ORIGINAL RESEARCH

Comparison of Effectiveness of Visual and Sign Motivation on the Oral Hygiene of Students

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Abstract

Aim: The aim of the study is to compare the effectiveness of visual and sign motivation on the oral hygiene of students with hearing and speech impairment studying in special schools of Meerut, Uttar Pradesh, India.

Materials and methods: A cross-sectional study was carried out on 200 students. The sample was divided into two groups. Ethical clearance was obtained from the Institutional Ethical Committee. Data were collected at three points of time–at baseline, 1st and 3rd month.

Results: In the age-group, 8–13 years, on intergroup comparison of mean oral hygiene index (OHI) score, no significant difference was observed on the first visit (*p*-value of 0.351) and second visit, respectively (*p*-value of 0.687), but on comparing the mean simplified oral hygiene index (OHI-S) score on third visit significant difference was observed (*p*-value of 0.03) and in the age 14–18 years, on intergroup comparison of mean OHI-S score no significant difference was observed on first visit (*p*-value of 0.593) and second visit, respectively (*p*-value of 0.404), but on comparing the mean OHI-S score on third visit, significant difference was observed (*p*-value of 0.018) Both the groups have shown that there was the positive impact of reinforcement on the oral hygiene of students in this age-group as well.

Conclusion: There was a significant improvement in oral hygiene status and a significant improvement in participant satisfaction toward oral health in both groups. Sign language video playback is not as effective and efficient in improving the maintenance of oral health in hearing and speech-impaired children as compared to sign language.

Clinical significance: This study has helped in the better understanding of different methods of maintaining good oral hygiene of hearing and speech-impaired children.

Keywords: Hearing, Oral hygiene index-S, Sign language, Speech.

International Journal of Clinical Pediatric Dentistry (2023): 10.5005/jp-journals-10005-2640

Introduction

"Kindness is a language that a deaf can hear and the blind can see."—Mark Twain.[1]

According to the World Health Record 2010, good health is essential to human welfare and to sustained economic and social development. World Health Organization (WHO) member states have developed the target for themselves to develop their health financing systems to make sure that all people can use health services, regardless of the financial hardship associated with paying for them.[2]

World Health Organization (WHO) defined health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity and the ability to lead a socially and economically productive life.[3] Good oral health plays a very important role in appearance, comfort, well-being, self-esteem, self-confidence, social acceptability as well as good general health. Thus, its neglect gives rise to negative health consequences and unpleasant social life of the individual.[4]

The oral cavity plays an important role in every individual's daily life by performing functions such as mastication, esthetics, phonetics, communication, and expression. The oral cavity is an important part of the body, and dental treatment can affect and be affected by a patient's general physical and mental status.[5]

Dental care is not a priority to families of multidisabled children, more awareness of the dental care needs of these special children is necessary.[6] A person with a disability—according to the definition given by WHO has a big disadvantage of a condition arising because of deficiency or disability, restricting their fulfillment of behavioral characteristics that are considered normal or within the normal limit for a healthy individual.

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How to cite this article: Singh R, Saraf BG, Sheoran N, *et al.* Comparison of Effectiveness of Visual and Sign Motivation on the Oral Hygiene of Students. Int J Clin Pediatr Dent 2023;16(5):671–677.

Source of support: Nil

Conflict of interest: None

Hearing loss can result from prenatal to postnatal infections, anoxia, prematurity, and exposure to ototoxic.[7] Hearing impairment primarily influences communication, which in turn can have a devastating effect on the individual. As the amount 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 introduction to the 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 rates.[8]

Children with hearing and speech impairment have communication barriers to receiving adequate oral health awareness and inadequate ability to control their dental plaque. Oral health education and motivation is the most cost-effective method for preventing dental diseases. The WHO recognizes

oral health education as a behavior that improves oral health and decreases the risk of oral diseases. Oral hygiene instructions can be rendered with the use of educational aids.[9] Realizing the need to motivate hearing and speech-impaired children to improve oral hygiene, the present study was planned to see the Effectiveness of visual and sign motivation on the oral hygiene of speech and hearing-impaired students of 8–18 years studying in special schools of Meerut, Uttar Pradesh, India.

Materials and Methods

Study Design

A cross-sectional study was carried out to assess the effectiveness of visual and sign motivation on the oral hygiene of students with hearing and speech impairment attending special schools in Meerut, Uttar Pradesh, India, and to assess the effectiveness of the health education program.

Source of Data

School-going students between the age-group 8–18 years from special schools in Meerut, Uttar Pradesh, India, were examined according to strict inclusion and exclusion criteria.

Sample Distribution

Around 200 students with hearing and speech impairment of age ranging from 8 to 18 years were taken for the study. Students were divided into two groups.

- Ethical clearance was obtained from the Institutional Ethical Committee.
- Prior to the onset of the study, the purpose of the study was informed and explained. The consent was obtained from parents to volunteer to participate in the present study.

Inclusion Criteria

- Students with hearing and speech impairment.
- Students of age-group 8–18 years.
- Students who were cooperative.

Exclusion Criteria

- Students whose parents were not willing to clinical oral examination of their children.
- Students without hearing and speech impairment.
- Students below 8 years.
- Students above 18 years.

Calibration

The principal investigator was trained and calibrated in the Department of Pediatrics and Preventive Dentistry, Sudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana, India, under the guidance of the chief supervisor before proceeding for the study till consistent results were obtained. This was done to avoid intraexaminer variability.

Data Collection

- The data was collected by "clinical examination" of 200 students with hearing and speech impairment studying in a special school.
- Every student's WHO examination type III also oral hygiene index (OHI)—S were noted on each visit.
- The first group of students was motivated with sign motivation with the help of their faculty members (Fig. 1).
- Specially designed videos were played to the second group of the student population to motivate them regarding their oral hygiene habits (Fig. 2).
- The questionnaire was administered thrice during the course of the study, that is, at baseline 1st and at 3rd months of follow-up.
- The structured questionnaire was comprised of questions related to type, material used and frequency of oral cleaning.

Results

A total of 200 hearing and speech-impaired students were enrolled in the study and were divided into two groups based on the method of motivation.

- Group I: Motivation done by the sign language method.
- Group II: Motivation done by visual method.

Figure 3 depicts the age-wise distribution of students among groups I and II and Figure 4 depicts the mean of the OHI-S index score recorded on the first, second, and third visits.

In the age-group 8–13 years in group I mean OHI-S score was 2.954 ± 0.9407 on the first visit which reduced to 2.468 ± 0.9556 on the second. On the third visit, the mean OHI-S was reduced to 2.010 ± 0.8643, which was statistically significant (p-value < 0.001).

Fig. 1: Motivation by sign language

Fig. 2: Motivation done by visual method

The test of significance used is repeated measures of the analysis of variance (ANOVA) test.

In group II mean OHI-S score was 2.756 ± 1.1431 on the first visit which reduced to 2.556 ± 1.9556 on the second visit. On the third visit, the mean OHI-S score was reduced to 2.473 ± 1.1943, which was statistically significant. The test of significance used is repeated measures of the ANOVA test.

On intergroup comparison of mean OHI-score, no significant difference was observed on the first visit (*p*-value of 0.351) and second visit, respectively (*p*-value of 0.687), but on comparing the mean OHI-S score on the third visit, significant difference was observed (*p*-value of 0.03) which shows that there was positive impact of reinforcement on the oral hygiene of students.

The test of significance used is the independent *t*-test (*p*-value < 0.001).

In the age 14–18 years.

In group I mean OHI-S score was 2.778 ± 1.0357 on the first visit which reduced to 2.260 ±0.9934 on the second visit. On the third visit mean OHI-S score was reduced to 1.806 ± 0.8883 which was statistically significant (*p*-value of <0.001).

The test of significance used is repeated measures of the ANOVA test.

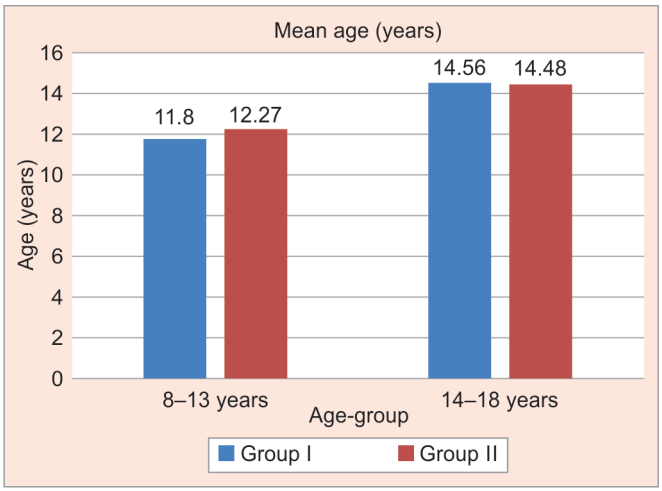

Fig. 3: It depicts the age-wise distribution of students in groups I and II

In group II mean OHI-S was 2.644 ± 1.4401 on the first visit which reduced to 2.467 ± 1.4533 on the second visit. On the third visit, OHI-S was reduced to 2.373 ± 1.4267 which was a significant difference (*p*-value of <0.001).

The test of significance used is repeated measures of the ANOVA test.

On intergroup comparison of mean OHI-S score, no significant difference was observed on the first visit (*p*-value of 0.593) and second visit, respectively (*p*-value 0.404), but on comparing the mean.

OHI-S score on the third visit significant difference (p-value 0.018) which shows that there was a positive impact of reinforcement on the oral hygiene of students in this age-group as well. Table 1 shows the age-group-wise comparison of the study population according to frequency.

The test of significance used is the independent *t*-test.

Brushing

First Visit

In the age-group 8–13 years:

- In group I frequency of brushing was once daily in 36% (18) and twice daily in 64% (32) students, respectively.
- In group II frequency of brushing was once daily in 41.7% (20) and twice daily in 58.3% (28) students, respectively, which was not significant (*p*-value of 0.679).
- The test of significance used is the Chi-square test.

In the age-group 14–18 years:

- In group I frequency of brushing was once daily in 40% (21) and twice daily in 22% (11) students, respectively.
- In group II frequency of brushing was once daily in 40.4% (20) and twice daily in 59.6% (31) students, respectively, which was not significant (*p*-value of 0.999).
- The test of significance used is the Chi-square test.

Second Visit

In the age-group 8–13 years:

- In group I frequency of brushing was once daily in 18% (9) and twice daily in 82% (41) students, respectively.
- In group II frequency of brushing was once daily in 22.9% (20) and twice daily in 77.21% (37) students, respectively, which was not significant (*p*-value of 0.0.621).
- The test of significance used is the Chi-square test.

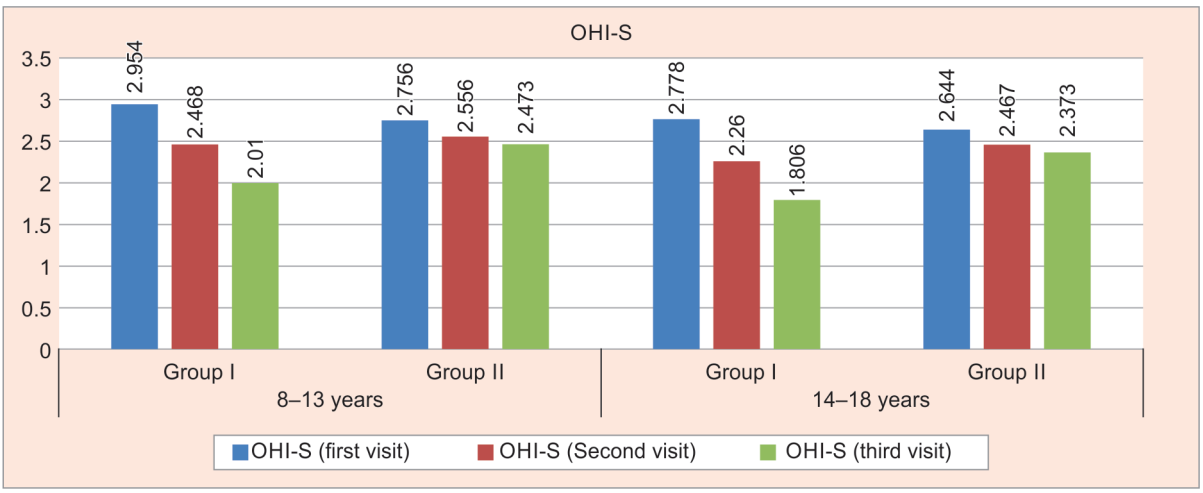

Fig. 4: It depicts the mean of the OHI-S index score recorded on first, second, and third visits

Table 1: Age-group-wise comparison of the study population according to the frequency of oral cleaning, at first, second, and third visits

			Frequency of cleaning					
			Visit 1		*Visit 2*		*Visit 3*	
			Once	*Twice*	*Once*	*Twice*	*Once*	*Twice*
8–13 years	Group I	*N*	18	32	9	41	9	41
		%	36.0%	64.0%	18.0%	82.0%	18.0%	82.0%
	Group II	*N*	20	28	11	37	11	37
		%	41.7%	58.3%	22.9%	77.1%	22.9%	77.1%
Total		*N*	38	60	20	78	20	78
		%	38.8%	61.2%	20.4%	79.6%	20.4%	79.6%
p-value			0.679, NS		0.621, NS		0.621, NS	
14–18 years	Group I	*N*	21	29	11	39	11	39
		%	42.0%	58.0%	22.0%	78.0%	22.0%	78.0%
	Group II	*N*	21	31	6	46	6	46
		%	40.4%	59.6%	11.5%	88.5%	11.5%	88.5%
Total		*N*	42	60	17	85	17	85
		%	41.2%	58.8%	16.7%	83.3%	16.7%	83.3%
p-value			0.999, NS		0.120, NS		0.120, NS	

In the age-group 14–18 years:

- In group I frequency of brushing was once daily in 22% (11) and twice daily in 78% (39) students, respectively.
- In group II frequency of brushing was once daily in 11.5% (6) and twice daily in 88.5% (46) students, respectively, which was not significant (*p*-value of 0.120).
- The test of significance used is the Chi-square test.

Third Visit

In the age-group 8–13 years:

- In group I frequency of brushing was once daily in 18% (9) and twice daily in 82% (41) students, respectively.
- In group II frequency of brushing was once daily in 22.9% (20) and twice daily in 77.21% (37) students, respectively, which was not significant (*p*-value of 0.0.621).
- The test of significance used is the Chi-square test.

In the age-group 14–18 years:

- In group I frequency of brushing was once daily in 22% (11) and twice daily in 78% (39) students, respectively.
- In group II frequency of brushing was once daily in 11.5% (6) and twice daily in 88.5% (46) students, respectively, which was not significant (*p*-value of 0.120).
- The test of significance used is the Chi-square test.

Hence on comparing all three visits the frequency of brushing increased to twice daily on the second visit which remained the same during the third visit irrespective age of the child showing a positive influence of reinforcing the oral hygiene habits as shown in Table 2.

Oral Hygiene

Visit One

In the age-group 8–13 years:

- In group I, oral hygiene status was poor in 50% (25), fair in 48% (24), and good in 2% (1) students, respectively. In group II of the same age-group, oral hygiene status was fair in 45.8% (22), poor in 43.8% (21), and good in 10.4% (5), respectively, which was not significant (*p*-value of 0.216).

In the age-group 14–18 years:

- In group I, oral hygiene status was poor in 38% (19), fair in 60% (30), and good in 2% (1) students, respectively. In group II of the same age-group, oral hygiene status was poor in 44.2% (23), good in 28.8% (15), and fair in 26.9% (14) students, respectively which were significant (*p*-value 0.019).
- The test of significance used is the Chi-square test.

Visit Two

In the age-group 8–13 years:

- In group I, oral hygiene status was fair in 66% (33), poor in 18% (9), and good in 16% (8) students, respectively. In group II of the same age-group, oral hygiene status was poor in 41.7% (20), fair in 39.6% (19), and good in 18.8% (9) students, respectively which was significant (*p*-value < 0.001).
- The test of significance used is the chi-square test.

In the age-group 14–18 years:

- In group I, oral hygiene status was fair in 62% (31), good in 20% (10), and poor in 18% (9) students, respectively. In group II of the same age-group, oral hygiene status was poor in 42.3% (22), good in 28.8% (15), and fair in 22.1% (11) students, respectively, which was significant (*p*-value < 0.001).
- The test of significance used is the Chi-square test.

Visit Three

In the age-group 8–13 years:

- In group I, oral hygiene status was fair in 66% (33), good in 28% (14), and poor in 6% (3) students, respectively. In group II of the same age-group, oral hygiene status was poor in 39.6% (19), fair in 37.5% (18), and good in 22.9% (11) students, respectively, which was significant (*p*-value < 0.001).
- The test of significance used is the Chi-square test.

In the age-group 14–18 years:

- In group I, oral hygiene status was fair in 50% (25), good in 44% (22), and poor in 6% (3) students, respectively. In group II of the same age-group, oral hygiene status was poor in 38.5% (20),

Table 2: Age-wise distribution of good, fair and poor oral hygiene status during the three visits

			Oral hygiene status								
			Visit 1			*Visit 2*			*Visit 3*		
			Good	*Fair*	*Poor*	*Good*	*Fair*	*Poor*	*Good*	*Fair*	*Poor*
8–13 years	Group I	*N*	1	24	25	8	33	9	14	33	3
		%	2.0%	48.0%	50.0%	16.0%	66.0%	18.0%	28.0%	66.0%	6.0%
	Group II	*N*	5	22	21	9	19	20	11	18	19
		%	10.4%	45.8%	43.8%	18.8%	39.6%	41.7%	22.9%	37.5%	39.6%
Total		*N*	6	46	46	17	52	29	25	51	22
		%	6.1%	46.9%	46.9%	17.3%	53.1%	29.6%	25.5%	52.0%	22.4%
p-value				0.216, NS			0.019, S			<0.001, S	
14–18 years	Group I	*N*	1	30	19	10	31	9	22	25	3
		%	2.0%	60.0%	38.0%	20.0%	62.0%	18.0%	44.0%	50.0%	6.0%
	Group II	*N*	15	14	23	19	11	22	19	13	20
		%	28.8%	26.9%	44.2%	36.5%	21.2%	42.3%	36.5%	25.0%	38.5%
Total		*N*	16	44	42	29	42	31	41	38	23
		%	15.7%	43.1%	41.2%	28.4%	41.2%	30.4%	40.2%	37.3%	22.5%
p-value				<0.001, S			<0.001, S			<0.001, S	

good in 36.5% (19), and fair in 25% (13) students, respectively, which was significant (*p*-value < 0.001).

- The test of significance used is the Chi-square test.

On comparing all three visits it can be inferred that oral hygiene status has improved in both the groups showing a positive impact of reinforcing oral hygiene habits in children with hearing and speech impairment.

Discussion

Hearing impairment refers to a condition within which individuals are fully or partially unable to detect some frequencies of sound that are heard by traditional people.[10] Hearing disorder mainly influences communication which may be the biggest barrier that a limit of obtaining information which further affect their lifestyle and overall health.[11] Hearing and speech impairment is a major disability affecting many children globally. According to a national sample survey organization in India, 0.4% of 1065.40 million children are hearing impaired and each child in 1,000 live births suffers from hearing impairment (according to the Joint Committee on Infant Hearing, American Academy of Audiology, 2000)[12]

There is a paucity of knowledge about the oral health status of hearing and speech-impaired children and the problems faced by them in maintaining their oral hygiene. Also, nationwide surveys of the of the oral condition of those children are lacking. Hence during this study main focus was on assessing the comparison of the effectiveness of visual and sign motivation on the oral hygiene of students with hearing and speech impairment studying in special schools of Meerut. Many studies are conducted investigating various sorts of instructions (direct/indirect) like personal instructions, self-education manuals, and audiovisual aids. Lees and Rock reported that there was no improvement in oral hygiene and plaque control for the written instruction group.[13] Warren and Yoder reported that no single instructional method suits all the learners.[14] In dentistry and medicine the main methods used for patient instructions are verbal, printed manuals, and videotapes. Peng et al. reported that written instructions were least effective as compared to other methods.[15]

In an exceeding review by Nielson et al. and Shepperd et al., they'd toward shown their support for the employment of videos for better understanding and increasing patient knowledge and skills toward more robust oral hygiene. Mccilloch et al. have shown their support toward videos over instructional methods as videos can be repeatedly used with no additional cost. Axelsson et al. suggested that instructions should be sufficient to target the private needs of hearing and speech-impaired children.68 According to Hakim et al., sign language videos don't seem to be that effective because linguistic communication has its own weakness, it's less efficient because many signs can be learned but not all meanings are often hinted or especially abstract meaning, and not everyone can understand sign language.[16]

Incongruity within the maintenance of oral hygiene between younger age-group children and older children does exist. Chronological age of the child can be a reasonable predictor of tooth brushing ability and manual tooth brushing skills are acquired after 4–5 years of age as stated by Unkel.[17] In contrast, Powell reported that the oral hygiene of the kid improves with increasing IO which was associated with the chronological age.[18] Apart from the communication barrier faced by the dentist during the dental treatment of deaf and mute children, dental anxiety could be a common problem that appears to develop mostly in all children during childhood and adolescence which prevent patients from cooperating during dental treatment.

The method of teaching dental and oral health care using sign language can improve the behavior of maintaining oral health care in children with hearing impairment. Mhaske et al. reported that sign language is an appropriate way to compensate for children's heavy loss, a substitute for hearing that functions as a sign receiver, they need sign language as a substitute.[19] Variza et al. reported that these methods can work sufficiently if they have finished with proper methods and materials that can work tunefully with one

another so that it will be effective, their study also reported that sign language video playback is not that effective and efficient in improving the upkeep of oral health in deaf children.[20]

In several studies done by Shetty et al., Pouradeli et al., the video clip method was used for oral health education, which proved effective in improving oral and dental health in children with hearing impairment.[21,22] The oral health status of disabled children differs depending upon several factors like disability type, parent's education level, socioeconomic situation, age and oral health knowledge.[23]

The results of the study show that children of the older age-group showed better improvement in the OHI-S. According to Price, when teachers and institutional attendants are included to help in intervention, better results are often expected. In our study, special school teachers helped us with the sign language.[24] In three studies by Pouradeli et al., Alse et al., and Lamba et al., education was given using a toothbrush and a dental model with the help of sign language, the result of all three studies showed that oral health status significantly improved after training.[22,25,26] In accordance with our study Shaalan et al., Sandeep et al., Shetty et al., and Pareek et al., showed a significant improvement in the oral hygiene status of children with hearing impairment as the children were given personal attention in the form of education programs, which made them more interested in maintaining good oral hygiene.[21,27–29]

Summary and Conclusion

Based on the results, we can infer that the examined hearing and speech-impaired children exhibit suboptimal oral status. The following conclusions were drawn from the study.

Oral Hygiene Status

The oral hygiene in most children was found to be fair according to the OHI-S index. This is likely due to a reduced ability to carry out hygiene tasks and/or a lack of information required to implement proper oral hygiene habits. Among younger and older age-group children, the older group exhibited better oral health status as compared to younger aged children and there was a statistically significant difference observed in both the groups.

Effectiveness of Visual and Sign Motivation

Based on the results of our study, There was a significant improvement in oral hygiene status and significant improvement in participant satisfaction toward oral health in both groups. Sign language video playback is not as effective and efficient in improving the maintenance of oral health in hearing and speech-impaired children as compared to sign language.

Clinical Significance

During our clinical study, we observed certain lacunae and will want to suggest certain recommendations for betterment of the special needs children so that their oral health problems can be addressed in a more efficient way,

- Oral health care professionals must coordinate with other community medical experts to initiate social and general benefits for oral health that are sustained for a longer period of time.
- Campaigns should be carried out for the special needs children to boost their oral health problems.
- Parents and caretakers of special needs children should be educated about their children.
- Public health should provide parents and caregivers with prepared oral health education and encourage them to engrain proper oral hygiene habits for his or her special needs children.
- Hearing-impaired children have limitations in their hearing sense, thus visual aids are recommended for these children.
- Government of India should have future public health plans and health care policies for youngsters with disabilities.

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