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Knowledge and attitude of Saudi individuals toward self-perceived halitosis



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Abstract *Objectives:* The aim of this convenient sample study was to assess the knowledge and attitude of Saudi individuals toward self-perceived halitosis. *Materials and methods:* A cross-sectional survey of Saudi adults using an 18-point self-administered questionnaire on self-perception of halitosis was performed. The questionnaire assesses subjects' awareness and knowledge about possible causes and available treatments of oral malodor. In addition, the influence of halitosis on social relations and level of confidence was also evaluated through this questionnaire. Significant associations between self-perceived oral malodor and various variables using Chi-square test were evaluated. *Results:* A total of 130 subjects participated (response rate = 72%). The prevalence of self-perceived halitosis was 68.5%. There was a significant association between knowledge about treatment and self-perceived malodor ($p = 0.025$), among oral hygiene measures teeth brushing was the only measure to show significant association with self-perceived halitosis ($p = 0.042$). There were significant associations between self-perceived halitosis and subject's hesitation to talk to other people ($p = 0.018$), their "uneasy feeling" when someone is nearby ($p = 0.002$), their avoidance to meet other people ($p = 0.032$), or their feeling that other people might avoid socializing with them because of their oral malodor ($p = 0.01$). *Conclusions:* Improving the patients' knowledge about causes of oral malodor might reduce their complaints of halitosis. Patients' complaint from oral malodor can significantly affect their self-confidence and social interaction with others.

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1. Introduction

Oral malodor or halitosis refers to unpleasant breath.¹ Physiological and pathological causes associated with halitosis include smoking, certain medications, alcohol, intake of certain foods, periodontal disease, respiratory tract disorders, and gastrointestinal disorders.¹ Halitosis results from the release of volatile sulfur compounds (VSCs) through putrefactive activities of predominantly anaerobic Gram-negative oral microorganisms.² Bacteria associated with the periodontal

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disease produce large amounts of VSCs.³ In most societies where halitosis is prevalent, people seek relief from the condition mostly because of social discomfort and embarrassment.⁴ Halitosis has also been associated with respiratory disorders and diseases of the gastrointestinal system that may result in the presence of odiferous gases in the air expelled from the oral cavity and the nose.⁵⁻⁸ It is commonly diagnosed during routine dental visits for treatments of dental caries and periodontal disease.⁹

A limited number of studies have evaluated the prevalence of oral malodor in the general population, with rates ranging from 22% to at least 50%.^{10,11} Results from a questionnaire-based study involving 4817 French individuals reported that 22% of participants complained of bad breath.¹² Likewise, clinical assessments of 2762 Japanese individuals indicated that 23% of these individuals had self-perceived oral malodor.¹³ The American Dental Association estimates approximately 50% of the adult population have had at least an occasional complaint of oral malodor while 25% appear to have it as a severe chronic problem.¹⁴ Consequently, this condition has recently received increasing professional and commercial interest in both its etiologic factors and therapeutic measures.¹⁴ Most professionals agreed that in the majority of cases (80–90%) the oral cavity is the main source of an existing condition of halitosis, and bacteria are the primary cause of the offensive odors.¹⁵

McKeown reviewed 55 client records in a breath odor clinic.¹⁶ In 75% of the records reviewed, patients reported decreased self-confidence and insecurity in social and intimate relations led them to seek therapy at the specialized breath odor clinic.¹⁶

To the author's knowledge from indexed literature, there are no studies that have assessed the knowledge and attitude toward halitosis among patients from Saudi Arabia. Moreover, limited information is available on the relationship of sociodemographic factors (such as age, gender, marital status), oral hygiene habits, symptoms of periodontal disease, and self-confidence in social life with complaints of oral malodor.¹⁷ In this regard, the purpose of the present study was to assess the knowledge and attitude of Saudi individuals toward self-perceived halitosis and to explore the effect of self-perceived halitosis on social interactions.

2. Materials and methods

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the College of Dentistry Research Center (CDRC) at King Saud University College of Dentistry. All participants signed an informed consent before their enrollment.

2.1. Structured questionnaire

An Arabic version of a specially designed self-administered questionnaire previously used and validated¹⁸ was used to assess subjects' awareness and knowledge about possible causes and available treatments of oral malodor. In addition, the influence of halitosis on social relations and level of confidence was also evaluated through this questionnaire. In total, 180 questionnaires were randomly distributed to Saudi adult patients visiting the College of Dentistry, and King Khalid

University Hospital, King Saud University, Riyadh Saudi Arabia out of which 130 (72%) questionnaires were returned and processed for data analysis. The questionnaire comprised of 18 points, divided into three parts. The first part of the questionnaire inquired about sociodemographic data, including age, gender, marital status, and occupation. The second part included questions about the presence or absence of medical conditions and habits (including diabetes mellitus, hypertension, chronic sinusitis, gastrointestinal tract disorders, respiratory disease, and smoking, respectively) that may have had an association with oral malodor. Participants' knowledge about oral malodor was assessed through questions about causes and treatment of malodor, and whether they had searched for treatment before, and who they think is the best health care provider to diagnose and to treat the condition. Oral hygiene practices among the respondents were also assessed through questions on the frequency of toothbrushing, dental floss, miswak (chewing stick), mouth rinse, and tongue scraper. In the third part of the questionnaire, respondents were inquired if they perceived to have halitosis, how they knew they had halitosis (through self-perception, diagnosis by a dentist or physician, or being told by a family member or a friend), at what times they noticed the condition, and what measures they employed to manage the condition. The fourth part focused on the influence of halitosis on social relations and level of confidence.

2.2. Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software, version 16. Chi-square test was used to find any significant association between self-perceived oral malodor and other variables.

3. Results

The sociodemographic characteristics of the study subject are summarized in Table 1. The mean age of the participants was 42 (range 17–70 years). Males comprised 77% of the sample out of whom 56% were married. The majority of participants (83%) were non-smokers. The response to questions about medical history is summarized in Table 2.

The prevalence of self-perceived halitosis in this sample was 68.5% ($n = 89$) Table 3. Seventy-four percent of the individuals with halitosis were aware of the problem through their own self-perception and 26% were informed by another person

Table 1 Sociodemographic characteristics and their association to self-perceived halitosis.

| Variable | <i>N</i> (%) | <i>p</i> value ^a |
|------------------------------|--------------|-----------------------------|
| Age: mean (range) | 42 (17–70) | 0.33 |
| Sex, <i>n</i> (%) | | 0.16 |
| Male | 100 (77) | |
| Female | 30 (23) | |
| Marital status, <i>n</i> (%) | | 0.08 |
| Married | 73 (56) | |
| Single | 57 (44) | |

^a Chi square test.

Table 2 Medical history and its association with self-perceived halitosis.

| Variable | N (%) | p value ^a |
|----------------------------------|------------|----------------------|
| Diabetes mellitus | | 0.75 |
| Yes | 4 (3%) | |
| No | 126 (97%) | |
| Hypertension | | 0.54 |
| Yes | 3 (2%) | |
| No | 127 (98%) | |
| Sinusitis or any nasal condition | | 0.14 |
| Yes | 27 (21%) | |
| No | 103 (79%) | |
| Lung and/or bronchial disease | | 0.2 |
| Yes | 6 (5%) | |
| No | 124 (95%) | |
| GIT disease | | 0.3 |
| Yes | 13 (10%) | |
| No | 117 (90%) | |
| Liver disease | | 0.15 |
| Yes | 0 | |
| No | 130 (100%) | |
| Smoking | | 0.7 |
| Yes | 22 (17%) | |
| No | 108 (83%) | |

^a Chi square test

(either family member or a friend) about their bad breath. Among the participants 93% had never had a dental examination or treatment for the management of halitosis, and 82% of them were willing to see a therapist for examination and treatment. The majority of subjects (83%) thought that “dentists” are the healthcare provider that they will seek to address their halitosis problem.

There was a significant association between knowledge about causes of malodor and self-perceived halitosis ($p = 0.025$), while there was no significant association between self-perceived malodor and the subjects’ knowledge about treatment of malodor ($p = 0.063$). The response to the question “What do you think is the main reason(s) for bad breath” is shown in Table 4.

When oral hygiene factors were tested for any possible association with self-perceived halitosis, there was a significant association between teeth brushing and self-perceived halitosis ($p = 0.042$), while other oral hygiene measures (flossing,

Table 4 Self-perceived prevalence of halitosis.

| Question? | N (%) |
|---|-----------|
| Do you notice bad breath in your own mouth? | |
| No | 41 (31.5) |
| Rarely | 24 (18.5) |
| Sometimes | 51 (39) |
| Mostly | 14 (11) |
| How did you know you have bad breath? | |
| My self | 66 (74) |
| Other person | 23 (26) |
| How long have you been aware about your malodor? | |
| More than 2 years | 50 (57) |
| 1–2 years | 24 (27) |
| 6–12 months | 5 (6) |
| 1–6 months | 6 (7) |
| Less than 1 month | 3 (3) |
| Have you ever had an examination for bad breath? | |
| Yes | 9 (7) |
| No | 121 (93) |
| Are you willing to see a therapist for examination and treatment? | |
| Yes | 107 (82) |
| No | 23 (18) |

mouth wash, Miswak, tongue scraper) have shown no significant association with self-perceived halitosis ($p > 0.05$).

There was a significant association between having a bad taste in the mouth and self-perceived halitosis ($p = 0.0001$), and between having white or yellowish coating on the tongue and self-perceived halitosis ($p = 0.03$). Self-perceived bleeding during brushing, mobile teeth and dry mouth showed no significant association with self-perceived halitosis.

The influence of halitosis on social relations and level of confidence is summarized in Table 5. There were significant associations between self-perceived halitosis and individuals’ hesitation for the following parameters: socially conversate ($p = 0.018$), “uneasy feeling” when someone is nearby ($p = 0.002$), avoidance to meet other people ($p = 0.032$), or feeling that other people might avoid socializing with them ($p = 0.01$). There was no significant association between self-perceived halitosis and the individuals’ family life ($p = 0.23$).

4. Discussion

Oral malodor is a recognizable condition that warrants professional attention by dental care providers.¹⁹ Identification of

Table 3 What do you think is/are the main reason(s) for bad breath?

| | Agree | I don't know | Disagree |
|---------------------------------|------------|--------------|------------|
| Gum Diseases | 108 (83%) | 20 (15%) | 2 (1.5%) |
| Decayed teeth | 104 (80%) | 20 (15%) | 6 (5%) |
| Tongue coating | 89 (68.5%) | 35 (27%) | 6 (5%) |
| Dry mouth | 68 (52%) | 44 (34%) | 16 (12%) |
| Smelly food: garlic, onion | 109 (84%) | 13 (10%) | 7 (5%) |
| Caffeinated drinks: coffee, tea | 34 (26%) | 51 (39%) | 45 (35%) |
| Tonsils infections | 67 (51%) | 47 (36%) | 15 (11.5%) |
| Sinuses infections | 40 (31%) | 67 (51.5%) | 23 (18%) |
| Gastric problems | 81 (62%) | 39 (30%) | 10 (8%) |
| Pulmonary problems | 44 (34%) | 64 (49%) | 22 (19%) |

Table 5 Association of self-perceived halitosis with influences on social relations.

| Do you face any of the following difficulties because of your bad breath? | Do you notice a bad breath in your mouth? | | | <i>p</i> -Value ^a |
|---|---|------------|----------|------------------------------|
| | Rarely | Sometimes | Mostly | |
| I hesitate to talk to other people | | | | 0.018 |
| Agree | 6 (25%) | 27 (53%) | 11 (79%) | |
| I don't know | 5 (21%) | 9 (18%) | 0 | |
| Disagree | 13 (54%) | 15 (29%) | 3 (21%) | |
| I feel uneasy whenever someone is nearby | | | | 0.002 |
| Agree | 6 (25%) | 26 (51%) | 13 (93%) | |
| I don't know | 5 (21%) | 8 (16%) | 0 | |
| Disagree | 13 (54%) | 17(33%) | 1 (7%) | |
| I don't like to meet other people | | | | 0.032 |
| Agree | 3 (12.5%) | 15 (29%) | 6 (43%) | |
| I don't know | 3 (12.5%) | 10 (20%) | 5 (36%) | |
| Disagree | 18 (75%) | 26 (51%) | 3 (21%) | |
| Other people may avoid me because of my bad breath | | | | 0.01 |
| Agree | | | | |
| I don't know | 1 (4.2%) | 12 (23.5%) | 7 (50%) | |
| Disagree | 6 (25%) | 17 (33%) | 3 (21%) | |
| | 17 (33%) | 22 (43%) | 4 (29%) | |
| My bad breath affects my family life | | | | 0.23 |
| Agree | 3 (12.5%) | 10 (20%) | 6 (43%) | |
| I don't know | 5 (21%) | 11 (22%) | 3 (21%) | |
| Disagree | 16(67%) | 30 (59%) | 5 (36%) | |

^a Chi square test.

the factors potentially contributing to the patient's complaint is therefore essential for proper diagnosis and patient management. This study was undertaken to assess the prevalence of self-perceived oral malodor in Saudi patients and to identify possible factors associated with this condition.

Oral malodor was assessed through a questionnaire and no clinical examination was performed in this study. Therefore, the reliability of the self-perceived prevalence of halitosis cannot be ascertained. Self-estimation of oral malodor has been demonstrated to be largely unreliable and that objective assessments do not correlate well with a patient's perception of his/her bad breath.²⁰ However, this unreliability was reported in patients who already believed they had oral malodor, or "worriers".²¹ In the general population or "non-worriers", self-assessment of halitosis has been found to be more reliable, and positively correlated with objective assessments.²²

The prevalence of oral malodor in this sample of patients was 68.5%. This figure is higher than the results reported in studies performed in the general population of the United States.²³ Despite the limitations of this study, including sampling design and use of self-reporting for oral hygiene measures and smoking status, this may indicate that the magnitude of this oral health problem in Saudi patients is relatively close to the reported rate in USA (50%), and that it therefore requires similar attention by dental care providers in this region.

The socioeconomic factors in this study, that included age, gender, and marital status, demonstrated no significant associations with self-perceived oral malodor (Table 1). The effects of these factors in the etiology and self-perception of halitosis are not clearly established.¹⁷ However, differences in oral hygiene habits or perception of overall self-image related to age, gender, and marital status were hypothesized to be

indirectly responsible for the differences in self-perceived prevalence of oral malodor. This could also illustrate the complex nature of self-perception of oral malodor and may warrant further investigation into the interplay of factors associated with the etiology and psychology of oral malodor.

All the medical history conditions included in this survey, including smoking, were found to be not significantly associated with self-perceived oral malodor in Chi square analysis (Table 2).

In this study, a significant association ($p = .025$) was found between the subjects' level of knowledge about causes of oral malodor and its self-perceived rate among them. It seems that subjects who know the causes of oral malodor have a lower self-perceived rate of oral malodor. Particularly, the majority of subjects agreed that periodontal disease (83%), decayed teeth (80%), and tongue coating (68%) are the major causes for halitosis (Table 3). However, no significant association ($p = .063$) was found between subjects' self-perceived halitosis and their knowledge about its methods of treatment. To date, there are no similar studies to help in validating or comparing the findings from this study to them.

When subjects were asked about different oral symptoms that could have a potential relation to oral malodor, there was a strong association between having "bad taste in the mouth" ($p < 0.0001$) and "having white or yellowish coating on the tongue" ($p < 0.0001$) with positive self-perceived halitosis.

Adequate oral hygiene habits were the most important factors associated with lack of self-perceived halitosis in this study. The strongest association was related to adequate tooth brushing (brushing once daily). This is in agreement with the recognized role of adequate oral hygiene measures in the prevention and treatment of oral malodor.^{24,25} Other measures of

the adequacy of oral hygiene were not significantly associated with self-perceived halitosis, including using dental floss or the traditional chewing stick (miswak), mouth wash, tongue scrapers. This could be due to the low prevalence of use of these methods in the entire sample, including patients without complaints of halitosis. Interdental cleaning methods, including dental floss, have been shown important in the treatment of oral malodor.²⁶

The data also show that halitosis may negatively affect the person's social life. A significant association was found between self-perceived halitosis and some obstacles in communicating socially with others, namely, hesitation to talk to other people ($p = .018$), feeling uneasy whenever someone is nearby ($p = .002$), avoiding meeting people ($p = .032$), and the thought that people may avoid meeting the subject because of his/her oral malodor ($p = 0.01$).

This survey has several limitations. It only relies on self-perceived data, and no clinical examination was performed. Also, the study has a relatively small sample size. Future study will be designed to overcome these limitations.

5. Conclusions

Within the limitations of this study, the following conclusions can be drawn

- Improving the patients' knowledge about causes of oral malodor can significantly reduce their complaints' of halitosis.
- There is a potential awareness among Saudi population that periodontal disease, decayed teeth, and smelly food are the main causes of oral malodor. However, it was found that there is lack of awareness of other important causes of oral malodor, like tongue coating, dry mouth, ENT infections, and gastric problems.
- Oral hygiene (particularly using toothbrush on a daily basis) can significantly reduce the patients' complain of oral malodor.
- Patients' complain from oral malodor can significantly affect their self-confidence and social interaction with others.

Conflict of interest

The author declares that there is no conflict of interest and there was no external source of funding for the present study

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