

HALITOSIS: CAN WE TREAT WHAT WE DO NOT UNDERSTAND?

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ABSTRACT

Halitosis is a malodor emerging from the oral cavity which leads to anxiety and psychosocial embarrassment. With proper diagnosis, identification of etiology and management, patients seeking assistance can be successfully treated. The aim of the present study was to evaluate the current knowledge of halitosis amongst registered dentists, house officers and dental hygienists working in Dow University of Health Sciences.

In this cross-sectional, descriptive study, 200 filled questionnaires were collected from registered dentists, house officers and dental hygienists and were evaluated. The questionnaire consisted of 17 questions. There were 8 questions for evaluating knowledge about etiology of halitosis, 3 questions for treatment, 2 questions on practices and 4 questions on attitude of dentists regarding halitosis. A criterion for assessing knowledge was set in which the individual who gave 5 or greater than 5 correct answers out of 8 were labeled as having awareness about halitosis. Descriptive analysis and Chi square was used for statistical analysis.

Only 49.2% of the dentists were aware of the subject of halitosis. There were no significant differences in the knowledge levels of the three categories, except for in two questions showing that the dentists had no advanced knowledge regarding halitosis when compared to the house officers and dental hygienists. However, all participants were eager to learn about this subject and to treat halitosis patients in the future.

Key Words: Halitosis, bad breath, oral malodor, oral health, microbiology.

INTRODUCTION

The term "halitosis" describes a "bad breath" and has a multi-factorial (both oral and non-oral) origin.¹ Approximately 85-90% of cases of halitosis are related to an oral cause, including tongue coatings (most common), deep carious lesions, oral infections, periodontal disease, pericoronitis, mucosal ulcerations, impacted

food, and poor oral hygiene.² Disorders related to non-oral causes include respiratory or gastrointestinal tract disturbances, metabolic disorders, systemic medications and carcinomas of the aerodigestive tract.³ The prevalence of halitosis has been evaluated to be in the range of 22% to more than 50%.⁴ An estimation of the most frequent reason for visiting a dentist was carried out in which halitosis was the third most common reason following dental caries and periodontal disease.⁵

Halitosis is broadly divided into two groups, genuine- and psychologically-based halitosis. Genuine halitosis is further divided into physiological and pathological halitosis. Physiological halitosis is related to a body's normal metabolic function and refers to those situations where malodor is attributed to a putrefaction process or reduced production of saliva during sleep or hunger.¹¹ Pathological halitosis has both intra-oral (80-90%) and extra-oral (5-10%) causes. A psychological factor is seen in about 5-25% of cases.¹²

The primary cause of halitosis is the microbial degradation of glucose, mucins and proteins (amino acids, cysteine, tryptophan and methionine) which

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are normally present in crevicular fluid, saliva, oral soft tissues and the food debris retained in the mouth. The action of the salivary enzyme beta galactosidase also plays a role in causing halitosis. The result of these activities produces volatile sulphur-containing compounds like hydrogen sulphide, methyl mercaptan and dimethyl sulphide.

Organisms associated with the production of these compounds include obligate anaerobes (especially the Gram-negative species) that are mainly found in tongue coatings and periodontal pockets. They reside within the tongue fibers or papillae and help in proteolytic degradation. Anaerobic bacteria can prosper in an environment which is lacking in oxygen, hence their role is very important in causing bad breath. These bacteria include *Aggregatibacter actinomycetemcomitans*, *Campylobacter rectus*, *Desulfovibrio* species, *Eikenella corrodens*, *Fusobacterium*, *Porphyromonas gingivalis*, *Prevotella* species, *Treponema denticola*, *Veillonella* species etc.⁶ With tongue scraping there is a drastic reduction in the volatile sulphur compounds and tongue coating scores. Therefore, the treatment modalities of halitosis include tongue cleaning along with oral hygiene instructions and mechanical scaling and root planning.⁷

Bad breath creates lack of self-confidence and anxiety in those affected which leads to the frequent use of chewing gums, mints and mouth rinses.⁸ Economically, halitosis is of significance since people spend over 2 billion dollars every year to buy products for masking their breath.⁹

Despite the pathological and psychological consequences of halitosis, dental health professionals usually lack proper training in this aspect and hence are unable to effectively guide their patients. This may in part be due to the lack of training received in dental schools regarding this topic.¹⁰ Therefore, the aim of the present study was to evaluate the knowledge and attitude of registered dentists, house officers and dental hygienists regarding an increasingly challenging issue – HALITOSIS.

METHODOLOGY

In this cross sectional, descriptive study a 17-item questionnaire was used to assess the knowledge of registered dentists, house officers and dental hygienists of Dow University of Health Sciences (DUHS) regarding the subject of halitosis. Since DUHS encompasses three campuses; Dr Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, Dow International Dental College and Dow Dental College, the present study was conducted in all campuses which cover different areas of Karachi.

The questionnaire was adopted and modified from the study done by Nunes¹³ and Oppliger.¹² The questionnaire was elaborated by the authors and contained

4 sections. The first section (Questions 1-8) were aimed at assessing knowledge about halitosis, focusing on its etiology, diagnosis and treatment. The other sections covered the attitude, practice and treatment aspects of halitosis. Finally, the participants were also asked to give information about the number of lecture hours given to them in their undergraduate classes on the subject of halitosis.

The present study was designed to assess whether the dentists are really being prepared for this important issue. All the registered dentists, dental hygienists and house officers were included in the present study. Those who refused to participate in the study and the undergraduate students were excluded. Sample size estimation was done using PASS v.¹¹ Chi-Square Test, a sample size of 180 achieves 80% power to detect an effect size (W) of 0.2462* using 3 degrees of freedom with a significance. *Calculated using Table 1: Association between the level of knowledge and gender 5.

A sample of 200 participants were used in the study. A two-stage cluster sampling was done in which 3 cluster samples were taken. Proportional allocation was done between groups and then compared. The study was explained and a verbal consent was obtained. Statistical analysis was done using SPSS version 16 and Descriptive Analysis and Chi square test along with goodness of fit test was performed and a p-value of less than or equal to 0.05 was considered significant. Results obtained were presented in frequency tables.

RESULTS

Socio-demographic characteristics of the 200 participants showed that 33% were male and 67% female out of which 49.2% were aware and 50.8% were unaware about halitosis. Statistical differences were seen in the questions about the most frequent non-oral cause of oral malodor in which the registered dentists had more accurate responses when compared to the house officers and dental hygienists and about awareness of the term pseudo-halitosis in which the dental hygienists had more accurate responses.

Regarding questions asked about their practices and total lecture hours given in their undergraduate level, 59.5% of participants reported that they get a one-hour lecture on halitosis in an academic year. In questions regarding their practice when they diagnose a patient with halitosis, 65.5% of the participants reported that they inform the patient about halitosis and treat it. Patients were not informed about halitosis until they seek treatment themselves in 24% of participant responses while another 4.5% do not inform their patients due to lack of knowledge on how to manage cases of halitosis.

Regarding treatment skills, 50% of the participants employ tongue scrapers as an integral part of treatment concept. The question pertaining to whether the par-

TABLE 1: KNOWLEDGE OF HALITOSIS

Questions	Number of inaccurate responses				
	Registered dentist	Dental hygienist	House officer	Total	P. value
What do you think are the causes of bad breath?	17(77.3%)	2(9.1%)	3(13.6%)	22	0.3
Which is the most frequently occurring cause of malodor?	25(18.0%)	3(30.0%)	11(21.6%)	39	0.59
Which non-oral cause is the most frequent?	98(70.5%)	9(90.0%)	45(88.2%)	152	0.023*
Volatile compound most frequently related to halitosis.	89(64.0%)	8(80.0)	37(72.5%)	134	0.3
Oral condition which favours the development of halitosis	109(78.4%)	6(60.0%)	42(82.4%)	157	0.2
Are you aware of the term “pseudo-halitosis”	75(54.3%)	3(30.0%)	19(37.3%)	97	0.05*
What is your opinion about “morning bad breath”	40(28.8%)	3(30.0%)	7(13.7%)	50	0.09
Which active compounds in a mouthwash would you recommend for halitosis?	54(38.8%)	3(30.0%)	20(39.2%)	77	0.85

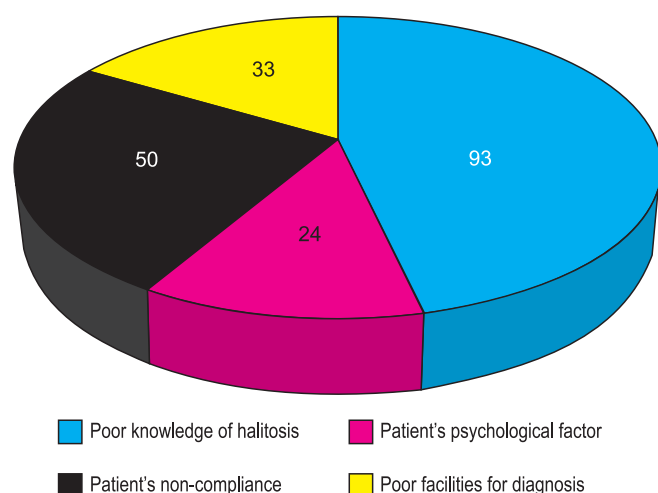


Fig 1: Reasons for unsuccessful treatment

Participants have come across the methods of quantifying malodor shows that 84.5% have never come across any measuring method of malodor. When inquired about the investigations performed for diagnosis of bad breath, 63% use history and clinical examination to detect and diagnose halitosis, while 26.5% use the sense of smell and only 10.5% use halimeter and organoleptic test. None of the participants used microscopy for the diagnosis of halitosis.

The participants' attitude towards future learning and treating halitosis patients was positive with 92% of the participants willing to learn about this subject and 73.5% willing to treat such patients in the future. The main reason for unsuccessful treatment of halitosis patients was due to lack of knowledge of the participants regarding halitosis (46.5%) and the insufficient training level in the colleges (49.5%). Poor facilities

for diagnosis and patient psychological factor were considered to be the reason by 16.5% and 12% of the participants respectively.

DISCUSSION

Halitosis is a state of self-conscious distress and has a great social impact. Millions of people are affected by it.⁵ Despite the large magnitude of this problem, participants in the present study showed poor knowledge regarding the etiology and treatment of halitosis with only 49.5% showing awareness.

According to Annemiek⁶, individuals who were healthy with no periodontal disease, the tongue was the major site for the production of volatile sulphur compounds. The gingival sulcus/periodontal pocket is a common cause for halitosis, a coated tongue is reported as the major site for production of bad breath.^{11,13} Approximately 56.5% of the participants considered gingival pockets and 24% considered the tongue as the most frequently occurring source of malodor. These findings are inconsistent with the previous study done by Nunes¹³ but are consistent with the study by Vasconcelos.¹⁴ Van Tornout¹¹ and Bornstein¹⁵ reported that bad breath in the younger generation is caused by tongue coatings while in the older generation it is caused by periodontitis.

The most frequent non-oral cause of halitosis was considered to be stomach disorder by 70% of the participants. Extraoral causes are primarily found in the otorhinolaryngeal area and are rarely of gastroenterological origin.¹⁶ Approximately 33% of participants of the present study were aware of the association of volatile compounds and halitosis while 21.5% knew that an alkaline pH and Gram negative bacteria favor the

development of halitosis. These results were consistent with the study by Nunes.¹³ Most of the participants (75%) were aware that halitosis occurs due to decreased flow of saliva. Sanz reported that after sleep bad breath is more evident in the morning time due to food stagnation and the process of putrefaction.¹⁷

The active compound in a mouthwash they would recommend to control halitosis as 61.5% gave appropriate responses. On the other hand, in the study conducted by Nunes, only 22% of the participants knew about the appropriate therapeutic agent to treat halitosis.¹³ Tongue scrapers were used as an integral part of treatment by 50% of the participants in the present study, which was lower than the study conducted by Oppliger.¹² However, similar results to the present study were obtained in France (52%).¹² In a study conducted by Cortelli, brushing the tongue dorsum with a tooth paste was found to be more beneficial than teeth brushing.²

Regarding investigations performed, the findings of the present study were with the study of Adewole.¹⁹ The results for limitation of successful treatment of halitosis were in contrast with the study done by Adewole, in which noncompliance of patients constituted 60%, poor diagnostic facilities 36.6%, patient psychological factor 33.3% and poor knowledge of halitosis 13.3%.¹⁹ The results for the number of lecture hours and training received during undergraduate studies are similar to the findings of Nunes.¹³

CONCLUSION

Although prevalent, the understanding of halitosis, diagnosis and treatment, amongst the participants was inadequate. However, they were keen to learn and treat such patients in the future. More emphasis is needed on this subject during the undergraduate studies to enable practitioners to effectively manage cases of halitosis.

REFERENCES

- 1 Vandekerckhove B, Van den Velde S, De Smit M, Dadamio J, Teughels W, Van Tournout M, Quirynen M. Clinical reliability of non-organoleptic oral malodour measurements. *J Clin Periodontol.* 2009 Nov; 36(11): 964-69.
- 2 Cortelli JR, Barbosa MDS, Westphal MA. Halitosis: A review of associated factors and therapeutic approach. *Braz Oral Res* 2008; 22(1): 44-54.
- 3 Dadamio J, Van Tournout M, Teughels W, Dekeyser C, Coucke W, Quirynen M. Efficacy of different mouthrinse formulations in reducing oral malodour: A randomized clinical trial. *J Clin Periodontol.* 2013 May; 40(5): 505-13.
- 4 Al-Ansari JM, Boodai H, Al-Sumait N, Al-Khabbaz AK, Al-Shammari KF, Salako N. Factors associated with self-reported halitosis in Kuwaiti patients. *J Dent* 2006 Aug; 34(7): 444-49.
- 5 Khalil I, Hassan K, Kheir E. Assessment of the knowledge of dentists about halitosis at two dental teaching hospitals in Khartoum City. *Int Arab J Dent.* 2015; Jun; 6(2): 77-86.
- 6 Annemiek MWT, Van den Broek, Feenstra L, de Baat C. A review of the current literature on aetiology and measurement methods of halitosis. *J Dent* 2007 Aug; 35(8): 627-35.
- 7 Tanwir F, Momin IA. Halitosis. *Pak Oral Dent J* 2011 Dec; 31(2): 304-08.
- 8 Sanz M, Bäumer A, Buduneli N, Dommisch H, Farina R, Kononen E, Linden G, Meyle J, Preshaw PM, Quirynen M, Roldan S, Sanchez N, Sculean A, Slot DE, Trombelli L, West N, Winkel E. Effect of professional mechanical plaque removal on secondary prevention of periodontitis and the complications of gingival and periodontal measures. *J Clin Periodontol.* 2015 Apr; 42(16): 214-20.
- 9 Azodo CC, Osazuwa-Peters N, Omili M. Psychological and social impacts of halitosis: A review. *J Soc Psychol Sci* 2010 Jan; 3(1): 74-92.
- 10 Maleki Z, Alavi K, Mohammadi SH. Knowledge of dentists about halitosis in Tehran. *Avicenna J Dent Res* 2009 Jan; 1(1): 29-36.
- 11 Van Tournout M, Dadamio J, Coucke W, Quirynen M. Tongue coating: related factors. *J Clin Periodontol.* 2013 Feb; 40(2): 180-85.
- 12 Oppliger N, Roth B, Filippi A. Knowledge of halitosis among dentists and dental hygienists. *Swiss Dent J* 2014; 124(2): 133-43.
- 13 Nunes JC, Sahuquillo AM, Cameira MJ, Marques HD. Halitosis: Are dentists being prepared for this challenge? A questionnaire survey in a dental school. *Revista Portuguesa de Estomatologia, Medicina Dentária e Cirurgia Maxilofacial* 2011 Jul-Sep; 52(3): 142-46.
- 14 Vasconcelos LCS, Veloso DJ, Cunha PA, Vasconcelos LC. *Rev Odonto Cienc* 2011; 26(3): 232-37.
- 15 Bornstein MM, Kislig K, Hoti BB, Seemann R, Lussi A. Prevalence of halitosis in the population of the city of Bern, Switzerland: a study comparing self-reported and clinical data. *Eur J Oral Sci* 2009 Jun; 117(9): 261-67.
- 16 Zurcher A, Fillipi. Findings, diagnoses and results of a halitosis clinic over a seven-year period. *Schweiz Monatsschr Zahnmed* 2012; 122(3): 205-10.
- 17 Sanz M, Roldan S, Herrera D. Fundamentals of breath malodour. *J Contemp Dent Pract* 2001 Nov 15; 2(4): 1-17.
- 18 Van den Broek AM, Feenstra L, de Baat C. A review of the current literature on management of halitosis. *Oral Dis.* 2008 Jan; 14(1): 30-39.
- 19 Adewole RA, Eweka OM, Agbelusi GA. A review of knowledge, diagnosis and treatment of halitosis among Nigerian dentists – a pilot study. *Oral Biol Dent.* 2014; 2: 6.

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