

# Research Paper: Knowledge and Practice of Dental Students in Guilan University About Halitosis: A Randomized Questionnaire-Based Cross-Sectional Study



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**Citation:** Malekzadeh M, Ezoji M, Maleki D. Knowledge and Practice of Dental Students in Guilan University about Halitosis: A Randomized Questionnaire-based Cross-Sectional Study. Journal of Dentomaxillofacial Radiology, Pathology and Surgery. 2018; 7(4):137-144. <http://dx.doi.org/10.32598/3dj.7.4.137>

<http://dx.doi.org/10.32598/3dj.7.4.137>



## Article info:

**Received:** 18 May 2018

**Accepted:** 10 Oct 2018

**Available Online:** 01 Dec 2018

## Keywords:

Awareness, Halitosis, Dental students

## ABSTRACT

**Introduction:** Halitosis (bad breath) is one of the common causes of referral to dental clinics. Dentists require adequate knowledge and good practice to evaluate and manage halitosis. The present study aimed to assess the knowledge and practice of dental students in Guilan University of Medical Sciences on halitosis.

**Materials and Methods:** A simple randomized, cross-sectional, questionnaire-based study on the knowledge and practice of dental students about halitosis in dental faculty of Guilan University of Medical Science (GUMS) was conducted. 140 subjects were selected using stratified random sampling technique. Students belonging to dental faculty of GUMS were included and subjects unwilling for the study were excluded. The collected data were analyzed in SPSS V. 20 by Chi-squared, Analysis of Variance (ANOVA), t-test, and regression analysis.

**Results:** Mean age of subjects were 23.5 years. 53.6% subject had moderate knowledge about halitosis. The results revealed that the fifth and sixth year students had more information than the third and fourth year students ( $P < 0.0001$ ). Comparing the performance of female and male students indicated a better hygiene status in females. Based on Chi-squared test results, the frequency of using mouthwash was significant in terms of the academic year ( $P = 0.049$ ).

**Conclusion:** The mean knowledge score of students about halitosis was moderate. Knowledge score and oral hygiene status had no significant relationship with marital status. Despite females having a significant better oral hygiene compared to males, the knowledge score about halitosis had no relation with gender. Students with higher academic grades, had significantly higher knowledge score about halitosis and maintained a significant better oral hygiene by using Chlorhexidine (CHX) mouth wash more frequently.

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## 1. Introduction

**H**alitosis is a bad breath that comes from the oral cavity or nose and was first defined as a clinical condition by Howe in 1874 [1, 2]. Halitosis is classified into three main categories; true halitosis, false halitosis, fear of halitosis. In true halitosis, the severity of bad odor is beyond the level of social acceptance [3]. If the smell is not detected by other people, but the patient is constantly complaining about it, it is known as false halitosis and if, following a successful treatment of halitosis, the patient still complains of bad breath, the condition is classified as fear of halitosis [4].

Halitosis is one of the common causes of dental visits with a prevalence rate of 33% [5]. In the developed world, 8-50% of people perceive chronic recurrence of halitosis [6, 7]; however, only a limited number of patients refer to dentists seeking for treatment [7]. It is estimated that 85 million individuals suffer from halitosis [8]. Halitosis results from poor oral hygiene, inappropriate denture cleaning, reduced saliva flow, use of tobacco in any form, specific systemic conditions, deep caries lesions, periodontal disease, peri-implantitis, mucosal ulcers and food retention [4, 5]. The main compounds that lead to halitosis are Volatile Sulfur Compounds (VSCs), especially hydrogen sulfide ( $H_2S$ ), methyl mercaptan ( $CH_3SH$ ), and dimethyl sulfide ( $(CH_3)_2S$ ) [6].

Halitosis is considered as an obstacle in social communication and can reduce individual efficacy; thus, seeking for treatment is of importance. The use of mouthwashes reduces halitosis temporarily. However, products containing zinc or ascorbic acid had low efficacy, and chlorophyll-containing products were ineffective. Oral hygiene instructions, Scaling and Root Planning (SRP) and treating periodontal disease, restoring caries, closing open contact between teeth, treating irreversible pulpitis and extraction of semi-impacted molar teeth without a space to erupt are among the treatment methods of halitosis [9].

Maleki et al. investigated the knowledge of halitosis among general dentists working in Tehran. The results revealed that general dentists' awareness of halitosis was relatively low [10]. Ashwath et al. surveyed the self-awareness of halitosis and oral hygiene habits among graduated dental students in India. Their results indicated a high awareness in this population [11]. Nunes et al. reported that 72% of dentists lack in responding to questions related to halitosis [12]. Regarding to the heterogeneity of findings, the necessity of conducting a

study to assess the knowledge of students about halitosis is unavoidable.

## 2. Materials and Methods

This was a simple randomized, cross-sectional, questionnaire-based study on the knowledge and practice of dental students about halitosis in dental faculty of Guilan University of Medical Sciences (GUMS). Approval was taken from ethical committee of GUMS. The subjects were informed about the purpose and objectives of the study. They were also provided information about their voluntary participation and right to refusal. Those willing to participate in the study signed a written consent.

Students belonging to dental faculty of GUMS were included in the study. Exclusion criteria were people unwilling for the study and incomplete questionnaires. The sample size was determined according to the similar study by Richard Ayodeji Adewole et al. (at 95% CI and considering the estimated of error of 7.5%) equal to 130 persons (Formula 1).

1.

$$1 - \alpha = 0.95 \rightarrow Z_{1-\alpha/2} = Z_{0.975} = 1.96$$

(estimated error limit) deviate = 7.5%

(the average awareness according to the reference)  
 $P = 25/5\%$

$$n \geq \frac{Z_{1-\alpha/2} \times p(1-p)}{d^2}$$

$$n \geq \frac{1.962 \cdot 0.255(1-0.255)}{(0.075)^2} \rightarrow n \geq 130$$

140 subjects were selected by stratified random sampling technique. Data was collected using a self-structured questionnaire which had three parts. The first consisted of demographic questions.

The second was designed to assess the knowledge of subjects on halitosis. Initially, 31 questions were considered. Based on Content Validity Ratio (CVR) index, only 13 questions satisfied the significance level (by Lavashe table ( $CVR \geq 0.6$ )) and the rest were removed. Based on Content Validity Index (CVI) index, all the remaining questions survived (CVI higher than 0.90). To assess the reliability of the remaining questions, two forms consisting of the 13 questions were provided to 15 randomly selected subjects, simultaneously. These subjects were not included in the study. The correlation between the

two investigated forms was strong (based on Pearson's correlation coefficient). The reliability of the questionnaire was above 95%.

Based on the correct answers, students who scored 0-6 were categorized by inadequate knowledge, 7-10 scores were considered as moderate knowledge and 11 to 13 were considered as having good knowledge about halitosis. The third, aimed to evaluate the students' oral hygiene status and included 15 questions which were chosen based on other studies. These questions were answered as yes or no or open answers. Data were analyzed using SPSS v. 20. For continuous variables, mean and standard deviation were computed. Analysis of Variance (ANOVA), t-test, Chi-Squared test, Pearson's correlation coefficient and Spearman correlation coefficient were performed.

### 3. Results

140 questionnaires were collected from dental students of GUMS to evaluate their knowledge and oral hygiene

status. The demographic data is presented in Table 1. Analysis of the second part of the questionnaire revealed that the incorrect answer was mostly given to the question No. 8 (79.8) and question No. 11 (67.1). Mean±SD was 6.94±2.07 (moderate knowledge). The lowest and highest scores were 2 and 12, respectively (Table 2). The frequency of correct and incorrect answer to each question is presented in Table 3.

The third part of the questionnaire evaluated the students' oral hygiene status. The answers to the questions are reported in Table 4. Interestingly, students using chlorhexidine mouthwash had a higher knowledge score of halitosis than those not using the mouthwash (P=0.047). Comparing the first and second part of the questionnaire; it is revealed that knowledge score had no significant relationship with gender and marital status. However, as students are in higher academic grades, their information about halitosis increases; students in the fifth, sixth and complementary years had significantly more information than the third and fourth-year students (P>0.0001).

**Table 1.** Demographic data (first part of the questionnaire)

Demographic Data		No. (%)
Gender	Male	70 (50)
	Female	70 (50)
Age (Mean±SD)	23.5±2.5	
Marital status	Single	7 (5)
	Married	133 (95)
Academic grade (semester)	5-6 <sup>th</sup>	17 (12.1)
	7-8 <sup>th</sup>	36 (25.7)
	9-10 <sup>th</sup>	38 (27.1)
	11-12 <sup>th</sup>	44 (31.4)
	Complementary	5 (3.6)



**Table 2.** Mean knowledge score of students about halitosis

Mean knowledge Score	No. (%)
Inadequate knowledge (0-6 correct answers)	6 (4.3)
Moderate knowledge (7-10 correct answers)	75 (53.6)
Good knowledge (11-13 correct answers)	59 (42.1)



**Table 3.** Students' knowledge about halitosis

Questions (Second Part of Questionnaire)	No. (%)	
	Incorrect	Correct
What is the most common cause of halitosis?	82 (58.6)	58 (41.4)
What part of the body does the mouth smell of fish root from?	55 (39.3)	85 (60.7)
What part of the body does the mouth smell of rancid apple source from?	45 (32.1)	95 (67.9)
What is the golden standard of diagnosing halitosis?	62 (4.3)	78 (55.7)
In what way does chewing gum most eliminate bad breath?	60 (42.9)	80 (57.1)
What method is incorrect through self-assessment applied to control the individual on the results of halitosis treatment?	77 (55)	63 (45)
Which option is not the cause of halitosis in patients with dry mouth?	94 (67.1)	46 (32.9)
Which internal-source halitosis is similar to external-source ones?	111 (79.3)	29 (20.7)
What is the first line treatment for halitosis?	43 (30.7)	97 (69.3)
Of the mouthwashes that are used to treat halitosis, which is the most effective antiplaque and anti-gingivitis?	34 (24.3)	106 (75.7)
Which mouthwash has reduced morning bad breath, despite inappropriate oral hygiene?	96 (68.6)	44 (31.4)
Which of the following mouthwashes reduce bad breath at the minimum possible, according to the scholars?	57 (40.7)	83 (59.3)
Is it possible to use a combination of fluoride and chlorhexidine as a mouthwash?	33 (23.6)	107 (76.4)



Comparing the first and third part of the questionnaire revealed that the difference of oral hygiene status had no significant relationship with different marital status. However, in terms of gender, the frequency of recognizing an approach to evaluate the smell of the breath ( $P=0.049$ ), the frequency of tooth brushing ( $P=0.021$ ), using chlorhexidine mouthwash ( $P=0.042$ ), smoking ( $P=0.001$ ), and cleaning the tongue with a tongue brush ( $P=0.042$ ) were statistically significant; females reported better oral hygiene, compared to males. Investigating the same frequency in terms of academic grade indicated significant difference in the use of chlorhexidine mouthwash ( $P=0.049$ ); students with higher academic grade used CHX mouthwash more frequently.

#### 4. Discussion

Epidemiological studies in European societies have suggested that out of every four people, one person is suffering from halitosis, and approximately 6% of all individuals suffer from their unpleasant mouth smell [1]. Halitosis is one of the reasons why people visit dental clinics and is a multifactorial condition requiring expert

assessment and treatment by a dentist, and if necessary, by a physician, a psychologist, and pharmacotherapy [11]. Vasconcelos et al. [13] stated that the methods for controlling halitosis should include eliminating bacterial agents and improving the quality of oral hygiene.

In the present study, there was no significant relationship between marital status, and halitosis; this finding is consistent with other studies. [10, 14]

The results showed that females had a better oral hygiene status compared to males. These findings are in line with the findings of Khani et al. [15], Al Omari [16], and Peker [17] investigations. Ashwath [11] also stated that females had a significantly better performance in using oral detergents, toothbrushes, and dental floss. Additionally, Bhat [18] stated that 100% of women used toothbrushes daily. However, in the study of Khaled Al-mas et al. [18], men were more likely to seek for halitosis treatment.

The current study claims that those who used chlorhexidine mouthwash had a higher knowledge score about halitosis which is in consistent with the study of Khani

**Table 4.** Students' oral hygiene status

No.	Questions (Third Part of Questionnaire)	Answers	No.	P
1	Do you know any approach to evaluate the smell of your breath?	Yes	42	0.418
		No	73	
		I am not sure	25	
2	Have you received any treatment for halitosis?	Yes	25	0.180
		No	115	
3	Has halitosis disturbed your social life?	Yes	5	0.165
		No	135	
4	In what time of the day do you conduct oral hygiene behaviors for reducing halitosis?	After waking up	94	0.405
		When hungry	35	
		When tired	4	
5	Do you brush your teeth every day?	Yes	128	0.086
		No	12	
6	How many times a day do you brush your teeth?	Once a day	31	0.133
		Twice a day	70	
		Three times a day and more	39	
7	Do you use chlorhexidine mouthwash for reducing halitosis?	Yes	66	0.047
		No	74	
8	When do you use mouthwash?	Before tooth brushing	5	0.137
		After tooth brushing	61	
9	Do you use toothpick or floss?	Yes	113	0.628
		No	27	
10	How many times a day do you brush your teeth?	Once a day	31	0.271
		Twice a day	70	
		Three times a day and more	39	
11	Do you use a fluoride mouthwash to prevent dental cavity?	Yes	72	0.096
		No	68	
12	Do you observe signs of gingival bleeding when brushing your teeth?	Yes	12	0.911
		No	128	
13	Do you receive a regular dental visit for examining your oral status?	Yes	12	0.232
		No	128	
14	Do you smoke cigarettes?	Yes	21	0.597
		No	119	
15	Do you use tongue brush to brush your tongue?	Yes	68	0.277
		No	72	

et al. [15]; who detected a significant correlation between the level of knowledge about halitosis and tooth brushing and dental visits however is not in accordance to Peker's [17] and Bhat's [18].

Higher academic grade was found to have a significant relationship with the higher knowledge of students in the current study. Khalil et al. [14] stated that with the increment of dentists' experience and employment record, their knowledge about halitosis increases. Also, Khami et al. [15] reported that senior students had more knowledge, compared to junior students which is confirmed by the current study.

Khaled Almas et al. [18] reported that 44% of male students and 32% of female students had a good knowledge about halitosis. Population of their study included medical and dental students; thus, the cause of higher awareness in their study could be the higher knowledge of medical students about the non-oral causes and other halitosis-related diseases as well as more experience and training on this subject. However, Maleki et al. [10] reported that the mean knowledge score of dentists using a 15-item questionnaire were 8.1 which was categorized as a low knowledge. Also, Khalil et al. [14] stated that with the increment of dentists' experience and employment record, their knowledge about halitosis increases [13]. Also, Khami et al. reported that senior students had more knowledge, compared to junior students which is confirmed by the current study [14].

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## 5. Conclusion

The mean knowledge score of students about halitosis was moderate. knowledge score and oral hygiene status had no significant relationship with marital status. Despite females having a significant better oral hygiene compared to males, the knowledge score about halitosis had no relation with gender. Students with higher academic grades, had significantly higher knowledge score about halitosis and maintained a significant better oral hygiene by using CHX mouth wash more frequently.

## Ethical Considerations

### Compliance with ethical guidelines

All ethical principles were considered in this article. The participants were informed about the purpose of the research and its implementation stages; they were also assured about the confidentiality of their information; Moreover, They were allowed to leave the study whenever they wish, and if desired, the results of the research would be available to them.

### Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### Authors contribution's

All authors contributed in preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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