

## The use of school teachers to promote oral hygiene in some secondary school students at Hyderabad, Andhra Pradesh, India: A short term prospective pilot study

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### ABSTRACT

**Study design:** It was a short term prospective pilot study on a group of 116 secondary school students. **Objectives:** To assess the feasibility of using the services of school teachers to promote oral hygiene in secondary school students and compare the effectiveness of dental health education (DHE) offered by school teachers on a fortnightly basis with what is offered by dental professionals at three-monthly intervals. **Materials and Methods:** Six secondary schools were randomly selected. The base-line Oral Hygiene Index simplified (OHI-S) and Plaque index (PI) scores for all the students were recorded. The teachers were trained on dental health facts. The six schools were divided into three groups of two schools with different intervention techniques: Group 1- Schools given no health education, Group 2 – Schools given health education by their school teachers on a fortnightly basis together with simple screening for deposits of gross calculus, Group 3 – Schools which were given health education by dental professionals at intervals of three months without any screening. Grade nine students were selected for pre and post intervention evaluation. The second examination was done six months following the intervention to find out the OHI-S and Plaque index scores. The examination was done by three trained and calibrated dentists. Data analysis was done with SPSS 16 with relevant statistical tests. **Results:** The mean OHI-S and PI scores were significantly less in group 2 and there was a statistically significant difference between the baseline OHI – S, PI score and the scores after six months in all the three groups. **Conclusion:** The concept of utilizing the teachers for frequent DHE and screening for any gross deposits of food debris and calculus is feasible. Also frequent DHE by teachers was more effective than the infrequent DHE by the professionals.

**Key words:** Dental health education, oral hygiene index-simplified, oral health promotion, plaque index, prospective study.

### INTRODUCTION

Health is a state of complete physical, social and mental well-being, but not merely the absence of disease or infirmity (W H O definition).<sup>[1]</sup> Within the context of health promotion, health has been considered less as an abstract

state but rather as a means to an end. This can be expressed in functional terms as a resource which permits people to lead individual, social and economically productive lives.<sup>[2]</sup> Health is a resource for everyday life and may be viewed as a fundamental human right. Social responsibility for health is reflected by decision makers in both public and private sectors in their pursuit of policies and practices which promote and protect health.<sup>[3]</sup>

In India, students aged less than 18 years constitute about 40% of the total population. The gross enrollment of students into primary and upper classes in the year 2001 was 95.7% and 58.6% respectively.<sup>[4]</sup> These students in schools are relatively easily accessible, compared to any other population groups for many health promotion programs.

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In the country, there are few organized school health programs, through which a major section of the population can be reached and the lifestyle changes effected. School health programs have proven effective in promoting health in many developed countries.<sup>[5,6]</sup> The New Zealand school dental nurse program implemented in the early part of the twentieth century to combat the oral health problems of the school students in that country, is one such that reflects the benefits of organized school dental programs.<sup>[7]</sup> Though oral health is an integral part of general health, it has not received any significant consideration in national health policies or in the planning of national health programs in many developing countries. Students who suffer from poor oral health are 12 times more likely to have more restricted days, miss school than those who do not.<sup>[8]</sup> More than 50 million school hours are lost annually as a result of oral diseases.<sup>[9]</sup> Though a National Health Policy for India has been drafted, no thought is being given to the national oral health policy at present. This indicates that the policy makers are neglectful of oral health, and its promotion is not being given the necessary attention in our country. Policy makers have to be made aware that oral health is fundamental to general health and well-being. A healthy mouth enables an individual to speak, eat and socialize without the feeling of any discomfort or embarrassment.<sup>[10]</sup> Schools provide a platform for the promotion of health and oral health not only for the students, but also for the staff, families, and members of the community as a whole.<sup>[11]</sup> Pain and tooth loss resulting from oral diseases adversely affect appearance, nutritional intake, quality of life, growth and development of students. Oral diseases such as dental caries and gingival diseases affect about 80% of the school students worldwide.<sup>[12-14]</sup> The prevalence of dental caries in students aged 12 and 15 years in India was 52.5% and 61.4% respectively. The prevalence of periodontal disease in 12 year- old students was 55.4%.<sup>[15]</sup>

The cost of treating dental caries alone can overwhelm a country's health care expenditure for students.<sup>[16]</sup> At the same time the cost of the neglect of these diseases is also high because of the personal, financial and social impact.<sup>[17]</sup> The approach suitable for the majority of the developing nations is a focus on prevention. Many students, their parents as well as teachers and policy makers are unaware that oral diseases can be prevented by simple self- controlled oral hygiene practices.<sup>[18-21]</sup> The lack of organized school health programs, the dearth of published literature that demonstrates the effectiveness of school-based dental health programs and the lack of means to implement schemes such as school dental nurse program in India, prompted us to assess the feasibility of utilizing the services of school teachers in the promotion of oral hygiene among secondary school students. The study compared the effectiveness of dental health education

(DHE) offered by school teachers along with screening for gross deposits of food debris and calculus at fortnightly intervals with the DHE offered by dental professionals at three- monthly intervals with no screening for gross deposits of debris and calculus.

## MATERIALS AND METHODS

This was a short- term prospective study done over a period of six months from January to June 2009. The study was planned as a pilot study to check the feasibility of utilizing the school teachers in oral health care programs for school students. The ethical clearance was obtained by the institutional ethics committee, Kamineni institute of dental sciences, Andhra Pradesh. Six secondary schools with no history of any DHE programs were randomly selected from the list of 69 Government schools in Hyderabad. The list of teachers in these schools was collected. The study protocol was explained to the teachers and their consent was obtained. The schedule for training the teachers was prepared in consultation with the head masters of the selected schools and the district education officer. A brochure containing photographs of diseased gingival tissues with gross calculus deposits, debris, brushing and flossing techniques, the operator's position for clinical examination of the students on foldable chair in natural daylight, the retraction of the cheek using the disposable plastic spoons was prepared by the investigators. A total of 32 school teachers were trained over a period of one week by one of investigators. The contents of the brochure were thoroughly explained to the teachers and a practical demonstration of brushing and flossing techniques, how to identify gross calculus deposits, and food debris was given in one of the schools using ten patients identified with continuous heavy bands of sub- gingival calculus. Each of the teachers was given a copy of the brochure prepared by the investigators on oral health.

The students in these schools were given health education once by the investigators after the training of the teachers. The preliminary examination was done by three trained and calibrated dentists to determine the level of oral hygiene among the students. The training and calibration of investigators in the application of oral hygiene index- simplified (OHI-S) and plaque index (PI) was done on a group of twenty patients. The method of examination, the teeth to be examined, the criteria for scoring in the indices were explained to the investigators by an expert public health dentist. The first investigator examined twenty selected students and recorded the OHI-S and PI on a data collection sheet. The two other dentists completed the examination in the same manner. The scores given by the three examiners for oral hygiene and

plaque for the patients were compared to determine the inter-examiner agreement, which was found to be 91% and 88% respectively. A data collection form containing the scoring charts for Greene and Vermillion OHI-S<sup>[22]</sup> and Sillness and Loe PI<sup>[23]</sup> was used to collect the information on the status of oral hygiene. Though health education was offered to all the students, only those in the ninth grade were considered for follow up. Only 20 students (10 males and 10 females) from each of the six schools were selected using stratified random sampling. Students with gross dental defects, deleterious oral habits, and those undergoing orthodontic treatment were not considered for the study. Overall, the data from 120 randomly selected students was considered for final analysis. These students were given identification numbers serially starting from the first to the sixth school. This was done for easy identification of the students even when all of them were pooled together for examination enabling us to blind the investigators on the group allocation of the students. For all these students, scaling and polishing was done after the preliminary recording of oral hygiene status, in order to reduce the OHI-S and PI scores to near zero.

After this, six schools were divided into three groups of two each with three different interventions. Group 1; had no further health education by the teachers or by the investigators after the initial health education. Group 2; for this group the headmasters were requested to allot a one-hour slot every fortnight, for the trained teachers to talk to the students about the importance of oral health, demonstrate the brushing technique and examine the students for any gross deposits of calculus and food debris. Group 3; the investigators themselves undertook the task of DHE at three months' interval with no oral examination at these times. The DHE offered by most of the dental institutions in India as part of school dental programs involves only infrequent health education sessions by dental graduates with no subsequent follow up or oral examination due to a lack of trained dental manpower. The deliberate difference in the intervention methods provided an opportunity to compare the effectiveness of infrequent DHE programs offered by qualified dentists without follow-up examinations (method commonly practiced) with what the school teachers offered as part of their curriculum on

a regular basis with screening for gross deposits of calculus (an innovative concept not previously done).

The second examination for the status of oral hygiene was done by the same investigators after six months using the same protocol, questionnaire and data collection form. In the second examination, all the students were instructed to come in their own clothes (not in school uniform) and pooled together in an auditorium. The students with no identification were examined by the investigators. After the completion of the data collection sheet, the identity numbers were entered by a group of three teachers. This was done to avoid an investigator bias (blinding). The difference in the oral hygiene status in the three groups was determined as an indirect estimate of the change in the oral hygiene behavior of the students following health education programs. An autoclaved set of instruments was used to record OHI-S and PI of the students. The data analysis was done using SPSS version 16. The mean OHI-S scores and PI scores between the preliminary examination and the examination after six months in each group was compared using paired t-test and that between different groups using one-way ANOVA. Wherever ANOVA yielded significant results, Tukey's post hoc test was done for pair-wise comparisons. The statistical significance was fixed at 0.05.

## RESULTS

Among 120 school students selected, three students from the first group and one from the second dropped out because of a change of school. The final analysis, therefore, included 116 students (58 girls and 58 boys) and the dropout rate was 3.3% [Table 1].

### Mean OHI-S and PI scores between the three groups at baseline examination

The mean baseline OHI-S score for the study population was  $3.66 \pm 0.82$  (Mean  $\pm$  SD), suggesting a poor oral hygiene status. The mean PI score was  $2.28 \pm 0.51$ . There was no statistically significant difference in the mean OHI-S score and PI scores among the students in three groups at baseline (OHI-S:  $P < 0.478$ , PI:  $P < 0.215$ , Table 2). This finding was true even of the comparison done of male and female students separately [Table 2].

**Table 1: Gender distribution of the study participants in different groups**

Group code	Males N(%)	Females N(%)	Total N(%)
Group 1 (Schools with no subsequent health education)	17 (45.9)	20 (54.1)	37 (100)
Group 2 (Schools with health education and fortnightly screening by school teachers)	21 (53.8)	18 (46.2)	39 (100)
Group 3 (Schools with health education by dental health professionals with no screening)	20 (50)	20 (50)	40 (100)
Total	58 (50)	58 (50)	116 (100)

Pearson's Chi-square value – 0.474, df = 2,  $P < 0.789$ .

### Mean OHI-S and PI scores between the three groups, six months following the intervention

The mean OHI-S score for the study population in the second examination was  $2.28 \pm 1.39$  (Mean  $\pm$  SD), suggesting that the status of oral hygiene was fair. The OHI – S score was highest in the first group ( $3.21 \pm 0.95$ ), which suggested poor oral hygiene, followed by group 3 ( $2.85 \pm 0.97$ ) suggesting fair oral hygiene. The lowest score ( $0.82 \pm 0.41$ ) suggesting good oral hygiene was in group 2. The difference in the mean OHI-S score among the students in the three groups was statistically significant ( $P < 0.0001$ , Table 3). Tukey's post hoc comparison revealed a significant difference between group 1 and group 2, as well between group 2 and group 3 with no significant difference between group 1 and group 3 [Table 3]. The overall mean PI score for the study population was  $0.84 \pm 0.66$ . The score was lowest in group 2 ( $0.15 \pm 0.36$ ). The scores in group 1 and 3 were  $1.16 \pm 0.34$  and  $1.2 \pm 0.56$  respectively. The difference was statistically significant ( $P < 0.0001$ , Table 3).

### Pre and Post intervention mean OHI – S and PI scores in three groups

There was a significant difference in the mean OHI-S and PI scores in the second examination in three groups. The students in group 2 showed a greater improvement in the status of oral hygiene than the students in the other two

groups. The reduction in the mean OHI- S and PI score compared to the baseline scores in this group was 2.97, 2.08 respectively [Table 4].

## DISCUSSION

The study found a significant difference in the mean OHI-S and PI scores in the second examination of three groups. The significant improvement in oral hygiene among students in group 2 clearly demonstrates that frequent health education by teachers brings about a desired change in the oral hygiene behavior of the students. The personal evaluation by teachers might have indirectly motivated the students to perform better. The lack of difference between group 1 and 3 with respect to OHI- S score and PI reveals that the infrequent DHE, though offered by a professional (which is a common practice by most dental institutions) may not bring about the the degree of change in the oral hygiene behavior observed when the same is delivered frequently by their teachers, whom they respect and have regard for. Moreover, the fact that a teacher may assess the child's performance every fortnight and congratulate the child with best oral hygiene performance, is in itself an encouragement for the child to improve his/her oral hygiene practices. A study by Shenoy RP and Sequeira PS<sup>[24]</sup>

**Table 2: Baseline comparison of mean OHI-S and PI scores between three groups**

Group code	OHI – S			Plaque index		
	Males Mean (SD)	Females Mean (SD)	Males and females combined Mean (SD)	Males Mean (SD)	Females Mean (SD)	Males and females combined Mean (SD)
Group 1	3.59 (0.8)	3.6 (0.82)	3.59 (0.8)	2.41 (0.51)	2.40 (0.5)	2.41 (0.5)
Group 2	3.86 (0.57)	3.72 (1.07)	3.79 (0.83)	2.24 (0.44)	2.22 (0.43)	2.23 (0.43)
Group 3	3.5 (0.56)	3.7 (0.92)	3.6 (0.84)	2.3 (0.65)	2.15 (0.49)	2.22 (0.58)
Total	3.66 (0.71)	3.67 (0.93)	3.66 (0.82)	2.26 (0.48)	2.26 (0.48)	2.28 (0.51)
Statistical inference ANOVA (between the three groups)	F = 1.405 P < 0.254	F = 0.093 P < 0.911	F = 0.742 P < 0.478	F = 0.489 P < 0.616	F = 1.456 P < 0.242	F = 1.559 P < 0.215

**Table 3: Comparison of Mean OHI-S and PI scores between groups, six months following the intervention in the second and third groups but no intervention in the first**

Group code	OHI – S			Plaque index		
	Males Mean (SD)	Females Mean (SD)	Males and females combined Mean (SD)	Males Mean (SD)	Females Mean (SD)	Males and females combined Mean (SD)
Group 1	3.05 (0.97)	3.35 (0.93)	3.21 (0.95)	1.18 (0.393)	1.15 (0.37)	1.16 (0.34)
Group 2	0.86 (0.91)	0.78 (0.33)	0.82 (0.41)	0.19 (0.4)	0.11 (0.32)	0.15 (0.36)
Group 3	2.55 (0.94)	3.15 (0.93)	2.85(0.97)	1.3 (0.57)	1.1 (0.55)	1.2 (0.56)
Total	2.09 (1.32)	2.48 (1.44)	2.28 (1.39)	0.86 (0.69)	0.81 (0.63)	0.84 (0.66)
One way ANOVA	F = 29.568 P < 0.0001	F = 49.69 P < 0.0001	F = 76.331 P < 0.0001	F = 34.611 P < 0.0001	F = 34.72 P < 0.0001	F = 68.752 P < 0.0001
Tukey's post hoc for males and females combined	Group 1 Vs Group 2 – P < 0.0001 Group 1 Vs Group 3 – P < 0.752 Group 2 Vs Group 3 – P < 0.0001			Group 1 Vs Group 2 – P < 0.0001 Group 1 Vs Group 3 – P < 0.928 Group 2 Vs Group 3 – P < 0.0001		



**Table 4: Comparison of pre-intervention and post-intervention mean OHI – S and PI scores in the three groups**

Schools	OHI – S			Plaque index		
	Before Mean (SD)	After Mean (SD)	Statistical inference	Before Mean (SD)	After Mean (SD)	Statistical inference
Group 1	3.59 (0.8)	3.21 (0.95)	t = 2.672 df = 36 P < 0.011	2.41 (0.5)	1.16 (0.34)	t = 11.79 df = 36 P < 0.0001
Group 2 This is the group that shows obvious statistically significant differences	3.79 (0.83)	0.82 (0.41)	t = 16.038 df = 38 P < 0.0001	2.23 (0.43)	0.15 (0.36)	t = 24.364 df = 38 P < 0.0001
Group 3	3.6 (0.84)	2.85 (0.97)	t = 3.717 df = 39 P < 0.001	2.22 (0.58)	1.2 (0.56)	t = 9.826 df = 39 P < 0.0001
Overall	3.66 (0.82)	2.28 (1.39)	t = 9.302 df = 115 P < 0.0001	2.28 (0.51)	0.84 (0.66)	t = 20.483 df = 115 P < 0.0001

found that the reinforcement through repeated DHE sessions, at three weeks' interval in the intervention schools resulted in a significant improvement in the knowledge of oral health, practices and reduction in the PI scores. The schools with frequent exposure to DHE programs scored better in all aspects compared to schools with less frequent exposures. The results of our study correspond with the findings of others.<sup>[25,26]</sup> The significant decrease in the OHI – S and PI scores in the second examination than the baseline scores in all three groups indicates that DHE by the professionals might have definitely improved the oral health knowledge of the students with a significant short-term improvement in the oral hygiene behavior, but the more dramatic change in group 2 stresses the need for more frequent health education and periodic screening to reinforce what has been previously learnt. A study by Goel P *et al*<sup>[27]</sup> to assess the relative improvement in the knowledge achieved after imparting DHE to school students of various socioeconomic groups and the long-term effectiveness of conventional (one-time) lecture technique revealed that the DHE program was effective in improving the knowledge levels of most students. However, with the reversion of scores to pre-intervention levels after 1 year, the authors concluded that the single-lecture technique appears to be inadequate and stressed that it was important to reinforce knowledge in health education to bring about a long term change in the practices of oral hygiene. Our findings correspond with the conclusion of the above –mentioned study and others.<sup>[28,29]</sup>

Since our study was a pilot project to check the feasibility of utilizing school teachers in programs aimed at promoting good oral hygiene behavior in school students, the second

assessment was made at the end of six months though the teachers were requested to continue with health education sessions. The significant change in oral hygiene behaviors may have been a short-lived improvement. Scaling and polishing of the teeth of the study participants after the preliminary examinations might have contributed to the significant reduction in the OHI- S and PI scores in the second examination (calculus accumulation in 6 months) compared to that in the baseline examination, which is the result of a lifetime accumulation of calculus. However, by scaling and polishing the teeth of all the study participants, we were able to appreciate better the effects of the three different intervention methods. The results were very promising but further long term trials are required to validate these results bearing in mind the limitations of the study.

## CONCLUSIONS

There is a pressing need for the promotion of oral health throughout the school system in India and other developing countries. The concept of using school teachers for frequent DHE and screening for any gross deposits of food debris and calculus is definitely feasible as well as more effective than the infrequent DHE by the professionals. Developing countries like India, that lack organized school dental health programs, oral health policy, trained dental manpower and funds for such programs involving trained professionals can afford to train the teachers on a short term basis. The DHE by school teachers can be organized frequently in the regular school hours without disturbing the curriculum. This would facilitate a change in the oral hygiene behavior of the secondary school students, the ideal

age for such a change in lifestyle practices. It is imperative for the public health authorities and health professionals to provide sustainable support such as funding, technical assistance and/or the learning aids to promote the effective utilization of school teachers. The dentists in the primary health centers (PHC) throughout the country may be given the responsibility of training teachers in the schools which come under their PHCs. The day assigned for teachers' monthly meeting may be utilized for these training programs and the continuous assessment of the progress of the program. The education department may assume the responsibility of printing the requisite materials as part of the school curriculum. The coordinated efforts of health and education departments along with active involvement of non governmental organizations and local civil societies is what is required at present in most developing countries to promote health and oral health among school students.

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