

Oral hygiene practices and influence of oral health education by multisensory methods among visually impaired children in residential school of Himachal Pradesh

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Abstract

Introduction: Vision is one of the most important sense for interpreting the world around us and in absence of vision such persons are always dependent on others and challenged everyday to do daily routine tasks so hurting an individual's self-esteem. Multisensory approach of oral health education of such children is very effective to improve their oral health status.

AIM: To assess oral hygiene practice and increase knowledge of oral health among visually impaired children in Himachal Pradesh by multisensory approach i.e. Verbal, Braille text and Tactile in visually impaired children.

Materials and Methods: 121 visually impaired children between 6-18 years of age, in residential school of Himachal Pradesh was randomly divided into 3 groups to provide oral health education. Group I- Verbal and Tactile- 40 children, Group II-Verbal and Braille- 40 children and in Group III-Verbal, Braille and Tactile-

41 children. To maintain oral hygiene, brushing techniques was explained to all the children by different methods. After 3 and 6 months time, oral hygiene status was recorded and compared using OHI-S index.

Statistical Analysis: Paired t-test was used to assess the difference between the scores before and after health education and Tukey *post-hoc* test for multiple group comparisons.

Results: There was decrease in mean OHI-S score at all time intervals in all groups compared to that of the baseline but most statistically significant difference in score was found in 3rd group i.e. multisensory approach of education was the most effective way to educate visually impaired children.

Conclusion: The study depicts that the combination of audio, Braille and tactile models i.e. multisensory approach of education is an effective way to provide oral health education and improve oral health status of visually impaired children.

Keywords: Verbal, oral health status, tactile, Braille, visually impaired

Introduction

Vision is the most important sense for interpreting the world around us. Blindness is defined as a condition where a person suffers from total absence of sight or visual acuity not exceeding 6/60 or 20/200 in the better eye even with correction lenses or limitation of the field of vision subtending an angle of 20° or worse".¹ According to Indian sample survey of 2011, census in India identifies 2,68,10,557 disabled citizen representing 2.21% of the population. Out of which about 18.8% are visually impaired followed by disability in speech, hearing and mentally handicapped.² Childhood blindness in developing countries is the result of congenital, acquired factors such as measles, syphilis, leukemia, diabetes mellitus, ophthalmia neonatroum, traditional eye medicine, premature birth and especially corneal scarring related to malnutrition and vitamin A deficiency.³ When sight is impaired especially in childhood, it can have detrimental effects making an affected individual to constantly depend on others for daily routine tasks so hurting an individual's self-esteem. Preventive dental care, oral health education and awareness are the most important steps to keep oneself healthy always.

Aims and Objectives

To assess oral hygiene practice and increase knowledge of oral health among visually impaired children in Himachal Pradesh.

To compare oral health status before & after oral health education by bisensory or multisensory approach of education.

Materials and Methods

The study was conducted on 121 children between 6 to 18 years of age in 4 different Institutionalized residential

school for special health care needs children in Himachal Pradesh.

Ethical clearance and informed consent

Ethical approval for the study was obtained from the Institutional Ethical Committee of Himachal Dental College & Hospital Sundernagar. Informed Consent was obtained before conducting the clinical examination and education from Principal /authority of Institute and H.P. State Council for Child Welfare-3 Craig Garden, Shimla.

Design of Study

No single oral hygiene programme is suitable to all the patients. A prospective study in which children were divided into three groups by simple random sampling to provide oral health education.

- Group I- Verbal and Tactile bisensory approach- 40 children
- Group II- Verbal and Braille bisensory approach - 40 children
- Group III- Verbal, Braille and Tactile multisensory approach - 41 children

Inclusion criteria

1. Children who were visually impaired.
2. Children who were free from any other form of mental or physical handicapping conditions.
3. All participants who gave written consent

Exclusion criteria

1. Mentally compromised children
2. Uncooperative children
3. Children using any chemical mode of plaque control.
4. Children with medical conditions that contraindicate an oral examination without appropriate modifications.

Armamentarium (According to WHO Oral Health Surveys: Basic Methods 5th Edition)⁴

- Plane No. 23 explorer
- mouth mirror

- Kidney tray
- Disposable surgical gloves
- Disposable face mask
- Typhodont

The study was carried out into three steps.

Step 1: Documentation and Face to face preliminary oral examination Questionnaire

Children's personal detail name, age, gender, date of birth, location and education level of parents was noted. A close ended questionnaire adopted from *WHO oral health questionnaire for children, 2013*⁴ were asked, oral health practices and utilization of dental services for all the children was asked as baseline information.

Step 2: Oral health education

In Verbal method

Education was given about the parts of mouth, brushing frequency, beneficial, harmful foods for oral health, oral habits, emergency self-care and appropriate time to seek professional help by speaking was told.

In Braille method

Oral health instruction was converted into Braille (Hindi) with the help of Braille instructor. Horizontal scrub method of tooth brushing was also converted into Braille to make them understand easily. Horizontal scrub had been encouraged as it has been to be the most comfortable and effective way of brushing in children as studied by Sangnes.⁵

In Tactile Group

The children were asked to feel their own teeth with their tongue by tactile sensation and any deposits to be felt by roughness or fir appearance. The students were asked to feel the typhodont models of the mouth (upper and lower arch) with their fingers and instructed horizontal scrub brushing technique using toothbrush on the model in a tailored method by holding their hand in correct stroke in the model. Toothbrush (Colgate super flexi) and tooth

paste Colgate which contained 1000 ppm of Fluoride was given to all participants to standardize the procedure.

Step 3: Assessment of impact of oral health by oral examination

DMFT was recorded by Klein, Palmer & Knutson's DMFT index⁶ and in primary teeth deft index by Gruebbel⁷ at the first visit to determine impact of oral hygiene practices by dental caries. Dental caries experience was detected at the cavitation level only (detectable softened floor, undermined enamel or softened wall). Criteria of "catching" or "retention" of the explorer was not used to detect caries.

Oral health status of children was evaluated by recording OHI-S Index by Greene & Vermilion⁸. Both DI-S and CI-S was evaluated at baseline, 3, 6 months intervals. All the subjects were examined in premises of the respective residential schools, under adequate natural illumination (Type III) using plane mouth mirror and No. 23 explorer [*American Dental Association, 1970*]⁹ by a single examiner to avoid inter-examiner variability. An explorer was used to remove large debris and to aid in assessing the oral hygiene.

Recording Criteria

Simplified Oral Hygiene Index (OHI-S) by Greene and Vermillion, 1964⁸

The DI-S and CI-S values may range from 0 to 3, which can be interpreted as:

- Good - 0.0-0.6
- Fair - 0.7-1.8
- Poor - 1.9-3.0

The OHI-S value ranges from 0 to 6, which can be interpreted as:

- Good - 0.0-1.2
- Fair - 1.3-3.0
- Poor - 3.1-6.0

Oral Hygiene Simplified index=Debris index +calculus index simplified

For primary dentition

The modified version of the OHI-S given by Miglani et al (1973)¹⁰ were used. In this modification, index teeth primary 2nd molars and primary central incisors was used to calculate the score.

Calculation of DMFT by WHO modification of DMFT Index of Klein, Palmer and Knutson in 1986⁶

Maximum DMF Index score for individual
 $DMF = D + M + F = 28/32$

Calculation of def Index by Gruebbel A.O. in 1944⁷

Maximum deft score for an individual =20

Total d+e+f=def

In Mixed dentition

There was a separate index, one for permanent teeth and another for primary teeth. After the examination, children in need of dental treatment were referred to the nearby dental hospital for rendering speciality care.

Statistical analysis

The statistical analysis was done using Statistical Package for the Epi Info™ 7.2.2.6. a trademark of the Centers for Disease Control and Prevention (CDC. Paired t-tests were performed used to assess the difference between the scores before and after health education. One-way Analysis of Variance (ANOVA) was used to test the differences in the mean scores of oral hygiene indicators. Mann-Whitney/Wilcoxon Two-Sample Test (Kruskal-Wallis test) was used to analyze the inter-group comparisons at different interval.

Results

In this study out of 121 visually impaired children involved, 92.6% belongs to rural area (Table1, Chart1). Regarding brushing habits 91.74% of the subjects brushed once daily. 54% of children never visited dentist for regular dental checkup and the most common reason for

the dental visit was pain or trouble with teeth, gums or mouth (58.62%) (Table2,Chart2). The mean OHI-S improved from 1.925 to 1.575 in Verbal Tactile group (p value 0.5035), 2.05 to 1.6 in Verbal Braille group (p value 0.0073) and 1.8537 to 1.122 in Verbal Braille Tactile group which is statistically highly significant with p value 0.0005(Table3).

Discussion

Majority of visually impaired children (92.6%) belonged to rural area where lack of dental health services could be factor for caries experience in children. As WHO also mentioned that prevalence of visual impairment directly related to low socioeconomic and geographic location. Oral hygiene practices in 91.7% of children brushes once a day without assistance. This suggest that tooth brushing with a frequency of at least twice a day may spare the teeth from developing caries by removing dental plaque more effectively and decreasing the risk of caries among children. Low maternal education is related to higher caries experience due to their geographic difficult accessibility of facilities in rural area which show statistically significant co-relation of education of mother and dental caries as p value was 0.0027.Kumar et al(2013)¹¹, also found that education of the mother had a significant effect on the oral hygiene status and higher caries prevalence in their children. The most common reason for utilization of dental health care services was only suffering from acute pain in tooth /gums in only 23.2% of study population. Jain et al (2008)¹², Reddy VK (2013)¹³ in India and Brown (2009)¹⁴ in Saudi Arabia also revealed under utilization of dental health care among special children. It could be attributed to the negligence and lack of awareness on behalf of parents and school authorities in providing dental treatment. In developed countries like United Kingdom treatment are readily available free of charge to all those who are under

18 years of age (e.g Birmingham study) by Shaw et al.¹⁵ But such facilities are not available in many developing countries, including India. The dental caries experience was low in visually impaired children, as they were having restricted sugar diet and disciplined life style in residential institution which was correlated with the result obtained by Binti Rani chand et al(2014)¹⁶. Reddy et al(2013)¹³ also found low mean DMFT score for the visually impaired as in this study the mean dmft score of 1.98 ± 1.68 in primary dentition and mean DMFT score of 1.24 ± 1.08 for permanent dentition . Although there was low DMFT score for (both male & female) in visually impaired children but percentage of children affected was high i.e. 57.7 %. There was no statistical significant difference between male and female caries experience.

While doing intergroup comparison of oral health status after oral health education in Group-I received instructions according to Hebbal's "ATP technique",¹⁷ which depends on Audio and Tactile Perception with proper training and periodic reinforcement among special children. After education of 6 months 45% population changed fair to good score but results were not statistically significant.

In Group- II after education of 6 months 25% population changed from fair to good score of OHI-S and no children had poor OHI-S score after 6 months. Taranatha Mahantesha (2015)¹⁸ et al also found 84% reduction of gingival score by giving education by verbal and Braille method.

In Group-III 67% children improved their oral hygiene after education of 6 months 68.3% population changed fair to good score of OHI-S score. Taranatha Mahantesha et al (2015)¹⁸ also found 70.6% reduction of plaque and 84% reduction of gingival score. Multisensory approach of education is very effective in providing awareness in learning and coping behaviour in visually impaired children as the perception of senses such as audio, touch,

taste and smell are very sensitive in such children. Hence, direct instructions in the form of live tactile demonstration of tooth brushing technique and indirect instructions in the form of verbal, braille text were utilized to stimulate motivation in these children. This study found improvement in mean OHI-S scores at all time intervals in all the groups as compared to the baseline.

It is not only brushing daily but complete removal of debris, plaque as well as cleaning of soft tissues and hard tissues of oral cavity is also important step to maintain good oral hygiene. Quality oral health education plays an important role to the holistic health, which should be a right rather than privilege. Group education in school is one of the imperative technique responsible for behavioral change in children as school going children are more influenced by their peers to learn healthy habits which remains throughout the life. It was demonstrated that simple incentives and reinforcement by professionals encourage visually impaired children to change their behaviour and maintain good oral hygiene practices.

Conclusion

Despite of advances in oral health services, children with Special Health Care Needs need significantly motivation regularly, priority in dental care in the society and health care services. Organization providing education for such children and health care providers can help students to improve their oral hygiene practices. Dental home are to be established with dental care facility for the priority of welfare of disabled people. There is need for greater maternal education, social awareness, developing good habits and oral hygiene practices to make our society caries free.

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Legends Table and Figures

Tables:

Location	Frequency	Percent
Periurban	6	4.96%
Rural	112	92.56%
Total	121	100.00%

Table 1: Distribution of study subject according to location

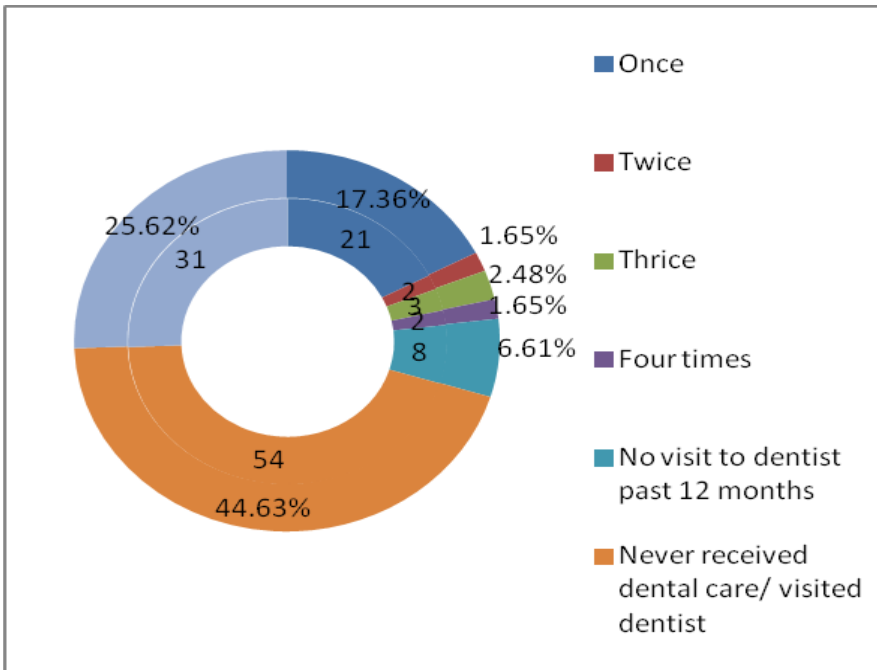
Frequency of time	Frequency of brushing	Percentage
Never	2	1.65%
Once a week	2	1.65%
Several times a week	2	1.65%
Once a day	111	91.74%
Two or more time a day	4	3.31%
TOTAL	121	100.00%

Table 2: Oral hygiene practices in study population

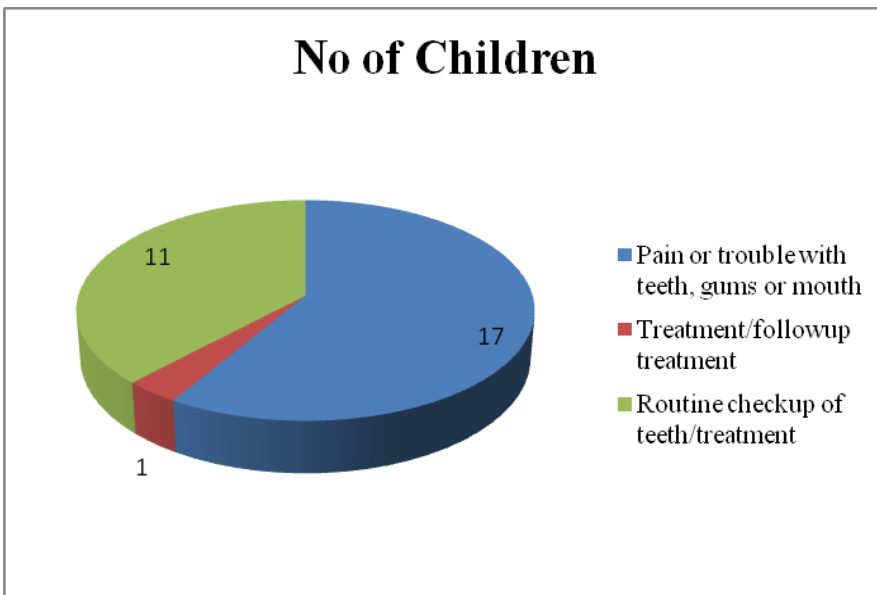
Groups	OHI -S	% age	Mean	Std Dev	OHI-S 3	% age	Mean	Std Dev	OHI -S 6	% age	Mean	Std Dev	P VALUE
Verbal & Tactile	8	20.00	1.925	0.5723	9	22.50	1.9	0.5905	26	65.00	1.575	1.5995	0.503
	27	67.50			26	65.00			13	32.50			
	5	12.50			5	12.50			1	2.50			
Verbal & Braille	6	15.00	2.05	0.597	10	25.00	1.82	0.3019	16	40	1.6	0.2462	0.007
	26	65.00			27	67.50			24	60			
	8	20.00			3	7.50			0	0			
Verbal, Braille & Tactile	8	19.51	1.8537	0.4775	28	68.29	1.34	0.5296	36	87.80	1.122	0.3313	0.0005
	31	75.61			12	29.27			5	12.20			
	2	4.88			1	2.44			0	0			

Table 3: Comparison of mean score of study Subject for Oral Hygiene Index- Simplified at different interval.

Graphs:



Graph 1: Distribution of study sample in utilizing dental services



Graph 2: Distribution of study sample showing reason for dental visit