

The Effectiveness of Oral Health Education Program with and without Involving Self-Maintainable Oral Hygiene Skills among the Visually Impaired Children

RVS. Krishna Kumar¹, Nusrath Fareed², Shanthi M³

1 MDS, Assistant Professor, Department of Public Health Dentistry, Narayana Dental College and Hospital, Chinthareddypalem, Nellore, India. 2 MDS, Professor & Head, Department of Public Health Dentistry, Narayana Dental College and Hospital, Chinthareddypalem, Nellore, India. 3 MDS, Professor, Department of Public Health Dentistry, Narayana Dental College and Hospital, Chinthareddypalem, Nellore, India.

Abstract

Introduction: Vision is the most important sense for interpreting the world around us and when sight is impaired especially in childhood it can have detrimental effects on physical, neurological, cognitive and emotional development and remains the remainder of an individual's life time.

Aim: Evaluating the effectiveness of a Dental Health Education program with and without involving Self Maintainable Oral hygiene skills among the institutionalized visually impaired children in Chittoor and Nellore Districts of Andhra Pradesh, India.

Material & Methods: A single blind, controlled, repeated measure trial to study the effects of health education program involving with and without self-maintainable oral hygiene skills among visually impaired children of two different visually impaired institutes was designed. Statistical analysis was performed using the SPSS version 19.0 software package.

Results: Comparison of mean PCR scores at first evaluation to that of base line indicated that there was an overall mean reduction to about 26 % .After second evaluation the mean reduction of PCR among cases and controls was 68.84% and 21 % respectively .After third evaluation the values were compared between cases and controls and among themselves to find the final effectiveness of the conducted study. Results showed that health education is beneficial in improving oral hygiene of the visually impaired children and are able to perform self-maintainable skills taught to them with relative ease.

Conclusion: Health education is beneficial in improving oral hygiene of the visually impaired children. Health education combined with self-maintainable skill training provides the maximum benefits in terms of improvement in oral hygiene as is evident from this study. Self-maintainable oral hygiene skill training is definitely achievable amongst the visually impaired subjects. The visually impaired subjects are able to perform self-maintainable skills taught to them with relative ease.

Key Words: Visual Impairment, Plaque Control Record (PCR), Oral Health Education, Oral Hygiene Skills.

Introduction:

Vision is the most important sense for interpreting the world around us and when sight is impaired especially in childhood it can have detrimental effects on physical, neurological, cognitive and emotional development and remains the remainder of an

individual's life time. Visual impairment is perhaps the worst form of disability and even a very common one. Most importantly, it makes an affected individual to constantly depend on others for even daily routine tasks, hurting an individual's self-esteem.

However, some neglected subgroups in the society including children with disabilities, have poor oral health. This higher level of oral disease among children with disabilities may be due to the fact that teaching students to manage their disability is of major concern among educators, but oral hygiene is not a priority.¹

In addition, people with visual impairment may have difficulty maintaining oral hygiene since they are less able to detect early symptoms of tooth decay that are typically recognized through vision.² For example, discoloration of teeth suggests tooth decay, and bleeding when brushing is an early sign of gingival inflammation. The observation of these symptoms would remind sighted people to seek dental treatment. However, people with visual impairment can be at a disadvantage as they are not in a position to detect or recognize early disease visually.³

Many studies have reported that people with visual impairment, like those with other disabilities, tended to have a large amount of dental plaque and were at a higher risk for dental diseases than were sighted people.⁴

In addition some children with visual impairment may have limited eye - hand coordination or manual dexterity, which is necessary to execute adequate oral hygiene skills such as brushing and flossing teeth. Consequently, the acquisition and maintenance of oral hygiene skills remain an important and a challenging task for the visually impaired.

Given that students who are visually impaired need to learn oral hygiene skills as do all children, dental instruction programmes targeting these groups must be developed. Despite the urgent need for subjects with visual impairment to learn these skills, little research has been conducted on teaching oral hygiene skills to them. Studies in dental literature on teaching oral hygiene skills to visually impaired are very scarce or practically nil. The dental profession also has paid only a lip service in this regard.

Based on these ground realities this study was thus under taken to find out “The Effectiveness of a Dental Health Education Program with and without involving self-maintainable oral hygiene skills among

the visually impaired children in Nellore and Chittoor districts of Andhra Pradesh, India”.

Methods:

A single blind, controlled, repeated measure trial to study the effects of health education program involving with and without self-maintainable oral hygiene skills among visually impaired children of two different visually impaired institutes was designed.

Ethical clearance was obtained by the ethical committee of Narayana Dental College & Hospital, Nellore. Voluntary informed consent was obtained by the parents of the children to participate in the study, permission and cooperation was solicited from the authorities at the institute during the entire period of study.

The study involved 159 children aged 5-17 years of age from two separate institutes in Chittoor and Nellore districts of Andhra Pradesh, India. One institute at Nellore was randomly selected to act as an external control group, the findings of which were compared with the case group at Chittoor district. These two institutes are about 135 kms from each other. This was done to avoid bias resulting from informal contacts between the study and the control group. Internal comparisons were also made within the cases and control groups between baseline, I, II and III evaluations.

The participants, their parents & guardians were informed that they were not liable for any penalty or punishment for non-participation in the study. They were further informed that they can withdraw from the study any time during the period of study. Their continuous collaboration was sought for their own benefit if any.

Inclusion criteria:

- All participants who gave informed consent.
- Participants residing in the institute irrespective of the degree of visual impairment.

Exclusion criteria

- Participants with visual impairment associated with any systemic condition/ associated disability.

The participants attended regular classes for the majority of the school day and received vision related services from teachers in the vision resource room.

Materials:

Basic Health Education

Health education was provided by Socratic Method at a group level. All the participants were classified into three groups based on the traditional school system.

Group I - Lower Primary School Students

Group II - Higher Primary School Students

Group III – Secondary School Children

Separate health education sessions were conducted for different age groups in the study based on their level of comprehension. Written material in the form of pamphlets in Braille were prepared with the help of teachers. These were distributed to individual students for self-learning. The contents of the Pamphlets were based on the level of understanding, and comprehension for each group of participants.

The same procedure of health education was provided for both the study and the control group. Percentage of attendance for health education and skill training programs was recorded for both cases and controls.

Health education provided to both the groups involved basic knowledge about:

- Importance of Oral health
- Functions of teeth.
- Importance of teeth for healthy living
- Functions of a tooth brush
- Naming the parts in the mouth
- Importance of brushing twice a day.
- Basic methods available to maintain oral hygiene.
- Distinguish between beneficial and harmful foods for oral health
- Harmful oral habits
- Emergency self-care when teeth are injured.
- Reasons and the appropriate time to seek professional help.

Skills Training

The case group only was trained in Self maintainable oral hygiene skills. The Skills included

in this study were the most basic and the ones which are specifically important to the visually impaired.

- Identifying tooth brush and paste in the bath rooms on their own
- Maintenance of a tooth brush
- Dispensing the paste on the brush without assistance.
- Training of an appropriate method of Tooth brushing by the investigator so that they could master the method of brushing on their own without depending on others.
- Dental Flossing Technique using indigenous material to subjects for whom flossing was necessary.
- Teaching the participants to feel the surfaces of the teeth that are covered with food debris with tongue and fingers so as to clean the surfaces and to maintain good oral health on their own.
- Enabling them to identify food debris with a toothpick, to touch and smell and to enable them to clean the food debris that is present on the tooth surfaces.
- Feeling a normal tooth and the carious tooth by touch and kinesthetic senses.

The study involved three further evaluations. First evaluation was done following four sessions of health education separately for each group among cases and controls. Second evaluation was performed following eight sessions of group level health education for both the groups while the case group additionally received individual training in performing oral hygiene skills. Third evaluation was performed after the cessation of intervention to both the groups for a period of 4 months. The total duration of the study was thus 11 months.

Each subject was personally trained & supervised in performing skills mainly teeth brushing. Flossing was trained for subjects only where it was necessary. The subjects were further encouraged to feel and detect plaque by running the tongue over their teeth before and after brushing and to recognize the “furred” feeling of unclean teeth, they were further encouraged to brush those areas with more emphasis. The subjects were also trained to use tooth pick on

areas of teeth which may have plaque and to smell it which further aided in plaque identification. In this study the material used for maintaining oral hygiene was the one which was already being used by the subjects in the institutes. The programs were planned keeping in mind the core objective of health education that is to undertake various self-help measures and to improve their own health.

The method of teeth brushing that the children were trained were:

- Group I: Fones technique.
- Group II: Scrub technique.
- Group III: Scrub technique.

Results:

Basic demographic data of all participants was recorded by the investigator himself in a specially designed proforma prior to intervention. Clinical parameters were also recorded in the same proforma. Basic dental treatment was provided for the subjects at both the institutes after baseline data recording. The treatment consisted mainly of oral prophylaxis and basic restorative care.

The studied population comprised of a total of 159 subjects, of which 95 were cases and 64 controls. The subjects were divided into three Groups based on the

traditional educational levels into Group I with 37 subjects of lower primary school aged 5 yrs to 8 yrs, Group II with 69 subjects of higher primary school aged 9 yrs to 12 yrs and Group III secondary school with 53 subjects aged 13-17 yrs. Statistical analysis was performed using the SPSS version 17.0 software package. Descriptive statistics were calculated and Chi Square test was employed to test the significance. The socio demographic characteristics of the studied subjects are as described in table 1. There was no statistical significant difference between various socio demographic parameters studied viz Age, Gender, Degree of Visual Impairment, Duration of stay between cases & controls.

Mean PCR scores among various groups between cases and controls at base line was not statistically significant in any of the 3 groups as shown in table 2. Group related mean PCR scores at base line for cases & controls found to be not statistically significant, as shown in table 3.

Comparison of mean PCR values at Base line, I, II, III evaluations are as shown in table 4. There was a consistent and statistically significant drop in mean PCR values among cases from Base line to III evaluation in all the 3 groups, whereas among the controls initial reduction was followed by an increase in the PCR values.

Table No. 1: Age, Gender and Degree of Visual Impairment and Duration of Stay of the Subjects in the Study

| Parameter | Cases | | | Control | | | p value |
|------------------------------|---------|----------|-----------|---------|----------|-----------|-------------|
| | Group I | Group II | Group III | Group I | Group II | Group III | |
| Age | 22 | 38 | 35 | 15 | 31 | 18 | 0.73 |
| Gender | | | | | | | |
| Male | 12 | 19 | 19 | 9 | 21 | 11 | 0.94 |
| Female | 10 | 22 | 13 | 6 | 10 | 7 | 1.52 |
| Degree of Visual Impairment | | | | | | | |
| Partial | 5 | 9 | 10 | 5 | 9 | 4 | 0.62 |
| Complete | 17 | 29 | 25 | 10 | 22 | 14 | 0.97 |
| Duration of Stay (in years) | 3.7 | 6.3 | 10.2 | 3.1 | 5.9 | 9.3 | 0.6 |

Table No. 2: Group and Gender Related Mean PCR Values at Base Line

| Group | Cases | | Controls | | p value |
|------------|-----------|------------|------------|------------|-------------|
| | Male | Female | Male | Female | |
| I | 20.16±2.5 | 18.27±1.67 | 19.34±1.09 | 18.11±2.09 | 0.86 |
| II | 13.12±1.9 | 14.2±1.67 | 13.39±1.07 | 13.41±1.74 | 1 |
| III | 26.11±2.9 | 24.31±2.68 | 25.11±3.2 | 27.18±2.74 | 0.54 |

Table No. 3: Group Related Comparison of Mean PCR Scores between Cases and Controls at Base Line

| Group | | Base line |
|------------------|----------|-----------|
| Group I | Cases | 19.34±3.6 |
| | Controls | 18.12±2.1 |
| Group II | Cases | 17.36±1.2 |
| | Controls | 18.32±3.2 |
| Group III | Cases | 24.21±1.2 |
| | Controls | 25.41±3.6 |

Table 4: Group Related Comparison of Mean PCR Scores between Cases and Controls at Various Stages of the Study

| Group | | Base line | I st Evaluation | II nd Evaluation | III rd Evaluation | P value |
|------------------|----------|-----------|----------------------------|-----------------------------|------------------------------|---------|
| Group I | Cases | 19.34±3.6 | 15.02±1.3 | 10.23±2.3 | 7.13±2.1 | 0.01 |
| | Controls | 18.12±2.1 | 13.60±1.6 | 12.5±2.4 | 16.8±1.5 | |
| Group II | Cases | 17.36±1.2 | 13.13±2.1 | 6.68±1.8 | 5.28±3.1 | 0.05 |
| | Controls | 18.32±3.2 | 13.41±3.2 | 12.8±2.1 | 15.3±2.6 | |
| Group III | Cases | 24.21±1.2 | 19.14±1.7 | 12.55±2.4 | 9.4±2.3 | 0.01 |
| | Controls | 25.41±3.6 | 18.11±2.8 | 17.2±2.3 | 21.4±2.1 | |

Discussion:

The goal of all planned health education programs is not only to bring about a change in the behavior but also to reinforce the existing health behavior. Hence health education programs should aim at developing favorable attitudes, habits and most importantly skills.⁵ The prevention of most dental diseases became a reality following epidemiologic studies that demonstrated a correlation between dental plaque and dental disease. The dental profession has since then responded to this information by establishing programs that taught dental plaque removal by efficient brushing and flossing.⁶

Schools are thought to be the most suitable environment to provide health information to children in order to achieve the goals of health education programs, as children are relatively accessible and are already in a learning environment. Dental health education programs in schools are thus popular. These programs have resulted in improvements in oral hygiene among school children over the past few decades. However, some significant subgroups of children including children with disabilities traditionally have higher levels of oral disease. This higher level of oral disease among the disabled may be due to the fact that teaching students to manage their disability is of major concern among the educators and oral hygiene is of least priority.¹

Visual impairment is perhaps the worst form of disability affecting everything and anything in human life; it is like leading a life in black. In addition they experience difficulty in all day to day activities yet having a sense of the world around them which they can only feel but not visualize. They have difficulty maintaining oral hygiene as they are less able to detect early symptoms of tooth decay and gingival inflammation which are typically recognized through vision.²

Visually impaired children are more adapt to converting instructions into manual practice and if trained can have same levels if not better oral health than their sighted partners.¹

This study was thus carried out with an aim of evaluating the effects of health education programs with and without involving skill training among the

visually impaired children residing in two separate institutes in the state of Andhra Pradesh, India. The institutes though separated from each other had similar groups of students in terms of age, gender, education, outside interaction, degree of visual impairment, the level of oral health, etc, as evidenced in the demographic data presented in the results section, thus making comparisons by eliminating confounding bias.

Various studies have shown that the kinesthetic and olfactory senses among the visually impaired subjects are more superior compared to the sighted individuals. This fact can be exploited to the betterment of the visually impaired children. This study too employed the use of kinesthetic and olfactory senses of visually impaired subjects to teach self-maintainable oral hygiene skills.

In a nutshell the results of this study indicate that the participants' oral hygiene status improved significantly at the completion of study. The PCR demonstrated the positive benefits over time of class room based instruction with individual skill training, as is evident with a PCR reduction from 20.28 to 13.16 with accounting to about 68% reduction among cases and 20% reduction among controls, these findings are similar to those of Yeng Hung Shi et al.⁷ Further comparative of this study revealed some interesting points which are discussed here as under. At baseline the PCR values for the studied population was 21.25 ± 3.5 , which is significantly above the values for reported for normal sighted subjects.^{2,4}

Gender wise comparison of the mean PCR values revealed that there was no statistically significant difference between males and females of either the case or the control group.^{3,8}

Mean PCR values among the partially impaired were comparatively lesser than those of the totally impaired subjects, proving that the partially blind subjects had a definite advantage compared to their totally impaired counterparts.^{3,9,10}

This study revealed that there was 26% of reduction in mean plaque scores compared to baseline; however the difference in reduction between cases and controls was not significant. However, the findings of this study supported other studies who reported similar

benefits among the visually impaired children following health education.^{3,7,10}

Percentage reduction of PCR values in terms of different groups and gender was found to be statistically insignificant in this study, indicating that the ability to grasp and practice health education message will not be affected by gender.

Percentage reduction of Mean PCR values in relation to the degree of visual impairment was measured in this study; it was found that there was a mean reduction of 17% in plaque scores among subjects with total visual impairment compared to a 24% reduction among subjects with partial impairment.^{3,10}

This study found a mean reduction of plaque scores of about 68.7% among cases compared to 23 % among controls at second evaluation, these findings should be accepted with caution as the evaluation was carried out immediately after the cessation of the intervention programs. These values were found to be slightly better compared to the ones reported by Yeng Hung et al⁷, who reported an average value of 64% at second evaluation. Nevertheless it should be realized that efficient plaque control was achieved following a combined intervention of health education and skill training compared to health education alone.

Group related comparison of the intervention among cases in this study revealed that a maximum reduction was achieved among Group II subjects with a nearly 70% reduction, this was followed by a 68% reduction among Group III subjects and the least amount of reduction was observed among Group I subjects at 52%, the reasons for this variation in reductions should be further explored.

There was an approximately 52.72% reduction, and 45.12% reduction in mean plaque scores among the males and females respectively of the studied population, this difference was not statistically significant.

Among the cases also gender based comparison of mean reduction of PCR values yielded statistically insignificant results. It can be assumed that irrespective of gender the studied population could understand and implement the health education message.

This study also finds that group wise gender comparison of mean reduction of PCR scores was similar to group wise comparison independent of gender, stressing again that in the studied population gender does not interfere with the understanding and implementing of health education messages and skills.

Percentage of reduction in mean PCR scores was compared in relation to the degree of visual impairment. This study revealed that there was no statistically significant difference in the mean reduction of PCR scores amongst the totally & partially visually impaired subjects contrary to the findings of previous studies^{4,8,10} who reported a more reduction primarily due to better perceptive and conceptual understanding and a better interaction with environment amongst the partially visually impaired. This study could not find any difference because of the fact that in this studied population the degree of visual impairment among the partially impaired was higher compared to other studies as mentioned. Group wise analysis in relation to the degree of visual impairment also did not find any statistically significant differences.

Third evaluation was conducted after 11 months of the start of study and 3 months after cessation of intervention for both cases and controls. There was rebound of the values both amongst cases and controls by about 7% amongst cases and about 3% amongst controls. However statistically significant reduction of about 68% amongst cases was observed similar to the findings of Yeng- Hung Shih.⁷ The rebound might have occurred due to the fact that the IIIrd evaluation was carried out after the period of vacation during which most of the subjects went home.

Group wise analysis revealed that the percentage reduction continued amongst group I, compared to the other two groups indicating that skills thought younger in life are better retained like any other children.^{6,8,11,12,13,14}

There was no difference in the mean reduction amongst males & females, however there was slight but negligible rebound of values. There was a rebound of 1% among the partially impaired and the same

amount of rebound was seen in the totally impaired children.

The study shows that the main source of oral health information is schools, whether or not visually impaired students because a productive member of society completely depends up on the education they receive. As such, educational opportunities that are provided for children without disabilities should also be provided for children with visual impairment. Intensified focus on educational and preventive programs might help to keep those with the disabilities from having negative dental experiences. It can be concluded from this study that oral health education programmes, nevertheless, are likely to be an important influence on the oral health of disabled children.

Conclusions:

This study was mainly aimed at making the visually impaired subjects to at least perform basic oral hygiene measures independently. The points worth observing at the outset are:

The number of visually impaired children is increasing and have higher levels of oral diseases compared to their sighted counter parts. Teaching to manage their disability alone has become the priority amongst the educators and institutes. Olfactory, kinesthetic and auditory senses among the visually impaired subjects are advanced compared to non visually impaired subjects.

Acknowledgement:

The authors want to thank Dr. Arun Shyam, Dr. Siva Kalyan, Dr. Kiran Kumar, Dr. Sudhakar, Dr. Sharath Babu, Dr. Dhanya, Dr. Sandhya, and Dr. Vineela for their constant support and encouragement during the entire period of this research.

References:

1. O' Donnell D, Crosswaite M.A. Dental health education for the visually impaired child, *JR Soc Health*; 1990, 2; 60-61.
2. Alexander Schembri. The implications of Visual impairment in an elderly population in recognizing oral disease and maintaining oral health; *Spec.Care.Dentist*, 2001, 21 (6); 222-226.
3. Joseph Z. Anaise. Periodontal disease and oral hygiene in a group of blind and sighted Israeli teenagers (14-17 years of age)"; *Community Dent. Oral Epidemiol*, 1979, 7; 353-356.
4. Greely C.B; Goldstein P.A & Forrester D.J.Oral manifestation in a group of blind students, *J.Dent. Child*, 1979, 26; 39-41.
5. K.Park, Park's Text Book of Preventive and Social Medicine, 21st Edition, M/S Banarsidas Bhanot Publishers, Jabalpur, India, 2011.
6. James E. Steward and Gary R. Wolfe. The retention of newly acquired brushing and flossing skills, *Jclin periodontal*, 1989, 16; 331-332.
7. Yeng- Hung Shin; Chien – Huey Sophic Chang. Teaching oral Hygiene skills to elementary students with Visual Impairments. *Journal of Visual Impairment & Blindness*, 2005 Jan, 99(1), 26-39.
8. Robinson et al. *Journal of Visual impairment and blindness*, 2004, 98(60), 350-366.
9. Rapp R, Kanar HL, Nagler B. Pedodontic care for the deaf and blind, *Dental clinics of North America*, 1996, March; 21-34.
10. Sebnem Ercalik Yalcinkaya. Improvement of oral health knowledge in a group of Visually Impaired students, *Oral health prev Dent*, 2006, 4 (4); 243-253.
11. Garcia- Godoy F. La Salud bucal como parte dal processo de socialization. *Acta odontol pediat*, 1986, 7; 11-13.
12. P. Axelsson, Y.A.P Buischi. The effect of a new oral hygiene training program on approximal caries in 12-15 year old Brazilian children: Results after 3 years; *Adv Dent Res*, 1994, 8 (2); 278-284.

13. Robinson et al. Journal of Visual impairment and blindness, 2004, 98(60); 350-366.
14. Soraya Coelho Leal, Ana cristina Barreto Bezerra, Orlando Ayrton de Toledo. Effectiveness of teaching methods for tooth brushing in preschool children; Braz Dent J, 2002,13 (2); 133-136.

Corresponding Author

Dr. RVS. Krishna Kumar

Department of Public Health Dentistry
Narayana Dental College and Hospital
Chinthareddypalem, Nellore, India.

Email id- drkkmds@yahoo.co.in