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Original Research Article

Effectiveness of oral health education on caregivers in improving oral health status among 3-6 years old school children in Nellore city – A randomized controlled trial

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ABSTRACT

Background: Oral health is a vital component of overall well-being, particularly during early childhood development. The early years, specifically between the ages of 3 to 6, mark a crucial period for establishing oral hygiene habits and preventing dental issues that can persist into adulthood. In this context, caregivers play a pivotal role as primary influencers in shaping children's oral health behaviors and practices. The aim of this study is the effect of critical role of caregiver education in promoting oral health status among 3 to 6-year-old children.

Materials and Methods: A total of 400 caregivers with 3-6 years old children were randomly assigned into two groups: Group 1 (verbal + pamphlets) and Group 2 (verbal+ pamphlets + visual). Clinical examination was carried out to record oral health status (OHIS-M) in children. REALD-30 and CRA-RT were given to caregivers to assess oral health literacy and knowledge about their children before and after intervention respectively. Data were analysed using SPSS version 21. Descriptive analysis and paired t - test were used to test intervention impact.

Results: Among 376 caregivers/children, mean age of children were 5.28 years. After the intervention, Group 2 shows more significant difference between REALD-30 and OHIS-M when compared to Group 1 ($p < 0.05$).

Conclusion: Verbal, Pamphlets and Visual aids (Group 2) were more effective in improving oral health status in children as compared to other group.

1. Introduction

Oral health is integral to overall well-being, particularly in early childhood, as this is a critical period for the development of oral health habits that can significantly impact a child's long-term dental well-being. Proper oral hygiene practices, dietary habits, and regular dental check-ups are essential components of maintaining optimal oral health during these formative years. Dental caries affects humans of all ages across the world and the complex multifactorial etiology associated with its initiation and progression makes it difficult to eradicate.[1] According to the World Health Organization (WHO), dental caries is still a major oral health problem, and about 60-90% of schoolchildren and the vast majority of adults are affected by dental caries. According to the national oral health survey, 89% of the 6- year-old children have had dental caries experience.[2–4] Epidemiological research shows significant differences in the incidence of caries among preschool children, varying between 3% and 85%, and strongly linked to socioeconomic status and ethnicity.[1] Worldwide, many early childhood caries (ECC) cases

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remain untreated due to limited dental care access. This can cause extensive tooth damage, chronic infections and inflammation, mouth pain, reduced appetite, disturbed sleep, and lowered school performance and confidence, all of which negatively impact children's quality of life, growth, and development.

A young child's dental environment is intricate because the mother's dental knowledge, attitudes, and practices significantly influence the child's oral health.Few studies have indicated that a mother's knowledge and attitudes regarding oral health significantly impact their children's tooth-brushing habits and dental health. The habits and conditions established during preschool years lay the groundwork for future oral health and the use of dental services into adulthood. It is crucial to help parents understand their role as models for their children and to encourage better dental health practices.[5,6] Therefore, equipping caregivers with the necessary knowledge and skills related to oral health promotion can have a significant impact on fostering good oral hygiene practices among preschool-aged children. As caregivers play a key role as transmitters of oral health behaviour for their children very few studies have been reported in India on oral health education of caregivers in schools and none so far in the southern state of Andhra Pradesh, India. So the aim of the study is to evaluate the effect of oral health education on caregivers and oral health status of 3-6 year old school going children in Nellore. Therefore, hypothesis of the study is increasing mothers/caregivers knowledge about positive attitude toward desirable oral health behaviours regarding their children will lead to better oral health of the children.

2. Materials and Methods

The study was randomised trial conducted in 400 children aged 3-6 years in schools of Nellore city, Andhra Pradesh, India. Ethical clearance was obtained from the Institutional Review Board of Narayana Dental College & Hospital (IEC/NDCH/2022/Mar/p-31 and CTRI -055250) and permission was obtained from school principals. Written informed consents were obtained from mothers and caregivers, and the study was explained to them. The sample size was calculated based on the prevalence 41.9% obtained from the previous study by Srikanth Koya et al[1] with a precision of 5% and a confidence interval of 95% and the total sample size achieved was 376. By adding 10% drop out rate a total of 400 sample size is obtained.

The selection of study participants were done on basis of inclusion and exclusion criteria.

2.1. Inclusion criteria

1. Children with age group 3 -6 years.
2. Having consent and willing to participate in the study.

2.2. Exclusion criteria

1. Failure to complete three educational sessions
2. Lack of desire for participation.
3. Suffering from mental and emotional diseases. (Concerning their medical profiles).

A pilot study involved 25-30 children and caregivers, distributing a pre- validated questionnaire to caregivers and oral examination of children.Oral health education was given to caregivers and and after 30 days again the same questionnaire was given to caregivers and collected. The questionnaire's reliability was tested using a test-retest method, obtaining a 0.9 cronbach's alpha value.

2.3. Study procedure

The children and caregivers were divided randomly into two groups: Group I and Group II.

2.4. Clinical examination

On the predetermined dates for each school, all enrolled participants were asked to gather in their classrooms. The investigator assessed the children's oral health using a mouth mirror and explorer by using Simplified Oral Hygiene Index modified by Miglani (OHIS-M)[7] was recorded. Caregivers knowledge on their Children's oral health was assessed through questionnaire which was pre-tested, self-structured, closed ended in their local language. By using CRA-RT 11 item closed ended questionnaire[8] and REALD-30[9] questionnaire childrens caries risk and oral health literacy of caregivers were assessed respectively.

At baseline and 3^{rd} month, health education were given to caregivers in the school premises with the help of school authorities.

2.5. Intervention (Oral Health Education)

Group I: The mode of delivery of oral health education was verbal along with pamphlets were used. Pamphlets contained colourful pictures alongside the text and explained in the regional language. The oral health education encompassed topics like the importance of teeth, type of dentition, brushing techniques and the importance of brushing, dental caries its etiology, treatment, preventive methods, the role of fluorides and rules for having a healthy mouth.

Group II: This group received a comprehensive program similar to group I, The mode of delivery of oral health education, along with verbal and pamplets, audiovisual aids were used. The video was 6 minutes and 10 seconds long. The video was also explained in the regional language.

During 6^{th} month, evaluation was done by recording OHIS-M index in children. By using the same CRA-RT and

REALD-30 children's caries risk and caregivers oral health literacy were assessed.

2.6. Statistical analysis

The data present in both pre and post intervention test was used for statistical analysis by using SPSS version 21.0.Basic descriptive statistics, paired and unpaired t-test, Wilcoxon signed rank test were used.

3. Results

A total of 400 school-aged children between 3 and 6 years old, along with their caregivers who met the inclusion and exclusion criteria, were included in the study. Group 1and Group 2 consisted of 200 participants each. In Group 1, 10 participants were lost to follow-up due to not completing the questionnaries and interventions sessions and in Group 2, 14 participants were lost for the same reason. Consequently, 190 participants in Group 1 and 186 participants in Group 2 were analyzed.

Table 1 shows sociodemographic characteristics of participants. The most common age is 5 years, with boys being more common. Female caregivers dominate, with first-born children being the most frequent. Parental education is most common among mothers with college degrees, and fathers with bachelor's degrees.

Figure 2 showed that the study compares the OHI-S index given by miglani for primary teeth in two groups, showing significant decreases in mean scores at 6 months in both the groups

Table 2 presents the comparison of CRA-RT scores within and between groups at baseline and 6 months. The mean CRA-RT score was decreased from 36.8±4.28 to 24.3±5.64 in Group 1 and the mean score in Group 2 decreased from 37.2±3.58 to 16.26±3.76 from baseline to 6 months with a significant p value (p=0.000). The intergroup comparision showed a non significant difference at baseline (p=0.49) but at 6 months p value is significant (p=0.000).

Table 3 shows the comparison of REALD-30 scores within and between groups at baseline and 6 months. The mean score increased from 5.35 (SD=1.90) to 15.1(SD=2.23) in group 1 and in Group 2 it increases from 6.03 (SD=1.71) to 15.39 (SD=1.88) and there is statistically significant difference was seen among the two groups at baseline and at 6 months with p-values (p=0.000). Intergroup comparision showed a significant difference at baseline (p=0.001) but not at 6 months (p=0.216).

4. Discussion

Caregivers play a vital role in improving children's oral health, especially through educational interventions that enhance oral hygiene practices. As oral health is crucial for overall well-being, particularly in early childhood, where good habits can ensure long-term dental health. Research

Figure 1: Clinical examination in children

Figure 2: Oral health education in caregivers

consistently demonstrates that when caregivers, including parents and guardians, are well-educated about oral health, it has a positive effect on children's dental habits.[10,11] According to our study, the intervention showed significant positive changes in both Group 1 and Group 2. The demographic data revealed that most children were around five years old, predominantly boys, with most caregivers being females.

When caregivers are well-informed and motivated to maintain good oral hygiene, children are more likely to experience fewer dental problems, such as cavities and gum disease.Few studies also reported the positive impact of educational interventions for mothers and caregivers on improving children's oral health behaviors. For instance, a study by Naidu et al.[12] indicated that children's oral health behaviors improved after parents and caregivers participated in educational intervention programs.

In this study,comprehensive educational interventions that include verbal instructions, pamphlets, and visual aids (Group 2) have proven to be more effective than those using only verbal instructions and pamphlets (Group 1).

The Oral Hygiene Index Simplified (OHI-S) by Miglani is a streamlined version of the Oral Hygiene Index (OHI) designed for easier and quicker assessment of dental cleanliness status of the primary dentition. The OHI-S simplifies the process by reducing the number of surfaces and teeth evaluated. The OHI-S by Miglani is widely used in both clinical practice and epidemiological studies due to its simplicity and efficiency in assessing oral hygiene.[7]

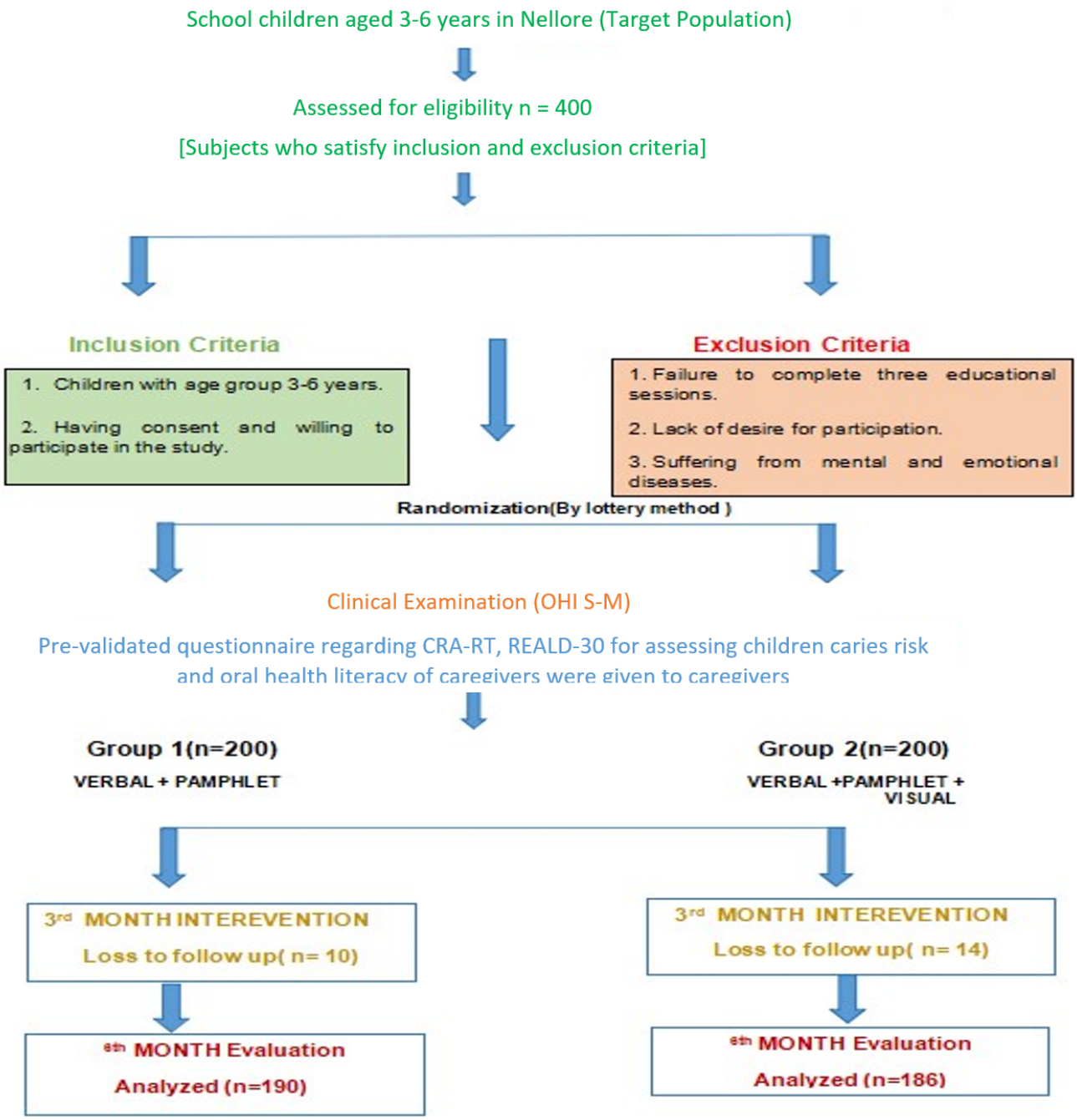

Figure 3: Consort flow chart of the study

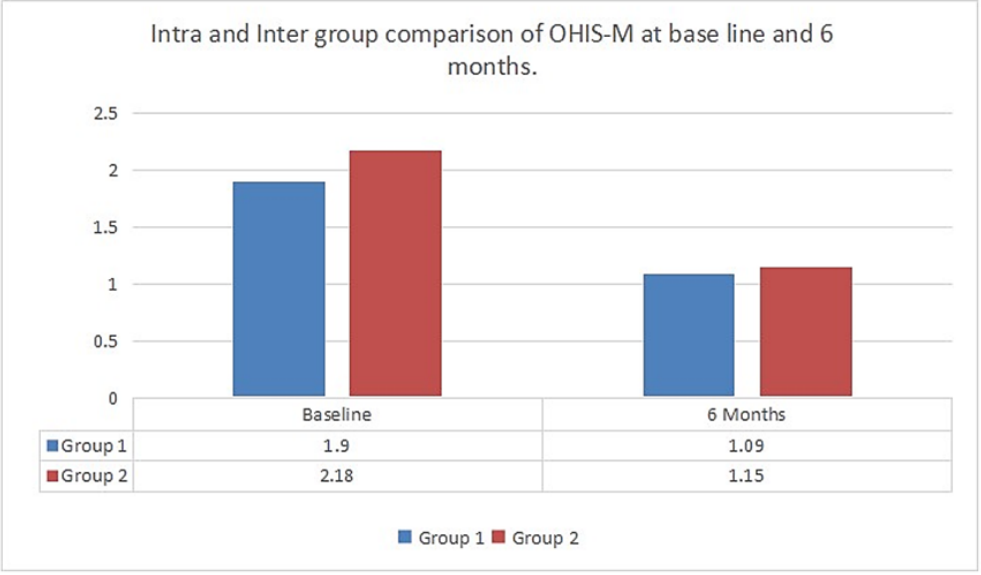

Figure 4: Intra and inter group comparison of OHIS-M at baseline and 6 months

Table 1: Sociodemographic characteristics of the participants

Demographics		Group 1		Group 2	
		Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Age of the child	4years	40	21.0	55	28.9
	5years	81	42.6	98	51.6
	6years	69	36.3	33	17.5
Gender of the child	Girls	87	45.8	83	44.6
	Boys	103	54.2	103	55.4
Caregivers	Female	173	91.1	167	89.8
	Males	17	8.9	19	10.2
Sequence of birth	1	103	54.2	122	65.6
	2	85	44.7	62	33.3
	3	2	1.1	2	1.1
	4	0	0	0	0
Mother education	Below high school	16	8.4	5	2.7
	High school	51	26.8	25	13.4
	College degree	74	38.9	107	57.5
	Bachelors degree	47	24.7	45	24.2
	Masters degree	2	1.1	4	2.2
Father education	Below high school	3	1.6	2	1.1
	High school	36	18.9	15	8.1
	College degree	50	26.3	83	44.6
	Bachelors Degree	75	39.5	73	39.2
	Master degree	26	13.7	13	7.0

Table 2: Intra and Inter group comparison of CRA-RT scores

	Baseline		6 months			
	Mean	Std. Deviation	Mean	Std. Deviation	Z value	P value
Group 1	36.8	4.23	24.3	5.64	-11.85	0.000*
Group 2	37.2	3.58	16.26	3.76	-11.833	0.000*
Uvalue	16958.0		90.500			
pvalue	0.49(NS)		0.000*			

Mann Whitney u test p<0.05* significant
Wilcoxon signed rank test p<0.05* significant

Table 3: Intra and Inter group comparison of REALD -30

	Baseline		6 months			
	Mean	Std. Deviation	Mean	Std. Deviation	Z value	P value
Group 1	5.35	1.90	15.1	2.23	-11.973	0.000*
Group 2	6.03	1.71	15.39	1.88	-11.851	0.000*
U value	760.0		16390.5			
pvalue	0.001*		0.216 (NS)			

Mann Whitney u test p<0.05* significant
Wilcoxon signed rank test p<0.05* significant

The study found that improved oral hygiene practices led to reduced debris and calculus. This aligns with Jackson et al. (2018)[13] and Shirahmadi S et al.[14] who also reported significant differences (P<0.001) in the OHI-S scores between control and intervention groups before and three months after the intervention.In the present study, the baseline oral health status using OHIS-M in the group 1 versus group 2, group 2 showed greater decrease mean value of 1.15.

Caries risk assessment tools, such as the Caries Risk Assessment (CRA), are essential for evaluating an individual's likelihood of developing dental caries. These tools guide decision-making and should be used before any treatment, ensuring effective allocation of resources.[8,15]The present study showed that by utilizing caries risk assessment and referral tools leads to improved oral health outcomes this is in accordance with the study done by Featherstone et al.[16] which demonstrated that targeted interventions based on CRA-RT resulted in reduced caries incidence and improved oral health behaviors in high-risk individuals.

In recent times, the estimation of adult literacy rates in India has gained significant attention, particularly due to its implications for public health. Literacy, defined as the ability to read and write, is foundational for health literacy, which is crucial for effective health management and disease prevention. Health literacy is the ability to obtain, comprehend, and use healthcare information to make informed health decisions. It serves as a non-pharmacological method for managing and preventing diseases, significantly enhancing the quality of health and healthcare.[17]

A specific aspect of health literacy is oral health literacy (OHL), which pertains to understanding and using information to maintain good oral health. Low OHL in the community can lead to difficulties in navigating dental care systems, increased emergency care utilization, inadequate use of preventive measures, and misunderstandings of self-care instructions. Poor OHL is linked to substandard oral health outcomes and health disparities.[18–20] Efforts to enhance health literacy can lead to better individual and community health outcomes, reducing healthcare disparities and improving the overall quality of life. In this study, caregivers in Group 1 had a mean REALD-30 score of 15.1 (SD=2.23), while Group 2 had a score of 15.39 (SD=1.88), both showing significant improvements (p=0.000). These findings align with Prakash D et al,[17] who reported a mean OHL score of 14.25 (SD=7.67) using the REALD-30 tool.Similarly, Jones et al.[21] found a mean of 23.9 (SD=1.3) in a private dental office.

Moreover, the oral health literacy (OHL) of caregivers was found to be linked to the oral health status of their 3-6-years-old children. Lower health literacy levels tend to use more healthcare resources than those with better literacy skills. As the education level of mothers increased, their children's oral health status improved. This finding are in accordance with Rao A[22] and Franciszek Szatko.[23]

There are several limitations to this study. Firstly, parents were asked to self-report when assessing their children's reading-based oral health literacy, and their pronunciation accuracy was not verified, potentially leading to errors. Additionally, the cultural influence on caregivers' perspectives was acknowledged. As our study is based on a self-administered questionnaire, it can be affected by participant recall and may also suffer from response bias due to 'social desirability,' where respondents misrepresent their behaviors by over-reporting socially acceptable actions and under-reporting undesirable ones. Aditionally potential bias from participants' desire to please healthcare providers by giving expected answers.

A key strength of this study was its assessment of child oral health status and practices. As the study was conducted in the school, the school environment is crucial for instilling healthy oral hygiene practices in young children. Since children are at a formative age, consistent exposure to oral health education in schools can effectively shape their lifelong habits. School-based programs can provide regular instruction and preventive care, ensuring that all children, regardless of their socio-economic background, have access to vital oral health information and resources.

5. Conclusion

In conclusion, educating caregivers on oral health can greatly enhance the dental health of preschoolers. The present study showed both groups had significant difference after intervention but group 2(verbal + pamphlet+ visual) showed somewhat more significance than group 1 (verbal + pamphlet). However, ongoing efforts are required to

ensure the long-term effectiveness and expansion of these educational programs in mitigating oral health inequities among preschoolers.

6. Source of Funding

None.

7. Conflict of Interest

None.

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