International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Effectiveness of Visual Pedagogy and Printed Aids on Oral Hygiene Status of Institutionalized Children Who are Hard of Hearing in D. K District, Karnataka - A Randomized Control Study

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Abstract: ***Background and objectives: The purpose of this study was to assess the effectiveness of visual pedagogy and printed aids on oral hygiene status of institutionalized children who are hard of hearing in D K district, Karnataka. Methods: A list of special schools in Dakshina Kannada district for children who are hard of hearing was obtained and 2 schools were randomly included in the study. Children who are hard of hearing from one school (50) were assigned as study group and other as control group (50). After collecting baseline data, oral health education and motivation were done at weekly intervals for 3 months with the help of visual pedagogy and printed aids for the study group. Oral hygiene index, plaque index and gingival index were assessed at baseline and after health education. Data were statistically analyzed. Results: At baseline, mean OHI - S, P1I and GI scores were 3.0092+/ - 1.23, 1.9032+/ - .57 and 1.8293+/ - .557 respectively. At the end of 3 months there was a significant decrease in OHI - S, P1I and GI scores. No significant difference was seen in control group. Oral health hygiene increased significantly at the end of the study when compared to baseline scores. Interpretation and Conclusion: The first phase of the study demonstrated poor oral hygiene indicating that these children were neglected and less treatment priority is offered. But by employing an appropriate program with close monitoring and periodic checkups, the oral hygiene of children who are hard of hearing could be improved. The combination of visual pedagogy and printed aids mode proved to be an effective tool to instill good oral hygiene practice in these children.***

Keywords: Oral hygiene, hard of hearing, oral health education, hearing impairment, visual pedagogy, dental education, children

1. Introduction

According to the American Academy of Pediatric dentistry (AAPD), special health care needs are any condition or impairment that is physical, developmental, mental, sensory, behavioural, cognitive or emotional and requires medical management, health care intervention, or specialized services or programs. The physical domain includes sensory disabilities, and one such infirmity which adversely affects the facets of daily life is hearing impairment. According to the 2005 estimates of the WHO, 278 million people worldwide have disabling hearing impairment, i. e. moderate to profound hearing loss in both ears (i. e. >41 dB hearing loss).3 It has been estimated that 4 in every 1000 children in India suffer from severe to profound hearing loss[5.] Caries prevalence in hearing impaired children is 42% - 46% and showed a higher prevalence in the age group of 11 to 15 years.[7] In general, it was observed that all the children had a very high decayed (D) component as compared to the missing (M) and filled (F) components.[10]

Most children with hearing difficulties are often facing difficulties because of lack of effective communication between the parent and the dentist or the dentist and the child. Apart from these lack of trained personnel, lack of dental professionals with advanced training, lack of recognition of the importance of oral health also are few factors.

Pediatric dentistry by definition includes special health care needs of patients and is the field of dental practice that addresses the needs of patients who require treatment accommodation to their physical, mental, or medical problems, whose dental health has been neglected, with resultant extensive oral disease, and who have difficulty in locating dentists to treat them.

So as pedodontists its our obligation to fulfil the health care needs as these sector of children are neglected by parents, peers and society and are institutionalized, so they may not be well educated or aware of oral hygiene.

Studies have reiterated that learning through visual aids is more effective than other instructions.[19] It has been suggested that hearing impaired individuals depend greatly on visual modality to acquire knowledge.[20]As visual learning strategies have been extensively employed to help these children acquire literacy skills the same method may be useful to teach oral hygiene practices.

Hence, the need for this in vivo study was to evaluate the efficacy of visual pedagogy & printed aids on oral hygiene status of children who are hard of hearing so that it may be beneficial to achieve good oral hygiene in them.

2. Methodology

A list of special schools in Dakshina Kannada district for children who are hard of hearing was obtained and 2 schools were randomly included in the study.

Randomly children who are hard of hearing from one school (50) were assigned as study group and other as control group (50). After collecting baseline data, oral health education and motivation were done at weekly intervals for 3 months with the help of visual pedagogy and printed aids for the study group. Oral hygiene index, plaque index and gingival index were assessed at baseline and after health education. Data were statistically analyzed.

Three dental indices were taken for each participant in a specially constructed proforma.

The three indices are namely - Oral Hygiene Index Simplified (OHI - S) by Greene and Vermillion 1964, Plaque index by Sillness. P and Loe. H, (PII) 1964 and Gingival index by Loe. H and Sillness. P (GI) 1963.

For the first school no health education was imparted since they acted as the control group. It was decided to provide them the necessary health education at the end of the study so that the concerned students get benefited too. In the second school after recording baseline indices values a health education power point presentation using a personal laptop with Microsoft office power point 2007 software was prepared for this purpose. It consisted of various slides with pictorial representations and oral hygiene instructions explained as sign language including video clippings. The slides contained health education materials in simplified english and care was taken to avoid any technically inclined dental terms as it might complicate the understanding capacity of the students. Along with these, pamphlets containing oral hygiene instructions also distributed to the study group and asked them to read it daily.

The duration of the study was three months. Weekly reinforcement of health education was given to all the students except the control group. The reinforcement consisted of repeating the same procedure of visual projections for the second school at one week intervals. In addition printed oral hygiene instruction pamphlets also provided to the study group. At the end of three months oral hygiene status was again assessed using the same indices for both the groups. Descriptive statistics was performed for both the study and control groups. Paired t test was used to compare the mean in the study group. Student t test was performed to assess the difference between study and control group. The level of significance was set up at P value <0.05

Sample size estimation

The sample size was estimated based on the previous study with the mean plaque score before motivation of 1.59±0.58 and an observed mean plaque score of 1.2±0.47 after motivation.

N = 462/82

Where N Sample size

= standard deviation d= precision

An additional 10% was added to compensate for sampling loss if any. Thus the final sample size accounted for 50 subjects per group thus a total of 100 subjects.

3. Results

This study was conducted to assess the effectiveness of visual pedagogy and printed aids on the oral hygiene status of institutionalized children who are hard of hearing in Dakshina Kannada district, Karnataka.

The results obtained are shown in:

Table 1: Mean values of oral hygiene index - simplified, plaque index and gingival index before and after intervention among study group

	Mean	N	Std. Deviation	Std. Error Mean	Significance
OHI S BF	3.0092	50	1.2333	0.17442	>0.05
OHI S AF	2.5089	50	1.12264	0.15877	
PI BF	1.9032	50	0.57086	0.08073	>0.05
PI AF	1.5578	50	0.58104	0.08217	
GI BF	1.8293	50	0.5574	0.07883	>0.05
GI AF	1.3147	50	0.473	0.06689	

Interpretation: Mean values of OHI - S, PI, GI among study group at baseline were 3.0092 +/ - 1.23, 1.9032+/ - 0.570, 1.8293 +/ - 0.557 respectively. But after the oral health education program, the values were: OHI - S 2.5089 +/ - 1.12, PI 1.5578+/ - 0.581, GI 1.3147+/ - 0.473.

Table 2: Comparative evaluation of oral hygiene index - simplified, plaque index and gingival index before and after intervention among study group.

Paired samples test

	Paired differences					t	df	Sig (2 - tailed)
	Mean	Std. Deviation	Std. Error Mean	95% confidence interval of the difference				
				Lower	Upper			
OHIS BF - OHI S AF	0.50029	0.35499	0.0502	0.39941	0.60118	9.965	49	0
PI BF - PI AF	0.34537	0.27341	0.03867	0.26767	0.42307	8.932	49	0
GI BF - GI AF	0.51462	0.3711	0.05248	0.40916	0.62009	9.806	49	0

Interpretation: the mean value difference of OHI - S before and after intervention in the study group was 0.50+/ - 0.35. P value was <0.05 which means that there is a statistically significant reduction in OHI - S score. The mean value difference of PII before and after intervention in the study group was 0.34+/ - 0.27. there was a statistically significant reduction in the PII score also (P - value <0.05). GI score also reduced significantly with a mean value difference of 0.51+/ - 0.37. (P value <0.05).

Table 3: Mean values of oral hygiene index - simplified, plaque index and gingival index at baseline and after 3 months among the control group

	Mean	N	Std. Deviation	Std. Error Mean	Significance
OHI S BF	2.8137	51	1.0253	0.14357	>0.05
OHI S AF	2.7605	51	0.96407	0.135	
GI BF	1.671	51	0.46718	0.06542	>0.05
GI AF	1.6093	51	0.40969	0.05737	
PI BF	1.928	51	0.5798	0.08119	>0.05
PI AF	1.8052	51	0.61256	0.08578	

Interpretation: Mean values of OHI - S, PII, GI among control group at baseline were 2.8137 +/ - 1.02, 1.9280+/ -

0.579, 1.6710+/ - 0467 respectively. The values after 3 months were Mean OHI - S 2.7605 +/ - 0.964, Mean PI 1.8051 +/ - 0.612, Mean GI 1.6093 +/ - 0.409.

Table 4: Comparative evaluation of the oral hygiene index - simplified, plaque index and gingival index at baseline and after 3 months among control group.

	Paired differences					t	df	Sig (2 - tailed)
	Mean	Std. Deviation	Std. Error Mean	95% confidence interval of the difference				
				Lower	Upper			
OHIS BF - OHI S AF	0.05321	0.37305	0.05224	-0.05171	0.15813	1.019	50	0.313
PI BF - PI AF	0.06169	0.37893	0.05306	-0.04489	0.16826	1.163	50	0.251
GI BF - GI AF	0.12297	0.47021	0.06584	-0.00928	0.25521	1.868	50	0.068

Interpretation: The mean value difference of OHI - S before and after 3 months in the control group was 0.053 +/ - 0.37. P value was.313 which is >0.05 which means that there is no statistically significant reduction in OHI - S score. The mean value difference of GI before and after intervention in the control group =.061+/ - 0.37 which was >0.05 and no significant difference. In the PI score also there was no significant difference with P value >0.05. Mean difference in the PI score was 0.12 =/ - 0.47**.**

4. Discussion

Oral health is an essential component of general health. According to Biesbrock who was a pioneer in the field of dental health education and his co - workers felt that there is an association between oral cavity and the development of healthy personality, perceptions and the overall experiences of pleasure by the child. However, Children with hearing and speech impairment have lesser access to information regarding oral hygiene compared to the general population due to which they lack awareness about the maintenance of good oral hygiene. According to the census of India 2011 about 2.21% of the total population suffers from a disability. Physical disability tops the chart amounting to 20.3% followed by hearing impairment. Over 5% of the world's population - or 466 million people - has disabling hearing loss (432 million adults and 34 million children). It is estimated that by 2050 over 900 million people - or one in every ten people - will have disabling hearing loss.[67]

A person who is not able to hear as well as someone with normal hearing - hearing thresholds of 25 dB or better in both ears - is said to have hearing loss. Hearing loss may be mild, moderate, severe, or profound. It can affect one ear or both ears, and leads to difficulty in hearing conversational speech or loud sounds.

'Hard of hearing' refers to people with hearing loss ranging from mild to severe. They often use sign language for communication. The causes of hearing loss and deafness can be congenital or acquired.

In order to achieve better oral health it is very important to inculcate oral health promoting habits in special schools at the earliest by providing dental health education for special children. However there is a paucity of data about the study on effectiveness of various educational interventional methods among children who are hard of hearing in India. Hence an attempt has been made in this study to assess the short term influence of health education using visual pedagogy & printed aids on oral health of these children.

Hence the aim of this study was to assess the effectiveness of visual pedagogy & printed aids on oral hygiene status of institutionalized children who are hard of hearing in Dakshina Kannada district, Karnataka for a period of three months. Another part of the study was to extend the results to assess the oral health needs of the children who are hard of hearing and to design proper oral health care for these children. To our knowledge, this was the first comprehensive interventional study conducted among children who are of hearing in Dakshina Kannada district. It is hoped that this study will provide some useful data for the health care providers in implementing oral health promotion programs for the children who are of hearing.

The prime motive of this study was to instil appropriate oral health awareness in these children. Education in general is one of the imperative factors responsible for behavioural change in children. Particularly, oral health education is the key to prevent oral diseases and it is always healthier to educate school age children because schools are the best environment to teach preventive dental health practices.

Two schools were selected for the study. The first school was considered as the control group whereas school 2 was imparted dental health education through visual aids.

The assessment of the outcome of the present study was done by assessment of Oral Hygiene Index simplified (OHI - S), Plaque index (PI) and Gingival index (GI). These indices were again assessed after the end of the study. Flanders et al stated that many measures are used to determine the success of health education, dental ill health is related directly to an individual and hence the parameters of success or failure should be measured with indices which will truly reflect behavioural change. " Hence in this present study the three indices namely oral hygiene index simplified, plaque index and gingival index were used.

Moreover, in the present study, visits were made on a weekly basis. At each of these visits the oral health education was reinforced to the test groups. Willford et al stated in his study that repetition and reinforcement of oral hygiene instructions were found to be significantly improving oral hygiene status. Zaki et al[3] concluded that a single session of motivational activities does not alter oral hygiene performance. Hence weekly reinforcements were conducted to the experimental groups between the four months of study period.

Various studies have investigated different types of instructions (direct/indirect) like personal instruction, self -

educational manuals and visual aids [19] and reported that visual instruction have the advantage of clarity and convenience. Hence in our study indirect instructions in the form of video clipping which has oral hygiene instructions explained in sign language were shown on every weekend for a period of 12 weeks for better reinforcement. Video clipping has the added advantage of repetitive usage with no additional cost which can be effectively used in developing countries.

In a similar study by Liliya Doichinova et al. they created training program in oral hygiene for 100 children with hearing disabilities.[38] Their training used a specially designed methodology (demonstration materials like models, audio - visual materials like cartoons and slide films) and showed significant improvement in oral hygiene after 6 months of training ($p<0.01$).

In the present study, visually appealing educational aids helped the children with hearing and speech impairment to understand and comprehend better. Similarly, in a study by Pareek et al., improved oral health status in hearing and speech impaired children was recorded through supervised oral hygiene measures.[40] In a study by Sandeep et al, visually appealing methods of teaching deaf and dumb children showed best results.[65]

The purpose of the present study was to understand the importance of using custom made tools to teach the differently abled children and help them build a healthier future. It was found that the children had got a better knowledge about oral health care, their self perception about their oral condition had improved and also their overall attitude about the oral health care had improved after the intervention, compared to before intervention.

The oral hygiene index simplified (OHI - S) was used to assess the efficiency of oral hygiene practices of the study population. A similar study was conducted by Podshadley [76] in which oral hygiene performance of elementary school students were increased following dental health education. At the baseline both the schools had a score of 2.8137 +/ - 1.02 and 3.0092 +/ - 1.23. After the end of the interventions, the scores of school 1 which was the control did not vary. However school 2 showed a reduction in its scores (2.5089+/ - 1.12). In a similar study by Flanders RA" there was a similar reduction in the OHI - S scores followed by health education through video cassette projection of oral health education.

When assessing the scores that were used to reflect plaque accumulation i. e PII, it was seen that there was a reduction in the mean plaque scores at the end of the intervention. Studies by Anaise et al [7]showed significant reductions in the plaque scores following oral health education. Thus scores in the present study decreased after interventions from 1.9032 +/ - 0.570 to 1.5578 +/ - 0.581 in study group. The scores of control group was unaltered in pre and post interventions. Thus there existed a significant difference in the plaque scores between pre and post interventions in study group.

When comparing the mean gingival scores in the present study, a reduction in the mean score was noted in study group from 1.8293 +/ - 0.557 to 1.3147 +/ - 0.473. There was no alteration in the GI scores of control group where it was almost 1.6. This finding was in accordance to a study by Naidu et al 7% where the study population showed a significant difference in the gingival scores after oral health education was imparted. Overall among the study population, the computer based power point projection method was found to be the effective method in improving oral health knowledge of study subjects. Gains in the oral health knowledge were translated into gains in the oral health status as this method was able to generate interest, discussion and communication in the study subjects.

Health education is essential, but will not solve the problem alone. Where special children are concerned, educational and motivational process should be extended to their parents, caregivers and instructors. Customization of treatment protocol is an essential requisite when special children are dealt with. Continuous motivation and reinforcement in the form of visual instruction is beneficial to achieve good oral hygiene levels in CHI.

5. Conclusion

The present study findings demonstrated poor oral hygiene, increased risk of periodontal diseases, and extensive unmet needs for dental treatment indicating that these children were neglected and less treatment priority is offered to these children who are hard of hearing.

Hence, it is recommended that the intervention program is much needed for these groups of subjects involving voluntary health agencies. Efforts must be taken to encourage and promote the parents of these children to improve their oral health.

So, the research showed that by means of an appropriate program with close monitoring and periodic dental check - ups, the knowledge on oral health and oral hygiene of children who are hard of hearing could be improved.

Children with hearing difficulties have enhanced cognitive ability. Their observation and visual perception are on a greater edge so as Pedodontists we can en - cash on these abilities to instil good oral hygiene practices in these children.

Hence, we can conclude that health education through visual pedagogy and printed aids are beneficial in improving the oral hygiene of the children who are hard of hearing.

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