

Prevalence of Dental Caries and Oral Hygiene Status among Institutionalized Special Children and Normal Children in District Mandi of Himachal Pradesh: A Comparative Study

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Abstract

Aim: Assessment and comparison of oral hygiene status and caries experience between the institutionalized special children and a group of healthy children, along with, association of oral hygiene with various sociodemographic variables (age, sex, etc.) and clinical variables (brushing frequency, cleaning mode, material used, etc.). **Materials and Method:** A cross-sectional study was conducted in district Mandi of Himachal Pradesh on 384 children aged 6–17 years, of which 184 belonged to special health-care needs and 200 healthy subjects were selected randomly from three other government schools. Oral hygiene status and caries were clinically examined using simplified oral hygiene index (OHI-S) index, decayed, missing, filled teeth (DMFT), and decayed-extracted-filled teeth index, respectively. **Results:** Mean OHI(S) scores for mentally retarded, visually impaired, hearing impaired, and healthy children were 3.08 ± 1.35 , 1.49 ± 1.44 , 0.81 ± 0.95 , and 1.14 ± 0.97 , respectively, and the results were statistically significant ($P < 0.05$). Mean DMFT scores for mentally retarded, visually impaired, hearing impaired, and healthy children were 1.48 ± 1.96 , 0.85 ± 1.06 , 0.68 ± 1.23 , and 1.64 ± 1.70 , respectively, and were statistically significant ($P < 0.05$). **Conclusion:** Mean OHI(S) score was significantly more for mentally retarded children followed by visually impaired, healthy, and hearing impaired whereas mean DMFT score was significantly more for healthy children followed by mentally retarded, visually impaired and hearing-impaired children.

Keywords: Decayed, missing, filled teeth, dental caries, index, oral hygiene

INTRODUCTION

Developmental disabilities can develop due to a variety of conditions which include cerebral palsy, Down's syndrome, mental retardation, autism, seizure disorders, hearing and visual impairments, congenital defects, and even social or intellectual deprivation.^[1] Providing health-care services for children with special health-care needs (SHCN) will continue to be a challenge in the 21st century.^[2]

Therefore, the present study intended to compare the oral hygiene status and dental caries experience among institutionalized special children with that of healthy school children in District Mandi of Himachal Pradesh.

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MATERIALS AND METHODS

Study design

A cross-sectional study was conducted on children with SHCN attending special schools and a group of healthy children attending normal schools in the district Mandi of Himachal Pradesh.

Sampling

The present study was conducted on a total of 184 children with SHCNs between 6 and 17 years of age, out of which 81 were hearing impaired, 13 were visually impaired, and 90 were

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mentally challenged, and a total of 200 healthy subjects of the same age group were randomly selected for comparison from three other government schools. The whole study population was divided into two groups - special children and normal children.

These groups were further subdivided into:

- Children below 12 years of age
- Children above 12 years of age.

Inclusion criteria

- All the children who were present on the day of survey and were willing to participate
- The children for whom guardian consent was given.

Exclusion criteria

- Uncooperative children
- Children with medical conditions that contraindicate oral examination without appropriate modifications
- Children who were absent on the day of examination.

Permission

A written permission was obtained from District Welfare Officer, Mandi. Ethical clearance was obtained from the institutional ethical committee, and consent was obtained from heads of the special care institutions before the study was scheduled. Informed written and verbal assents were obtained from both the School Authority and guardians of the children, respectively.

Questionnaire

A close-ended questionnaire adopted from the WHO oral health questionnaire for children, 2013^[3] was conducted on sociodemographic factors (age, gender, economic status, occupation, and educational background of parents), dietary habits, oral hygiene habits, frequency of sugar intake, tobacco-related habits, presence or absence of dental pain, and utilization of dental services for all the children, and the responses were retrieved from the children's records, through personal interviews with the person in-charge and with the help of guardians. The interview was followed by the clinical examination of children by the calibrated examiner.

Clinical examination

All the subjects were examined in premises of the respective schools, under adequate natural illumination (Type III) using plane mouth mirror and No. 23 explorer.^[4] Sufficient number of presterilized instruments were carried to the institutions on the day of examination. Oral hygiene status was recorded according to the criteria of simplified oral hygiene index (OHI[S]) by Greene and Vermilion, and dental caries in primary and permanent dentition was recorded using Klein, Palmer and Knutson's decayed, missing, filled teeth (DMFT) index, and decayed-extracted-filled teeth (deft) index proposed by Gruebbel.

Statistical analysis was done using the SPSS version 17.0 (IBM SPSS Statistics, Chicago, Illinois, USA; www.ibm.com/products/spss-statistics) Chi-square analysis was used to

explore the association between categorical variables and oral health. Statistical significance was fixed at $P < 0.05$.

RESULTS

Demographic distribution of the sample population according to age and gender

Graph 1 shows that most of the subjects belonged to later age group. Furthermore, out of 184 special care children, 61 (33.2%) were males and 123 (66.8%) were females. Among 200 healthy children, 116 (58.0%) were males and 84 (42.0%) were females.

Mean scores of study subjects for oral health variables

Graph 2 shows that mean OHI(s) score was found to be 3.08 ± 1.35 , mean debris index-simplified (DI[S]) score = 1.74 ± 0.67 , and mean calculus index-simplified (CI[S]) score = 1.34 ± 0.77 for mentally retarded children. Mean OHI(s) = 1.49 ± 1.44 , mean DI(s) score = 1.09 ± 0.99 , and mean CI(s) score = 0.40 ± 0.55 for visually impaired children; mean OHI(s) = 0.81 ± 0.95 , mean DI(s) score = 0.70 ± 0.69 , and mean CI(s) score = 0.11 ± 0.37 for hearing impaired children and for healthy children mean OHI(s) score = 1.14 ± 0.97 , mean DI(s) score = 0.93 ± 0.73 , and mean CI(s) score = 0.21 ± 0.33 . The results were statistically significant ($P < 0.05$) with respect to DI(s), CI(s), and OHI(s) variables showing that mentally retarded subjects had poorest oral hygiene status.

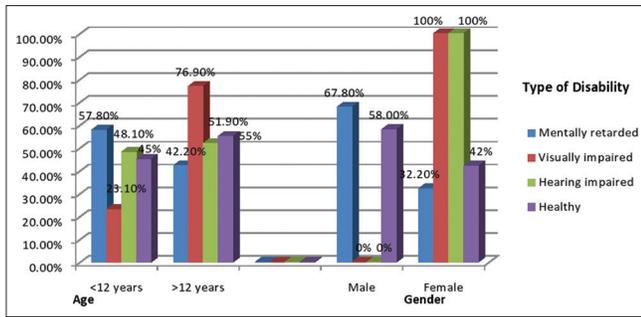
Graph 3 shows that mean DMFT score was found to be 1.48 ± 1.96 for mentally retarded, followed by 0.85 ± 1.06 for visually impaired and 0.68 ± 1.23 for hearing-impaired subjects. Healthy children had mean DMFT score of 1.64 ± 1.70 . Hearing-impaired children had lowest DMFT score, and healthy children had the highest DMFT score and the difference was found to be statistically significant ($P < 0.05$).

Graph 4 shows that mean deft score was found to be 1.19 ± 2.10 for mentally retarded children, followed by 1.04 ± 1.94 for hearing impaired and 0.08 ± 0.27 for visually impaired children. Healthy children had the highest deft score of 1.28 ± 2.18 . Visually impaired children had lowest deft score and healthy children had the highest deft score, but the difference was found to be statistically nonsignificant ($P > 0.05$).

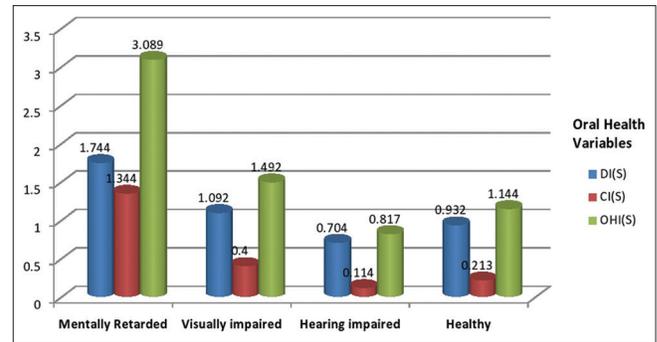
DISCUSSION

Oral health is an important attribute for the overall health and well-being of the children, especially those with disabilities because they have greater oral health needs.^[5] Quality oral health-care contributes to the holistic health, which should be a right rather than a privilege. Therefore, in this study, oral health status of children with SHCN was assessed and compared with a group of healthy control subjects who were matched by sociodemographic factors, such as age, gender, parental literacy, occupation, family income, disabled sibling, dietary habits, and clinical variables.

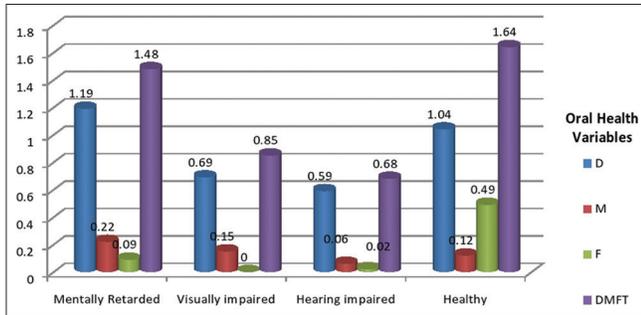
In the present study, 184 institutionalized disabled subjects (90 mentally retarded, 81 hearing impaired, and



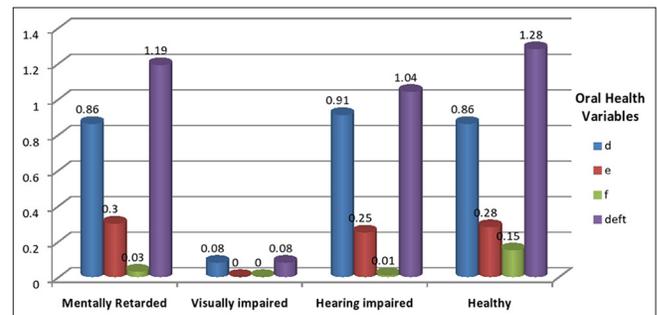
Graph 1: Distribution of study subjects according to age and gender.



Graph 2: Mean scores of the study subjects for debris index-simplified, calculus index-simplified, and oral hygiene index-simplified.



Graph 3: Mean scores of the study subjects for decayed component (d), missing component (m), filled component (f), and overall DMFT index.



Graph 4: Mean scores of the study subjects for decayed component (d), missing component (e), filled component (f), and overall deft index.

13 visually impaired) of age between 6 and 17 years were examined.

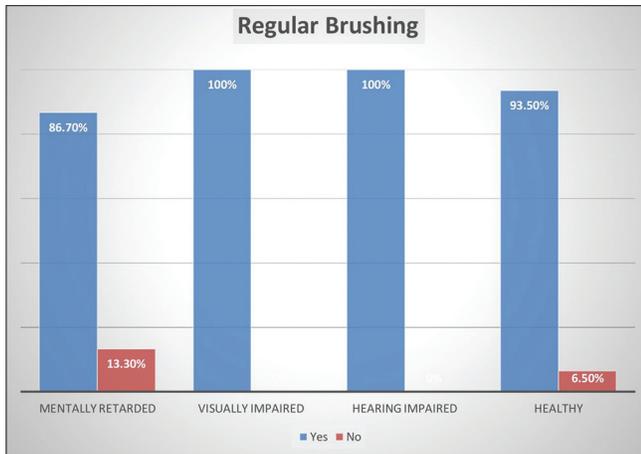
The demographic information related to all the study groups revealed that there was no significant difference ($P > 0.05$) between all the groups with respect to age. However, there was a significant difference ($P < 0.05$) between the study groups with respect to gender, with female population slightly more in number than males unlike the study by Reddy *et al.*,^[6] in which no significant difference was there between the study groups with respect to age and gender composition. Furthermore, Jain *et al.*^[7] found that the number of males was significantly higher than that of females in their study on institutionalized blind and hearing-impaired children.

In the present study, there was a significant difference ($P < 0.05$) found between the study groups regarding their brushing habits, with most of the subjects brushing regularly [Graph 5], brushing frequency [Graph 6], with or without assistance [Graph 7]. Only mentally retarded subjects needed assistance while brushing as they were more dependent on their caregivers in regard to nutrition and oral hygiene habits because of the manual dexterity due to which they were unable to perform self-help skills. Similar results were seen by Habashneh *et al.*^[8] in their study on children with Down syndrome in special need center's in which it was found that all non-DS subjects who reported brushing teeth maintained oral hygiene by themselves, and about 11.6% of those with DS who brush their teeth maintained oral hygiene with the help of their mothers or caregivers. In contrast, Reddy *et al.*^[6] in their study showed that there were no significant differences between the

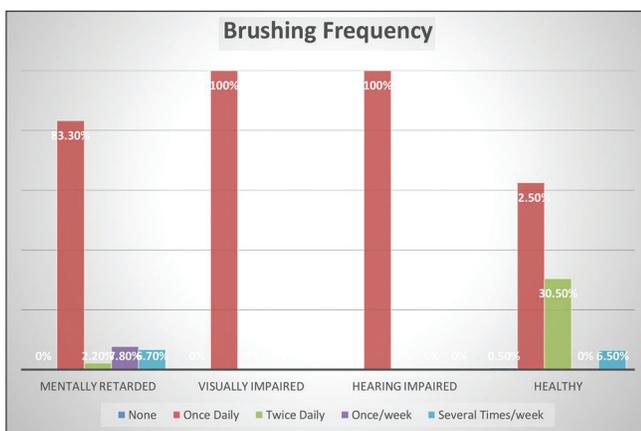
groups regarding their brushing habits, last day sugar exposure, tobacco-related habits, and utilization of dental care and thus did not influence the study results.

The assessment of oral hygiene status revealed that the hearing impaired children were found to be significantly better than other disabled and healthy children ($P < 0.05$). This may be perhaps due to the fact that hearing-impaired children can visualize the act of tooth brushing, which is still one of the most common means of maintaining oral hygiene especially, in developing countries like India. This finding was in agreement with the study reports of Shaw *et al.*^[9] in Birmingham, in which hearing impaired were having better oral hygiene than other handicapped groups. In the present study, out of 81 hearing impaired, more than half of the subjects (60.4%) had profound deafness. The degree of hearing loss had no significant effect on the oral hygiene status even though it was found to be poorer among persons who were severely impaired. These results were supported by the findings of the study by Kumar *et al.*^[10]

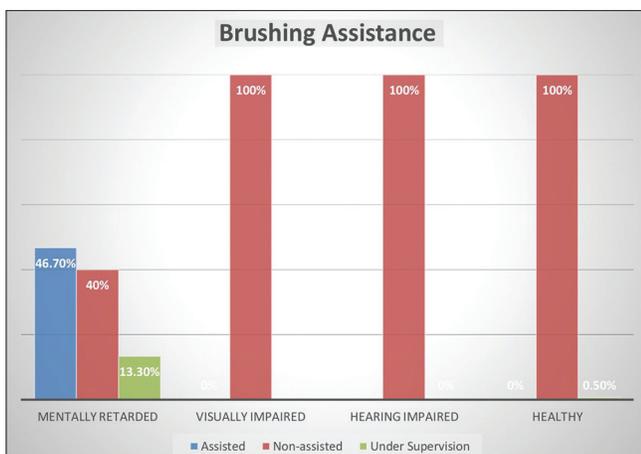
There was a significant difference ($P < 0.05$) between the study groups with respect to mean DMFT, with hearing-impaired children having the lowest values of DMFT, i.e. 0.68 ± 1.23 . This may be due to the reason that these children were institutionalized and had a fixed dietary pattern and were exposed to controlled dietary sugar. Similar results were found in a study conducted by Dinesh Rao *et al.*^[11] in Mangalore, Karnataka, India, with a mean DMFT of 2.48 ± 2.02 in hearing



Graph 5: Distribution of subjects according to the brushing habit.



Graph 6: Distribution of subjects according to brushing frequency.



Graph 7: Distribution of subjects according to need of assistance during brushing.

impaired and 5.92 in blind children (aged 6–18 years), which is high compared to the present study. In the same study, the mean deft was 2.6 ± 3.37 for hearing-impaired and 0 for visually impaired. Broadly similar findings came from a study in Davangere, Karnataka, by Aruna *et al.*,^[12] which reported a mean DMFT of 1.64 for the deaf.

There was no significant difference between the study groups with respect to mean “deft,” due to the low caries prevalence and the small amount of active decay, leading to the results of less statistical importance. The trends found in this study are similar to those found in the study conducted by Shaw *et al.* in 1986.^[9] However, hearing impaired individuals showed slightly higher values of “decayed” component in primary dentition, i.e. 0.91, compared to other study groups. This may be perhaps due to the exposure of hearing impaired to a different living environment that includes various factors such as socioeconomic status, peer influence, illiteracy, and lack of awareness toward oral health among the parents, which might have encouraged the frequent consumption of refined sugars resulting in a higher DMFT before their admission to the special care institutions. Reddy *et al.*,^[6] in their study, found bit different results with significantly higher mean “deft” among hearing impaired as compared to visually impaired children.

The mean oral hygiene index of the mentally retarded population was 3.08 ± 1.35 , whereas it was observed to be in the range of 1.14 ± 0.97 among healthy school children. This finding was in co-relation with the study done by Sogi GM, Bhaskar DJ^[13] in 2002, who found that the mean oral hygiene index of the study population was 3.80 ± 1.42 , whereas it was observed to be in the range of 1.1–1.7 among school children of Davangere, India.

Caries experience in mentally retarded subjects seems quite comparable with that seen in nonhandicapped children of the same age [Table 1]. A study by Gizani *et al.*^[14] showed a mean DMFT score of 2.9 versus 2.7 in 12-year-old children in Belgium. In our study, the mean DMFT score was 1.48 versus 1.64, in mentally disabled and healthy 6–17-year-old subjects, respectively. Children with mental retardation had more missing permanent (0.22 ± 0.65) and primary teeth (0.30 ± 0.78) than did the children with other disabilities (0.15 ± 0.37 and 0 for visually impaired, 0.06 ± 0.36 and 0.25 ± 0.69 for hearing impaired) or healthy children (0.12 ± 0.39 and 0.28 ± 0.64). These results of the study show that tooth extraction is preferred over tooth restoration in children with mental retardation as compared to normal children. This might probably be because of the difficulty of treating children with mental disabilities.

In our study, mean DMFT/deft was 0.85/0.08, 1.64/1.28 in visually impaired and normal children, respectively, which was much less as compared to the previous studies. Similar results were seen in a study conducted by Arenal *et al.* in 1998^[15] in schoolchildren at Asturias, Spain, who showed a mean caries incidence of 3.30 DMFT. Moreover, the present study revealed no significant association between the degree of blindness of 6–17 years’ old visually impaired students and their caries experience. The same results were seen in a study by Bekiroglu *et al.* in 2012.^[16]

In our study, visually impaired children were having fair oral hygiene with mean OHI(S) score of 1.49. These results were not in agreement with the results of the study conducted by Ahmed *et al.*,^[17] in which most of the blind students examined were

Table 1: Mean scores of the study subjects for overall decayed, missing, and filled teeth index

Dependent variable	Type (I)	Type (J)	Mean difference (I-J)	P
DMFT	Mentally retarded	Visually impaired	0.632	1.000
		Hearing impaired	0.799*	<0.05
		Healthy	-0.162	1.000
	Visually impaired	Mentally retarded	-0.632	1.000
		Hearing impaired	0.167	1.000
		Healthy	-0.794	0.582
	Hearing impaired	Mentally retarded	-0.799*	0.011
		Visually impaired	-0.167	1.000
		Healthy	-0.961*	0.000
	Healthy	Mentally retarded	0.162	1.000
		Visually Impaired	0.794	0.582
		Hearing impaired	0.961*	0.000

DMFT: Decayed, missing, and filled teeth

having poor oral hygiene. Relatively, poor oral hygiene was seen in visually impaired individuals (1.49) when compared to hearing impaired (0.81) and healthy children (1.14). This may be due to the lack of development of self-help skills, inability to visualize the act of cleaning the teeth as most of the children were totally blind and had never seen in their lives, so could not form visual concepts, and the stay in hostel thus leading to lack of supervision while brushing.

In a study of 85 visually impaired students, Prashanth *et al.* in 2011^[18] stated that there was not any significant relationship between dental caries and oral hygiene practice with type of cleaning tools and neither it was significantly related with knowledge about impact of sugar consumption on dental caries nor with the visit to dentist (occasionally, never). These results were consistent with the results of the present study. This may be attributed to the fact that all these children were institutionalized and so, their oral hygiene practices, dietary habits, history related to dental setup exposure were similar.

The proportion of the mean DMFT that was restored in both primary and permanent dentition was found to be lower in the handicapped children in every age group than healthy children. This emphasizes the fact that handicapped children are still receiving less dental care than their normal counterparts, and that when treatment is provided it is more likely to be in the form of extractions rather than restorative care. Thus, there is a high demand for the provision of dental services, especially to the disabled section. These results were in accordance with the study conducted by Shaw *et al.* in 1986.^[9] on handicapped children attending special schools in Birmingham, UK, who

found that the handicapped children in special schools tended to have more missing and decayed and fewer filled teeth than their normal counterparts.

Limitations

The present study provides only an insight into oral hygiene status and caries status of relatively small population and lacks a wider perspective on a detailed oral health examination. It is therefore suggested to conduct a study on large scale in the region to help planners in formulating an effective oral health-care program for this underserved population.

CONCLUSION

The findings of the present study showed that despite the advances in oral health, children with disabilities have a significantly higher burden of oral diseases. A number of factors may exist to explain why there are so much unmet treatment needs among handicapped children. Lack of knowledge about good oral hygiene practices among the concerned authorities, lack of motivation, low priority given to the dental care in the society, lack of facilities for early and regular oral health check-ups and prompt treatment, poor socioeconomic status of the parents or guardians, and cost of the treatment may be the reasons for these accumulated treatment needs. Thus, a systematic endeavor to enhance the preventive approach as a component of comprehensive school-based dental health promotion programs should be undertaken by the oral health authorities.

Why this paper is important to pediatric dentists

The present study provides an insight into oral hygiene status and caries status of relatively neglected population of special health needs children in a hill town of India, who still have a significantly higher burden of oral diseases and unmet treatment needs, despite the advances in oral health.

Comparing oral health attributes between different groups of special care children would be helpful in obtaining baseline data to understand oral health needs of these children and accordingly recommending appropriate preventive measures.

Thus, a systematic endeavor is required by the oral health authorities to enhance the preventive approach as a component of comprehensive school-based dental health promotion programs for this underserved population.

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Conflicts of interest

There are no conflicts of interest.

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