Impact of practice modification on oral health status of students: An interventional study from a tribal area of India

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ABSTRACT

Context: Tooth decay precipitated by poor oral hygiene is one of the most common oral diseases that affect 60–90% of school children. It not only interferes with speech, self-esteem but pain caused by decay also affects nutrition intake, resulting in malnutrition with abnormal cognitive development. **Aim:** To evaluate the impact of health education and supervised brushing intervention on their oral health status. **Settings and Design:** Cross-sectional interventional study. **Methods and Materials:** The study was conducted on students of class 8th, 9th, and10th of an Ashramshala (tribal residential school). All the students present in the school on the day of data collection were included in the study. A semistructured questionnaire was used for data collection. A qualified dentist, who is part of research team, conducted oral examination of the students. They were asked to demonstrate their brushing method and relevant observation was noted. The oral health status of the students was analyzed using DMF (decayed, missed, and filled) index and oral hygiene index- simplified score (OHI-S). Three training and educational sessions of one hour each were conducted separately for each class and a separate session was conducted for the teachers and caretakers of the school. Thereafter, randomly selected students (peers) were asked to demonstrate the technique to their peers to ensure proper understanding. Compliance was ensured through weekly follow ups to the school by the research team. DMF score and OHI-S were recalculated after 3 months and compared with their previous scores. **Statistical Analysis:** Chi-square test, one-way analysis of variance and paired *t*-test were used for analysis. **Results:** The mean DMF and OHI-S score of the students was 2.61+/-2.309 and 2.11+/-0.96, respectively. A significant change (*P* = 0.021) in OHI scores was observed as a result of intervention. **Conclusions:** Promoting healthy dental practice with supportive supervision form the cornerstone for good health and hygiene.

Keywords: Adolescent, dental caries, health education, oral hygiene

Introduction

Oral hygiene is the practice of keeping the mouth clean and free of disease by regular brushing and mouth washing. Improper oral hygiene can lead to much morbidity including systemic diseases.[1]

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Tooth decay precipitated by poor oral hygiene is the most common oral disease affecting school children.[2] Decayed tooth can have direct and indirect effects on growth and development of children.[3] The problem is worse among rural and tribal populations where common beliefs, traditional customs, myths, practices related to health and disease influence the health-seeking behavior of people.[4]

The epidemiological factors influencing oral hygiene are multiple. Most of these factors are modifiable. Behavioral and lifestyle training in childhood is the key to tackle oral health problems.[5] Evidence shows that early intervention can translate

into significant cost savings for dental care, especially for families at or below the poverty level.[6]

Schools are best places to inculcate good dental hygiene habits. Studying the acceptability and applicability of standard methods of dental hygiene in local conditions is imperative in promoting holistic oral health. A search of the existing literature revealed that many studies quantify the prevalence of the dental disease among various age groups but studies focusing on oral hygiene and its determinants are rare. Studies evaluating the effect of practice modification on oral hygiene are scarce. There is a paucity of research on oral health among the tribal populations and the available evidence is from isolated and fragmentary studies.

The present study is an attempt to understand the epidemiological determinants of oral health in a tribal school in India and to evaluate the effect of peer-led oral health education and modification of brushing technique on oral hygiene status of school students in a tribal area.

Material and Methods

The present study is conducted in an Ashramshala (Tribal residential school) catering to a tribal population. School children from 1st to 10th standards were included in the study. Ethical clearance for conducting the study was obtained from the institutional ethics committee. Relevant permission for the conduction of the study was obtained from the head of the school.

The study was conducted among students of classes 8th, 9th, and 10th. Prior information regarding the purpose of the study and the method of conducting the study was given to the students classwise in presence of their class teacher. If there were any queries, they were answered by the research team.

A baseline survey was conducted among the students to know oral health hygiene and practices related to the same. All the students present in the school on the day of data collection were included in the study. A semistructured questionnaire was prepared in line with the objectives of the study. The questionaire was validated for content. Informed assent was obtained from each student before the collection of data. Information collected included the basic demographic factors of family, routine oral hygiene practices, method, frequency of teeth cleaning and a few of the food habits. A qualified dentist who is part of the research team conducted an oral examination of the students. They were asked to demonstrate their brushing method and relevant observations were noted. The dental examination of the students was done in a sitting position using the WHO oral health survey method. Mouth mirror, explorer, and natural illumination were used. Before the examination, each child was asked to rinse their mouth with water and the teeth were then dried using cotton rolls. The dental status of the students was analyzed using DMF (decayed, missed, and filled) index score[7] and oral hygiene was assessed using oral hygiene index- simplified score (OHI-S).[8]

After that three training and educational sessions of one hour each were conducted separately for each class. A separate session was conducted for the teachers and caretakers of the school. The sessions included lectures on methods of maintaining good oral hygiene like rinsing mouth after food, brushing twice a day, correct method of tongue cleaning, and live demonstrations of the "Bass method" of brushing was done using audiovisual aids. After that randomly selected students (peers) were asked to demonstrate the technique to their peers to ensure proper understanding by the students. Separate training sessions were conducted for their caretakers so that they can supervise the students. Compliance was ensured through weekly follow-ups to the school by the research team. Students were re-examined after 3 months by the same dentist to avoid interobserver bias. DMF score and OHI-S were recalculated and compared with their previous scores. Chi-square test, paired *t*-test and one way ANOVA were used for finding the relationship between the study variables.

Results

All the participants were residing at Ashramshala and visited their homes only during vacations. Age of students ranged between 14 and 16 years. A total of 65.8% of students were boys and 34.2% were girls. All students were in high school (8th–10th standard) and belonged to low socioeconomic class.

Almost 81.7% students were using brush and paste to clean teeth, 6.7% were using fingure-toothpowder. Few of them were using neem sticks and masheri (a locally prepared powder that contains tobacco along with other components) and fingers for cleaning their teeth. Also, 76% of students were brushing teeth once daily, whereas only 26% were brushing twice a day. 51.2% of the girls brushed twice a day compared to 27.84% of the boys. The difference was statistically significant ($P = 0.035$). On observing the brushing technique, 66.7% were using horizontal strokes, 10.8% vertical strokes, whereas 18.7% were using both. Majority of students were using excess paste than recommended. Majority (41.7%) of the students reported replacing their toothbrushes only after the bristles of the previous are frayed. 67% of students were cleaning their tongue after brushing with the help of tongue cleaner (54.2%), whereas others used toothbrush and fingure.

Toothache was the most common morbidity experienced by the students [Table 1].

Only 21 (17.5%) students visited the dentist at least once in the last year. The mean DMF score of the students was 2.61+/-2.309 with the decayed component being predominant and filled component being least contributing. The mean DMF score was found to be higher in boys ($\mu = 2.71$) compared to girls ($\mu = 2.56$) although the difference was not statistically significant. On applying multivariate analysis (one-way ANOVA) it was found that the students who had visited dentist at least once in last year, those using both vertical and horizontal strokes while brushing and those who changed their brush frequently had significantly

lower DMF index scores compared to those who were not doing the same [Table 2].

The mean OHI-S scores of the students were 2.11+/-0.96. The mean OHI score was found to be higher in boys (μ = 2.25) than in girls (μ = 1.85) although the difference was not significant.

On applying multivariate analysis (one-way ANOVA), it is observed that students who had the habit of rinsing their mouth had significantly less mean debris index score than who did not or occasionally practiced mouth rinsing [Table 3].

Multivariate analysis using one-way ANOVA revealed that students who reported to have toothache had significantly higher oral hygiene index scores than their normal counterparts [Table 4].

On using bivariate analysis (paired T-test) a statistically significant difference was observed between the pre- and post-investigation oral hygiene scores. Although the calculus index score which is a part of the oral hygiene index did not show any significant change [Table 5].

Discussion

All the students belonged to tribal community with their parents staying in distant villages. Age of students ranged between 12 and 16 years. They were residing in the premises of the Ashramshala. The parents of most of the students were illiterate and were involved in agricultural occupations. The findings were similar to the findings by Moses *et al.*[5] and Sogi *et al.*[2] who reported a strong correlation between oral hygiene status and socioeconomic status. Most students were using toothbrush and fluoridated toothpaste for cleaning their teeth. Similar findings were reported by de Menezes *et al.* and Aheto *et al.* who found that only 51 (62.96%) children were using brush, whereas 37.03% were using fingers to clean their teeth.[9,10] Majority of the students were brushing their teeth once a day.[10,11] More girls were brushing their teeth twice a day compared to boys. John *et al.* studied the frequency of brushing and reported 85% of tribal school children brushed once daily.[12] He further reported that 58.2% of students from India brush teeth ones a day.[12] Nordstorm *et al.* reported that 87% of the girls brushed

Table 1: Oral morbidities among the students

Morbidity	Frequency*	Percentage
Toothache#	69	47.5
Halitosis	31	25.8
Gum bleeding	22	18.3
Tongue	38	31.7
Periodontitis	11	9.1

*Multiple responses given, #During last 12 months

Table 2: Association between DMF index score and practices of students

	n	Mean	Std. deviation	Std. error	Minimum	Maximum	*F*	Sig.*
Dentist visit in last 1 years								
Yes	21	2.32	2.222	0.500	0	8	9.218	0.003
No	99	3.95	2.291	0.223	0	10		
Type of brushing strokes								
Horizontal	80	2.78	2.338	0.261	0	10	4.967	0.010
Vertical	13	3.77	2.587	0.717	0	8		
Both	27	1.56	1.672	0.322	0	5		
Frequency of change of brush								
3 monthly	53	1.74	1.972	0.271	0	8	10.159	0.000
6 monthly	3	2.33	2.082	1.202	0	4		
Till bristles are frayed	50	3.64	2.319	0.328	0	10		

*P<0.05=Significant

Table 3: Association between mouth rinse and debris index score

Rinse mouth after meals	*n*	Mean	Std. deviation	Std. error	Minimum	Maximum	*F*	Sig*.
Yes	62	1.0410	0.57657	0.07322	0.00	2.30	4.641	0.011
No	52	1.2054	0.70857	0.09826	0.00	2.83		
Sometimes	6	1.8533	0.75064	0.30645	0.70	3.00		

*P<0.05=Significant

Table 4: Association between oral hygiene index score and toothache

Toothache#	*n*	Mean	Std. deviation	Std. error	Minimum	Maximum	*F*	Sig.*
Often	25	3.1084	0.98822	0.19764	0.80	5.70	10.159	0.000
Occasionally	26	2.2996	0.85392	0.16747	0.17	4.00		
Rarely	18	1.8961	0.57620	0.13581	0.50	2.67		
Never	51	1.6006	0.67910	0.09509	0.50	3.87		

*P<0.05=Significant

Table 5: Representation of pre and postintervention oral hygiene scores							
Scores	Mean	*n*	Std. deviation	Std. error mean	*t*	df	Sig. (2-tailed)
Debris index -Pre	1.1528	120	0.66462	0.06067	5.007	119	0.000
Debris index-Post	0.6766	120	0.52935	0.04832			
Calculus index-Pre	1.0518	120	1.04862	0.09573	10.632	119	0.080
Calculus index - Post	1.0495	120	1.04781	0.09484			
Oral hygiene index - Pre	2.1105	120	0.96268	0.08788	-2.342	119	0.021
Oral hygiene index - Post	1.7733	120	1.20095	0.10963			

twice a day compared to 67% of the boys in their study.[13] Less frequent brushing by the students in our study may be due to a lack of awareness and the absence of parental supervision. In this study >75% of students reportedly used a half or a full load of toothpaste, which exceeds the current recommendation for no more than a pea-sized amount (0.25 g)[14,15] potentially exceeding daily fluoride ingestion. It may be emphasized that more toothpaste use increases foaming which leads to more chance of swallowing it by students which may result in fluorine excess in the body causing dental and skeletal fluorosis.[16] In our study, majority of students changed their toothbrushes only after their bristles got frayed. This is similar to the finding of Punitha VC *et al.* low purchasing power may be the reason for the same.[11] Toothache and diseases of the tongue were the most common morbidities among the students. Still, very few students visited the dentist. Al Omiri *et al.* witnessed toothache to be the major driving factor for dental visits.[17] In the current study, unavailability of dentists may have led to less frequent visits. The DMF scores of the students were high in general. Girls had lower DMF scores. More frequent brushing and good hygiene practices among the girl student may have led to this. Students who used both horizontal and vertical strokes while brushing changed their brushes ones in 3 months and visited the dentist at least once a year had lesser DMF scores. Following recommended oral hygiene practices prevent the build of debris in the mouth which when combined with prophylactic dental visits might have prevented or delayed the destruction of the teeth. Students who rinsed mouth after the food had lesser debris index. Water washes the food stuck in between the teeth and might have prevented a buildup of debris. Moderate OHI-S scores were observed in our study. Debris score was marginally more than the calculus scores. Punitha VC *et al.* reported lower oral hygiene status scores (OHIs - 1.42).[11] On comparing the pre and post-intervention oral hygiene score, we found a significant decrease in the post-intervention oral hygiene score signifying the improvement in oral hygiene of the students. Calculus scores of the students did not show any significant change which may be because the calculus is formed by the calcification of debris and require specialized dental treatment for removal. We found that creating awareness among the students about oral hygiene and the use of simple and scientifically approved brushing techniques along with supportive supervision from the mentors will help in improving the oral health of tribal school children. Eden E *et al.* reported similar results.[18] When used consistently, it is a cost-effective tool in preventing dental and oral health morbidities, promoting

oral health in particular and overall health in general would be a right step in the direction of achieving health for all.

Poor oral health can have a significant negative impact on performance as well as the personality of the students which would, in the long run, affect their wellbeing. Therefore, awareness sessions regarding the importance and methods of maintenance of oral hygiene can be organized by the schools with the help of community physicians and family practitioners. The school teachers and caretakers can be trained to handhold and guide the students regarding these methods and screen common morbidities. Mobile dental clinic services can be implemented at the residential school to provide curative services through the public-private partnership (PPP) model. The study also calls for regular screening of the students for oral morbidities and making services of dentistry available to those who screen positive through primary health center especially in difficult to reach areas. Such studies may be repeated in similar as well as different study settings as such endeavors help in raising awareness about the neglected issue of oral health which has a significant impact on growth and development.

Conclusion

The present study brings out the staggering prevalence of oral morbidities among school students of tribal areas. Oral morbidities are directly related to oral hygiene and oral problems in school children are rooted in improper practices. Promoting healthy attitudes and practices with supportive supervision from the mentors or teachers can manifest in healthy habits. These healthy habits form the cornerstone for healthy oral health and a healthy life in general. When simple but scientifically proven practices like "the correct method of brushing teeth" are introduced into the routine school teaching, they go a long way in creating healthy children.

These are most cost-effective and relevant solutions for oral health in resource-constrained settings like in tribal areas. These simple but effective steps pave way for achieving health for all that is the aim of primary health care. It helps us reach the unreached using the systems and resources that are already in place. These interventions help us attain oral health equity that is right of each person.

Conflicts of interest

There are no conflicts of interest.

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