PriMera Scientific
Medicine and Public Health
Volume 7 Issue 3 September 2025
ISSN: 2833-5627

Effect of Oral Health Education on Visually Impaird Students of Age 12-18 Years by Using Braille

Type: Case Report
Received: August 13, 2025
Published: August 31, 2025

Citation:
Sachin Gugawad., et al. "Effect of Oral Health Education on Visually Impaird Students of Age 12-18 Years by Using Braille". PriMera Scientific Medicine and Public Health 7.3 (2025): 35-40.

Hindavi Joshi[1], Divyaprakash Tripathi[1], Sachin Gugawad[2]* and Shashikiran ND[3]

[1]Dental surgeon (BDS), School of Dental Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Satara, India

[2]Professor, Department of Paediatric and Preventive Dentistry, School of Dental Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Satara, India

[3]Dean and Head of Department of paediatric and preventive Dentistry, School of Dental Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Satara, India

***Corresponding Author:** Sachin Gugawad, Professor, Department of Paediatric and Preventive Dentistry, School of Dental Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Satara, India.

Abstract

Aim: Visually impaired children often face numerous challenges in their everyday lives, one of which includes maintaining proper oral hygiene. This study aims to assess the oral health status of visually impaired students.

Objectives:

To assess the oral hygiene status of visually impaired students.

To raise awareness about oral hygiene through tactile and model-based education.

To compare oral hygiene status before and after a 6-month education period.

Methodology: A 6-month comparative study was conducted on 160 visually impaired students, aged 12-18 years, who were trained in Braille. The study utilized the DMFT (Decayed, Missing, and Filled Teeth) index and the OHI-S (Simplified Oral Hygiene Index) for evaluation. The data was collected at the beginning and after 6 months, followed by statistical analysis using paired t-tests.

Results: After 6 months of using Braille-based education, a significant improvement in OHI-S scores was observed (from 2.623 to 0.875). However, no significant changes were noted in the DMFT scores. Additionally, parents reported improved oral hygiene practices in their children.

Conclusion: Oral hygiene practices in visually impaired students significantly improved after the implementation of Braille-based oral hygiene education.

Keywords: Braille; DMFT; OHI-S; oral hygiene practice; visually impaired

Introduction

The mouth plays a key role in daily life, enabling communication, mastication, phonetics, and expression. Proper oral health care from an early age is essential, as neglecting oral hygiene can lead to conditions like dental caries and gum diseases, which can negatively affect overall oral health [1].

In India, 20% of the global blind population is located, with approximately 39 million blind individuals worldwide [2]. Childhood blindness is prevalent in India at a rate of 0.8 per 1,000 children under the age of 16, leading to an estimated 300,000 blind children in the country. One of the main objectives of the World Health Organization's VISION 2020 initiative, "The Right to Sight Program," is to prevent childhood blindness [3].

Dental care is often one of the most overlooked issues for children with visual impairments. Research shows that blind children tend to experience poor oral hygiene, gingivitis, and periodontal problems. As such, this group should be a priority in dental education programs, as they need guidance on maintaining oral hygiene and proper care. Visually impaired individuals primarily rely on senses such as touch (tactile perception), sound, and voice to navigate their environment [4]. Given this, it is crucial to introduce dental education early in a child's school life, as schools provide an ideal setting for health education. Students spend significant time in school, making it the perfect environment to promote health education and achieve its goals [5].

Recently, the goals of health education have focused on encouraging individuals to adopt and maintain health-promoting lifestyles and practices. It is crucial to employ a range of innovative strategies for delivering oral health education, enabling the acquisition of new knowledge, the development of skills, and the transformation of attitudes. This approach helps individuals make informed decisions to address their health issues and achieve better oral health. Therefore, the objective of this study was to evaluate the effectiveness of innovative oral health education methods, using tactile sensation, among visually impaired children at Lok Vishvas Pratishthan in Ponda, Goa.

Methodology

A comparative intervention study was carried out at Lok Vishvas Pratishthan, a school for visually impaired children in Ponda, Goa, from 2023 to 2023. Institutional ethics approval was obtained (KIMSDU/IEC/01/2023). The study included 160 students aged 12-18 who could read Braille. Parents and teachers consented to participate.

Data was collected using the DMFT and OHI-S indices at baseline and after 6 months. Students were educated on oral hygiene using tactile tools, including Braille books, and periodic reinforcement was carried out by trained teachers. After 6 months, data was analyzed using paired t-tests.

Pre-Evaluation & Post-Evaluation Parameters

Before starting, parental consent and student history were recorded. The students were examined using simple dental tools under natural light. The OHI-S and DMFT indices were used to assess the students' oral hygiene status at the start and end of the study.

Evaluation of OHIS Index

The Oral Hygiene Index consist of the combined Debris Index and Calculus index. The Maxillary and the Mandibular arches each include three segments. Each segment was examined for debris or calculus. From each segment one tooth were done used for calculating the individual index, for that particular segment [6].

The method for scoring calculus were done same as that applied to debris, but additional provisions were done made for recording subgingival deposits.

A standard formula was used to calculate the sample size where a total of 160 participants were required taking into consideration an attrition rate of 15%. Before the commencement of the study, approvals from the institutional ethical committee (Obtained KIMS-DU/ IEC/01/2023).

Criteria for classifying debris

0 No debris or stain present.

1 Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area.

2 Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface.

3 Soft debris covering more than two thirds of the exposed tooth surface.

Criteria for classifying calculus

0 No calculus present.

1 Supragingival calculus covering not more than third of the exposed tooth surface.

2 Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of sub gingival calculus around the cervical portion of the tooth or both.

3 Supragingival calculus covering more than two third of the exposed tooth surface or a continues heavy band of sub gingival calculus around the cervical portion of the tooth or both.

Calculation

After the scores for debris and calculus are recorded, the Index values were done calculated. For each individual, the total debris score was done taken and divided by the number of segments scored.

The same method was done used to obtain the calculus index scores.

The average individual or group debris and calculus scores were done combined to obtain Oral Hygiene Index, as follows.

Oral Hygiene Index = Debris Index + Calculus Index

A simplified version exists, the Simplified Oral Hygiene Index (OHI-S by Greene and Vermilion, 1964).

Evaluation of DMFT Index

It was done calculated for 28 teeth, excluding 18, 28, 38 and 48 (the “wisdom” teeth).

DMFT was denoted as-

D-How many teeth have caries lesions (incipient caries not included)?

M-How many teeth have been extracted?

F-How many teeth have fillings or crowns?

The sum of the three figures forms the DMFT-value.

After Clinical Examination oral hygiene instructions were given-

Oral hygiene training for students

The Tell-Show-Feel-Do technique, a modified version of the traditional Tell-Show-Do method, was employed during the instruction [7]. For the training program, specialized materials were created, including models of teeth with and without dental plaque, tartar, and carious lesions. The smoothness of a healthy tooth was demonstrated, along with common areas where plaque forms when teeth are not brushed. The child's hand was guided over the surface of a gypsum model, allowing them to feel the cavities. Additionally, the "Tooth Teacher" Braille book was introduced to further enhance the students' dental education [8].

Oral hygiene training for teachers

For this training program the teachers will have a PowerPoint presentation which highlights the use of Braille book for betterment of dental care and will introduce the teachers with methods to enhance their oral hygiene.

After completion of the program all subjects were done given appointment cards and were done checked again after 6 months. After 6 months again OHIS and DMFT index were done evaluated and statistically results were done compared and evaluated.

Parental satisfaction: To know the actual effect of oral hygiene education on participants, 5 questionnaires were taken by the parents. The questions as follow a) Is your child follow proper tooth brushing technique? b) Are they brushing twice daily? c) Mouth rinses after consuming any sticky food are being followed? d) does your child practice oral hygiene maintenance habit with his/her will? e) Are you satisfied with the oral hygiene of your child? All these questions had yes or no option to select.

Inclusion criteria: Visually impaired students were included into the study through convenience sampling.

Exclusion criteria: Students with normal eye sight.

Students knowing how to read braille book.

Risks involve: No risks are involved in this study.

The analysis of these data was done by using Statistical Package for Social Sciences (SPSS) software, version 20. Descriptive analyses were done to summarize information by calculating the number and percent for categorical variables. The mean DMFT and OHIS scores were compared between the baseline and six months using paired t-tests. The proposal of this study had been revised and approved by the ethics committee of the institute.

Results

Time Interval	*Number*	*Mean*	*SD*	*Mean Difference*	*'t' Value*	*'P' Value*
Baseline	160	2.623	0.351	-1.748	-1.704	0.100
6 Months	160	0.875	0.276		-3.847	0.001*

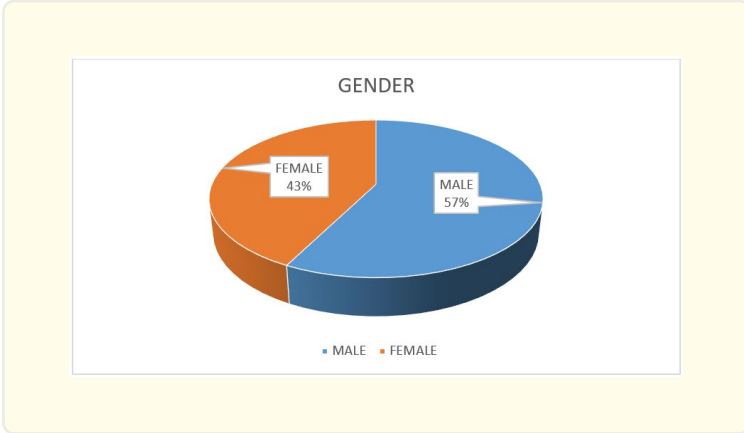
*=Dentoes statistical significance, OHI-S= Oral Hygine Index -Simplified, SD= Standard Deviation.

Table 1: Comparison of OHI-S between the baseline and after 6 months. The OHI-S was found to be significantly low after 6 months of oral hygiene education by using braille book. (P < 0.05).

Time Interval	*Number*	*Mean*	*SD*	*Mean Difference*	*'t' Value*	*'P' Value*
Baseline	160	0.720	1.370	-0.110	-0.652	0.990
6 Months	160	0.830	1.250			

Table 2: DMFT and deft between the two groups at different time intervals. Difference in mean DMFT and deft between fluoridated group and non-fluoridated group was not found to be statistically significant at any time intervals.

In present study, a total of 160 visually impaired children belonging to the age group of 12 to 18 years were enrolled comprising of 92 males and 68 females (Graph 1).



Discussion

Visually impaired children face numerous challenges in their everyday lives. One of the most significant difficulties is their inability to maintain proper dental health [9]. The "Tooth Teacher," a Braille book, is an effective tool for teaching children how to properly care for their oral hygiene, which is crucial for establishing healthy habits and understanding oral health at an early age [10].

This study assessed the effectiveness of the "Tooth Teacher" Braille book in improving oral hygiene habits and outcomes. By the end of the study, there was a notable increase in oral hygiene knowledge, as confirmed by the students' parents. The newly acquired knowledge translated into better oral hygiene practices and improved overall oral health.

Adolescents between the ages of 12 and 18 are particularly vulnerable to developing plaque buildup, making preventive measures especially necessary for them [11]. By the end of the study, improvements were observed in various oral hygiene practices, such as brushing with a toothbrush, rinsing after meals, and cleaning the tongue. These improvements in hygiene practices were largely attributed to the knowledge gained from the Braille book and the ongoing support provided by their teachers.

The frequency of brushing teeth increased from once to twice daily in both groups, a result that mirrors the findings of a similar study by Hebbal et al [12].

The OHI-S scores show significant difference at the end of the study. This was similar to the study conducted by Kumar et al [13].

No significant differences were found when comparing DMFT at the end of the study which is found to similar with study conducted by A Tagelsir et al [14].

The limitation of the study was that the participants were selected from the same school due to which carry-over effect could have occurred. This study was conducted in a residential school for a short duration. Further studies involving long duration are suggested.

Conclusion

This study demonstrates that oral health education through Braille can greatly improve the oral hygiene of visually impaired children. The increased knowledge, supported by consistent reinforcement, led to better oral hygiene practices. However, additional research with extended follow-up periods is necessary to assess the long-term impact on oral health outcomes.

References

1. Anand S., et al. "Assessment of Oral Health Status with Visually Impaired Children in Patna City, Bihar". J Pharm Bioallied Sci 13.Suppl 2 (2021): S1709-S1712.
2. Deccan Herald. "India accounts 20 per cent of global blind population". New Delhi: Deccan Herald (2012).
3. Gilbert C and Foster A. "Childhood blindness in the context of VISION 2020–the right to sight". Bull World Health Organ 79.3 (2001): 227-232.
4. Bhor K., et al. "Effect of oral health education in the form of Braille and oral health talk on oral hygiene knowledge, practices, and status of 12-17 years old visually impaired school girls in Pune city: A comparative study". J Int Soc Prev Community Dent 6.5 (2016): 459-464.
5. Lilia Doichinova, Natalia Gateva and Krasimir Hristov. "Oral hygiene education of special needs children". Part 2: visually impaired children, Biotechnology & Biotechnological Equipment (2019): 821-826,
6. Greene JC and Vermillion JR. "The simplified oral hygiene index". J Am Dent Assoc 68 (1964): 7-13.
7. Fathonah Y, Fatmasari D and Santoso B. "Yay's Dental Education Model as an Effort to Improve Knowledge, Attitudes, and Behavior of Parents of Children with Autism Spectrum Disorder". Journal Kesehatan Gigi 9.2 (2022): 132-6.
8. Sachin Gugawad. "The Tooth Teacher". Braille book for visually impaired 1 (2015): 1-45
9. Al-Alousi JM. "Oral health status and treatment needs among blind children in Iraq". MDJ 6 (2009): 313-24.
10. Yalcinkaya SE and Atalay T. "Improvement of oral health knowledge in a group of visually impaired students". Oral Health Prev Dent 4.4 (2006): 243-53.
11. Reddy K and Sharma A. "Prevalence of oral health status in visually impaired children". J Indian Soc Pedod Prev Dent 29.1 (2011): 25-7.
12. Hebbal M and Ankola AV. "Development of a new technique (ATP) for training visually impaired children in oral hygiene maintenance". Eur Arch Paediatr Denti 13 (2012): 244-7.
13. Kumar S., et al. "Effect of oral health education and fluoridated dentifrices on the oral health status of visually impaired children". Contemp Clin Dent 3 (2012): 398-401.
14. Tagelsir A, Khogli AE and Nurelhuda NM. "Oral health of visually impaired schoolchildren in Khartoum State, Sudan". BMC oral health (2013): 33.