

# Impact of school-based oral health education program on oral health of 12 and 15 years old school children

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## ABSTRACT

**Background:** Health education for the school age child is a specialized field within the broad discipline of education. Oral health education program are educational aspects of any curative, preventive and promotional health activity. **Aim:** The study has been undertaken to evaluate the impact of oral health education on the status of plaque, gingival health and dental caries among 12 and 15 years old children attending government school in Shimla city. **Materials and Methods:** Two hundred and seventy six school children participated in the study. The study was conducted over a period of 4 months from May 2010 to August 2010 in Government Senior Secondary School, Sanjauli. Plaque, gingival and caries status was assessed by using Silness and Loe plaque index, Loe and Silness gingival index and WHO modified DMFT index, respectively. Data was analyzed using the software SPSS version 15. Paired *t*-test and Wilcoxon signed rank sum test were used appropriately for statistical comparisons. *P* value  $\leq 0.05$  was considered statistically significant. **Results:** Overall mean plaque score and gingival score decreased significantly after oral health education irrespective of gender. However, decrease in plaque score among 15 years old female children and gingival scores among 12 and 15 years old female subjects was not significant. Difference in mean caries status was statistically insignificant among all the subjects. **Conclusion:** Short term oral health education program may be useful in improving oral hygiene and gingival health. Coordinating efforts should be enhanced between school personnel, parents and health professionals to ensure long-term benefits of such program.

**Key words:** Dental caries, gingival status, oral health education, plaque, school children

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## INTRODUCTION

Health is a common theme in most cultures and is a fundamental human right without distinction of race, religion, and political belief, economic and social condition.<sup>[1]</sup> Oral health is a standard of health of the oral and related tissues that enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment and contributes to the general well being. It is concerned with maintaining the health of craniofacial complex, the teeth and gums, as well as the tissue of the face and head that surrounds the mouth.<sup>[2]</sup> Oral health is an integral part of general health.<sup>[3]</sup> Oral diseases are major health problem, especially in children,

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owing to their high prevalence and incidence in all the regions of the world. At the global level, prevalence rates and pattern of oral disease have changed considerably over the past two decades.<sup>[4,5]</sup> Increasing levels of dental caries among children are observed in some developing countries, especially for those countries where community and school based preventive oral care programs are not established.<sup>[6]</sup> Health education is an important tool of public health and an effective primary preventive method. Efficient dental health education should incorporate oral health instructions and methods to eliminate plaque. Research has revealed the efficacy of health education in controlling plaque and thereby dental diseases.<sup>[7-9]</sup> Health education programs are not isolated events but educational aspects of any curative, preventive and promotional health activity.<sup>[10]</sup> Health education for the school age child is a specialized field within the broad discipline of education. No evaluation study of oral health education program for school children have been reported till date in Himachal Pradesh. Hence, the present study has been undertaken to evaluate the impact of oral health education on the status of plaque, dental caries and gingival health among 12 and 15 years old children attending government school in Shimla city.

## MATERIALS AND METHODS

A total of 306 children of both genders studying at Government Senior Secondary School Sanjauli, Shimla aged 12 and 15 years were examined on the first visit. The study was conducted over a period of 4 months from May 2010 to August 2010. Prior to the conduct of the study, the purpose was clearly explained to the school authorities and written permission was obtained. Consent was obtained from the parents and teachers of the students. A one time verbal consent was taken from each study subject in the presence of class teacher. This study was approved by the institutional ethical committee. Only 276 children were available for the examination after 3 months. Inclusion Criteria: All the children aged 12 and 15 years who were present in the school on the day of examination and were willing to participate in the study. Exclusion Criteria: Those children under antibiotic therapy within 30 days of the initial examination, undergone oral prophylaxis and those who were absent on the day of examination were excluded from the study. At the initial visit, each subject was interviewed using a specially designed questionnaire and examined for plaque, gingival and caries status by using Silness and Loe plaque index,<sup>[11]</sup> Loe and Silness gingival index<sup>[12]</sup> and WHO modified DMFT index.<sup>[13]</sup> The questionnaire collected information regarding oral health habits and visit to the dentist. The data was collected by the investigator himself. A trained recorder was made to sit close to the examiner so that instructions could be heard easily. The examiner was calibrated in the college O.P.D. and kappa statistics showed higher degree conformity with the observations (Kappa co-efficient = 0.9).

After collecting the base line data, oral health education was imparted to children, which included instructions on the importance of maintenance of oral hygiene, use of appropriate

oral hygiene aids and demonstration of the method of tooth brushing. Bass method of tooth brushing was taught as it is the easiest and most effective technique for the children to learn.<sup>[14]</sup> Information regarding common oral diseases and their prevention was also provided. Oral health education was supplemented with the use of teaching resources such as chalk and blackboards, models, posters and charts. Daily, twice tooth brushing was emphasized for prevention of bad breath and tooth decay. To evaluate the effectiveness of the educational program, the presence of plaque, gingivitis and dental caries was assessed at the end of 3 months.

The data was analyzed using the software SPSS version 15 (SPSS Inc., Chicago) to find out the differences between plaque scores, gingival and caries status before and after the education program. Paired *t*-test was used to evaluate the changes in the plaque and gingival status at baseline and after 3 months. Wilcoxon signed rank sum test was used to find the difference in mean caries status (DT) of the subjects before and after dental health education. *P* value  $\leq 0.05$  was considered statistically significant.

## RESULTS

A total of 306 school children were examined at the baselines and 276 were examined after 3 month period at the time of follow-up. Attrition in the study was 30 children (9.8%). In the age group 12 years, 146 school children were examined out of which 79 (54.1%) were males and 67 (45.9%) were females. Among 130, 15 years old children 71 (54.6%) and 59 (45.4%) were males and females, respectively. Questionnaire was analyzed according to their responses. Majority of school children 257 (93.1%) were using toothbrush, with once a day history of tooth brushing 220 (79.7%). Majority of 248 (89.8%) were using tooth paste. Two hundred and thirty six (91.8%) practiced a faulty horizontal pattern of cleansing with brush, whereas 21 (8.2%) employed the vertical method of tooth brushing [Table 1]. Significant reduction was observed for plaque and gingival score ( $P > 0.05$ ) among 12 and 15 years subjects irrespective of gender [Tables 2 and 3]. However, difference in mean caries status was statistically insignificant [Table 4].

**Table 1: Distribution of study subjects according to different variables**

Variables	Frequency/type	Number of subjects	%
Means of cleansing	Tooth brush	257	93.1
	Fingers	19	6.9
Frequency of brushing	Once a day	220	79.7
	Twice a day	56	20.3
Dentifrice used	Tooth paste	248	89.8
	Tooth powder	28	10.2
Brushing	Horizontal strokes	236	91.8
	Vertical strokes	21	8.2
Rinsing after sweet intake	Yes	46	16.66
	No	230	83.34
Visit to a dentist	Yes	23	83.33
	No	253	16.67

**Table 2: Plaque score of the study subjects at baseline and 3 months after oral health education**

Age group	Gender	Number of subjects (%)	Plaque score				P value*
			At baseline		After 3 months		
			Total plaque score	Mean ±	Total plaque score	Mean ±	
12 years	Male	79 (54.1)	148.52	1.88±0.98	130.35	1.65±0.86	0.049**
	Female	67 (45.9)	95.14	1.42±0.76	71.02	1.06±0.57	0.024**
	Total	146 (100.0)	240.9	1.65±0.87	201.37	1.38±0.71	0.037**
15 years	Male	71 (54.6)	135.6	1.91±1.13	106.12	1.49±1.26	0.016**
	Female	59 (45.4)	92	1.56±1.22	62.19	1.05±0.96	0.23
	Total	130 (100.0)	227.6	1.73±1.18	168.19	1.29±1.11	0.042**

\*P-value (paired t-test), \*\*: Statistically significant

**Table 3: Mean gingival score of study subjects at baseline and 3 months after oral health education**

Age group	Gender	Number of subjects (%)	Gingival score				P value*
			At baseline		After 3 months		
			Total gingival score	Mean ±	Total gingival score	Mean ±	
12 years	Male	79 (54.1)	42.4	0.53±0.42	38.2	0.48±0.51	0.021**
	Female	67 (45.9)	30.3	0.45±0.51	24.3	0.36±0.66	0.091
	Total	146 (100.0)	72.7	0.49±0.47	62.5	0.42±0.58	0.032**
15 years	Male	71 (54.6)	46.4	0.65±0.61	42.4	0.59±0.49	0.02**
	Female	59 (45.4)	35.2	0.59±0.52	28.4	0.48±0.39	0.32
	Total	130 (100.0)	81.6	0.62±0.57	70.8	0.54±0.44	0.012**

\*P-value (paired t-test), \*\*: Statistically significant

**Table 4: Mean caries status of study subjects at baseline and 3 months after oral health education**

Age group	Gender	Number of subjects (%)	Caries status				P value*
			At baseline		After 3 months		
			Total caries status	Mean ±	Total caries status	Mean ±	
12 years	Male	79 (54.1)	48	0.61±0.92	51	0.65±0.97	0.59
	Female	67 (45.9)	76	1.14±1.02	72	0.95±0.92	0.41
	Total	146 (100.0)	124	0.85±0.96	123	0.84±0.94	0.73
15 years	Male	71 (54.6)	57	0.81±1.19	59	0.83±1.12	0.76
	Female	59 (45.4)	49	0.83±1.14	48	0.81±0.98	0.23
	Total	130 (100.0)	106	0.82±1.12	107	0.82±1.05	0.47

\*P-value (Wilcoxon signed rank sum test)

## DISCUSSION

The present study was targeted at school going children because of the ease of accessibility. School forms an environment that provides considerable number of individuals of the same age and strata. Pretest questionnaire was used to assess the oral hygiene practices and visit to a dentist. Since the analysis of the questionnaire revealed poor dental attendance and inadequate oral hygiene habits, the oral health education emphasizing on proper method of tooth brushing, the importance of oral hygiene and regular dental checkup was provided. In 15 years age group, no significant difference was found among female study subjects, whereas the reduction in the plaque scores was significant among male subjects. Reason for the less improvement of oral hygiene among 12 years old study subjects may be because of failure of younger study subjects in complying with the instruction given during oral health education program.<sup>[15]</sup> Reduction in plaque and gingival scores may be due to change in tooth brushing frequency and adoption of appropriate tooth-brushing technique after oral

health education.<sup>[16]</sup> Older study subjects, particularly female subjects showed better understanding of oral health education program. Rayner JA,<sup>[17]</sup> Ivanovic, *et al.*<sup>[18]</sup> and Ajith Krishnan, *et al.*<sup>[9]</sup> have found similar significant reduction in mean plaque scores after oral health education in their studies.

Similar results were obtained in the studies,<sup>[19,20]</sup> which revealed an improvement in Silness and Loe index, which has been used in the present study also. However, contrary to the results of this study, Franklin, *et al.*<sup>[21]</sup> and Helderman, *et al.*<sup>[22]</sup> found no significant reduction in plaque scores. Gingival bleeding is commonly used to evaluate the status of oral hygiene of children. Significant reduction in the gingival scores was observed in the study depicting the transient improvement of gingival health. Similar results were observed in the study conducted by Shenoy, *et al.*<sup>[23]</sup> and Petersen, *et al.*<sup>[24]</sup> No significant reduction in the gingival scores were found in the studies.<sup>[9,19]</sup> Reduction in the mean caries status of the study subjects was insignificant, which is in agreement with the results of the studies.<sup>[9,18,19,22]</sup>

## CONCLUSION

The study revealed that short term oral health education program may be useful in improving oral hygiene and gingival health but not effective in improving caries status. Reinforced oral health education may improve oral hygiene and gingival health to a significant extent, but may prove inadequate in the long run if low cost oral hygiene aids are not made available to the general population, which is an uphill task. Such programs should be conducted annually in the schools with the provision of oral hygiene aids at concessional rates. In the present study, parental participation was not included, which is otherwise essential for the achievement of long term benefits of the enhancement of the program for implementation during their stay at home. Long term value of the improvement need to be confirmed by further studies because improved oral hygiene in children may exist only during the program or a short period thereafter. School personnels and teachers should be involved. A chapter on importance of oro-dental health should be included in the syllabus. Coordinating efforts should be made between school personnel, health professionals and parents to ensure long-term benefits of such programs.

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