

## Dentition status and treatment needs among children with impaired hearing attending a special school for the deaf and mute in Udaipur, India

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**Abstract:** The present cross-sectional study was conducted to assess the prevalence of caries and treatment needs among 127 institutionalized subjects aged 5-22 years attending a special school for students with hearing impairment in Udaipur City, Rajasthan, India. The data were collected using the methods and standards recommended by the WHO for oral health surveys, 1997. Dentition status and treatment needs along with DMFT, DMFS, dmft, dmfs were recorded using a Type III examination procedure. ANOVA, chi-squared test and multiple regression analysis were conducted using the SPSS software package (version 11.0). The mean DMFT was 2.61. Of the 127 subjects, 111 (87.4 %) needed treatment. Filling of one tooth surface was necessary for 79.5% of the subjects. Pulp treatment was needed in less than 7%. There was a high prevalence (83.92%) of decayed teeth, whereas only 7.14% of subjects had filled teeth. Multiple regression analysis showed that DMFT had a close association with age. Linear regression analysis revealed that age explained a variance of 32% and 25.4% for DMFT and dmft respectively. The findings of this study demonstrate that young people with impaired hearing in this region have a high prevalence of dental caries, poor oral hygiene, and extensive unmet needs for dental treatment. This highly alarming situation requires immediate attention. (J. Oral Sci. 50, 161-165, 2008)

**Keywords:** hearing impairment; dental caries; oral health; treatment needs.

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### Introduction

The disabled form a substantial section of the community, and it is estimated that there are about 500 million people with disabilities worldwide (1). Children with hearing impairment constitute one of the major population groups of disabled children. About one in 600 neonates has congenital hearing loss (2). According to the National Sample Survey Organisation (NSSO) India in 2002, 0.4% of 1065.40 million children (Census 2002) suffered from hearing impairment. According to a WHO 1980 report, the main causes of hearing impairment in India were 1) infections such as bacterial meningitis, mumps, and measles, 2) neglect, and 3) ignorance. Three levels of prevention of hearing impairment were also documented: 1) Primary, 2) Secondary, and 3) Tertiary. Measurement of hearing loss can be made using various techniques, otoacoustic emission measurement being particularly accurate.

The primary target of a nation should be to improve the health and social functioning of deprived people. Hearing disorders affect general behaviour, and impair the level of social functioning. This group is often neglected because of ignorance, fear, stigma, misconception, and negative attitudes.

The Court report of London "fit for the future" (3) recommended that the dental health of handicapped children should be brought up to, and maintained at the level of that provided for other children. This recommendation was based upon previous studies that showed a higher prevalence of untreated dental disease in handicapped children than

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in normal children (4,5). Dental caries is the most prevalent disease among children worldwide, and “dental treatment is the greatest unattended health need of the disabled” (6). Some of the most important reasons may be inadequate recall systems, practical difficulties during treatment sessions, socioeconomic status and underestimation of treatment needs, communication problems and poor cooperation (6,7-10).

Brown and Schodel (11) reviewed 32 studies of handicapped children and reported that such children tended to have poorer oral hygiene than their normal counterparts. In developing countries such as India, this is quite a serious problem. Patients with such disorders comprise a unique population deserving special attention. To date, only a few studies have been conducted to determine the oral health status and dental caries prevalence of handicapped children in India (12,13).

The aim of this study was to assess the prevalence of caries and the treatment needs of institutionalized subjects with impaired hearing in a special school at Udaipur city, Rajasthan, India. The study area is located between 23°46' and 25°5' North and 73°9' and 74°35' East. In order to assess dental caries, decayed, missing and filled teeth were taken into consideration.

## Materials and Methods

We conducted a cross-sectional descriptive survey of 140 subjects aged 5-22 years attending a school for the deaf and mute in Udaipur City. Nine subjects who were absent and 4 who were suffering from systemic diseases were excluded, yielding a final study sample of 127 students. Twenty-three subjects were aged 5-9, 48 were aged 10-14 and 15-19, and 8 were aged 20-22 years.

The subjects were examined using a plane mouth mirror and CPI probe where necessary in accordance with the WHO criteria for diagnosis of dental caries (World Health Organization, 1993). All instruments were sterilized, and examinations were performed using the Type III examination procedure. Teachers were utilized for communication with the students.

There were two examiners, who were calibrated before the survey for inter-examiner variability, and their reliability, as tested by means of weighted kappa statistics, was 90.3%. Ethical clearance had been obtained from the ethics committee of Darshan Dental College and Hospital.

In this study a specially designed WHO Proforma was used to record dentition status and treatment needs along with DMFT and DMFS index. Decayed, missing and filled components were recorded for all age groups along with dentition status and treatment needs as recommended by the WHO for oral health surveys (World Health

Organisation, 1997). Observations were recorded on the simplified WHO oral health assessment Proforma. ANOVA, chi-squared test and multiple regression analysis were applied using the SPSS software package (version 11.0). Multiple regression analysis was used for multiple comparisons where the dependent variables comprised DMFT, dmft, DMFS, and dmfs, and independent variables included those related to demographics, such as age, caste, level of education, and socioeconomic status, and health status such as degree of hearing loss. Four degrees of hearing loss were designated: Mild (26-40 db), Moderate (41-70 db), Severe (71-90 db), and Profound (> 90 db). According to caste, subjects were divided into four categories: Scheduled caste, Scheduled tribes, other backward castes and General category. Education level was categorized into primary, upper primary, secondary, and senior secondary levels. With regard to socio-economic status, children were categorized into two groups: BPL (below the poverty line) and non-BPL, based on the BPL card provided by the central government of India. All the data were immediately recorded on a microcomputer (14), and the data were transferred to a host computer and processed using SPSS v11.0.

## Results

Analysis of the data showed marked differences between the age groups. Most of the results are therefore presented according to age.

Table 1 shows the mean level of caries prevalence [DT, MT, FT, and DMFT] for the different age groups with standard deviation. Mean DMFT was 0.50 for the 5-8 age group, 1.76 for the 9-12 age group, 2.95 for the 13-17 age group, and 4.48 for the 18-22 age group, clearly demonstrating an increase in caries prevalence with age. Adults had a greater number of decayed teeth. The largest component of DMFT was the D component, with a mean of 2.3. The *P* value was 0.000, showing that this was highly significant. The M and F components had very low mean values of 0.19 and 0.15, respectively.

In Table 1 for comparison of means, one-way ANOVA was used instead of the *t* test because the latter test is used only for comparing means of two groups, while ANOVA is used to compare the means of three or more groups together.

Table 2 displays DMFS by age. The highest mean DMFS was recorded for the 18-22 age groups. In the younger age groups (13-17 and 18-22), decayed surfaces showed high values of 2.43 and 4.45 respectively. Missing surfaces and filled surfaces did not account for a major proportion in any of the age groups except the 18-22 age groups.

Table 2 shows the mean level of caries prevalence I deciduous teeth for the different age groups. The highest mean dmft & dmfs were recorded for the 5-7-year age group, and the value decreased with age (P<0.000). Mean dmft and dmfs were 0.83 and 1.40, respectively

Table 3 shows the results of multiple regression analysis in which the dependent variables were DMFT, dmft, DMFS, dmfs. The independent demographic variables were age, caste, level of education, and socioeconomic status. Degree of hearing loss was an independent health-related variable. DMFT showed a close association with age, and the values for DMFT, dmft, DMFS, and dmfs were 32%, 25.4%, 40.9%, and 22.9%, respectively, age being a constant predictor. DMFT did not show any variation with caste, level of education, socioeconomic status or degree of hearing loss.

Table 4 shows the treatment needs for the various age groups estimated according to WHO guidelines for the whole sample. One surface filling was needed by 79.5% of the 127 subjects examined, while 22% needed two

surface fillings. Less than 7% needed pulp treatment. Teeth indicated for extraction accounted for a very low proportion. The proportion of subjects requiring crowns was low but significant. Preventive care and fissure sealant were required in 15% of the study population.

### Discussion

The main finding of the present study was that the prevalence of caries was very high in this population of young people with hearing difficulties. The prevalence of caries was related to age, the older age group having more permanent teeth at risk and a higher incidence of caries.

The mean DMFT and the mean number of decayed teeth in the 9-12-year age group were 1.76 and 2.18, respectively, which are higher than the corresponding figures for the general population (0.9 and 0.9, respectively), likely because of ignorance and poor oral hygiene habits (15). Caries prevalence in the 9-12- and 13-17-year age groups was 93.33 and 88.37, respectively, being higher than the general population, likely because of ignorance on

Table 1 DMFT and DMFS by age

Age group	No. of individuals (n)	D* (SD)	M** (SD)	F*** (SD)	DMFT**** (SD)
5-8	18	0.50 (0.79)	0.00 (0.00)	0.00 (0.00)	0.50 (0.79)
9-12	37	1.81 (1.56)	0.027 (0.16)	0.027 (0.16)	1.76 (1.74)
13-17	43	2.67 (1.90)	0.12 (0.33)	0.16 (0.37)	2.95 (2.00)
18-22	29	3.48 (2.34)	0.62 (0.49)	0.38 (0.49)	4.48 (2.43)
Total	127	2.3	0.19	0.15	2.61

ANOVA, F-Value, F\*-11.57, F\*\*-24.06, F\*\*\*-7.49, F\*\*\*\*- 19.37, P-0.000 (HS)

Age group	No. of individuals (n)	DS+ (SD)	MS++ (SD)	FS+++ (SD)	DMFS**** (SD)
5-8	18	0.56 (0.98)	0.00 (0.00)	0.00 (0.00)	0.56 (0.98)
9-12	37	1.97 (1.69)	0.14 (0.82)	0.027 (0.16)	2.05 (2.27)
13-17	43	2.93 (2.16)	0.49 (1.47)	0.21 (0.51)	3.58 (2.69)
18-22	29	4.45 (2.93)	2.97 (2.47)	0.45 (0.53)	7.86 (3.93)
Total	127	2.69	0.88	0.18	3.69

ANOVA, F- Value, F+-14.20, F++- 23.96, F+++- 6.29, F++++-34.06, P-0.000

Table 2 dmft and dmfs by age

Age group	No. of individuals (n)	dmft* (SD)	dmfs** (SD)
5-8	18	2.17 (1.98)	3.67 (3.90)
9-12	37	1.59 (2.03)	2.62 (3.34)
13-17	43	0.16 (0.61)	0.35 (1.41)
18-22	29	0.00 (0.00)	0.00 (0.00)
Total	127	0.83 (1.60)	1.40 (2.81)

ANOVA F\*-16.47, F\*\*-34.06, P-0.000 (HS)

Table 3 Multiple regression analysis

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
DMFT				
1	0.565 (a)	0.320	0.314	1.90
dmft				
1	0.504 (a)	0.254	0.248	1.39
DMFS				
1	0.640 (a)	0.409	0.405	2.85
dmfs				
1	0.429 (a)	0.229	0.223	2.48

a, predictors (constant), age

Table 4 Treatment needs

Age group	No. of individuals (n)	Pit & Fissure sealants (%)	1 surface filling (%)	2 surface filling (%)	Crowns (%)	Veneers (%)	Pulp care (%)	Extraction (%)
5-7	18	2 (1.6)	12 (9.4)	7 (5.5)	0	0	0	2 (1.6)
8-12	37	5 (3.9)	29 (22.8)	11 (8.7)	1 (0.8)	1 (0.8)	0	1 (0.8)
13-17	43	10 (7.9)	35 (27.6)	5 (3.9)	1 (0.8)	4 (3.1)	4 (3.1)	0
18-22	29	2 (1.6)	25 (19.7)	5 (3.9)	5 (3.9)	3 (2.4)	9 (7.1)	4 (3.1)
127	127	19 (15)	101 (79.5)	28 (22)	7 (5.5)	3 (2.4)	13 (10.2)	7 (5.5)

Chi Square = 53.52; P < 0.001 (HS)

the part of parents and school teachers. Whereas the corresponding figures for the general population were 39.1% and 33.1% for 12 and 15 years age groups respectively. (chi squared: 71.72 and 52.21;  $P < 0.001$ ) (15).

In a study conducted in the UK in 1986, Shaw et al. (16) reported a mean DMFT score of 1.76 in 3562, 5-15-year-old intellectually handicapped children. In our study the figure was 2.61 for 5-22-year-olds with hearing impairment, probably due to lack of parental care as parents were ignorant about dental health.

In another study conducted in Kuwait in 1999, Shyama et al. (17) demonstrated a higher prevalence of caries, 86%, with a mean DMFT score of 5.0 in subjects aged 3-29 years with hearing impairment, due changes in lifestyle and dietary habits. In our study the prevalence of untreated tooth decay was 83.92% and the mean DMFT was 2.61, possibly due to barriers in communication for proper health education and poor oral hygiene habits.

Nowak (18) reported a mean DMFT of 13.25 in handicapped young adults aged 17 years and older, who participated in a program run by the US National Foundation of Dentistry for the Handicapped. In our study the figure was 4.48 in the 18-22-year age group.

The neglect of dental care in our study population was even more evident than that in another survey from West Germany in 1978 (19), which yielded representative data for various age groups. The DMFT values were generally about 15% higher in handicapped adults, although the number of untreated carious lesions was more than twice as high. In our study, the subjects had 329 untreated decayed teeth; 87.4% needed some sort of treatment and 12.6% did not. One surface filling was needed for 79.5% of the 127 subjects, while 22% needed two surface fillings.

A study conducted by Rao et al. in 2001 at Mangalore, Karnataka, showed a slightly higher caries prevalence with a mean DMFT of 2.48, and 66.18% of the subjects were affected by caries. The corresponding figures in our study were 2.61 and 88.18%, emphasizing the need to reorganize preventive care measurements and improve dental care, particularly in disabled children (20).

A study conducted by Alvarez-Arenal A et al. in June, 1998 schoolchildren at Asturias, Spain, showed a mean caries incidence of 3.30 DMFT. In all of the 6, 9, and 12-year age groups, the D-component constituted the major part of the caries index. In our study it was 2.61 in the 5-22-year age group and the D-component also constituted the major part of caries index (21).

A study conducted by Ivancić Jokić N et al. in 80 disabled children in the 3-17-year age group in Rijeka, Croatia, showed a mean DMFT of 6.39 in permanent dentition, whereas in our study it was 2.61 in the 5-22-year

age group (22). The results of our study were similar to surveys in Norway, where high caries prevalence has been found in handicapped adults (23).

Another study conducted by Al-Qahtani and Wyne in March 2004 at Riyadh, Saudi Arabia, showed a mean dmft score of 7.35 (SD: 3.51) in deaf children 6-7 years old and a mean DMFT score of 5.12 (SD: 3.45) in 11-12-year-old children. In our study the mean dmft was 2.17 (SD: 1.98) in 5-8-year-old children with hearing impairment, and the mean DMFT was 1.76 (SD: 1.74) in children aged 9-12 years, perhaps because of the better availability of dental manpower in India than in Saudi Arabia (24). A study conducted by Alvarez-Arenal A et al. in June, 1998 schoolchildren at Asturias, Spain, showed that one and two surface fillings were required in all age groups; 58.39% of subjects required one surface filling and 27.02% required two. In our study 79.5% of subjects needed one surface filling and 22% needed two (21). One or two surface fillings were more wide-spread followed by other treatment needs in accordance with a previous study conducted by Mandal et al. in 2001 (25). The present study showed an 83.92% prevalence of decayed teeth and a 7.14% prevalence of filled teeth, which is a highly alarming situation. This may be attributed to negligence on the part of parents and school authorities in obtaining dental treatment for these deaf and mute children. Efforts must be made to encourage the parents and school teachers of these children to promote and improve their oral health. Dental health education should be provided to parents and school teachers, to improve the oral health of this social group. Parents should be educated about dental development of their children, dental disease processes, the role of diet in initiation of caries, and oral hygiene measures that are appropriate for children.

The present findings demonstrate a high caries prevalence, poor oral hygiene, and extensive unmet needs for dental treatment in our study population. We found a mean DMFT of 2.61 and a prevalence of decayed teeth of 83.92%, indicating that these children were not given much treatment priority. This highly alarming situation needs immediate attention. A prevention-based intervention program is recommended for these special groups of subjects involving voluntary health agencies. Effort must be made to encourage the parents of these children to promote and improve their oral health.

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