Correlation of oral hygiene practices, smoking and oral health conditions with self perceived halitosis amongst undergraduate dental students

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Abstract

Objective: The present study was undertaken to determine the prevalence of oral hygiene practices, smoking habits and halitosis among undergraduate dental students and correlating the oral hygiene practices, oral health conditions to the prevalence of self perceived oral malodour.

Materials and Methods: A self-administered questionnaire was distributed among 277 male and female students. A questionnaire was developed to assess the self-reported perception of oral breath, awareness of bad breath, timing of bad breath, oral hygiene practices, caries and bleeding gums, dryness of the mouth, smoking and tongue coating.

Results: The results indicate female students had better oral hygiene practices. Significantly less self-reported oral bad breath (P = 0.007) was found in female dental students (40%) as compared to their male counterparts (58%). It was found that smoking and dryness of mouth had statistically significant correlation with halitosis (P = 0.026, P = 0.001). Presence of other oral conditions such as tongue coating and dental caries and bleeding gums also showed higher prevalence of halitosis in dental students.

Conclusion: A direct correlation exists between oral hygiene practices and oral health conditions with halitosis. Females exhibited better oral hygiene practices and less prevalence of halitosis as compared to male students.

Key words: Dental students, halitosis, oral hygiene, oral malodour

INTRODUCTION

Halitosis is the general term used to describe any disagreeable odour in expired air, regardless of whether the odorous substances originate from oral or non-oral sources. Other names used are fetor ex ore, fetor oris, bad or foul breath, breath malodour, and oral malodour.[1] Researchers conventionally use an osmoscope to study the sources and conditions surrounding bad breath.

Results from previous studies suggested that even though there are several causes of bad breath including those resulting from a systemic or nasopharyngeal pathology or condition, the main source of most halitosis is the oral cavity. Non-oral sources of breath odour are generally related to systemic problems and/or medications including conditions such as diabetes, liver and kidney disorders, and pulmonary disease. Some medications, especially those that reduce salivary flow such as antidepressants, antipsychotics, narcotics, decongestants, antihistamines, and antihypertensive drugs contribute towards non-oral sources of breath odor.[2-4]

Systemic conditions and medications can contribute to breath problems, but the majority of bad breath originates in the oral cavity. Bacterial putrefaction[5-7] by gram-negative anaerobic bacteria, particularly those residing on the posterior dorsum of the tongue,
utilize sulphur containing amino acids, primarily cysteine and methionine\cite{8-10} to produce volatile sulphur compounds (VSCs) which lead to halitosis.\cite{11} Other organic components e.g., organic acids, indole/skatole, putrescine, cadaverine may be involved in the production of halitosis.\cite{12} Hydrogen sulphide (H$_2$S), methyl mercaptan (CH$_3$SH), and dimethyl sulphide [(CH$_3$)$_2$S] have been identified as the predominate VSCs responsible for oral malodor.\cite{9,13,14} While the tongue is considered the primary source of VSC production, other dental problems can generate these offensive gases. Dental conditions such as gingivitis, periodontal disease, gross carious lesions, and poor oral hygiene have been shown to contribute to bad breath.\cite{15-18} However, when dental disease is the source of oral malodour, treatment of the condition will often eliminate the problem.\cite{17,19}

Oral health is an integral part of general health. The oral health care providers of a country are responsible for enhancement of oral health of the entire nation and they can only do so if they have sound oral health themselves. As there is not much data available on the oral hygiene practices and oral malodour in dental students of India so the study was aimed at assessing the oral hygiene practices of the future dentists who hold the responsibility of maintenance of oral health of the entire nation. Oral malodour is a characteristic finding in poor oral health so this parameter was assessed to evaluate oral hygiene.

The other objectives of the study were to find out if there is any difference between the oral hygiene and self reported halitosis amongst male and female dental students.

**MATERIALS AND METHODS**

A questionnaire based study was carried out at Gain Sager Dental College and Hospital after taking approval from the institutional ethical committee. Final sample consisted of 277 (200 female and 77 male) dental students as more number of female students is enrolled each year as compared to males. The sample consisted of equal distribution of male and female students from second year (69 students), third year (70 students) fourth year (69 students) and dental interns (69 students).

A self-administered questionnaire was developed to assess the prevalence of oral hygiene habits including brushing, flossing, tongue cleaning, use of mouthwash, self-perception of oral health, awareness of bad breath, timing of bad breath, caries and bleeding gums, dryness of mouth, smoking habits, and tongue coating.

The questionnaire was developed by reviewing the literature.

**Data collection**

The questionnaire was distributed all the dental students in the mentioned institution with permission and co-operation of the head of the institute and the respective head of the departments. The identity of the students was not disclosed and the confidentiality of the identity was assured to them. Sufficient amount of time of 10 minutes was provided for the filling up of the questionnaire.

**Statistical analysis**

The data was entered into Statistical Package for Social Sciences (SPSS) version 16.0 and was utilized for data analysis. Chi-square test was used for comparisons among male and female students and to correlate the oral hygiene practices, smoking habit, presence of dry mouth, dental caries, bleeding gums and tongue coating to the prevalence of oral malodour. The significance level (P value) was set at 0.05.

**RESULTS**

Out of a total of 381 students, 290 students filled the questionnaire and responded. The response rate was 76%. The incomplete questionnaires were not included in the study. Valid cases were those who answered the questionnaire completely. The number of valid cases for data analysis was 277 (72.7%). All the respondents were in the age range of 19-25 years with a mean age of 21.2 years.

The results revealed that all participants reported to brush their teeth daily. 40.8% of individuals brushed only once a day, 57.4% brushed twice and 1.4% brushed three times, whereby a very few (4%) brushed four times a day. Also the difference in result between males and females was not statistically significant. 69.9% used one tooth brush for less than 3 months, 25.4% for less than 6 months and 5.1% for more than 6 months with no statistically significant difference among male and female students. Only 14.8% of students use a dental floss. 93.5% dental students claim to clean their tongue daily but only 44.7% of them use a tongue cleaner to do so while the others (55.3%) use a toothbrush for this task. This result was found to be statistically significant when comparison was done among the male and female students ($P = 0.017$) ($P < 0.05$). 32.1% of dental students use a mouthwash daily and only 25% of them use a mouthwash prescribed by a dentist [Table 1].

Self-reported prevalence of dryness of mouth, dental caries, tongue coating and bleeding gums was assessed among male and female dental students. However, there was no statistically significant difference in the results between the two groups ($P > 0.05$) [Figure 1].
Almost 58% of male and 40% of female students had self-perceived bad breath [Figure 2]. The difference in data was statistically significant ($P = 0.007$) ($P < 0.05$). The majority of students, 84.4% male and 88.6% female, experienced bad breath after waking up [Table 2]. Almost 15% of female and 11% of male students experienced bad breath while they are hungry and 7.6% of females and 20% males experience halitosis during thirst. This difference in result was statistically significant ($P = 0.042$). Some students also perceive halitosis while working, talking to other people and when they are tired. Almost 1% of females and 2% of males experience halitosis all day long.

It was found that students who brush twice daily experience less halitosis as compared to students who brush once daily. Students who changed their brush within three months experienced less halitosis as compared to ones who changed their brush within 6 months or after six months [Table 3]. 44.5% of students with a habit of tongue cleaning, 53% of students using a dental floss and 50.6% of students using a mouthwash experience oral malodour. Halitosis was present in 80% of the individuals who smoke. This result showed statistical significance ($P = 0.026$). Presence of dry mouth was directly correlated to presence of halitosis with high statistical significance ($P = 0.001$). Halitosis was present among 52% of individuals with dental caries. It was more prevalent among those who had decayed lesions as compared to filled lesions. Also, 53% of dental students with tongue coating or tongue deposits and 55.6% of students with bleeding gums reported halitosis [Table 4].

### DISCUSSION

Bad breath can be a social handicap for an individual. Self-perception is important for diagnosing and controlling bad breath. A recent study of United States dentists reported that chronic bad breath was diagnosed by 41% of practicing dentists in one week.\textsuperscript{[20]} Studies conducted in Japan,\textsuperscript{[21]} Sweden\textsuperscript{[22]} and France\textsuperscript{[23]} have also reported the prevalence of oral malodor in the population. From such studies it can be concluded that halitosis is a problem that is perceived in different cultures and societies of the world.
In spite of the wealth of information on the condition, identification of the actual cause remains sometimes difficult. In many studies, including ours, the assessment of malodour relies on the subject's self-perception. Many professionals do not consider this method to be reliable because it is subjective, and obviously, the method is not standardized among participants. Nevertheless, despite its shortcomings, this method has been the most commonly used organoleptic technique of evaluating malodour.[24]

In our study the health care professionals such as dental students were studied for the prevalence of halitosis by correlating it to oral hygiene practices being followed by the students, the oral conditions such as dental caries, dryness of mouth, smoking, bleeding gums and tongue coating. It suggested that students who brush their teeth with a frequency of at least twice daily, changed their brush within 3 months, used a tongue cleaner to clean their tongue on a regular basis and used a mouthwash had lesser prevalence of halitosis as compared to the ones who did not follow such oral hygiene practices.

The oral hygiene practices were better among the female students [Table 1] and also the prevalence of self reported oral malodor was less in the female dental students [Figure 2]. These results coincide with the results of other studies.[25,26]
Dry mouth is also major con related with oral malodor. In our study, almost 21% males and 14% females reported of dry mouth. It has been suggested that a reduced saliva flow during sleep favors anaerobic bacterial putrefaction, giving rise to so-called “morning breath,” a transient condition which disappears after a meal.[1,27] The presence of halitosis in individuals with dry mouth was supported with statistically significant result in our study \( (P = 0.001) \) [Table 4]. In an estimated 10 to 30% of the population in the United States the problem of dry mouth remains more persistent and halitosis persists throughout the entire day.[28]

Halitosis was most prominent soon after waking up in most of the individuals (87%) who complaint of self perceived oral malodor. This can be attributed to the reduced salivary flow at night or to the lack of brushing habit at night. More males as compared to females experience halitosis while talking to other people and while they are thirsty. This difference in result was statistically significant \( (P = 0.007, P = 0.042) \) and can be due to better oral hygiene habits and less prevalence of bleeding gums, tongue coating and dry mouth in the female dental students.

Smoking has been defined as an extrinsic cause of oral halitosis.[20] In our sample, 2.5% females and 6.5% males were smokers. Many people try to overcome halitosis, this halitosis may be present in the strong smokers’ breath, and a history of smoking has been implicated in decreasing olfactory sensitivity.[25]

The prevalence of bleeding gums was almost equal among males and females in this study. Dental caries and periodontal diseases are potential factors contributing to the bad breath.[22] In the present study dental caries and periodontal disease such as bleeding gums showed correlation with the oral malodour but the result was not statistical significance. It has been seen in Table 4 that prevalence of halitosis was more in presence of decayed carious lesions as compared to filled carious lesions.

The presence of tongue coating was recognized in almost 105 males and 4% of female students. Miyazaki et al.[15] suggested oral malodor in younger generations could be ascribable mainly to tongue coat deposition. Furthermore, a positive correlation between levels of VSC on the tongue’s dorsum surface and whole oral malodor has been demonstrated.[20] Kishi et al.[30] indicated several VSC producing bacteria have the ability to colonize on the coat of the tongue in periodontally healthy subjects. It was also suggested oral malodor could be related to not only the amount of tongue coating but also the colonization of \( P. \) gingivalis in the coating 52.9% of the students who experienced tongue coating reflected the perception of bad breath.

Eli et al.[31] concluded in a recent study that the self-perception of breath odor is a multifactorial, psycho-physiological issue related closely to one’s body image and psychopathological profile. Therefore, in the present study, the subjective self–reported information should be carefully evaluated, due to the limitation of the reliability of the questionnaire surveys.

**CONCLUSION**

From our study we conclude that female dental students maintained better oral hygiene practices than male dental students and had less prevalence of halitosis as compared to the male student population. There is room for considerable improvement in the oral health behavior of both the male and female dental student groups with a particular emphasis on the former as they are role models for their patients and the public at large. The oral health care providers are responsible for sound oral health of the nation. They cannot be role models for their patients until they maintain good habits themselves. This can be done by greater emphasis during their undergraduate dental training could improve their oral self-care behaviors. Halitosis is a reflection of poor oral health. In can be concluded from our study that poor oral hygiene habits and presence of conditions such a dryness of mouth, bleeding gums, dental caries and coating or deposits over tongue tend to influence the prevalence of halitosis.

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