

Oral health status and treatment needs of hearing impaired children attending a special school in Bhimavaram, India

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ABSTRACT

Background: Children with hearing impairment (CHI) have special accessibility issues to meet their health care needs. Their oral health status is deprived and has wide ranging treatment needs to attend.

Aim: The aim of this study was to evaluate the oral health status and treatment needs of CHI attending a special school in Bhimavaram Town, India.

Study Design: The study design was a descriptive cross-sectional study.

Materials and Methods: This study was conducted in November 2012 at SVS special school for deaf, Bhimavaram, India. This study involved 180 CHI of both genders, aged 6–16 years, divided into Group-I (6–8 years), Group-II (9–12 years), and Group-III (13–16 years). Oral health status and treatment needs were recorded using methods and standards recommended by the WHO for Oral Health Surveys, 1997. Dental caries prevalence (decayed, missing, and filled teeth [DMFT/dmft]), gingivitis levels (Löe, Silness Gingival Index), plaque levels (Silness, Löe Plaque index), and treatment needs were the parameters recorded and analyzed.

Statistical Analysis: Z-test for proportion, one-way analysis of variance, and Chi-square test were used to analyze the data.

Results: Prevalence of dental caries in the sample was found to be 65% with a mean level of caries prevalence (DMFT) of 1.6 ± 1.3 in Group-I, 1.9 ± 1.2 in Group-II, and 2.2 ± 1.2 in Group-III. About 91.7% of the total children examined needs treatment. The mean plaque and gingivitis scores of the sample were 1.70 ± 0.61 and 1.59 ± 0.58 , respectively.

Conclusion: These findings imply the overwhelming situation of CHI in oral health perspective. Hence, prevention-based educational and motivational programs should be targeted to this vital group to achieve adequate oral hygiene levels.

Key words: Gingival index, hearing impairment, oral health education, plaque index, visual instruction

Received : 28-03-14
Review completed : 24-04-14
Accepted : 24-02-16

Special child is the one, who for various reasons, cannot fully make use of all his/her physical, mental, and social abilities or do things that other child of his/her age can do. Globally, there is an estimated 150 million children with disabilities, most of who live in an inaccessible health care arena.^[1] They suffer high risk in oral health perspective.^[2]

Their dental needs are said to be highly underserved due to health care neglect (care takers or parents), communication barriers, socioeconomic status, etc.^[3,4] Children with hearing impairment (CHI) are one important group deprived of good oral health due to communication barriers.^[5,6]

Deafness refers to the complete loss of ability to hear from one or both ears. However, CHI is a broad term used to describe any degree of hearing loss in children varying

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Access this article online	
Quick Response Code:	Website: www.ijdr.in
	DOI: 10.4103/0970-9290.179835

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How to cite this article: Sandeep V, Kumar M, Vinay C, Chandrasekhar R, Jyostna P. Oral health status and treatment needs of hearing impaired children attending a special school in Bhimavaram, India. Indian J Dent Res 2016;27:73-7.

from mild (15–30 dB) to profound impairment (>95 dB). Hearing impairment (HI) affects many children worldwide. In the UK, there are 23,000–25,000 children (aged 0–15 years) who are permanently deaf and many more hard of hearing^[7] (statistics 1997). In India, about 0.4% of 1065.40 million children are hearing impaired and every child in 1000 live births suffers from HI^[4,8] (NSSO 2002). In Turkey (2007 and 2008), only 6268 CHI were enrolled in special education schools that account for only 5.4% of the total deaf and mute.^[9] HI delays speech and linguistic outcome, reduces cognitive skills, and as a whole hinders their academic progress in school affecting the overall development and maturation of child.^[8,10]

Various cross-sectional studies on CHI reported poor oral health status with extensive treatment needs. All these studies were conducted on a small sample, with wide variations in age distribution and reviewed concomitantly with other special children^[2,11–13] (children with visual impairment, physical and mental disability, etc.). Recently, very few studies reported a descriptive evaluation of their dental needs in an isolated approach.^[4,14–16] Any motivation to improve oral health should be efficient and appropriate to the target groups.^[17,18] This is only possible when the needs of the target groups are identified precisely. Hence, the purpose of the present study was to evaluate the prevalence of dental caries, plaque scores, gingivitis scores, and treatment needs of CHI and have a short review on their caries experience and treatment needs.

MATERIALS AND METHODS

Ethical approval

This descriptive cross-sectional study was approved by the Institutional Ethical Review Board for research activities (IERB/VDC-117/2012). Prior written consent was obtained from the school authorities and parents. All the parents were informed regarding the study protocol during their monthly visit to the school and consent was obtained.

Sample

This descriptive comprehensive survey was done on CHI, aged 6–16 years (average age 10.83 ± 2.9 years) of both genders attending a special school for deaf and mute in Bhimavaram Town, Andhra Pradesh, India. The study sample was, therefore, neither representative of hearing impaired children of the town nor the district and nation. Out of 192 children in the school, five were absent on the day of examination and seven were excluded based on the inclusion criteria, yielding a total sample of 180. Inclusion criteria are children with good general health (American Society of Anesthesiology I-II). Exclusion criteria are children with other systemic diseases and uncooperative children unable to cope up with the examination procedure. Demographic distribution of the sample is presented in Table 1.

Examination

All the children were examined during school hours using a mouth mirror, CPI probe under artificial illumination of a head lamp in accordance with the WHO survey recommendations.^[19] Level of dental caries, gingivitis scores, plaque scores, and treatment needs were recorded on a simplified WHO oral health assessment form. Examinations were carried out by two examiners calibrated for interexaminer variability and reliability (kappa value-0.71). A trained dental assistant was used to record the data.

Assessment of dental caries (decayed, missing, and filled teeth)

A tooth was considered to be decayed when there was lesion in the pit/fissure/smooth surface, undermined enamel, temporary filling with caries, and softened floor. A tooth was classified as missing if it was extracted due to caries. A tooth was classified as filled if it had a restoration for a carious lesion. Exfoliated teeth in the primary and mixed dentition, unerupted, and those extracted for other reasons apart from caries were not included. Previous treatment records of the children were obtained from the institution

Table 1: Demographic distribution of the sample-180

Age group (years)	Gender
Group-I (6-8) - 50	Males - 88
Group-II (9-12) - 72	Females - 92
Group-III (13-16) - 58	

Table 2: Plaque scores

Plaque score	Number of children (%)
0-1	34 (19)
1.1-2.0	81 (45)
2.1-3.0	65 (36)

Table 3: Gingivitis scores

Gingivitis score	Number of children (%)
0.1-1.0	40 (22)
1.1-2.0	90 (50)
2.1-3.9	50 (28)

Table 4: Prevalence of caries in relation to age and gender

Group (years)	Number of children	Caries present n (%)	Groups	Z*	P
Prevalence of caries in relation to age					
Group-I (6-8)	50	33 (66)	I-II	1.60	0.11, NS
Group-II (9-12)	72	57 (79.2)	II-III	4.00	<0.001, S
Group-III (13-16)	58	27 (46.6)	I-III	2.07	0.04, S
Total	180	117 (65)			
Prevalence of caries in relation to gender					
Males	93	57 (61.3)	Males versus females	1.09	0.28, NS
Females	87	60 (69)			

*Z-test for proportions. NS=Not significant, S=Significant

Table 5: DMFT and dmft

Group (years)	dmf	d	m	f	DMF	D	M	F
Group-I (6-8)	2.8±2.2	2.5±2.1	0.1±0.6	0.1±0.5	1.6±1.3	1.4±1.2	0.04±0.3	0.16±0.6
Group-II (9-12)	2.1±1.5	1.7±1.3	0.4±0.8	0.04±0.3	1.9±1.2	1.9±1.2	0.08±0.4	0.01±0.12
Group-III (13-16)	1.1±1.3	0.5±0.8	0.6±0.8	0.07±0.4	2.2±1.2	2.0±1.1	0.16±0.4	0.05±0.3
Total	2.0±1.8	1.5±1.7	0.4±0.8	0.07±0.4	1.9±1.3	1.8±1.2	0.10±0.39	0.07±0.4
ANOVA								
F	14.83	28.50	4.41	0.66	3.38	4.22	1.20	2.52
P	0.00, S	0.00, S	0.01, S	0.52, NS	0.04, S	0.02, S	0.30, NS	0.08, NS

One-way ANOVA. ANOVA=Analysis of variance, NS=Not significant, S=Significant, DMFT=Decayed, missing, and filled teeth

to exclude the bias of noncarious extraction and filling. No radiographic examination was performed during the examination.

Assessment of plaque and gingivitis scores

Gingivitis scores using Löe, Silness Gingival Index^[20] and plaque scores using Silness, Löe Plaque Index^[21] were obtained from the gingival third of buccal and lingual surfaces on both mesial and distal sites (four measurements) and average score was calculated. All the teeth were examined and average score was calculated.

The Statistical Package for Social Sciences (SPSS) was used for data analysis (SPSS Inc., version 14.0, Chicago, IL, USA). Z- and Chi-square tests were used to compare the prevalence of caries and treatment needs. Analysis of variance (ANOVA) was used to compare caries levels (decayed, missing, and filled teeth [DMFT/dmft]) between the groups. For all the tests, $P \leq 0.05$ was set for statistical significance and $P \leq 0.001$ represents a highly significant relation.

RESULTS

Statistical analysis revealed variations between different age groups. Hence, most of the results were described pertaining to age group.

Plaque and gingivitis scores

The mean plaque and gingivitis scores of the total sample were found to be 1.70 ± 0.61 and 1.59 ± 0.58 , respectively, with no gender and age variations. Eighty-one percent of the total sample had moderate to abundant deposits of plaque and 78% of the sample exhibited moderate to severe gingival inflammation [Tables 2 and 3].

Prevalence of dental caries

The total prevalence of dental caries in the present sample was found to be 65% with a prevalence rate of 66.0% in Group-I, 79.2% in Group-II, and 46.6% being the least in Group-III. Statistically significant differences were found when Group-III was compared with Group-I ($P = 0.04$) and II ($P < 0.001$). Caries prevalence was 61.3% in boys and 69% in girls with no significant difference between them ($P = 0.28$) [Table 4].

Table 6: Children needing one or the other treatment

Group (years)	Examined	Children with treatment need	Percentage	Significance
Group-I, 6-8	50	46	92	$P=0.99^*$, NS
Group-II, 9-12 years	72	66	91.7	
Group-III, 13-16 years	58	53	91.4	
Total	180	165	91.7	
Gender wise (needing one or the other treatment)				
Males	93	86	92.5	Males versus females 0.69*, NS
Females	87	79	90.8	

*Chi-square test. NS=Not significant

The mean level of caries prevalence (DMFT) for different age groups was found to be 1.6 ± 1.3 in Group-I, 1.9 ± 1.2 in Group-II, and 2.2 ± 1.2 in Group-III. One-way ANOVA showed a statistically significant difference between the groups ($P = 0.04$). The largest component was found to be decayed (D) with a mean total prevalence of 1.8 ± 1.2 . When dmft was compared, mean dmft was 2.8 ± 2.2 in Group-I, 2.1 ± 1.5 in Group-II, and 1.1 ± 1.3 in Group-III with "d" being the largest component [Table 5].

Treatment needs

The total number of children who needed one or the other treatment was 91.7% with 86% of the total boys and 79% of the total girls needing treatment. No significant gender ($P = 0.69$) or age ($P = 0.99$) variations were observed [Table 6].

The number of children requiring individual treatment need was compared between different age groups, children in need of sealant placement were more in Group-I, children needing two surface fillings were more in Group-II, and children needing extraction were more in Group-III [Table 7].

DISCUSSION

Dental treatment is the greatest unmet health need of the handicapped child.^[3] This statement by Nowak was substantiated by various studies done globally on special

Table 7: Number of children requiring specific treatment

Group (years)	Total number	Sealants n (%)	One surface n (%)	Two surface n (%)	Crown n (%)	Pulp care n (%)	Extraction n (%)	Others n (%)
Group-I (6-8)	50	17 (34.0)	33 (66.0)	32 (64.0)	3 (6.0)	21 (42.0)	2 (4.0)	12 (24.0)
Group-II (9-12)	72	1 (1.4)	56 (76.8)	37 (51.4)	6 (8.3)	26 (36.1)	12 (16.7)	20 (27.8)
Group-III (13-16)	58	-	40 (69.0)	18 (31.0)	6 (10.3)	16 (27.6)	16 (27.6)	16 (27.6)
Total	180	18 (10)	129 (71.7)	87 (48.3)	15 (8.3)	63 (35.0)	30 (16.7)	48 (26.7)
Age group wise comparison								
χ^2		44.37	2.32	12.13	0.66	2.52	10.75	0.25
P		0.00, S	0.31, NS	0.002, S	0.72, NS	0.28, NS	0.005, S	0.88, NS

Chi-square test. NS=Not significant, S=Significant

children.^[11-13] Similarly, in the present study, the overall dental caries prevalence of the sample was 65% with a drastic portion of the sample (91.7%) needing one or the other treatment. This distressing condition can be ascribed to communication barriers faced by these children in various parts of the world.

Recently, another study done by Wei *et al.* on 229 senior high school deaf students comparing 196 healthy adolescence reported a caries prevalence rate of 55.9%.^[14] Many other studies done solely on CHI reported wide variations in caries prevalence rates. Suma reported a prevalence rate of 42% with decayed component of the index being the highest.^[16] Al-Qahtani and Wyne reported a prevalence of 91% and 95% in 6–7 and 11–12-year-old CHI, respectively.^[12] Shyama *et al.* reported a prevalence rate of 84.6% with 86% of the caries lesions still untreated.^[22] Rao *et al.* reported a prevalence rate of 65.1%.^[13] Meaningful comparison of caries prevalence rates cannot be made from these studies as there are wide variations in age distribution of the sample selected in each study; however, all these studies signify the devastating situation of CHI concerning oral health.

A similar study done by Jain *et al.* in India reported mean DMFT of 0.5 in 5–8 years CHI, 1.76 in 9–12 years, and 2.95 in 13–17 years.^[4] In our study, it was 1.6, 1.9, and 2.2, respectively. In both the studies, DMFT scores increased with increase in age. The largest component was the decayed component in both the studies. This resemblance may be due to comparable health care delivery systems in both the regions (India).

The results of the present study depict that 81% of the total sample have moderate to abundant deposits of plaque. Similarly, 78% of the total sample have moderate to severe gingivitis scores. This implies that oral hygiene performance in these children is somehow compromised.

Treatment needs evaluated by Jain *et al.*^[4] on CHI reported concomitant findings with the present study. He noted 75.9% of the children needing one surface filling compared to 71.7% in our study. Children requiring extractions were 16.5% in our study, but Jain *et al.* noted only 5.5%. The fewer rates can be attributed to the health care access of

the children in cities such as Udaipur compared to remote area like ours.

The possible limitation of the present study is the lack of control group. The present sample was from a special school funded and run by Tirumala Tirupati Devasthanam (Andhra Pradesh, India), which is a government organization having its own disciplines regarding diet (strict vegetarian), commodities, etc., There was no other school in the locality which can provide comparable diet patterns and other confounding variables. Henceforth, this study was restricted to give descriptive data of these children only.

CONCLUSION

The present findings of the study show that CHI have poor oral health and extensive treatment needs. A caries prevalence rate of 65% was noted and large portion (91.7%) of the sample requires treatment. Hence, it is suggested that oral health educational programs should be tailored to this important group to improve their oral health status.

Acknowledgment

The cooperation rendered by the school authorities of SV School of Deaf, Bhimavaram, West Godavari, Andhra Pradesh, India, is deeply appreciated by the authors.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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