

Effectiveness of Braille Text and Audio Tactile Performance Technique on Oral Hygiene Status of Visually Impaired School Children in Chennai City

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Abstract

Background: To compare the effectiveness of braille text and audio tactile performance technique in improving the oral hygiene among 10-17 year old visually impaired school children in Chennai city.

Materials and Methods: Baseline oral hygiene status was assessed among 112 children using Plaque Index and Gingival Index. Oral health education was given to 56 children through Braille text and to 56 children through Audio Tactile performance technique. Follow up plaque index and gingival index scores were evaluated after 3 months. Wilcoxon signed rank test and Mann-Whitney U test were used to assess inter and intra group differences.

Results: The mean PI score in the braille group reduced from baseline (1.72) to third month (1.11) and in the ATP group from baseline (1.71) to third month (1.12) which was statistically significant ($p < 0.001$). The mean GI score in the braille-based group reduced from baseline (0.85) to third month (0.64) and in the model-based group from baseline (0.85) to third month (0.57) which was also statistically significant ($p < 0.001$).

Conclusion: The intervention given through the braille script and ATP technique improved the oral hygiene status among the visually impaired school children.

Keywords: Braille text; Audio Tactile performance technique; Plaque Index and Gingival Index.

Introduction

The best and the most beautiful things in the world cannot be seen or even touched. They must be felt with the heart" Hellen Keller¹. Of the total world population which is about 7.6 billion² an estimated 253 million people live with vision impairment of which 36 million are blind and 217 million have moderate to severe vision impairment³. And of the

children under age 15, 19 million are visually impaired.³ The startling fact is that India is the home to the largest blind population accounting to about 12 million.⁴

Vision being one of the most important senses for interpreting the world around us, if impaired in childhood can have ominous effects on physical, neurological, cognitive, and emotional develop-

ment⁵. Childhood blindness is one among the stifling global problems and when compared to adult blindness is a crippling issue which vexes children for lifetime. It remains an undone problem in the field of ophthalmology and serves as a stringent challenge to medical professionals and healthcare administrators across the globe.⁶

The oral cavity is a 'window or mirror' to the overall health of the body and quite often divulges the early signs and symptoms of systemic diseases. Visually impaired people once being categorised as people with impairment are now been called with a truthful term "specially able" where the tag of disability disappears from their mindsets. Despite this encouragement showered on them, there is a restrain on the side of parents towards their child's dental care where they consider the teeth of their children as hopeless. Other barriers towards receiving optimal oral healthcare include presence of normal siblings, curb in finance from family and reluctance from the side of dental health care professionals to provide good oral healthcare.⁷

Health promotion pertaining to the maintenance of oral hygiene is a cardinal aspect for every individual, including children with special health care needs. Such children are found to be recipient of less oral care than the normal population, in spite of the high level of dental diseases among them. The oral hygiene status of these vulnerable groups with visual impairment should be improved by heightened awareness through paediatricians, health visitors, community and primary care teams⁸. There have been various modes of health promotion in practice, emphasising the importance of oral health among the visually impaired which include the audio tapes, tooth models, braille scripts and even music based system⁹ of which braille and the tooth model based oral health education and promotion work quite efficiently.

Braille is an important language for reading in visually impaired. It helps them understand and feel the world via touch.¹⁰ It is a tactile writing system, traditionally written with embossed paper.⁸ Tooth model based oral health education helps children learn the proper brushing technique with tactile perception.

Audio Tactile performance (ATP) technique is a combination of audio and tactile perception, now being adopted as a novel method to educate the visually impaired children.¹¹ With dearth in literature regarding the assessment of oral hygiene status comparing braille and audio tactile performance technique, this study aimed to assess the effect of oral health education through braille text

and audio tactile performance technique on oral hygiene status of visually impaired school children aged between 10-17 years in Chennai city.

Materials and Methods

Study Design: Interventional study.

Study Setting: School setting.

Study Duration: 3 months.

Study Population: 10-17 year old visually impaired students of Saint Louis Institute for Deaf and Blind, Adyar, Chennai.

Ethical clearance was obtained from the Institutional ethics committee and necessary permission was obtained from the school authorities before commencement of the study. Two hundred and ten students were screened of which one hundred and twelve students who met the inclusion and exclusion criteria were allocated into the braille and the ATP group.

Inclusion criteria

- Visually impaired children aged between 10-17 years
- Parents/guardians of the school children who gave consent for their child to participate in the study.
- Participants with baseline Plaque Index score and Gingival Index score more than 1

Exclusion criteria

- Children who had any systemic diseases
- Uncooperative children
- Children who had visited the dentist within 3 months from the commencement of the study
- Children whose parents did not wish to give consent.

The students were divided into two groups by coin toss method

- Group A: Oral health education using English braille (n=56)
- Group B: Oral health education using ATP (Audio Tactile Performance technique) (n=56)

Baseline oral hygiene status for both the groups was assessed using Silness and Loe Plaque Index and Loe and Silness Gingival index. After the assessment of baseline oral hygiene status, 2 modes of oral health education were given as an intervention.

Information given to students in group A in English braille:

- Brush your teeth twice daily.
- Floss once a day.
- Clean your tongue daily.
- Rinse your mouth after every meal.
- Eat nutritious food.
- Limit snacking between meals.
- Visit dentist every six months ¹².

The information was converted to English braille and back translated to English with the help of staff of the school and given to the children in braille sheets for them to read.

The students in group B were first verbally informed about the importance of the teeth and were made to feel the teeth on a large sized model on which the Fone’s method of brushing was taught and then they were made to brush with assistance (Figure 1).

Follow up oral hygiene status was assessed 3 months after the intervention with Plaque index and Gingival Index. Comparison of baseline and follow up scores was done for both modes of intervention.

The data were entered in spreadsheet in Microsoft Excel and subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS) version 20. Mann Whitney U test and Wilcoxon signed rank test were used to assess the Plaque and Gingival Index scores.

Results

Reduction in the mean plaque index scores in both group A (Braille group) and group B (ATP group) from baseline to the 3rd month which was statistically significant (p<0.05). However, there was reduction in the mean plaque index scores between group A and group B at the 3rd month which was not statistically significant (Table 1).

Table 1: Comparison of mean plaque index scores within and between group A and B at baseline and at 3rd month.

Groups	Mean Pi Scores ± Standard Deviation		P-Value	Z Value
	Baseline	3 rd Month		
Braille	1.72 ± 0.15**	1.11 ± 0.30**	0.000 (S)	-6.278
Atp	1.71 ± 0.15**	1.12 ± 0.26**	0.000(S)	-6.206

*Wilcoxon signed rank test

** Z value -0.861, p value 0.389 Mann Whitney U test

++ Z value -0.480, p value 0.631 Mann Whitney U test

S- Significant

Similarly, the decrease in mean gingival index scores from baseline to the 3rd month was statistically significant in both the groups (p<0.05). There was no statistically significant difference in the mean gingival index scores between group A and group B at the 3rd month (Table 2).

Table 2: Comparison of mean gingival index scores within and between group A and B at baseline and at 3rd month.

Groups	Mean Gi Scores ± Standard Deviation		p-Value*	Z value
	Baseline	3 rd Month		
Braille	0.85± 0.45**	0.645 ± 0.306**	0.001(S)	-6.307
ATP	0.85 ± 0.31**	0.57 ± 0.149**	0.001 (S)	-6.417

*Wilcoxon signed rank test

** Z value -0.500, p value 0.617 Mann-Whitney U test

++ Z value -0.777, p value 0.437 Mann-Whitney U test

S- Significant

Discussion

An interventional study design was used in this study as it was considered the most effective method to determine whether a cause effect relationship exists between an intervention and outcome. The design was specifically attuned to evaluate the direct impacts of intervention on the oral health of the individual.

Good health is a fundamental human right, a social goal and an essential human need to be achieved.¹³ Oral problems have emerged as one of the important public health concerns in India. Oral problems result in pain, agony, functional, and aesthetic problems for the individual which leads to the loss of working man hours.¹⁴ Visually impaired children were selected for this study because of the higher risk they are in, to develop oral diseases.¹¹ Dental care is the most common unmet need among visually impaired children. They also have poorer oral health status compared to the general population.⁹ The development of manual dexterity is related to chronological age. 10-17 year old visually impaired children were chosen for this study as children only above 6 years are capable of independent brushing.¹¹

Visually impaired children depend a lot on sound, speech and touch to adapt themselves to situations which necessitates comprehensive oral health education delivery based on simple but effective learning approaches to improve the oral hygiene skills and knowledge among them.¹² Braille based oral health education has been extremely

useful among visually impaired individuals¹⁵. It is an important language for reading in visually impaired children where they understand and feel the world via touch perception.¹⁰

The ATP technique has been proven to be effective in helping the visually impaired children develop their brushing skills and improving their oral hygiene.^{16,17}

In this study, the oral hygiene status was assessed using the plaque index (PI) and gingival index (GI). There was a statistically significant reduction in both the plaque index and gingival index scores at the 3rd month after intervention in both braille group and ATP group. The mean plaque index score for the braille group was 1.72 ± 0.15 at baseline which got reduced considerably to 1.11 ± 0.30 at the 3rd month. For the ATP group, the mean plaque index score was 1.71 ± 0.15 at baseline and 1.12 ± 0.26 at the 3rd month.

Similarly, the mean gingival index score for the braille group was 0.85 ± 0.45 at baseline and 0.64 ± 0.30 at the 3rd month. For the ATP group, the mean gingival index score was 0.85 ± 0.31 at baseline and 0.57 ± 0.14 at the 3rd month. There was no statistically significant difference in the inter group comparison (braille and ATP groups) at baseline and also at the 3rd month. This might be because of the shorter duration (3 months) and also because of the fact that both the techniques were equally acceptable among children.

A research by Krishnakumar et al proved that there was a significant decrease in the mean plaque index scores post intervention with oral health education through ATP technique proving the effect of model-based health education¹¹. Similar results were observed in a study by Gautham A et al where there was a significant reduction in both the plaque and gingival index score among the visually impaired children who received health education through braille text and also through tactile tooth models in conjunction with the audio aids¹⁷.

The effectiveness of the model based oral health education was also stressed upon through another research by Joybell C et al¹⁶ where there was a statistically significant decrease in the mean plaque index score post intervention after 2 months. Hebbal M et al, in their research proved yet again that model-based health education (ATP) method was effective in reducing the plaque scores after 18 months.¹⁸

A research by Arpan Debnath also stressed upon the importance of combination of braille text, tooth models and music based brushing technique to be

effective in reducing the mean plaque scores at 6 months.¹² The results of this study are also in line with results of a research by Chowdary PB et al where combination of verbal instructions, braille text and model-based education significantly reduces both the mean plaque and gingival index scores post intervention.¹³

Overall results showed that there was a statistically significant reduction in the mean plaque and gingival index scores post intervention in both braille group and ATP group. This led to the fact that the improvement in oral hygiene could be due to the advocated proper tooth brushing method through tooth models and also proper oral hygiene instructions given through braille script. Both Audio tactile performance technique and braille based oral health education methods are thus effective methods which could pave way for improving oral hygiene of visually impaired children.

Interventions should be given to the children based on their liking some children have exceptional ability to read braille, some children learn better through ATP method. Additionally, with longer periods of follow up and with proper reinforcement, the ability of visually impaired children to be able to persist with the techniques (braille text and ATP method) should be explored.

Strengths of the study

- The study was registered in Clinical Trial Registry of India.
- Braille text and ATP method are accepted modes of health education among visually impaired children in various studies.

Limitations of the study

- Generalizability was hindered due to heterogeneity in this particular population and more so as the students were recruited from only one school of the city, in this study.
- Only one gender (boys) was recruited in the study.

Conflicts of interest: NIL

Funding: NIL

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