

Oral Health Behavior and its Relationship with Dental Caries Status and Periodontal Status among 12-13 Year Old School Children in Udaipur, India

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Abstract

Aim: The aim of the study was to assess the oral health behavior and its relationship with dental caries status and periodontal status among 12-13 year old school children in Udaipur, India.

Material and methods: In a cross-sectional study, a total of 514 children of 12-13 years old (306 (59.5%) Boys and 208 (40.5%) Girls) were surveyed using a Performa prepared with help of a self administered structured questionnaire written in English and validated through a pilot survey including 13 multiple choice questions to assess the oral health behavior and modified dentition status and CPI index for recording dental caries and periodontal status respectively. Frequency distribution, mean scores and standard deviation were calculated. The Student's *t*-test and chi-squared test were used as a test of significance.

Results: The mean percentage behavior scores among all were 64.34 ± 11.37 , with no statistically significant difference in the behavior scores by age or gender. Dental caries was 18.9% with no statistically significant difference for the mean percentage behavior scores among the children with dental caries (63.79 ± 11.95) and those without dental caries (64.47 ± 11.24). Calculus was the most prevalent condition (50.6%) with significantly higher behavior (65.82 ± 11.05) among those with calculus than those with healthy periodontium (62.21 ± 11.02).

Conclusion: To conclude, behavior at least in this sample of children does not appear to predict their actual oral health status. Though dental caries prevalence (18.9%) was low, the high prevalence of calculus (50.6%) found in present study indicates a need for oral health promotion including health education along with oral health care service provision.

Key Words: Oral Health Behavior, Dental Caries Status, Periodontal Disease Status, School Children, Prevalence

Introduction

The planning for most of the comprehensive oral health care programs is based on the information gathered from surveys for oral health status assessment. Oral health and general health status depend on a dynamic interplay of many factors, including the individual's personal characteristics, behaviors and perception [1].

There are many realms of behaviours, but in health context the most relevant are those that relate to the risk of developing disease or health problems [2]. The oral health behavior relates to the individual's lifestyle, and influences health of the mouth of an individual.

Among common oral diseases, caries and periodontal disease are the two foremost oral pathologies that remain widely prevalent and affect all populations throughout the lifespan [3].

The risk behaviours for dental caries and periodontal disease include frequent intake of sugary food and drinks, irregular tooth brushing, smoking, alcohol consumption and irregular dental attendance [4].

For child population, behaviour modification may be a family responsibility, but given that many risk behaviours stem from the school-age years, schools have powerful influences on children's development and well-being [5-7].

Dental services in India are predominantly provided by private dentists since the Government diverts limited resources to finance dental services [8,9]. A major emphasis is placed on curative rather than preventive services.

At present there are no community oriented comprehensive

oral health care programs in India indicating a need to develop a strategy for the oral health promotion of the school children.

Aim

So the present study was aimed to assess the oral health behavior and its relationship with dental caries status and periodontal status among 12-13 year old school children in Udaipur, India so as to provide data essential for developing the strategy for the oral health promotion of the school children in India.

Materials and Methods

Subjects

An epidemiological cross-sectional survey involving 514 school children aged 12-13 years was conducted for a period of three months in randomly selected two schools in Udaipur, India.

Sampling

List of all the schools (Govt. and Govt. aided) in Udaipur city and the no. of 12-13 year old students enrolled in these schools was obtained. Pilot study was done in one randomly selected school and that data was omitted from the study. Two schools with 15% of the total 12-13 year old students having parents from similar socioeconomic status representing the general population of Udaipur were selected for the survey.

Ethical approval, official permission and informed consent

Before starting the survey ethical approval was obtained from the ethical committee of PAHER University, Udaipur, India

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and official permission was obtained from the authorities (Principal/Director) of the schools. Informed consent was obtained from the parents of all the participants (See Consent form in Supplementary files).

Survey proforma

A survey proforma (See Supplementary files) was prepared with help of a self administered structured questionnaire written in English and validated through a pilot survey (N=50) including 13 multiple choice questions to assess the oral health behavior and WHO oral health assessment form (1997) to record the periodontal disease and dental caries status [10]. The questionnaire showed good reliability with Chronbach's α coefficient value of 0.7.

The survey proforma was divided into three sections as follows:

Demographic information: About Name, Age, Sex, Name and area of school and Year of study of the participants.

Oral health behaviour: The assessment of participant's oral health behavior included 13 questions on frequency of teeth cleaning, time of cleaning teeth, material used for cleaning teeth, use of fluoridated toothpaste, frequency of change of tooth brush, mouth rinsing after meals, habit of tongue cleaning, use of dental floss, care of teeth as much as any other part of body, visit to a dentist and reason for that, frequency of sweet consumption, frequency of soft fizzi drink consumption and adverse habits like pan chewing, Gotha chewing or cigarette smoking.

Indices for periodontal disease and dental caries assessment: A modified dentition status index was used for the assessment of dental caries status (Modified Dentition Status in Supplementary files) and CPI index was used for the assessment of the periodontal disease status (CPI-Index in Supplementary files). Examinations were conducted according to the recommendations of the "WHO Oral Health Surveys – Basic Methods", Geneva, 1997 (WHO Basic Methods) [10].

Training and calibration

All the 12-13 year old children were examined according to the recommendations of the "WHO Oral Health Surveys – Basic Methods," Geneva, 1997 (WHO Basic Methods) [10]. The examiner was trained and calibrated by an experienced Professor in the Dept. of Public Health Dentistry, and practiced examination on a group of 10 subjects with a wide range of levels of disease conditions. Any differences in diagnosis were reviewed by the examiners and were resolved by discussion. A modified Oral health assessment form was used to assess the dental caries status [11]. CPI Index in the Oral health assessment form was used to assess the periodontal status.

Methodology

All the 12-13 year old children in the selected schools were invited to participate in the survey. The purpose of the study was informed and explained to the children. All the children available on the days of survey and whose parents gave written informed consent to participate in the survey were included in the survey.

Before the clinical examinations all the participants were asked to respond to each question according to the response format provided in the questionnaire. The response format included multiple choice questions in which the students were instructed to choose only one response from provided list of options. The students received a full explanation of how to fill in the questionnaire. Furthermore, the investigator was always available during the completion of the questionnaire and the participants were encouraged to approach the investigator for clarification of any queries.

The students who were asked to fill in the questionnaire without discussion with each other took an average of 10 min to complete the procedure. It was later checked by the investigator that none of the questions were left un-attempted.

After completing the survey proforma, the participants were systematically examined by using Type – III examination in natural day light, sitting on ordinary chairs with plane mouth mirror and CPI probe and a recording clerk was responsible for data recording and sterilization of the instruments used. The dental caries in the children was recorded only in the permanent teeth and was expressed as DMFT and DMFS. Because usually shedding of deciduous teeth lasts from age six to age twelve, the dental caries in deciduous teeth was not considered. Because all the children were below 15 years of age, periodontal pockets were not examined. The findings were recorded and coded as indicated in the standard form for oral health assessment.

During the survey duplicate examinations were done on 5% subjects with a time interval of 30 minutes between examinations to assess the consistency of each examination. There was 100% reliability with Chronbach's α coefficient value of 1 for the dental caries assessment and the reliability of examination for periodontal status was good with Chronbach's α coefficient value of 0.71.

A total of 514 children of 12-13 years old (63.4% 12 years old and 36.6% 13 years old) participated in the survey, of which 306 (59.5%) were boys and 208 (40.5%) were girls (*Table 1*). No attempt was made to pursue the children absent on the days of investigation.

Table 1. Mean percentage behaviour scores by age and gender of the study participants.

Variables		N	%	Mean	S. D.	P
Age	12 yrs.	326	63.4%	64.18	11.20	0.666
	13 yrs.	188	36.6%	64.63	11.67	
Gender	Boys	306	59.5%	63.85	11.73	0.232
	Girls	208	40.5%	65.07	10.80	
Total		514	100%	64.34	11.37	

Test of significance: Student *t*-Test

Statistical analysis

For the purpose of analysis of the behavior, zero, one two and three scores were given according to the appropriateness of the options selected by the respondents.

The data were analyzed using the SPSS version 11.5 software (SPSS Inc., Chicago, IL, USA). The individual scores were summed up to yield a total score. Descriptive statistics were obtained and mean percentage scores, standard deviation and frequency distribution were calculated for the behavior section. Dental caries scores and Periodontal index scores were computed according to WHO recommendations (WHO, 1997). The prevalence, proportion rates and mean values and standard deviation were calculated for the purpose of analysis.

The Student's *t*-test, ANOVA test and Post Hoc test were applied for the statistical evaluation of means and chi-squared test was used for comparisons of proportions. The P value was set at 0.05 as a significance level.

Results

The mean percentage behavior scores among all were 64.34 ± 11.37 . Though there was no statistically significant difference in the behavior scores by age or gender, girls showed high mean percentage behavior score (65.07 ± 10.80) than boys (63.85 ± 11.73) (Table 1).

When asked about the frequency of brushing, 58.0% of the respondents stated that they brush at least twice daily and 4.7% of the respondents said that they brush after every meal, whereas 37.3% of the respondents brushed their teeth once daily before breakfast.

The percentage of tooth paste and tooth brush use was 78.8% followed by 14.8% using toothpowder along with toothbrush. Neem stick was used by 4.3% of the respondents.

Among those using tooth pastes for cleaning their teeth, only 39.3% said that their tooth paste contained fluoride. Among those using tooth brush, 21.0% changed their brush as soon as the bristles start fraying, 41.8% change it after every 3 months and 19.8% after every six months.

Among all, 70.8% of the students always rinsed their mouth after meals, whereas 20% did it some times and 9.1% did not have the habit of rinsing mouth after meals. Tongue cleaning two or more times a day was done by 48.4%, once

a day by 25.9% of the students. Dental floss was used as an oral hygiene aid two or more times a day by 27% and once a day by 10.1% of the children. 44.4% said that they do not use dental floss and 18.5% used it sometimes. Among all, 84.4% of the children said that they take care of their teeth as much as other parts of body.

About visiting a dentist and the reason for the visit, 38.7% of the children said that they have never visited a dentist before. 18.7% visited a dentist for routine checkup, 10.5% with pain and swelling and 7.6% with complain of pain in the teeth. Esthetic reason was given by 8.2% of the respondents, bleeding gums by 5.6%, cavity by 5.1%, fractured teeth by 3.3% and malodors by 2.3% of the children.

Regarding the sweet consumption habit, 50.4% said that they do eat sweet at all, 3.7% consume sweet two/more times per day and 22.2% at least once per day. Soft fizzy drinks were consumed by 0.4% of the children two /more times per day, 17.3% consumed fizzy drinks at least once daily and 65.4% said that they do not consume soft fizzy drinks at all. None of the study participants had any adverse habits like pan chewing, Gotha chewing or cigarette smoking.

Among all the mean DMFT was 0.33 ± 0.81 and mean DMFS was 0.43 ± 1.15 . Among all, the mean numbers of healthy sextants were 4.86 ± 1.34 ; with bleeding on probing were 0.27 ± 0.71 and those with calculus were 0.87 ± 1.15 (Table 2).

The percentage of children with dental caries in permanent teeth was 18.9% and those without dental caries in permanent teeth were 81.1%. No statistically significant difference was observed for the mean percentage behavior scores among the children with dental caries (63.79 ± 11.95) and those without dental caries (64.47 ± 11.24) with $p > 0.05$ (Table 3).

Percentage of children with healthy periodontium were 39.9%, with bleeding on probing were 9.5% and those with calculus were 50.6%. The mean behavior percentage scores were significantly high (65.82 ± 11.05) among those with calculus than those with healthy periodontium (62.21 ± 11.02) with $p < 0.05$. The mean percentage behavior scores for the children who exhibited bleeding on probing (65.43 ± 13.17) did not differ significantly from those with healthy periodontium or those with calculus (Table 4).

Table 2. Mean no. of decayed, missing and filled permanent teeth/surfaces (DMFT, DMFS) and mean no. of sextants with different CPI scores among the study participants.

Variables	Mean	S. D.
Mean DMFT and DMFS	DMFT	0.33
	DMFS	0.43
Mean Sextants with CPI scores	Healthy (0)	4.86
	Bleeding (1)	0.27
	Calculus (2)	0.87

Table 3. Mean percentage behavior scores among those with dental caries and those without dental caries in permanent teeth.

Variables	N	%	Mean	S. D.	P
With caries	97	18.9%	63.79	11.95	0.595
Without caries	417	81.1%	64.47	11.24	
Total	514	100%	64.34	11.37	

Table 4. Mean percentage behaviour scores among those with healthy periodontium, bleeding and calculus.

CPI Score	N	%	Mean	S. D.	P
Healthy (0)	205	39.9%	62.21*	11.02	0.002
Bleeding (1)	49	9.5%	65.43	13.17	
Calculus (2)	260	50.6%	65.82*	11.05	
Total	514	100%	64.34	11.37	

Test of significance: ANOVA and Post Hoc.

Discussion

Oral diseases over the years have been fluctuating with changing lifestyle. Many of the oral diseases or conditions are associated with unhealthy lifestyles. Health related behavior change would reduce unhealthy behaviours such as sugar in the diet and smoking, as well as increase healthy behaviours such as flossing and dental attendance [12].

Healthy behaviours and lifestyles developed at a young age are more sustainable. So in these young children we can cultivate healthy lifestyles for better tomorrow.

In present study, the mean percentage behavior scores among all were 64.34 ± 11.37 . Though not statistically significant, girls showed high mean percentage behavior score (65.07 ± 10.80) than boys (63.85 ± 11.73). This result was in line with results of some previous studies, by Osteberg et al. [13] and Polychronopoulou et al. [14].

Oral hygiene practices in India are deeply rooted in tradition and culture with use of Indigenous substances being widely prevalent [15]. The 4.3% children using Neem stick for cleaning their teeth could be explained by this fact. Present study revealed that 93.6% of the children used tooth brush to clean their teeth (78.8% using tooth brush and tooth paste and 14.8% using tooth brush and tooth powder).

The percentage (78.8%) of tooth paste use along with tooth brush was low in present study compared to 83.1% of the school children in North Jordan in a study by MK Al-Omiri et al. [16] and 99% of the Chinese children in a study by MGM Wong et al. [17]. The caries preventive effect of fluoride toothpaste has been well documented [18]. The percentage of fluoridated tooth paste use (39.3%) found in present study was high compared to the subject (16.8% of 12 year olds and 10% of the 18 years old) in a study by Ling Zhu et al. [19]. and was low compared to the 12 year old school children (73%) in Thiruvananthapuram in a study by David et al. [20].

The percentage of twice daily brushing found in present study (58%) was lower compared to that among the school children in North Jordan (69%) in a study by MK Al-Omiri et al. [16] and 77% of the urban children in a study by Wong et al. [17] and was higher compared to 14.7% of the 15 year olds in a study by Dr. Faisal AII [21], 40% of the 12 year old urban school children in People's republic of china in a study by Peng et al. [22] and 45% of the 12 year olds in a study by Ling Zhu et al. [19].

The percentage of children brushing after every meal (4.7%) found in present study was lower compared to 16.0% 12 year olds and 17.3% 18 year olds brushing after meals and 17.8% and 18.9% respectively brushing after sweets in a

study by Ling Zhu et al. [19].

The percentage of school children who had never visited a dentist (38.7%) found in present study was lower compared to 51% of the rural children in a study by MGM Wong et al. [17] and 41.7% 12 year olds and 52.2% 18 years olds in a study by Ling Zhu et al. [19] and 60% of the children in the study by J. David et al. [20] and was higher compared to 13% of the urban children in a study by MGM Wong et al [17], 11% of the study participants in a study by Rajab et al. [23], 20% of the study population in a study by MK Al-Omiri et al. study in North Jordan [16].

Though in the present study, the main reason for the visit to a dentist for routine checkup was observed for 18.7% of children, this percentage was lower compared to 33.9% of the Spanish children in a study by Jimenez et al. [24] and 36% urban children in a study by MGM Wong et al. [17].

Daily one or more times consumption of sugary foods (25.9%) found in present study was higher compared to 14% of the children saying that they had sweets/candy and 10% having cake once daily, or more in a study by MGM Wong et al. [17]. and this percentage was lower compared to the participants in a study by Ling Zhu et al. [19] who reported 1-3 times per day consumption by 66.8% of 12 year olds and 66.6% of 18 year olds, 4-6 times per day by 7.9% 12 year olds and 5.3% 18 year olds, and 7-10 times per day consumption by 1.4% 12 year olds and 0.7% of the 18 year olds.

Percentage of children (65.4%) having cold drink seldom or never and those (17.7%) having it daily were higher compared to 60% and 9% of the children respectively in a study by MGM Wong et al. [17].

None of the study participants in present study showed any of the adverse habits like pan chewing, gutkha chewing or cigarette smoking.

Though, the school children in present study showed positive oral health behaviour, certain preventive behaviours like, use of fluoridated tooth paste, use of dental floss and visiting a dentist for routine checkup needed to be improved. This reflects a need for educating the children about the preventive behaviours for maintenance of good oral health. Proper techniques of tooth-brushing, flossing must be explained and demonstrated on models as a part of general health promotion. One needs to emphasize that tooth brushing should not only be performed in the morning and bed time but also immediately after meals or snack.

As no statistically significant difference was observed for the behavior scores among the children with and without dental caries ($p > 0.05$) and higher mean behavior scores were observed among those with calculus than those with healthy

periodontium ($p < 0.05$), no positive association could be established between oral health behavior and oral health status of the 12-13 year old school children in present study. These results are in conflict with the findings from previous research documenting a positive association between preventive oral behaviors and oral health status [25-29].

One implication of the findings of the present study is that behavior at least in this sample of children does not appear to predict their actual oral health status. This might be because the results related to oral health behavior rely on self reported data, so the rates of oral health behavior might be biased through over and under reporting due to social desirability. It is widely accepted that self report is an imperfect predictor of behavior. There most adequate assessment for planning an oral health evaluation program would be both self report and clinical assessment with the help of indices.

Although the present study reported a low dental caries prevalence (18.9%), mean DMFT (0.33 ± 0.81) and mean DMFS (0.43 ± 1.15) score, among the 12-13 year old children, the high prevalence of calculus (50.6%) found in present study indicates a need for educating the children about oral hygiene maintenance because unless the individual is able to

maintain a reasonable level of oral cleanliness by regular and consistent home care, the benefits of any treatment by dental professionals will be limited [30]. Professional treatment being quite expensive, primary prevention by means of preventive school dental health programs can be effective in improving oral health of these children.

Conclusion

The oral health behavior of the children does not appear to predict their actual oral health status and there is a need for oral health promotion including health education along with oral health care service provision. So, oral health promotion for the children can easily be integrated into general health promotion and the children can be provided with the skills that enable them to make healthy decisions, to adopt healthy lifestyles and to deal with conflicts.

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