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Assesment of oral hygiene and impact of oral health education on knowledge, attitude and practice of dental hygiene among high school students in a rural area of Ernakulam district

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ABSTRACT: Context: Good oral health not only promotes an individual to look and feel good, it also helps in preserving oral functions. Dental disease due to poor dental hygiene is a persistent public health problem globally. Poor oral hygiene has been reported among children and adolescents.

Aims: To assess the oral hygiene and evaluate the impact of oral health education on knowledge, attitude and practice of dental hygiene among high school students.

Settings and Design: An interventional study was conducted on 42 high school students.

Methods and Material: A pre-tested structured questionnaire was administered before and after oral health education that assessed knowledge, attitude and practice of students towards oral health and hygiene.

Statistical analysis used: The results were analyzed by descriptive statistics. Tests of significance used was paired t test. All tests were set at 5% significance level and 95% confidence level.

Results: Initially only 92.9 % of the students were aware of the importance of evening brushing which increased to 100 % after the intervention. The most common oral hygiene aid ie.toothbrush with toothpaste/toothpowder was used by 95.2% of students which increased to 97% after intervention. Practice of evening brushing showed significant increase from 33.5% to 90.5%. Mean oral hygiene index scores reduced significantly during follow up after 2 months.

Conclusions: There was significant improvement in knowledge, attitude and practice of oral hygiene of students.

Key-words: Oral Health Education, Knowledge, Attitude and Practice,Ernakulam

Key Messages: Oral health education programs gives awareness to students to adopt healthy lifestyle and dietary practice, and to have positive attitudes to oral health.

I. INTRODUCTION

Oral diseases have been a persistent public health problem globally, with almost every individual experiencing poor oral health at least once in their lifetime.[1, 2]

Oral health affects the general health and well-being of families, as well as education and development of children and determines the quality of life.[3] Essential nutrients for the body are obtained by an individual through their ability to chew and swallow which is a critical function and provides the building blocks for general health.[4]

Worldwide 60-90% of school children have dental cavities.[5] Dental caries is a public health problem in India. The prevalence is as high as 60-80% in Indian school children.[6]

Oral disease in children and adults is higher among poor and disadvantaged population. Risk factors for oral diseases include an unhealthy diet, tobacco use, harmful alcohol use, poor oral hygiene and other social determinants.[7]

Oral health knowledge contributes to good oral health, but unless attitudes and habits are developed and put into practice, little will be gained. It is important to review the knowledge, attitude and practice of oral health of adolescents, even though they are educated, with the objective of inculcating healthy lifestyle practices to last for a lifetime. Individuals who hold favourable oral health related beliefs over time have better oral health in their later years than those who do not.[8]

Children who have dental caries in their primary dentition are more likely to have dental caries in permanent dentition. Growing children need proper guidance for healthy growth, upkeep and hygiene of their teeth. Good dental hygiene and

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regular attention to dental caries are vital parts of health supervision during this period.[9]

Several studies about effectiveness of oral health education have been reported, but data from Kerala particularly from Ernakulam, is scarce. Hence the present study was undertaken to assess the oral hygiene and evaluate the impact of oral health education on knowledge, attitude and practice of dental hygiene among high school students of a rural area in Ernakulam district, Kerala.

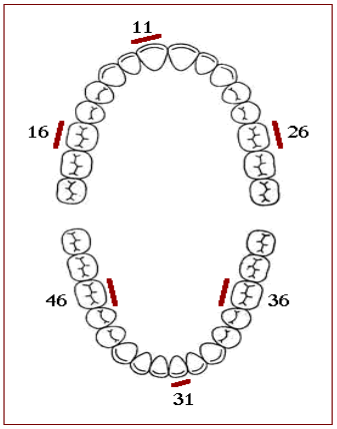
II. METHODS AND MATERIALS

An interventional study was conducted in a higher secondary school during October to December. Random sampling was employed to select the school from a panchayat of Ernakulam district. Minimum sample size was calculated to be 16 according to a study conducted in Gujarat[10] using n Master 2 software. Level of significance was kept at 5% with 80% power. Sixty students of 9th standard were randomly selected. Those students who were present on the day of conducting the study and those who gave consent were included in the study. The final sample size was 42.

Tool that was used for data collection was a structured questionnaire containing socio-demographic details and questions on knowledge, attitude, dental cleaning practices and dental hygiene status of the students (Oral Hygeine Index –Simplified). The questionnaire (pre test) was given to the students during their class hours and collected after 30 minutes. The questionnaire was a close ended type consisting of 25 questions of which 9 were knowledge based,4 were attitude based and 12 were practice based. For every correct response, score of 1 was given, and for every wrong or 'don't know' response, a score of zero was given. Total maximum score was 25.

Simplified oral hygiene index (OHI-S) was used to assess the oral hygiene of the students. [11] The OHI – S index has two components- Debris index and Calculus index. Each of these indices, in turn, is based on numerical determinations representing the amount of debris or calculus found on the preselected tooth surfaces.

Figure 1: Selection of tooth surfaces [11]



Selection of tooth surfaces (figure 1) [11]

The six surfaces examined for the OHI-S are selected from four posterior and two anterior teeth.

In the posterior portion of the dentition, the first fully erupted tooth distal to the second bicuspid (15), usually the first molar (16) but sometimes the second (17) or third molar (18), is examined. The buccal surfaces of the selected upper molars and the lingual surfaces of the selected lower molars are inspected.

In the anterior portion of the mouth, the labial surfaces of the upper right (11) and the lower left central incisors (31) are scored. In the absence of either of this, anterior teeth, the central incisor (21 or 41 respectively) on the opposite side of the midline is substituted. Criteria for classifying debris/calculus is shown in table 1.

Table 1: Criteria for classifying debris/calculus [11]

Scores	Criteria	
	Debris	Calculus
0	No debris or stains present	No calculus present
1	Soft debris covering not more than1/3rd of the tooth surface, or presence of extrinsic stain without other debris regardless of surface area covered.	Supragingival calculus covering not more than one third of the exposed tooth surface.
2	Soft debris covering more than 1/3rd, but not more than 2/3rd, of the exposed tooth surface.	Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both.

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3	Soft debris covering more than 2/3rd of the exposed tooth surface.	Supragingival calculus covering more than two third of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth or both.

Simpified Debris Index (DI-S) = (The total of the upper and lower buccal-scores) + (The total of the upper and lower lingual-scores) /(The number of segments scored).
Simplified Calculus Index (CI-S) = (The total of the upper and lower buccal-scores) + (The total of the upper and lower lingual-scores) / (The number of segments scored).
Simplified Oral Hygiene Index (OHI - S) = Simplified Debris Index + Simplified Calculus Index
Grading for the DI and CI score is: Good – 0 to 0.6, Fair – 0.7 to 1.8 and poor – 1.9 to 3.
Grading for OHI score is: Good – 0 to 1.2, Fair – 1.3 to 3 and poor – 3.1 to 6.
A dental examination of the students was conducted which focused on debris, dental carries, plaque and bleeding gums. In continuation to the assessment of dental hygiene, we conducted health education to the school children for 1 hour.

Oral health education (OHE): We conducted an interactive session using audio-visual aids. The topics discussed were : number and types of teeth present in each dentition and their functions; importance of a balanced diet and ill effects of sugar rich food ; importance of oral hygiene and basic concepts of oral health promotion, various dental and oral problems ; prevention of dental caries; importance of fluoride containing tooth paste; injurious oral habits; influence of oral health on general health; importance of brushing teeth particularly night brushing and mouth rinsing; proper tooth-brushing technique; and importance of a regular dental visit. The health education session was repeated after 1 month. The dental hygiene status of the children was re-assessed after 2 months and the questionnaire (post test) also was administered to them. The data was entered in Microsoft excel and analysed using the software SPSS 15 version. Descriptive statistics (frequency and percentage) were calculated. Pre test and post test mean score was compared by paired t test. P value < 0.05 was considered statistically significant. Mean debris index , calculus index and Simplified Oral hygiene index was calculated before and after the OHE session and it was compared using paired t test.
Permission was obtained from the authorities of school. A written consent was obtained from parents of all the study participants prior to data collection. The study was approved by the institutional ethics committee.

III. RESULTS

Among 42 students of the higher secondary school, 21 were males and mean age of the students were 14.071 with standard deviation 0.55.

The OHI-S scores reduced significantly after 2 month follow up interval. Mean debris index and mean oral hygiene index had decreased after the health education program and this difference was statistically significant (Table 1). Similarly the mean score of pre-test given to the students on knowledge, attitude and practice on oral health was 15.31 and after the health education sessions the mean score increased to 20.76 and this difference was statistically significant (Table 2)

Table 2: Comparison of mean DI, mean CI, mean OHI before and after Oral Health Education Programme (n=42)

	Before intervention	**After intervention**	**P value**
Debris Index(DI) Mean±SD	0.79±0.53	0.50±0.34	**<0.001**
Calculus Index (CI) Mean±SD	0.33±0.35	0.25±0.34	0.121
Oral Hygiene Index (OHI) Mean±SD	1.12±0.69	0.74±0.52	**<0.001**

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Table 3: Assessment of mean score differences in oral health knowledge, attitude and practices (KAP) before and after oral health education

KAP assessment	N	Mean score	Std.Deviation	P value
Pre Test	42	15.31	2.57	0.008
Post Test	42	20.76	2.52	

Table 4: Assessment of differences in oral health knowledge before and after oral health education programme

Questions	Pre-test (%)	Post-test (%)	P value
1. Is oral health a part of general health?	38(90.5)	42(100)	-
2. How many permanent teeth an adult person is having?	30(71.4)	41(97.6)	**0.001***
3. What are the most common problems affecting oral cavity?	20(47.6)	32(76.2)	**0.017***
4. Why do we get dental problems?	14(33.3)	27(64.3)	**0.004***
5. What causes tooth decay?	34(81)	36(85.7)	0.754
6. What is the reason for bleeding gums?	12(28.6)	26(61.9)	**0.001***
7. How can we prevent dental caries?	34(81)	37(88.1)	0.549
8. Which of the following causes black / brown stains on teeth?	18(42.9)	32(76.2)	**0.001***
9. Have you heard of fluoride related to dental health?	16(38.1)	35(83.3)	**0.001***

Table 5: Assessment of differences in oral health attitude before and after oral health education programme

Questions	Pre-test (%)	Post-test (%)	P value
1. Do you think maintaining oral hygiene is individual responsibility?	40(95.2)	42(100)	-
2. Do you think it is required to visit a dentist periodically to maintain health of your teeth?	20(47.6)	31(73.8)	**0.001***
3. Do you think evening brushing is necessary?	39(92.9)	42(100)	-
4. Do you think brushing all the teeth are necessary?	42(100)	42(100)	-

Table 6: Assessment of differences in oral health practices before and after oral health education Programme

Questions	Pre-test (%)	Post-test (%)	P value
1. Do you brush your teeth daily?	42(100)	42(100)	#
2. How do you clean your teeth ?	40(95.2)	41(97.6)	1.000
3. How often do you clean your teeth?	18(42.9)	39(92.9)	**0.001***

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4. What type of toothbrush bristles do you use?	19(45.2)	29(69)	**0.013***
5. Do you rinse your mouth after meals ?	36(85.7)	37(88.1)	1.000
6. How do you brush your teeth?	17(40.5)	36(85.7)	**0.0001***
7. How often do you change your toothbrush?	19(45.2)	26(61.9)	0.092
8. Do you brush teeth before bed time?	14(33.3)	38(90.5)	**0.001***
9. Do you clean your tongue?	26(61.9)	26(61.9)	1.000
10. Do you experience sensitivity in your teeth ?	18(42.9)	22(52.4)	0.424
11. Is there any bleeding from your gums ?	27(64.3)	31(73.8)	0.388
12. How often you drink milk?	10(23.8)	13(31)	0.453

The knowledge, attitude and practices of the school students improved after the health education session. Regarding knowledge, questions 2,3,4,6,8 and 9 showed statistically significant improvement (Table 3). 38.1% of students did not know that fluoride was related to dental health, but after the intervention 83.3% responded correctly.The attitude of the students to visit a dentist periodically to maintain oral health improved from 47.6% to 73.8% and this difference was statistically significant (Table 4). The practice questions, 3, 4,6 and 8 showed an improvement which was statistically significant (Table 5).90.5% students brushed their teeth before going to bed at night as against 33.3 % before the health education. They (85.7%) also practiced the correct method to brush teeth. This result was also statistically significant.

Fig 2: Comparison of grading of Debris index (DI) score of students before and after OHE

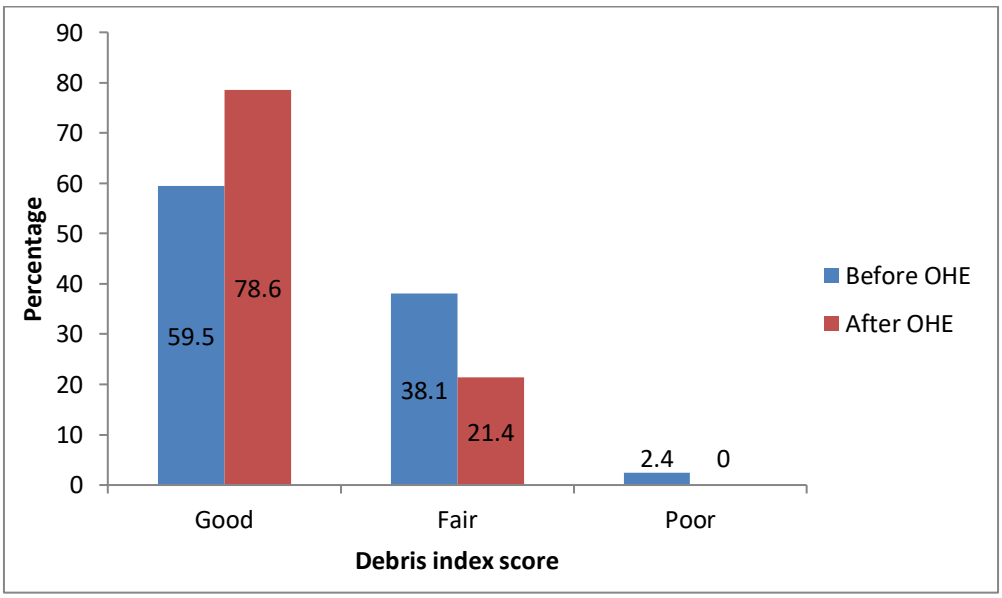

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Fig 3: Comparison of grading of Calculus index (CI) score of students before and after OHE

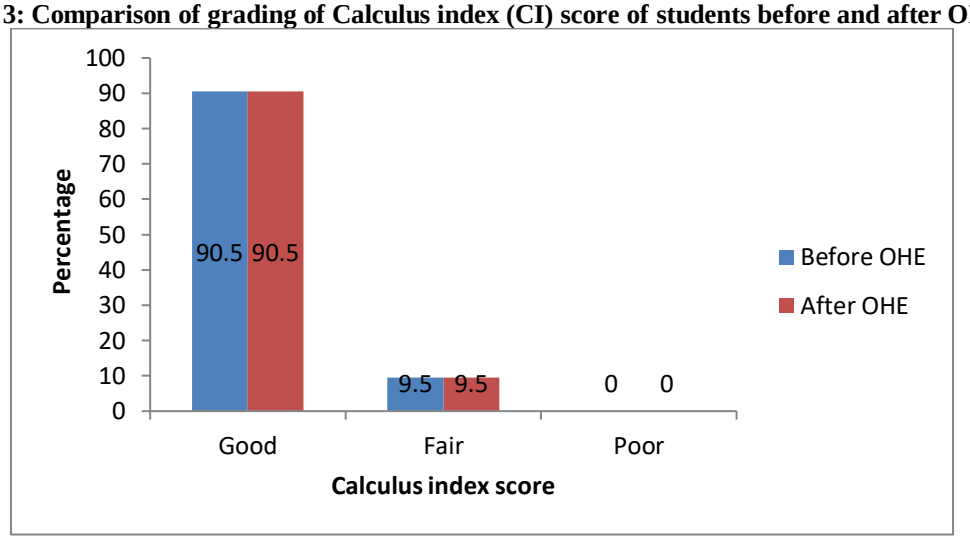
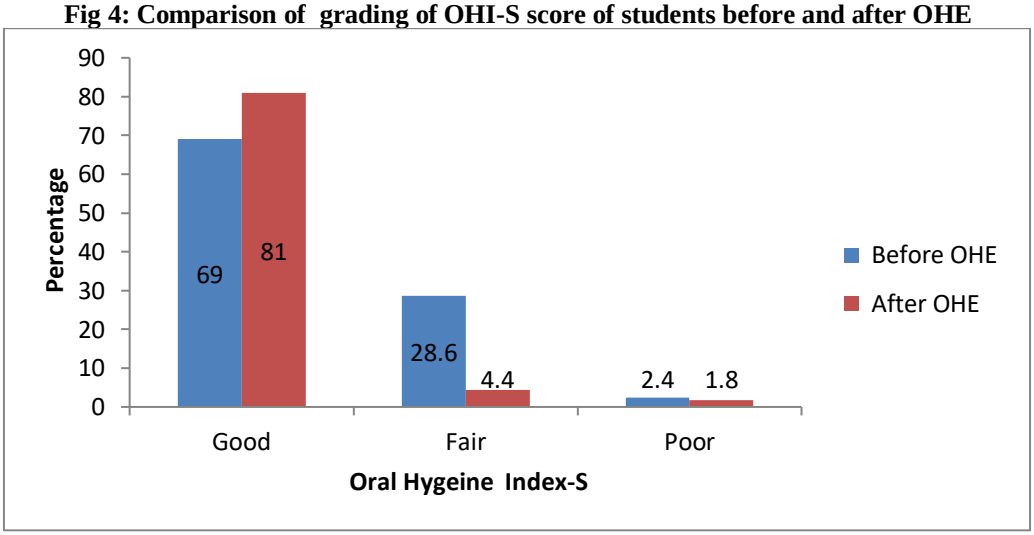


Fig 4: Comparison of grading of OHI-S score of students before and after OHE



Figures 2,3and 4 shows the change in the grade of scores of students after the health education session. After the OHE, 78.6% of students were graded as 'good' for debris index as compared to 59.5%. Before the OHE 69% of students were in 'good' category for oral hygiene and post OHE 81% came in 'good' category. The figures show that there was an increase in number of students in 'good' category and decrease in number of students in 'fair' and 'poor' category except for the calculus index.

IV. DISCUSSION

Oral health is a key indicator of overall health, well-being and quality of life. It encompasses a range of diseases and conditions that include dental caries, periodontal disease etc. [3]

Health education is one strategy for implementing health promotion and disease prevention programs. It provides knowledge and also helps in developing positive attitudes towards health issues and promoting decision-making.[12] This study demonstrated that a school based, educational intervention can be effective in improving the oral health of school children. On analyzing the pre-test and post-test, it was found that there was a significant increase in the proportion of correct

responses to all questions from baseline to 2 months.

In our study 90.5% students agreed that oral health is a part of general health during pre-test and in post-test all students agreed on that. In a similar study conducted among school students, 53% of students considered oral health as part of general health in pre-test and in post-test 86% agreed to it. [10]

Reinforcement through repeated OHE sessions resulted in significant improvements in oral health knowledge especially on the common problems affecting oral cavity and the reasons for the same. Initially only 38.1% knew the relation between fluoride and dental health but in post-test 83.3% were aware about it.

In our study, 95.2% agreed that maintaining oral hygiene is part of individual responsibility and in post-test all students agreed to it. The attitude of the students to visit a dentist periodically for better oral health improved significantly after the OHE.

This study also shows that repeated health education can build good practices in the students. They brushed their teeth two or more times a day, used the correct tooth brush and brushed in circular method. Bed time brushing was done by 90.5% of students as against 33.3% before intervention. This is consistent with results of other similar studies.

In our study baseline debris index scores were fair (0.79±0.53) and post health education debris index was good (0.50±0.34) and this was statistically significant. While study conducted in Gujarat [10] showed pre and post debris index to be (1.52±0.56) and (0.83±0.62) respectively with P value < 0.001.

Calculus index scores of the students were good in the beginning ie. (0.33±0.35). This may be due to the younger age group. After 2 months it reduced to (0.25± 0.34). But the difference was not statistically significant. Similar results were obtained in a study done in Gujarat . [10]

Oral hygiene index (OHI) was calculated by summing up debris index and calculus index. In our study at the baseline OHI was found to be (1.12±0.69) and post interventional OHI decreased significantly to (0.74±0.52). But in the study conducted in Gujarat pre and post interventional OHI was (1.92±0.85) and (1.21±0.82) respectively with P value < 0.001. Our study provides valuable information about the effectiveness of dental health education among high school children.

Limitations: Calculus cannot be changed by education as it is accumulated food particles turned to be hard. Calculus can be removed only by cleaning/descaling of dentition by a dentist. Thus there was no remarkable change in the calculus index. The present study has been conducted among a small group of rural school students and hence further studies are required for generalizability of the findings.

V. CONCLUSION

Schools act as building blocks in shaping up children's behaviour. Enhancing the levels of a child's knowledge by school dental health education plays a pivotal role in improving oral health.[13] Thus, the present study concludes that the students showed higher levels of knowledge, attitudes and oral hygiene practices after the intervention (OHE) at baseline, and at 2 months. The difference in mean pre-test and post-test scores were found to be statistically significant. The mean OHI –S also showed a significant reduction after OHE. Thus, OHE programs gives awareness to students to adopt healthy lifestyle and dietary practice, and to have positive attitudes to oral health. This leads to change in behavior and healthy practices in promoting oral health. Inculcating positive attitudes and good practices in childhood is a part of primary prevention wherein the problem is struck at the root that is even before its inception. Moreover these OHE programs are cost-effective and easy to deliver in schools.[14,15]

VI. RECOMMENDATION

Lessons on oral hygiene should be included in school curriculum. Oral health awareness programs in the form of quiz, poster competitions, role play etc should be organized periodically for school students. World dental day should also be a platform for such events. School health programs should focus on oral health with periodic dental check- up.

Limitation: Sample size was small and we studied only a single class of a rural school.

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Conflicts of interest: Nil

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