Comparison of impact of oral hygiene instructions given via sign language and validated customized oral health education skit video on oral hygiene status of children with hearing impairment

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ABSTRACT

Introduction: Children with special health-care needs have limitations in oral hygiene performance due to their potential motor, sensory, and intellectual disabilities and so are more prone to have compromised oral health. Aim: This study aimed to compare the impact of oral hygiene instructions given via sign language and a validated customized oral health education skit video on oral hygiene status of children with hearing impairment (CHI). Settings and Design: Ethical clearance was obtained from the institutional ethical committee for research activities. The study was carried out across CHI schools of Wardha district, Maharashtra, India. Methodology: Sixty-eight CHI, within the age group of 6–13 years, were divided into two educational intervention groups: customized oral health educational video (Group A) and sign language (Group B). A structured questionnaire was designed to gather information about the routine oral hygiene practices via the Indian Sign Language. Baseline Gingival Index (GI)-S and Plaque Index-S indices were recorded. Based on the group assigned, oral hygiene instructions were given on a daily basis. Reassessment was done after 4 weeks. Statistical Analysis: Unpaired t-tests were performed (P<0.05) to determine if significant differences exist between the two groups. Results: Postintervention plaque scores between Group A and Group B were 0.12 ± 0.22 and 0.07 ± 0.22, respectively, and the difference between the two was statistically insignificant (P = 0.330). For GI, scores in Group A and Group B were 0.03 ± 0.12 and 0.04 ± 0.12, respectively, and the difference was statistically insignificant (P = 0.669). Conclusion: Both sign language and the validated customized video modeling have been proved to be positively influencing the oral hygiene status of CHI equivalently.

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Introduction

Children with special health-care needs (CSHCN) are the ones with impaired cognitive abilities, behavioral problems, hearing impairment, impaired mobility, neuromuscular disorders, uncontrolled body movements and many more. According to WHO estimates of 2018, 466 million people have disabling hearing loss across the globe, out of which 34 million are children. Looking at the numbers from India alone, according to the 2011 census, more than 3 million people have disabling hearing loss and more than 1.2 million people have speech disability. It is the presence of any one or multiple such disabilities that make learning and other activities difficult. The age, degree of impairment, and socioeconomic conditions can have further impact on the oral health.

The oral hygiene performance of CSHCN is primarily restricted due to their potential motor, sensory, and intellectual disabilities, making them more prone to have compromised oral hygiene. Many a time, the CSHCN do not understand the gravity of the impending problem and/or may not willingly agree for preventive oral health practices.

Many parents and guardians themselves do not possess the required knowledge and ignore the oral hygiene of CSHCN as they themselves do not maintain good oral hygiene or choose a proper diet. Various authors have reported more dental problems and more untreated dental diseases among CSHCN as compared to other children. CSHCN belonging to lower socioeconomic classes and those with greater restrictions attributable to their disability, were expected to have more unmet dental problems, especially periodontal treatment needs. There is, hence, a need to communicate with the CSHCN to make them aware of the importance of oral hygiene, which comes with its own challenges. The aim of the present study was to compare the impact of oral hygiene instructions given via (i) sign language and (ii) a validicated customized oral health education skit video on the oral hygiene status of children with hearing impairment (CHI).

Methodology

The present study was ethically approved by the institutional ethical committee for research activities prior to commencement of the study (IEC/2018-19/7498). This was a cross-sectional, interventional type of study. The study was carried out across CHI schools of Wardha district, Maharashtra, India. Official permissions were obtained from the heads of the schools. The study protocol was explained to the parents/guardians of the children to be included in the study, and a written informed consent was obtained. Prior to commencement of the study, the investigator attended 3-month-long certified training program for learning the Indian Sign Language from a registered institution.

CHI in the age group of 6-13 years, having a plaque score >1.0, and attending an institute for rehabilitation of CHI were included in the study. Children who are on long-term antibiotics in the past 3 months, had ulcerative gingivitis and stomatitis, and who were suffering from any known systemic diseases were excluded from the study. Based on the previous literature and using the sample size formula, a total of 68 CHI were selected for the study who were equally divided into two groups (Groups A and B), with 34 CHI in each group.

A structured questionnaire was designed to gather information about the routine oral health practices followed and demographic details of individual participants included in the study. As the information was to be gathered by the investigator in the Indian Sign Language, the case study form was first assessed by the faculty of department of pediatric and preventive dentistry, further by the sign language expert and the caregivers of the schools.

Foremost, the oral cavity of all the children selected for this study was examined without any intervention in their existing oral hygiene practices. The examination was carried out in their schools on a portable dental chair using a mouth mirror and the WHO Probe. Plaque status and gingival health of the participants were assessed using Plaque Index (PI) given by Silness and Loe and Gingival Index (GI) given by Loe and Silness for baseline examination.

All the children selected for the study were provided new toothbrushes to avoid re-contamination of the oral cavity before intervention. Oral hygiene instructions were delivered through an oral health education skit recorded as a customized video in Group A. The copyrighted visual clipping (copyright no. CP-4517/2019) was prepared by a multimedia expert under the investigator's supervision.

The validated video clip involved participation of CHI themselves, in which through a customized skit, the children themselves explained about the ill effects of having a bad oral hygiene and how the social life of an individual could get affected on having dental caries. Further, healthy oral hygiene practices such as mouth rinsing and tongue cleaning were highlighted. The Modified Bass Technique was encouraged as the correct technique of brushing. Video clipping was shared with the school of the children belonging to Group A (https://youtube/Orxxwf3PMSc). Reinforcement to the children in Group A was made by playing the video daily for 1-month time period.

The same oral hygiene instructions, however to be delivered via sign language, were taught to the
caregivers of schools in Group B. Reinforcement was done by the caregivers to the children in Group B on a daily basis for a period of 1 month. After 4 weeks, the PI[17] and GI[17] scores were recorded in both groups and statistically analyzed with the baseline scores.

Statistical analysis
Analytical test namely unpaired t-test was performed with $P < 0.05$ to determine if significant difference exists between the two groups. All the statistical analyses were performed using with Statistics for Windows, Version 21.0. (IBM Corp., Armonk, NY). Data obtained were tabulated and compared between the two groups.

Results
Tables 1 and 2 summarize the details of oral hygiene habits of the participants in Groups A and B, respectively. Table 3 shows the comparison of plaque and gingival scores pre- and post-intervention. In Group A, the mean plaque scores pre- and post-intervention were $1.45 \pm 0.33$ and $0.12 \pm 0.22$, respectively. The gingival scores pre- and post-intervention were $0.51 \pm 0.30$ and $0.03 \pm 0.12$, respectively. In Group B, preintervention plaque score was $1.39 \pm 0.30$ and post intervention, it was $0.07 \pm 0.22$. The gingival scores were $0.43 \pm 0.04$ and $0.04 \pm 0.12$ pre- and post-intervention, respectively. Table 4 shows that plaque scores post intervention between Group A and Group B were $0.12 \pm 0.22$ and $0.07 \pm 0.22$, respectively, and the difference was statistically insignificant ($P = 0.330$). For GI, the scores in Group A and Group B were $0.03 \pm 0.12$ and $0.04 \pm 0.12$, respectively, and the difference was statistically insignificant ($P = 0.669$).

Discussion
The WHO has defined disabled hearing loss as when an individual has hearing loss $>40$ decibels (dB) in the better hearing ear in adults and a hearing loss $>30$ dB in the better hearing ear in children.[4] Genetic causes, complications at the time of birth, occurrence of certain infectious diseases, use of particular drugs, excessive noise exposure and aging are the etiological factors, which result in hearing loss.[4]

Our oral cavity is considered a mirror of our general body health. Individuals with disabilities are at a greater risk for developing oral health problems and pose unique difficulties in their dental management.[18] Primary preventive care is of utmost importance and services for masses need to be designed with the basic objective of alleviating and preventing diseases in our society.

Professionals should take into consideration barriers which CHI face while making an appropriate health education model and educate them accordingly regarding the oral diseases and their treatment. For any educational method to be effective, the professional should know that it needs the participant’s attention and retention and recall from memory during a similar circumstance.[19] The participant’s drive to mimic the learned behavior is also an aspect not to be ignored. Thus, it is important to ensure that the instructions being delivered are competent in targeting the needs of the participants and also apt for their cognitive ability.

Various authors have explored different modes of communication for CHI, such as through written instructions to individuals, informative manuals, and also via videos. They have stated that written instructions seem to be least effective, whereas instructions given via visual means have the advantage of better understanding and convenience.[20] The use of video modeling as health education method has this added advantage that it can be used repetitively without any extra cost and efforts. Visual instructions have successfully lowered plaque and gingival scores.

| Oral hygiene habit          | Preintervention (%) | Postintervention (%) | $P$   |
|-----------------------------|---------------------|----------------------|-------|
| Brushing frequency          |                     |                      |       |
| Once                        | 33 (97.05)          | 0 (0)                | 0.000*|
| Twice                       | 1 (02.95)           | 34 (100)             |       |
| Time of brushing            |                     |                      |       |
| Morning                     | 33 (97.05)          | 0 (0)                | 0.000*|
| Evening                     | 0 (0)               | 0 (0)                |       |
| Both morning and evening    | 1 (02.95)           | 34 (100)             |       |
| Material used for brushing  |                     |                      |       |
| Toothpaste + brush          | 34 (100)            | 34 (100)             | 1.00 (NS) |
| Toothpaste only             | 0 (0)               | 0 (0)                |       |
| Brush only                  | 0 (0)               | 0 (0)                |       |
| Method of brushing          |                     |                      |       |
| Horizontal                  | 34 (100)            | 0 (0)                | 0.000*|
| Circular                    | 0 (0)               | 34 (100)             |       |

*P<0.001; statistically highly significant. NS=Not significant
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in CHI.\cite{21,23,25,27} Shetty et al. proved the efficiency of sign language in training the CHI along with the assistance of their caregivers.\cite{22} Video modeling is based on social learning theory, which states that majority of the habits of an individual are learned either by his/her own experiences or by observing other people.\cite{19} Hence, in the present study, a validated customized oral health educational skit video was shown on a daily basis, for a period of 4 weeks, for reinforcement. Use of customized videos involving CHI themselves not only improves the credibility of the video but also improvises the adaptiveness of the targeted population.

Sign language is one of the commonly employed methods for communicating with hearing-impaired children.\cite{28} In this, words are symbolized by forming different shapes with fingers and hands representing a different alphabet, requiring a lot of practice and skill.\cite{26} Hence, this method necessitates the support of trained personnel to interact. This barrier is overcome by a novel way of training the dental professional in standardized Indian Sign Language in the present study. This not only encourages others to support CSHCN, but also sets an example for the entire medical and paramedical professionals.

In the present study, baseline plaque score in both the groups was fair, along with moderate level of gingivitis, which is in accordance with the observations of other studies indicating that there is a scarcity of awareness among CHI.\cite{21,23,25,27} It was observed in the present study that scores of all indices showed a statistically highly significant difference ($P=0.000$) postintervention in both Group A and Group B at the end of 4 weeks, which is in accordance with the study conducted by Sandeep et al.\cite{21} and Pareek et al.\cite{24}

The reduction in PI and GI in this study is likely due to the knowledge acquired through the validated health education method. The fact that all of the students were aware of their participation in a dental health camp may have positively inclined the results. However, none of them were informed prior on exactly which day the examination will be carried out.

The mean reduction was found in both the groups as the same instructions were given via the standardized sign language. The employment of standardized sign language enhanced the understanding of the students and improved the credibility of health education.\cite{28} Flanders have suggested that when special initiatives are taken and programs are designed specifically for the population, the oral hygiene of participants has improved.\cite{29} Stacey et al. have suggested that the proper brushing technique must be demonstrated and the importance of dental health must be emphasized for attaining the desired level of dental hygiene.\cite{30}

The advantages of the study include that the children selected were institutionalized children provided with

| Oral hygiene habit | Preintervention (%) | Postintervention (%) | $P$ |
|--------------------|---------------------|----------------------|-----|
| Brushing frequency |                     |                      |
| Once               | 33 (97.05)          | 0 (0)                | 0.000* |
| Twice              | 1 (02.95)           | 34 (100)             |     |
| Time of brushing   |                     |                      |
| Morning            | 33 (97.05)          | 0 (0)                | 0.000* |
| Evening            | 0 (0)               | 0 (0)                |     |
| Both morning and evening | 1 (02.95) | 34 (100)             |     |
| Material used for brushing |              |                      |     |
| Toothpaste + brush | 34 (100)            | 34 (100)             | 1.00 (NS) |
| Toothpaste only    | 0 (0)               | 0 (0)                |     |
| Brush only         | 0 (0)               | 0 (0)                |     |
| Method of brushing |                     |                      |
| Horizontal         | 34 (100)            | 0 (0)                | 0.000* |
| Circular           | 0 (0)               | 34 (100)             |     |

* $P \leq 0.001$; statistically highly significant. NS=Not significant

| Group | PI | GI |
|-------|----|----|
| Group A | 0.12±0.22 | 0.03±0.12 |
| Group B | 0.07±0.22 | 0.04±0.12 |

* $P=0.330$ (NS) |

NS=Not significant; GI=Gingival index; PI=Plaque index

**Table 3: Comparison of plaque and gingival scores in Groups A and B pre- and post-intervention**

**Table 4: Comparison of plaque and gingival scores postintervention in Groups A and B**

| Group | PI | GI |
|-------|----|----|
| Group A | 0.330 (NS) | 0.669 (NS) |
| Group B | 0.04±0.12 |     |

* $P=0.000*$; statistically highly significant. GI=Gingival index; PI=Plaque index

Flanders have suggested that when special initiatives are taken and programs are designed specifically for the population, the oral hygiene of participants has improved.\cite{29} Stacey et al. have suggested that the proper brushing technique must be demonstrated and the importance of dental health must be emphasized for attaining the desired level of dental hygiene.\cite{30}
the same diet. Second, the balancing of the study was done by selecting children with plaque score >1.0. This ensured that only those who had fair or poor oral hygiene and those who were in need of proper oral hygiene instructions were made a part of the study to check the efficacy of the health education model. Third, a novel way of training the health professional in standardized Indian Sign Language was attempted, which ensured good communication and rapport build up with the participants of the study. Further, this study resulted in the development of a comprehensive and validated health education module for hearing impaired children as recommended by Hashmi et al.[3] The development of the customized oral health education video has overcome the attitudinal, physical, and financial barriers faced by individuals with disabilities.

Conclusion

Both sign language and the validated customized video modeling have been proved to be positively influencing the oral hygiene status of CHI equivalently. Hence, it can be circulated to one and all in need of it, which can improvise the oral hygiene status of masses at absolutely zero additional costs. It can very well be used in developing countries, like India. This is also of clinical significance, as video modeling is a simpler and effective alternative for general practitioners for giving oral hygiene instructions and hence can be recommended.

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Conflicts of interest
There are no conflicts of interest.

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