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Halitosis-related Knowledge, Attitude and Practice (KAP) among Mustansiriyah Dentistry Students A cross sectional study

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Abstract

Aim: To determine the knowledge, attitude and practice of dental students regarding oral halitosis and associated gender differences at Mustansiriyah university-college of dentistry. **Methods:** A cross-sectional study design was used in Baghdad, Mustansiriyah University-college of dentistry and a total of 136 students participated in the study. A standardized questionnaire that was self-administered was used to collect data on socio-demographics, oral halitosis knowledge, attitudes, and practices. After being examined and cleaned, the data was imported into SPSS version 25.0. The data was described using descriptive statistics, and the results were shown in tables and texts. **Results:** A total of 136 undergraduate dental students were assessed on the perception of halitosis. In terms of knowledge, the overall participants had satisfactory knowledge toward halitosis (62.8%). The participants demonstrated a favorable attitude toward halitosis, with an overall attitude score of 87.3%. The overall level of practice toward halitosis was low (23.3%). The students' gender demonstrated a statistically significant association with selected items only; specifically in one knowledge question and two practice questions, whereas no significant gender-related differences were detected across any of the attitude items. The overall association between knowledge and practice was weak to moderate. **Conclusion:** The study concludes that the overall knowledge about halitosis was satisfactory with generally positive attitudes. However, the overall practice was low. This highlights the need for focused educational and behavioral interventions and to enhance the practices of oral hygiene. Students' gender did not have an impact on the KAP domain.

Keywords: Halitosis, knowledge, attitude, practice.

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Introduction

An unpleasant or disagreeable odor originate from the oral cavity is the hallmark of halitosis. Another popular name for it is "bad breath." People of every age and gender, regardless of their social standing, can develop halitosis (Tungar et al., 2024). It could have a significant negative psychological and social impact (Azodo & Omo, 2011). Halitosis affects a large number of people worldwide. In 2017, halitosis was projected to affect 31.8% of the general population (Silva et al., 2018). However, there is a great deal of variation in the reporting of halitosis's prevalence worldwide because there is no universally recognized description of the condition, reporting is subjective, and various methodology are employed. Numerous physiological and pathologic factors can lead to halitosis (Tungar et al., 2024 ; Hasan et al., 2019). Desquamated epithelial cells, stagnant saliva, and the putrefaction of retained meal particles due to bacterial buildup are the causes of physiologic halitosis, which is characterized by foul-smelling morning breath (Kapoor et al., 2016).

The pathological causes include metabolic failures, chronic illnesses, hereditary issues, and systemic or local infections (We et al., 2020). Nonetheless, some people may have halitosis but deny it, while others may have pseudo-halitosis, which is the belief that one has halitosis despite not having it, or halitophobia, which is an exaggerated fear of halitosis (Geest et al., 2020). Whatever its form, halitosis significantly impairs a person's quality of life and makes navigating social situations challenging because it is a condition that is more noticeable to close friends and family than to the person who has it (Bicak et al., 2018).

The behaviors and knowledge of halitosis among dental students have been the subject of several studies in different countries. The dental students can educate their families and the community by learning the necessary information about oral health. In Iraq there is a limited information about halitosis, as evidenced by a lack of understanding of the disease's cause and potential treatments (Alawsiy et al., 2021). Since halitosis is thought to be a significant factor that would affect quality of life and lessen social stigmatization, more research on the condition is required (Akaji et al., 2014). The purpose of this study is to determine the dental students' level of knowledge, attitude, and practice about

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halitosis and associated gender differences, as they will be the future providers of dental care. The data gathered may be useful in revising the current dentistry students' course material on halitosis.

Methods

Study Design

A cross-sectional survey was administered to dental students of 22-25 years old and carried out at the Department of oral surgery and Periodontology, College of Dentistry-Mustansiriyah University in Baghdad, Iraq, from January to April 2025. The study was conducted after obtaining approval from the ethical committee of Dentistry/Mustansiriyah University following the 'Tokyo and Helsinki Declaration of Human Research (World Medical Association, 2013). Reference Number (MUOSU-202124) in 01-12-2024. All participants were informed about the study's procedures and their confidentiality was assured. All participants provided informed consent.

Sample size calculator for prevalence studies (version 1.0.01) done by Daniel WW, 1999 (Pourhoseingholi et al., 2013). The KAP score was calculated using the overall percentage method, which is commonly applied in KAP studies when individual response data are not analyzed separately. The total obtained scores from all participant was divided by the maximum possible scores (that equals the sum of K+A+P) multiplied by100, based on the calculated score, the level was categorized according to standard cut-off points: low: < 50%, satisfactory: 50–74%, and good: ≥ 75%.

Inclusion criteria

The Inclusion criteria include Male and female undergraduate dental students. The age of the students ranged from 22 to 25 years. Participants who met the inclusion and exclusion criteria who consented to participate in the study were asked to fill a questionnaire survey to identify the level of KAP towards halitosis.

Exclusion criteria

The exclusion criteria include systemic diseases, pregnancy, patients with inflammatory diseases, and uncooperative students.

Data Collection

Data were collected from January to April 2025. The participants asked if they were willing to participate in the study. All participants who agreed to join the study signed a consent form and were handed the

DOI: 10.32828/mdj.v22i1.1228

self-administrated questionnaires which consisted of 20 questions and 4 sections namely; demographics (age, gender, course, medical and dental history). The second section focused about the participants' halitosis knowledge. The third section related to the attitude towered the condition. The last section about the practice towered halitosis. The English questionnaire was translated into Arabic using a forward-backward method. The face validity of the questionnaire was evaluated by three questionnaire development specialists. The experts were questioned regarding the questions' clarity and applicability. Only a few terms in the questionnaire required to be clarified and rephrased, based on the responses.

Statistical analysis

The IBM statistical package for Scientific Solutions (SPSS) version 25.0 was used to evaluate the questionnaire data. Prose and frequency tables were used to present the findings.

Result

Study Population

The participants were undergraduate dental students randomly chosen from 4th and 5th grades, at Mustansiriyah College of Dentistry. The average age ranged from 22 to 25 years. (Table 1).

Table 1: Gender Distribution of the Participants

Gender	n=136	percentage %
Male	88	64.71%
Female	48	35.29%

Knowledge about halitosis among dental students

The first question is about the primary cause of halitosis. Among the total number of participants, 27 (19 %) responded that the gingival sulcus is the primary cause of halitosis, whereas 68 (50 %) responded that the tongue is the main cause. In addition, 23% reported that periodontal pocket is the cause halitosis, and only 5% reported that gastrointestinal diseases primarily cause halitosis. About the golden slandered diagnostic method for halitosis (Question 2) about 66% responded for the organoleptic

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method. Regarding the VSC that mostly related to halitosis (Question 3) about 41% of participants responded with hydrogen sulfide and 53% insured (I don't know). Regarding the bacterial species that mostly caused halitosis (Question 4) 66% reported that *P. gingivalis* are mainly associated with halitosis. The majority of participant (85%) agreed that CX and Zing components recommended to reduce halitosis (Question 5).

The knowledge score was calculated using the overall percentage method, which is commonly applied in KAP studies when individual response data are not analyzed separately. The total number of correct responses from all participants was divided by the maximum possible correct responses and multiplied by 100 to obtain the overall knowledge score, based on the calculated score. Overall, the participants had a satisfactory level of knowledge toward halitosis (62.8%). A statistically significant association between knowledge and gender was found only in the first question (P value < 0.05), while no significant relationships were detected with gender in the remaining questions (Table 2).

Table 2: Knowledge about Halitosis

		Total		M	F	Fisher exact	P value
		N	%	%	%		
Q1-What is the primary source of halitosis?	gingival sulcus	27	19.61	9.09	38.89	13.273	**0.000**
	Tongue	68	50.98	60.61	33.33		
	PD pocket	34	23.53	27.27	16.67		
	Stomach	7	5.88	3.03	11.11		
Q2-The gold standard diagnostic method?	gas-chromatography	16	11.76	12.12	11.11	0.573	0.961
	Organoleptic method	91	66.67	66.67	66.67		
	Sulphur monitor	11	7.84	9.09	5.56		
	I don't know	18	13.73	12.12	16.67		
Q3- VSCs that most frequently related to halitosis?	Methane	14	9.80	12.12	5.56	3.523	0.296
	Urea & ammonia	18	13.73	12.12	16.67		
	H2S & methyl mercaptan	56	41.18	48.48	27.78		

DOI: 10.32828/mdj.v22i1.1228

	I don't know	48	35.29	27.27	50.00		
Q4-Which bacteria are mainly associated with halitosis?	S. mutans	15	12	12	12.7	0.573	0.962
	P. gingivalis	90	66.7	66.5	66.6		
	lactobacillus	13	8.8	10	6		
	I don't know	18	13.37	12.12	16.6		
Q5-Active component recommended to reduce halitosis?	CHX, Zinc	113	84.31	87.88	77.78	1.708	0.760
	Mint, Cysteine & amino acid	11	7.84	6.06	11.11		
	No active compound	6	3.92	3.03	5.56		
	I don't know	6	3.92	3.03	5.56		

Attitude toward halitosis

The attitude towered halitosis among students was assessed by asking if they suffered from halitosis (Question 1) and at which time (Question 2). Among the participants, 75 % responded that they suffer from halitosis, particularly after wake up 84%, whereas 88 % responded that they were not told that they have halitosis (Question 3) and the majority 98% not visited a doctor for this problem (Question 4). All the participants (100%) agree that halitosis is a common social problem (Question 5). The participants demonstrated a favorable attitude toward halitosis, with an overall attitude score of 87.3%. Ther is no significant relation between the gender of students and the attitude toward halitosis (Table 3).

Table 3: Attitude toward halitosis

		Total		M	F	Fisher exact	P value
		N	%	%	%		
Q1-Do you suffer from bad breath?	Yes	88	74.51	75.76	72.22	0.915	0.839
	No	48	25.49	24.24	27.78		
Q2-What time do you feel it more?	Wake up	82	84.31	84.85	83.33	1.235	0.453
	Hungry	20	11.76	9.09	16.67		
	Thirsty	24	1.96	3.03	.00		
	All the day long	10	1.96	3.03	.00		

DOI: 10.32828/mdj.v22i1.1228

Q3-Have you been told that you have halitosis?	Yes	16	11	11	10	0.301	0.98
	No	120	88	89	90		
Q4-Have you visit a doctor for your bad breath?	Yes	6	2	2	2	0.201	0.999
	No	130	98	98	98		
Q5-Dose halitosis is a common social problem?	Yes	136	100	100	100	1.00	1.00
	No	.00	.00	.00	.00		

Practices toward halitosis

Among the participants, 65% reported brushing once daily wears only 20% brush their teeth twice daily. Regarding the interdental cleaning the majority of the participant reported irregular using of dental floss and only 33% use it regularly. Only 15% from the participant answered that they performed tongue cleaning as routine oral hygiene measures while 85% answered never. About 58% from the participants reported that they never use antibacterial mouthwash. However, 40% of the participants used the mouthwash rarely. The majority of the participants (92%) reported that they never visit the dentist for regular checkup. The overall level of practice toward halitosis was found to be low (23.3%), indicating that most participants do not follow appropriate oral hygiene practices, despite demonstrating a positive attitude." A statistically significant association between the practice towered halitosis and gender was found only in the second and forth questions (P value < 0.05), while no significant relationships were detected with gender in the remaining questions (Table 4).

DOI: 10.32828/mdj.v22i1.1228

Table 4: Practice towards halitosis

		Total		M	F	Fisher exact	P value
		N	%	%	%		
Q1-How often do you brush your teeth?	One a day	88	65	66.45	60.44	0.201	**0.999**
	Twice a day	27	20	10.52	35.56		
	Irregular	21	15	16.03	5.00		
Q2-Do you use dental floss or interdental cleaning tool?	Yes, regularly	45	33	12.12	44.44	10.039	**0.000**
	Irregularly	81	60	60.48	55.00		
	Never	10	7	28.39	1.56		
Q3- Do you clean your tongue?	Yes	21	15	6	10	1.600	**0.69**
	NO	115	85	94	90		
Q4- use an antibacterial mouthwash?	Always	13	2	4.04	.00	12.013	**0.000**
	Sometimes	26	40	6.06	84.4		
	Never	97	58	90	16.6		
Q5- visit the dentist regularly for checkup?	Always	20	5.8	3	11	7.292	**0.092**
	Sometimes	95	1.96	.00	5.5		
	Never	21	92	97.9	83.33		

Discussion

In the present study, 136 students aged 21-25 years old were selected randomly from 4th and 5th stages at Mustansiriyah University/college of dentistry, no previous Iraqi study on halitosis was done in this area for this age. The purpose of this study was to evaluate undergraduate dental students' knowledge, practice and altitude of halitosis and associated gender differences. Its conclusions are significant as one of the most undesirable features of social contact is halitosis.

According to the study's findings, the participants showed a satisfactory knowledge about halitosis, this is consistent with Alshehri F.'s (2016) findings. The most common causes of poor breath mentioned by survey participants were intra-oral problems (Alshehrin et al., 2016), in contrast to another study findings in Saudi Arabia which cited the stomach problems as a main cause of bad breath, followed by periodontal diseases and tongue coating (Setia et al., 2014), and Jordan (Aydin et al., 2014), which found a low knowledge rate (20.5%),

DOI: 10.32828/mdj.v22i1.1228

indicating a notable discrepancy. In this study about 50% of participants were aware that tongue coating and 25.5% were aware that periodontal diseases could cause halitosis. These results are in consistent with an Indian study (Karem et al., 2020). The success of educational measures, cultural ideas on dental health, and the differences in the availability of information can all affect the overall-students information about halitosis. Differences in methodology can also affect the level of knowledge and produce different outcomes, these include variations in the study design, sample size, demographics, and survey equipment. Furthermore, about 97% of the students concurred that oral-malodor is a common social issue that has a detrimental impact on a person's social life.

This study examined the impact of halitosis on society. The study also suggests that dental students are aware about the potential effects of halitosis on social interactions and personal relationships. According to Aydin et al in 2014, the lack of general acceptance of halitosis could have negative social effects on the patients who suffer from it (Aydin et al., 2014). This focused the importance of specific public health efforts to improve the awareness and attitudes about halitosis. Programs that address the stigma associated with halitosis while educating the public and dental students about the causes, prevention, and treatment could be helpful. The study's findings indicate that while a significant portion of the students are well-informed about halitosis prevention measures, only 20% from students said they performed teeth brushing and used an interdental cleaning device twice daily, 12% said they regularly brushed their tongues, 15.5% said they always used mouthwash. This suggests that even though many students practice good oral hygiene, they may not employ effective measured to avoid or treat oral-malodor. These results are in line with previous studies conducted in Iraq about halitosis, which revealed that dental students demonstrate an acceptable oral hygiene practices and attitudes (Karem et al., 2020). However, the intervention component of the best oral hygiene practices still needs to be emphasized. A prior research at Mustansiriyah College of Dentistry revealed greater percentages (84.8%) of dental students undergoing a routine oral examination (Mustansiriyah Dental Journal, 2025). This cross-study consistency suggests a broader problem that may be present in other groups.

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Low halitosis practices result from a variety of factors, including failure to address the underlying halitosis causes. Mouthwash and regular oral-dental care are important, but it's not enough if they don't consider the fundamental causes of bad breath, such as poor oral-hygiene, certain diets, or underlying medical conditions. The low percentage of participants' habits indicates the need for additional educational programs in oral health. In addition to encouraging good dental hygiene, public health efforts should offer thorough information about the halitosis causes and efficient treatment options.

According to the current study, there is typically a moderate positive correlation between knowledge and practice, such as the positive relationship between the frequency of teeth brushing and knowledge of the bacteria causing halitosis. This result implies that individuals with a greater understanding of the microbial causes of halitosis were more likely to practice good oral hygiene. The gender of students demonstrated a statistically significant association with selected items, a larger proportion of male students than female students got the knowledge question on the main cause of halitosis right, demonstrating a statistically significant association between gender and selected items. There is a significant association between the gender and practice towered halitosis demonstrated by higher usage of dental floss and mouthwash from female than male. This difference may indicate variations in oral hygiene behaviors between genders, with females tending to adopt better oral care practices. It might also reflect greater health awareness among females regarding oral cleanliness. Similar studies conducted in Iraq reported a difference between the gender and oral hygiene behaviors. A study in Erbil found that the usage of mouthwash and dental floss higher in females than males ($p < 0.05$) (Kamel et al., 2021). Another research in Baghdad among medical students revealed that dental floss utilizing is higher in females compared to males (Mohammad et al., 2024). These findings support our results and demonstrating a better oral hygiene practices among females than males in Iraq.

This research has limitation and concerns. The likelihood of social approval bias is a major concern since it might alter the participants' responses. Furthermore, because the study was only conducted at a specific organization, the generalizability of the findings is limited. Furthermore, the

DOI: 10.32828/mdj.v22i1.1228

factors behind the participants' halitosis-related knowledge, attitudes, and behaviors were not investigated in the study. Future studies that examine participants' knowledge, attitudes, and practices (KAPs) surrounding halitosis should be given priority in order to fill in these gaps and offer a deeper understanding of the observed disparities.

Longitudinal studies with repeated measurements of parameter during different time of day, weeks and months, it would be more informative in establishing these relationships. The longitudinal study is more effective on result accuracy, further sample size and multicenter sample collections. The students may expose to anxiety and stress during study period, so that it may be effect on measurements.

Overall, the current study's respondents showed a positive attitude and good understanding in many areas, but in others, their attendance was unacceptable, indicating a major lack of perspective of halitosis.

Conclusion

Dental students of Mustansiriyah dentistry college exhibited a satisfactory knowledge and good attitude towards halitosis; however, their practical application was poor and less encouraging. The overall association between knowledge and practice was weak to moderate. The gender of students did not exert a consistent effect across the KAP domain. Consequently, there is a necessity for enhanced dental education regarding routine oral health practices to enable the dental students to serve as effective role models for the general population.

Conflict of interest

The authors reported that they have no conflicts of interest.

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