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## RESEARCH ARTICLE

# IMPROVEMENT IN ORAL HYGIENE STATUS OF VISUALLY IMPAIRED SCHOOL CHILDREN BY EDUCATIONAL INTERVENTION

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**ABSTRACT**

**Aims:** To evaluate and improve the oral health status in visually impaired children with the educational intervention in the form of braille and hands-on demonstration of brushing technique.
**Materials and Methods:** The baseline Oral Hygiene Index-Simplified (OHI-S), Gingival Index(GI) and oral health awareness was recorded. An educational intervention in form of verbal, brailed manuscript and hands on demonstration for brushing was provided with periodically reinforced by the professionals to the blind children. At end of 6 months re-evaluation was done on the same participants.
**Results:** The study revealed highly significant improvement in OHIS and GI post intervention
**Conclusion:** Educational intervention in the form of braille and hands-on demonstration of brushing technique can significantly improve oral hygiene of the visually impaired school children.



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## INTRODUCTION

The prevalence of blind children globally is estimated to be 1.4 million, three-quarters of whom live in the poorest regions of Africa and Asia. (Manish Jain *et al*., 2008) In low-income countries, the prevalence of childhood blindness may be as high as 1.5 per 1000 children. (Naveen and Reddy, 2010) Such a high prevalence, alongside poor management of resources may result in huge impacts. Childhood blindness impacts negatively on longevity, psychomotor, social, and emotional development thus adversely affecting the visually impaired young child. (Manish Jain *et al*., 2008) Studies pertaining to the oral health status of the handicapped individuals in the past few decades have shown that though the handicapped children start their life with teeth and gums that are strong and healthy as that of normal children, however their diet, eating pattern, medication, physical limitations, lack of cleaning ability and the attitude of their parents and the health care providers all contribute to the poor oral health. (Naveen and Reddy, 2010; Azza Tagelsir *et al*., 2013) Oral health is an important aspect of overall health, for all children, and, is particularly more important for children with special health needs. The oral health of children who are visually impaired tends to be compromised as they are at a disadvantage and are often unable to adequately apply the techniques necessary to control plaque. (Vabitha Shetty *et al*., 2010) Mann *et al*. (Mann *et al*., 1984) suggested that this can be due to their inability to visualize the plaque on tooth surfaces resulting in inadequate plaque removal and therefore the progression of dental caries and inflammatory disease of the periodontium. Shetty *et al*. (2010) proposed other factors such as lack of manual-visual coordination and parental supervision, and the child's reduced concern for his/her appearance. There are very few studies addressing the impact of the severity of visual impairment on oral health of blind children. Hence this study was proposed with following Aims and Objectives –

- To evaluate the oral health status of visually impaired children.
- To evaluate improvement in oral health status of visually impaired children after giving the educational intervention in the form of braille and hands-on demonstration of brushing technique.
- To correlate oral health awareness with oral health status of visually impaired children.

## MATERIALS AND METHODS

In the present study 100 healthy, totally visually impaired children between the age of 6-17 years were selected from a

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Day-Care Centre in Pune with prior parental and institutional consent. Those children who were unable to comply with the follow-up visits were excluded from the study. The children on the first visit were examined and the findings were recorded. The general information of the patient and the readings of their Oral Hygiene Index Simplified (OHIS), and Gingival Index (GI) (WHO Performa) were recorded (Naveen and Reddy, 2010). The Tell-feel-do technique was employed to record these indices. A questionnaire, which assessed their knowledge about oral hygiene, tooth brushing technique, parental guidance/assistance etc., were given to each of these children. The questionnaire was read and the answers obtained were entered. Their awareness level was assessed based on the number of questions correctly answered. (Naveen and Reddy, 2010) The children then received toothbrush and fluoridated dentifrice, one-to-one oral health education and motivation in accordance with the skills, impairment and requirements of each individual with the help of educational intervention as verbal and brailed manuscript regarding oral health care measures provided to them. Modified Bass method of brushing was taught to the children using hands on demonstration method conducted by the dental health professionals (Figure 1). Instructions regarding the same technique were also provided to the children in braille (Figure 2). Reinforcement of educational intervention as brushing technique demonstration was done every 15 days and braille reading was carried out once week. At the end of 6 months the same questionnaire was given to each child to assess their level of oral health awareness, OHI-S and GI post intervention was scored accordingly and statically analyzed with Wilcoxon Signed Rank Test.

## RESULTS

**Table 1 and Graph 1 shows means, standard deviation and mean reduction of OHI-S and GI at base line and 6 month post intervention**

The base line mean of OHI-S was 2.018 with SD ±1.410 and post intervention had mean of 0.8070 with SD ±0.7402. There was mean reduction of 1.211 which is highly significant ($p < 0.001$). The base line mean of GI was 1.077 with SD ±0 .9168 and post intervention mean of 0.5640 with SD ±0.73134. There was mean reduction of 0.513 which is highly significant ($p < 0.001$)

**Table 2, Graph 2A and Graph 2B shows base line scores and post intervention scores with improvement**

Improvement in base line scores of OHIS was observed post intervention with 19% increase in score good, 6% and 13% decrease in fair and poor scores respectively. Improvement was also seen in base line scores of gingival index were there was 20% increase in mild score, while there was 14% and 6% decrease in moderate and sever scores respectively

**Table 1. Standard deviation and mean reduction of OHI-S and GI at base line and 6 month post intervention**

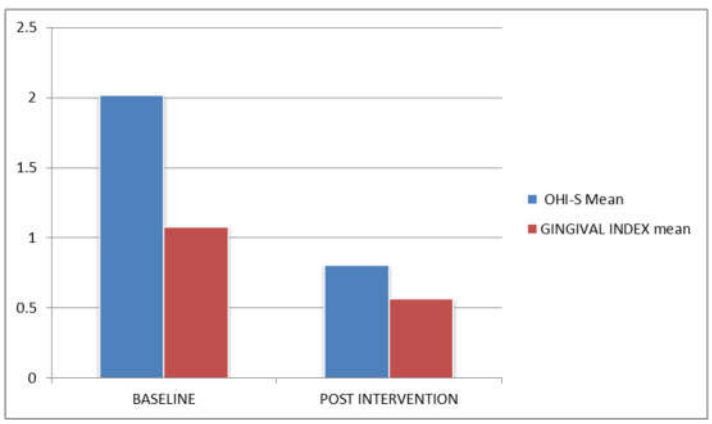
| Variable | Time point | N | Mean | Std. Deviation | Mean reduction |
|---|---|---|---|---|---|
| OHI-S | Pre test | 100 | 2.0180 | 1.41081 | 1.211 |
| | Post test | 100 | .8070 | .74022 | |
| Gingival index | Pre test | 100 | 1.0770 | .91683 | 0.513 |
| | Post test | 100 | .5640 | .73134 | |

**Table 2. Base line scores and post intervention scores with improvement**

| Variable | Time point scores | Pre test % | Post test % |
|---|---|---|---|
| OHI-S | Good | 32 | 51 |
| | Fair | 44 | 38 |
| | Poor | 24 | 11 |
| Gingival index | Mild | 49 | 69 |
| | Moderate | 39 | 25 |
| | Severe | 12 | 6 |

**Table 3. Correlation between oral health awareness and the OHI-S index**

| Time point | Oral health awareness | OHI-S Mean |
|---|---|---|
| Pre test | 38% | 2.01 |
| Post test | 57% | .80 |




**Graph 1. Baseline and post intervention means of OHI-S and GI**

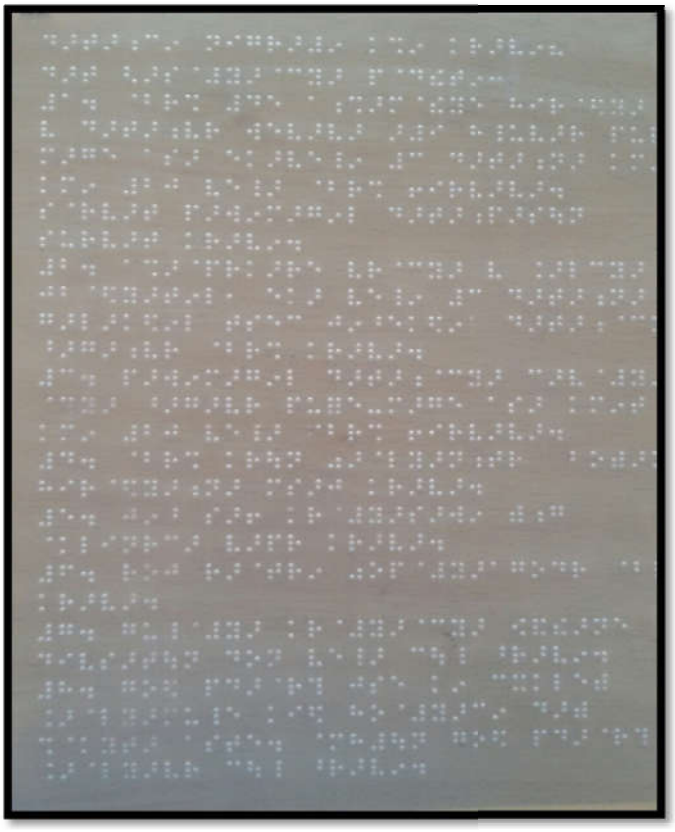
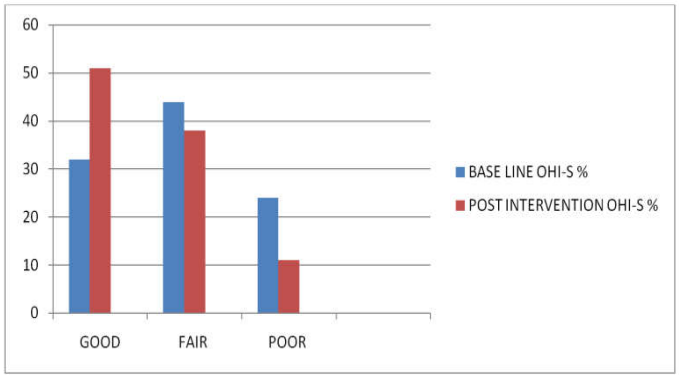
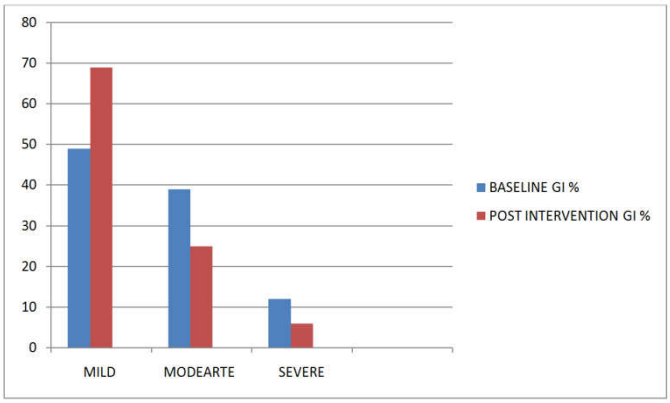


**Figure 1. Braille manuscript**

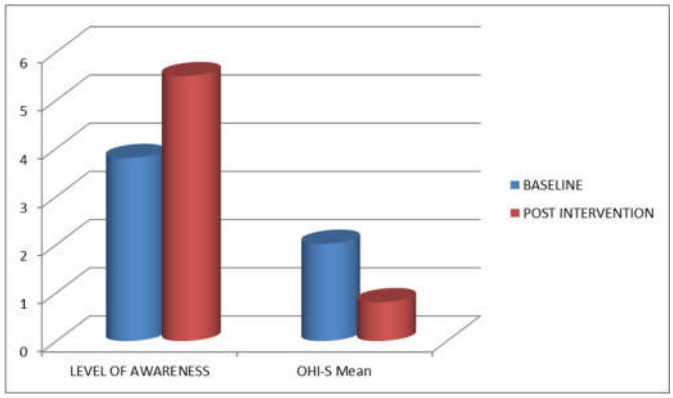
**Figure 2. Hands-on demostration for brushing technique**




**Graph 2A. Imrpovement in OHI-S between base line and post intervention scores**




**Graph 2B. Improvement in Gingival Index between base line and post intervention scores**




**Graph 3. Indirect co-relation of oral health awareness and OHI-S means**

**Table 3 and Graph 3 shows correlation between oral health awareness and the OHI-S index**

There was indirect correlation between oral health awareness and OHI-S index, as there was increase in awareness the OHI-S decreased.

## DISCUSSION

The oral health of people who are visually impaired can be disadvantaged, as they are not in a position to detect and recognize the early oral disease and may be unable to take immediate action unless informed of the situation. Hence adequate instruction and proper care of teeth and oral tissues are essential. The visually impaired depend much more on sound, speech and touch, to orient them to a situation. (Naveen and Reddy, 2010; Nandini, 2003) Hence the oral health education should be modified to accommodate their handicap. Tooth brushing is recommended as an official dental health education material and is one of the main means of preventing gingivitis and dental caries. A correlation between good oral hygiene and gingival health has been clearly demonstrated in both adults and children. The use of fluoridated dentifrice is one of the most common ways of delivering topical fluorides in developed countries, and results from clinical trials have shown that it is an effective caries prevention method. (Seki *et al*., 2003) Visual impairment relates to a person's eyesight, which cannot be corrected to normal vision. Nandini *et al*. assessed oral health status and hygiene practices in 150 visually impaired children, out of which 37.3% of the participants were affected by dental caries and 71.3% by

gingivitis. (Nandini, 2003) Hence, there is utmost need of individual training in oral care and Plaque control in order to reduce the prevalence of dental caries among visually impaired children. Teaching good oral hygiene practices among visually impaired children requires a special approach with time and patience. Most programs rely on tactile senses. In the present study, the patients were assisted in exploring oral structures of the mouth with the help of models. Children received one-to-one oral health education and motivation in accordance with the skills, impairment and requirement. Modified Bass method of brushing was taught by hands-on demonstration to train & improve dexterity. Oral hygiene instructions were converted into braille with the help of braille instructor and each child received a copy. Oral health education was reinforced on a one-to-one basis periodically.

The present study showed a decrease in the mean OHI-S and GI scores at 6 months post intervention intervals which are highly significant as compared to the baseline. As visually impaired children were able to comprehend braille instruction and had developed normal motor skills due to periodic education, hands on demonstration and reinforced motivation which helped in their oral hygiene maintenance. However, towards the end of observation period, it was noticed that almost all the children had developed the modified Bass technique and also religiously brushed twice-a-day with stipulated amount of dentifrice. Studies have also shown that fluoridated dentifrices did not increase calculus accumulation. (Putt *et al*., 2004; Schiff *et al*., 2008) This could be the reason for the significant decrease in the mean OHI-S in these children at 6-month interval which also contribute in significant decrease in GI. Oral health awareness at baseline showed indirect correlation with OHI-S index. The awareness had increased from 38% to 57% at the end of the study. This would be due to the periodic education along with the instructions in given to them in braille. This was in accordance with a study by Ercalik *et al*. (Yalcinkaya and Atalay, 2006) who conducted a 24-item verbal questionnaire to record their general health, impairment, the socio-economic profile and education level of their parents, oral health knowledge, sources of information about oral health, awareness of sugar in-take caries risk, frequency of dental check-ups and oral hygiene habits, as well as any difficulties they experienced. Hence, periodic education and motivation effectively improved the oral hygiene status of the visually impaired children. However, long-term study with large sample size is essential to substantiate these results as this study was done only for a period of 6 months.

**Conclusion**

Educational intervention and its regular reinforcement for visually impaired children can significantly decrease OHI-S and GI. Braille manuscript was easily comprehended by visually impaired children who improved their skills to follow instructions and increased awareness contributing significantly improving oral hygiene status. A hand on brushing technique (Tell-feel-do) is important to develop dexterity in visually impaired children and should be implemented at early age.

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