data obtained after a detailed clinical examination were computed, and the mean values of DMFT, DMFS, OHI-S, CPI, and Loe & Sillness index and loss of gingival attachment were measured. All the results are presented in Tables 1 ~ 4.

Discussion

According to the review of literature, 278 million people worldwide have moderate to profound hearing loss in both ears. At least 80% of deaf or hearing-impaired people live in developing countries. The number of people worldwide with all levels of hearing impairment is rising due mainly to a growing global population and the longer life expectancies. General health including oral health is usually neglected among such people either due to lack of proper communication or due to societal misconception regarding the status of these individuals in society[9].

Contemporary concepts of health suggest that dental health should be defined in terms of physical, psychological, and social well-being vis-á-vis dental status[10], considering the fact that the greatest contribution of dentistry for such individuals is the improvement of quality of life because most oral diseases and their consequences interfered with -- or had an impact on -- daily life.

When this study was undertaken, the prevalence of dental caries and Periodontal Disease was assumed to be high among deaf and mute children. Note, however, that the prevalence of dental caries was found to be within the acceptable limit.

In this study, the prevalence of dental caries was found to be 35.76%. Moreover, the percentage was higher among females at 39.34% compared to male children (32.89%), although there was no significant difference at p value of 0.76 despite the female preponderance[10]. The study conducted by Shyama, et al[11] and Manish Jain, et al[12] reported the prevalence of dental caries to be 86% and 83.92%, respectively, among hearing-impaired children.

The study conducted by Rao, D.B., et al[13] among disabled children found the prevalence of dental caries to be 86%. On the other hand, the study conducted by Sudaduang Gherunpong, et al[14] reported dental caries prevalence of 43.1%. On the other hand, according to the study conducted by Murray, J.J., and Macleod, J.T.,[15] the prevalence of dental caries was 58.5%. Similarly, the study conducted by Dr. Harry Ames16 reported the prevalence of dental caries to be 58%.

The mean DMFT score in this study was found to be 2.53 $\pm$ 1.72 (Table 1). The DMFT score among male deaf and mute children was 2.46 $\pm$ 1.71, which was slightly lower than that among female deaf and mute children (2.62 $\pm$ 1.77). Statistically, however, there was no significant difference (p value = 0.76). The study conducted by Manish Jain, et al[12] also pegged the mean DMFT score at 2.61. The acceptable DMFT score as per the WHO guideline in year

Table 1. DMFT Index of Deaf and Mute Children

INDICES	Total(mean score)	Male(mean score)	Female(mean score)
DI	2.46 $\pm$ 1.57 P $\leq$ 0.80	2.41 $\pm$ 1.45	2.52 $\pm$ 1.75
MI	1.20 $\pm$ 0.45 P $\leq$ 0.50	1.33 $\pm$ 0.58	1.00 $\pm$ 0.00
FI	0.00	0.00	0.00
DMFT	2.53 $\pm$ 1.72	2.46 $\pm$ 1.71	2.62 $\pm$ 1.77

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2000 is less than 3.00. Therefore, the DMFT index reported in this study was within the acceptable limits.

The study conducted by Balwant Rai, et al[10] and Rao, D.B., et al[13] found that the mean DMFT score was 2.82, and 2.48, respectively. The study conducted by Sudaduang Gherunpong, et al[14] found that the mean DMFT score was 1.5, which was similar to that of this study. In contrast, the report on the 1996~97 Oral Health Survey of First Nations and in-unit children in Canada-Health Canada reported the mean DMFT score to be 4.5 among children aged 13 years; this is quite higher compared to this study. The study conducted by Shyama, et al[11] and Ivancic Jokic N[17]. noted a higher DMFT score among disabled children , i.e., 5.0 and 6.39. The study conducted by AI Qahtani and Wyne, A.H.,[18] also reported the mean DMFT among disabled children to be 5.12.

In this study, the mean OHI-S score among deaf and mute children was found to be 1.49 $\pm$ 0.76 (Table 2); that among

Table 2. OHIS and Loe&Silness Index of Deaf and Mute Children

INDICES	Total(mean score)	Male(mean score)	Female(mean score)
CIS	1.10 $\pm$0.47 P $\leq$0.00	1.20 $\pm$0.49	0.96 $\pm$0.40
DIS	0.60 $\pm$0.41 P $\leq$0.67	0.59 $\pm$0.41	0.63 $\pm$0.40
OHIS	1.49 $\pm$0.76 P $\leq$0.02	1.62 $\pm$0.80	1.30 $\pm$0.65
Loe&Silness	0.81 $\pm$1.46 P $\leq$0.13	0.97 $\pm$1.62	0.59 $\pm$1.16

The independent-Samples t-test was used; p value $\leq$ 0.05 considered significant.

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males and females was 1.62 $\pm$ 0.80 and 1.30 $\pm$ 0.79, respectively. The OHI-S score among females was higher compared to males, and the difference was statistically significant (p value = 0.02). These findings differ from the findings obtained by Santhosh kumar[19] and Manish Jain, et al[12], who reported that the mean OHI-S score among children with hearing impairment was 1.88 and 2.0, respectively. The study conducted by Sudaduang Gherunpong, et al[14] reported the mean OHI-S score to be 2.5, which was slightly higher compared to this study.

In this study, the Mean Loe & Sillness index score was 0.81 $\pm$ 1.46 (Table 2). The Mean Loe & Sillness index score among male deaf and mute children was found to be 0.97 $\pm$ 1.62, and that among female deaf and mute children, 0.59 $\pm$ 1.16. Statistically, however, there was no significant difference (p-value 0 = 0.13). The study conducted by Rawlani, et al[20] also found the mean Loe &Sillness score among disabled children to be 0.9, which was consistent with the finding obtained in this study.

Prevalence of periodontal disease among deaf and mute children was 49.64% (Table 4). Specifically, prevalence of

Table 3. CPI Index and Attachment Loss of Deaf and Mute Children

INDICES	Total(mean score)	Male(mean score)	Female(mean score)
CPI	0.46 $\pm$0.31 P $\leq$0.60	0.44 $\pm$0.30	0.50 $\pm$0.34
Attachment Loss (mm)	0.26 $\pm$0.15 P $\leq$0.05	0.30 $\pm$0.17	0.18 $\pm$0.07

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periodontal disease among male deaf and mute children was 43.42%, and that among female deaf and mute children was 57.37%. There was no significant difference with p value = 0.27, however. Contrary to our findings, the study conducted by Balwant Rai, Rajesh Jain, et al[10] and the study conducted by Sudaduang Gherunpong, et al[14] revealed higher prevalence of periodontal disease among males than females.

This study found the overall prevalence of periodontal disease to be 49.64% only. The study conducted by Manish kumar Jain, et al[12] also reported the prevalence of periodontal disease among deaf and mute children to be 58% only. In addition, the study conducted by Rawlani, et al[20] found the prevalence of periodontal disease among disabled children to be 52.2% only. These findings were not consistent with those of most of the investigators such as Balwant Rai, Rajesh Jain, et al[10], Sudaduang Gherunpong, et al[14], Vaish, Ram Prasad[21], and Malohtra A.K., Saimbi, C.S., and Chawla, T.N.,[22] who reported the prevalence of periodontal disease to be more than 80%.

In this study, the mean score for the CPI Index was 0.46 $\pm$ 0.31, with no significant difference between male and female at p value of 0.60. The score for male was 0.44 $\pm$ 0.30, and that for female was 0.50 $\pm$ 0.30. These values are similar to values obtained in most of the studies. The loss of gingival attachment among deaf and mute children was 0.26 $\pm$ 0.15mm; that among female children (0.18 $\pm$ 0.07mm) was lower compared to 0.30 $\pm$ 0.17mm among male children (Table 3).

In this study, the overall oral health status of deaf and mute children was good; this was probably because this study was conducted in only one school of a private organization with a well-equipped dental setup, and the children undergo regular dental checkup since they are residents of the same organization. Such may be the main limitation of this study.

Table 4. Prevalence of Periodontal Disease in Deaf and Mute Children

Age Group	No. of Children Examined	Periodontal Disease	
		No. of Children Affected	Percentage
7 ~ 18 Years	Male-76	33	43.42%
	Female-61	35	57.37%
Total	Total-137	68	49.64%

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Conclusion

In both medicine & dentistry, effective two-way communication is essential for safe &effective practice, be it clinical, teaching, or research work. Note, however, that hearing represents only part of the process, with non-verbal communication, perception, & understanding also making major contributions. Thus, a hearing-impaired person with keen powers of observation, good perception, and understanding may communicate just as normally as individuals with normal hearing do. A dental education program must also be established by organizations particularly for teachers so that they can educate deaf and mute children and make them understand the importance of oral health and ultimately help them in achieving the goal of dental health. In other words, organizations have an important role in maintaining the oral heath of deaf and mute children by arranging regular dental health education programmed for children as well as teachers. Since these have been neglected, however, the prevalence of various dental diseases differs from organization to organization.

Limitations and Recommendations of the Study

1. The study was conducted on only 137 children studying in one residential school of a private organization.
2. A large sample size is required from different schools to determine the oral health condition of deaf and mute children.
3. Various government and nongovernment organizations should be considered for a study on the role of the organization.
4. Need to develop a training resource on Primary Ear and Hearing Care for primary health care workers
5. Specially trained teachers are required for deaf and mute children to overcome the communication barriers faced by the deaf and mute.
6. Special dental care required for deaf and mute children to improve their oral health status
7. Need to encourage countries to establish a national program for prevention

Details of correction made according to the reviewer's suggestion

Major Considerations

1. Title changed ("Oral Health Status of Deaf and Mute Children Attending Special School in Anand-Wan, Warora, India")
2. The use of attachment loss is described in both methods and results sections.
3. The limitations of this study are described at the end of the manuscript.
4. and 5. The explanations for the results of this study are presented in the conclusion and discussion sections and in the section on the limitations of the study.
6. Prevalence of dental caries was calculated as per the number of children affected with dental caries (purely dental caries associated with those having DT).

Minor Considerations

1. A: The size of the study population is indicated.
   B: Mean age and gender distribution are cited.
2. The reference for the second paragraph in the introduction is Reference no. 3.
3. Six paragraphs in the introduction are modified and merged with paragraph no. 5.
4. In the second paragraph in the methods section, the reviewer asked to change community periodontal probe to community periodontal index, but it is the community periodontal probe that is used for the assessment of community periodontal index.
5. Grammatical errors are corrected throughout the manuscript.
6. The reference for the first paragraph in the discussion section is Reference no. 9.
7. Footnotes are provided under Table 2.

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