Impact of Visual motivation on Oral Hygiene Status of Children with Speech and Hearing Impairment

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***Abstract*— Speech and Hearing impairment hampers personality development of the child, because of the social stigma that such disability conditions carry. As these children lack the normal ability to listen and respond to the audible sounds they are deprived of learning and imitating healthy oral hygiene measures. Speech and Hearing impaired children have poor oral health and extensive unmet treatment needs. Customization of therapeutic and preventive protocol is important for this special group to attain healthy oral hygiene levels. The objective of the study was to evaluate the effect of visual motivation on oral hygiene status and to evaluate the effectiveness of computer assisted technology to practice barrier free communication in speech and hearing impaired children. Oral hygiene status, of 180 institutionalized hearing impaired children aged 6-16 years, was evaluated using Silness, Loe plaque index and Loe, Silness gingival index. Motivation was done by showing video clips, demonstrating brushing technique and live demonstration on a child. Video clipping was shown every weekend and after 12 weeks oral hygiene status was re-assessed. On comparison of plaque and gingivitis scores before and after motivation there was a significant mean reduction of 0.37 in plaque scores and 0.39 in gingivitis score. Visual motivation is an effective oral health education tool for hearing impaired children to inculcate appropriate oral hygiene practice**

Key words- Hearing impaired, speech impaired, special care needs dentistry

I. INTRODUCTION

Dental treatment is the greatest unmet health need of the handicapped person [1]. The reason being their inability to cooperate with dental treatment due to communication barriers [2]. Recently in India National Sample Survey Organization (NSSO) reports that the number of disabled persons in the country was estimated to be 18.49 million which accounts to 1.8% of the total population, out of which 0.4% children are speech and hearing impaired . Literature reports high caries prevalence, poor oral hygiene status and extensive treatment needs in speech and hearing impaired children worldwide [2, 3, 4].Children with disabilities are at greater risk for developing oral disease which in turn jeopardizes their health [3]. Routine dental services which lack special aids to provide barrier free communication and education make task of treating these children difficult. Hence, we propose to develop computer assisted tool to facilitate dental services and create oral health awareness for such children without any communication barrier.

A prevention based intervention program should be recommended for this extreme needy children and efforts be made to ncourage the care takers to promote and improve oral health. Communication is the biggest hurdle with speech and HI children. So the present study was programmed to improve their cognitive skills towards oral health care using computer assisted aids on a touch screen monitor. In our pilot study, we have evaluated the effect of visual motivation on oral hygiene status among 180 institutionalized hearing impaired children using video clippings of brushing techniques.

II. METHODOLOGY

The present study was approved by the Institutional ethical review board for research activities (IERB/VDC-113/2007) and was carried out at West Godavari District, Andhra Pradesh, India. Children from schools which provide special education for hearing impaired children were included in the study. The total strength of 180 hearing impaired children aged 6-16 years (Average age - 10.83 years) from both the sexes were included without any sampling. Demographic distribution of the sample according to sex – Males: 76; Females: 104, according to age – Primary grade children (6-11 years): 105; Secondary grade children (12 -16 years): 75.Prior permission was obtained from the school authorities and parents by explaining the intention of the motivation program.

Baseline gingival and plaque status were scored by a single calibrated examiner using Loe, Sillness Gingival index (1963) [5] and Sillness, Loe Plaque index (1964) [6].Examination of all the teeth was done and average score was calculated. After initial examination in both the schools the motivation program was planned. The motivational video clipping was prepared by a multimedia expert under the investigators supervision. A tooth brush and tooth paste (Pepsodent G, Hindustan unilever LTD, Mumbai, India-1000ppm of Maximum available fluoride) was given to all the participants to standardize the process.

The motivation was done by playing video clip of simple brushing technique (Horizontal scrub method) on a portable screen. Further a live demonstration of the technique on a child was performed for better reinforcement at the same time. The motivation sessions continued at every weekend for a period of 12 weeks(12 sessions), after which once again gingival and plaque status was recorded and statistically analyzed with baseline scores.

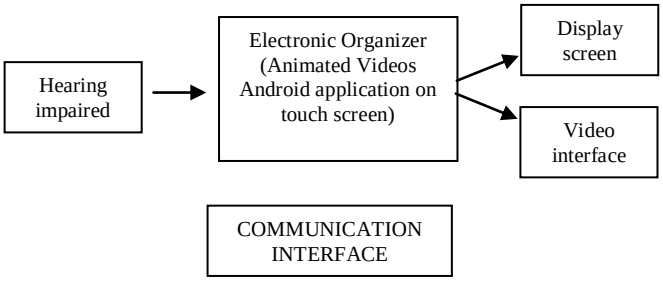

Fig 1: Framework

III. RESULTS

The data was stored in an excel spread shet (Microsoft, Inc., Redmond, Wash) and statistical analysis was carried out using Statistical Package for Social Sciences (SPSS, Inc., Chicago,I11). Paired and unpaired T test was used to compare the initial and final scores. For all the tests, a P-value of 0.05 or less was set for statistical significance and a value of 0.001 or less represents a highly significant relation.

The mean plaque and gingivitis scores of the total sample before motivation were 1.70±0.61 and 1.59±0.58 respectively. After 3 months of motivation, the mean plaque scores reduced to 1.33±0.49 (Mean reduction - 0.37) and gingivitis scores reduced to 1.20±0.47 (Mean reduction - 0.39). These findings were statistically significant (P<0.001) as shown by paired T test **(TABLE I).**

On gender wise comparison, a statistically significant reduction (P<0.001) in plaque scores was observed in males (0.43±0.48) than females (0.32±0.47). **(TABLE II).**Similarly, statistically significant reduction in gingivitis scores in males (0.55±0.54) than females was observed (0.28±0.56)(P<0.001) **(TABLE III).**

Age wise comparison of reduction in plaque scores showed a significantly greater reduction in secondary grade children (0.52±0.50) compared to primary grade children (0.26±0.43) (**TABLE IV).** However, there was greater reduction in gingivitis scores in secondary grade children, but it was statistically insignificant (P= 0.24) **(TABLE V).**

IV. CONCLUSION

The results of the present study reflect that visual motivation, followed by periodic reinforcement results in effective plaque control practice in speech and HI children. Perhaps it has the added advantage of repetitive usage with no additional cost which can be effectively used in developing countries.

Fig 2: Animated videos depicting tooth brushing

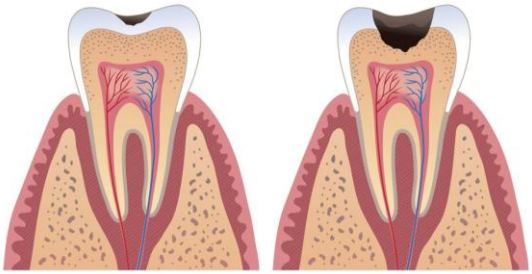

Fig 3: Animated videos depicting progression of tooth decay

Continuous motivation and reinforcement in the form of visual instruction is beneficial to achieve good oral hygiene levels in speech and hearing impaired children. Health education is essential but alone will not solve the accessibility problem. We have observed that one of the major hurdles during treating speech and HI children is lack of barrier free communication. These children may have special accessibility problems because the dental health system does not meet their special needs for communication. So we also intend to develop a computer assisted application on touch screen (android supported) that can be utilized by the Dental professionals for effectively treating speech and HI children without any barriers for communication. Ultimately our efforts are towards improving the cognitive ability of these special care needs children regarding oral health. These aids could be used as cost effective tools for rendering efficient dental services to special children especially in developing countries like India.

Fig 4: Computer assisted application on touch screen to aid communication

TABLE I.

COMPARISON OF PLAQUE AND GINGIVAL SCORES OF THE TOTAL SAMPLE BEFORE AND AFTER VISUAL MOTIVATION

MOTIVATION	SAMPLE EXAMINED	PLAQUE SCORE		GINGIVAL SCORE	
		Mean	SD	Mean	SD
Before	180	1.70	0.61	1.59	0.58
After	180	1.33	0.49	1.20	0.47
Mean Reduction		0.37		0.39	
t* - value		10.35		9.31	
P – Level		< 0.001, HS		< 0.001, HS	

*Paired t test; HS- Highly significant

TABLE II.

COMPARISON OF PLAQUE SCORES BETWEEN MALES AND FEMALES BEFORE AND AFTER MOTIVATION

Sex	Sample examined	Before motivation		After motivation		Mean reduction ±sd
		Mean	SD	Mean	SD	
Males	76	1.79	0.54	1.36	0.44	0.43±0.48
Females	104	1.63	1.31	1.31	0.32	0.32±0.47
Males v/s Females	t - value **	1.74		0.66		15.37
	P - Level	0.08, NS		0.51, NS		< 0.001, HS

TABLE III

COMPARISON OF PLAQUE SCORE BETWEEN PRIMARY AND SECONDARY GRADE CHILDREN BEFORE AND AFTER MOTIVATION						
Age	Sample examined	Before motivation		After motivation		Mean reduction ±sd
		Mean	SD	Mean	SD	
Primary grade(6-11 years)	105	1.66	0.63	1.40	0.50	0.26±0.43
Secondary grade(12-16 years)	75	1.74	0.58	1.22	0.45	0.52±0.50
Primary v/s Secondary	t - value	0.85		2.50		3.74
	P - Level	0.39, NS		< 0.05, S		< 0.01, HS

TABLE IV

COMPARISON OF GINGIVITIS SCORE BETWEEN MALES AND FEMALES BEFORE AND AFTER MOTIVATION						
Sex	Sample examined	Before motivation		After motivation		Mean reduction ±sd
		Mean	SD	Mean	SD	
Males	76	1.65	0.51	1.1	0.41	0.55±0.54
Females	104	1.55	0.62	1.27	0.28	0.28±0.56
Males v/s Females	t - value **	1.22		2.47		13.21
	P - Level	0.22, NS		< 0.05, S		< 0.001, HS

TABLE V

COMPARISON OF GINGIVITIS SCORE BETWEEN PRIMARY AND SECONDARY GRADE CHILDREN BEFORE AND AFTER MOTIVATION						
Age	Sample examined	Before motivation		After motivation		Mean reduction ±sd
		Mean	SD	Mean	SD	
Primary Grade(6-11 yrs)	105	1.60	0.59	1.24	0.5	0.36± 0.55
Secondary grade(12-16 yrs)	75	1.59	0.56	1.14	0.43	0.45± 0.59
Primary v/s Secondary	t - value	0.04		1.38		1.17
	P - Level	0.96, NS		0.17, NS		0.24, NS

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