



A review of knowledge, diagnosis and treatment of halitosis among nigerian dentists- a pilot study

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Abstract

Background: Halitosis is an unpleasant or offensive odour emanating from the breath. The aim of this study is to determine the depth of knowledge of diagnosis and management of halitosis among Nigerian dentists.

Methods: A self administered questionnaire was designed and circulated among 80 dentists practicing in Nigeria. We assessed the knowledge of the diagnosis of halitosis, the success rate of treatment, limitations and comments on adverse effects of halitosis.

Results: The Nigerian dentists assessed were categorized into 3 groups namely A,B and C according to the number of years of clinical experience. Group A dentists are 38(47.5%) of the total, their perception of the aetiology of halitosis was poor oral hygiene in 10.1%, caries and periodontal diseases in 27%, psychogenic causes 29.7% and causes from systemic diseases 32.4%. 47(58.5%) dentists carried out various investigations in the diagnosis of halitosis. Majority agreed that psychological factors did play a role in the aetiology of halitosis.

Conclusion: The study reviewed the knowledge, diagnostic methods, perception of adverse effects of halitosis among Nigerian dentists and reasons for limitation of successful treatment.

Keywords: Halitosis, knowledge, diagnosis, treatment, nigerian dentists

Introduction

Halitosis is an unpleasant or offensive odour emanating from the breath. The condition is multi-factorial and may involve oral and non-oral conditions [1]. The offensive odour is caused by volatile organic compounds originating from the mouth or the expired air. They can be specific for certain diseases or infections [2]. In a study conducted by Van den Broek et al., [1], halitosis was caused by oral conditions which results from tongue coating, periodontal disease, peri-implant disease, deep carious lesions, exposed necrotic tooth pulps, pericoronitis, mucosal ulceration, imperfect dental restorations, unclean dentures and factors causing decreased salivary flow rate in approximately 80-90% of their cases.

The basic pathophysiology is microbial degradation of organic substrate giving off volatile gases. The factors that support the growth of these organisms and predispose to halitosis includes accumulation of food in periodontal pockets, dorsum of the tongue or in the tonsillar cripts, diminished salivary flow, mucus in throat and sinuses [3]. Furthermore,

other studies have demonstrated that metabolism of amino acids leads to metabolites such as indole, skatole, and volatile sulphur compounds—hydrogen sulphide, methylmercaptan and dimethyl sulphide which have been claimed to be the main aetiological agents of halitosis [3]. They also showed that perception of halitosis varies in culturally and racially diverse populations and this should be used to treat patients to improve quality of life and well-being of individuals [4].

It has also been shown that dorsum of the tongue posterior to circumvallate papillae consistently carry highest load of bacteria contributory to halitosis [5].

Other researchers considered halitosis as an extra-oesophageal cause of gastro-oesophageal reflux disease and they have also linked halitosis with *H. Pylori* [6-8]. These studies in addition, found that *H. Pylori* eradication with triple regime led to dramatic improvement of halitosis. In other studies, using polymerase chain reaction (PCR) *H. Pylori* was detected in saliva, subgingival and supragingival plaques of patients with periodontitis and levels of hydrogen sulphide and dimethyl

sulphide in mouth were significantly higher in H. Pylori positive patients than H. Pylori negative patients [9]. Furthermore, Lee et al., [10], showed that H. Pylori produce hydrogen sulphide and methyl mercaptan suggestive of organism as a contributor to development of halitosis. These findings suggest that communication of dentists and gastroenterologist is imperative for success of overall treatment of patients.

In addition, Nalcaci et al., [11] showed that age, prevalence of dental caries played a significant role in the aetiology of mal-odour. Non-oral causes of halitosis include disturbances of upper and lower respiratory tract, diseases of gastrointestinal tract, some systemic diseases, metabolic disorders, medications and carcinomas. Stressful conditions are predisposing factors to halitosis [1] it has been associated with weight loss [12].

It has been reported that self-reported halitosis (SRH) and perceived taste disturbance (PTD) are forms of loss of self esteem, social withdrawal, and depression [13]. In a survey of 254 healthy subjects, aged 55 years and above, the factors most strongly associated with SRH and PTD were subjective oral dryness, tongue coating, inadequate oral hygiene practice and partial or complete denture wear.

The management of halitosis is also complex and hardly satisfactory. In view of the recent research frontiers on the subject, the unsatisfactory management and non existence of studies on the subject in Nigeria, we therefore decided to conduct this pilot study among Nigerian Dentists with the hope that this will form the basis of a future comprehensive study on the subject.

The detection and measurement of halitosis have been attempted by several workers using different methods [14], the use of organoleptic test appears to be the 'the gold standard'. However, gas chromatography method is preferable if specific gases are required to be measured such as hydrogen sulphide [1]. By using modern instrumental analysis, they focused on analysis of breath volatiles as biomarkers of internal diseases [14]. Here, they seldom considered the subject's oral health status. They therefore identified idiopathic mal-odour production from either oral cavity or body. They found patients with chronic halitosis and differentiated them from those with genetic, odour-producing metabolic disorder trimethylaminuria (TMAU). In their population sample, TMAU was the largest cause of undiagnosed body odour present with halitosis and dysgeusia [14]. Halitosis therefore, is a subject that has a complex inter-play of factors in terms of aetiology and diagnosis. The standard methods of diagnosis of halitosis include, halimeter which measures volatile sulphur compounds, and gas chromatography which measures volume of volatile compounds [15], While both methods were found to relate well, a newer organoleptic test (without the disadvantage of lack of objectivity and reproducibility) showed a significant positive correlation between the new method and concentration of hydrogen sulphide [16].

The scientific and practical value of additional measurement methods, such as BANA test, chemical sensors, salivary incu-

bation test, quantifying beta-galactosidase activity, ammonia monitoring, ninhydrin method, polymerase chain reaction, has to be established [17].

Aim and objectives

The aim of this study is to determine the depth of knowledge, diagnosis and management of halitosis among Nigerian dentists.

Materials and methods

The Nigerian Dental Association conducts Continuing Dental Education Programme (CDEP) twice yearly as a means of Continuing Professional Development (CPD) during which interesting topics and issues are discussed by specialists/consultants in different fields of Dentistry. One of such updates was on Halitosis.

As a pre-test for assessing the knowledge of dentists, an open-answered questionnaire was designed and circulated among 80 dentists practicing in Nigeria who attended the CDEP. The data collected included their age, sex, years of working experience, what were their opinions about halitosis, possible aetiology, previous encounter with patients with halitosis, how often such patients were seen, what investigations are available in their centers/practice. Furthermore, how they arrived at the diagnosis of halitosis, treatment and the success rate of treatment, limitations and comments on adverse effects of halitosis were requested. Finally, their sources of information on the subject 'halitosis' were requested.

Thereafter, an update on halitosis was undertaken in line with research frontiers.

Results

A total of 80 Nigerian dentists were enrolled into the study. They were categorized into 3 groups namely A,B,C according to the number of years of clinical experience. Group A represents the dentists with less than 10 years of clinical practice, Group B are those with 11-20 years of clinical experience, and C are those with 21-30 years experience. 41 males and 39 females dentists giving a M:F ratio of almost 1:1, with age range from 21 to 57 years, mean age was 28 years.

Group A dentists were 38(47.5%) of the total number of dentists, their enumeration of possible causes included poor oral hygiene (10.1%), caries and periodontal diseases in 27%, while 29.7% thought psychogenic causes may be responsible, however 32.4% said systemic diseases such as diabetic mellitus, respiratory disease may be responsible.

In category B 31(38.8%), 41.9% agrees that perception of halitosis was due to psychological causes, they also agreed that the poor oral hygiene, caries and periodontal diseases could be responsible for halitosis in patients. While 58% included systemic causes such as diabetes mellitus, cancer, uremia, gastro-intestinal disease as causes of halitosis. The most experienced dentists category C were 12 dentists (13.7%) of total number. 41.6% of which agrees that defective dental

restorations and systemic diseases (58.3%) are additional causes of halitosis. The responses in the 3 categories were mostly from dentists working in the teaching hospitals which constituted over 77% of the total respondents (**Table 1**).

From the 80 respondents, only 47 (58.8%) employed routine investigations in the diagnosis of halitosis. These included history taking and clinical examination (15%), dentists sense of smell only (15%), 16.2% employed the use of halimeter, while microscopy, culture and sensitivity was used in 3.8%, the least used methods for diagnosis were blood tests and endoscopy which constituted 2.5% each. Additionally, only 3 dentists in group C employed psychological assessment as an adjunct for diagnosis. All these are dentists in the teaching hospitals, the private and state hospital dentists rely solely on their sense of smell for the diagnosis of halitosis (**Table 2**).

Table 1. Distribution of dentists according to Categories A, B, C and place of practice.

	Group A (1-10 years) n=38	Group B (11-20 years) n=31	Group C (21-30 years) n=11
Teaching hospital	32	25	5
State hospital	3	5	4
Armed forces	1	--	2
Private practice	2	1	--

n=number of dentists(respondents)

Table 2. Investigations used for diagnosis of Halitosis.

Investigations done	Number of dentists	Percentage (%)
History & clinical exam	12	25.5
Halimeter & organoleptics tests	13	27.7
Radiology	3	6.4
Sense of smell only	12	25.4
Microscopy, culture & sensitivity (MCS)	3	6.4
Blood test	2	4.3
Endoscopy	2	4.3
Total	47	100

The acceptance of halitosis as adverse effects of psycho-logical disturbance in patients by dentists in category A was positive in 27 (71%) out of 38, while in categories B and C Dentists, 90.3% and 100% respectively held on to this view Thus the older dentists, held more tenaciously to psychological factors as a major aetiology of halitosis. Among all respondents 57.5% agrees that loss of self esteem is a major adverse effect of halitosis, while 46.3% agrees with psychological disturbance, 18.4% agrees that social withdrawal and depression are consequences of halitosis (**Table 3**).

There are various reasons adduced by dentists for limitation of successful treatment of halitosis. In category A dentists, non-compliance of patients with instructions constituted 60%, while 36.6% agreed that poor diagnostic facilities in the hospitals was responsible, others included patient's psychological factors (33.3%), poor knowledge of halitosis by dentists (13.3%), financial constraints (6.6%) and systemic diseases (3.3%). In category B and C dentists, the reasons follow the same pattern (**Table 4**).

The frequency at which dentists from different practices see patients with halitosis is shown in **Table 5**. Dentists from the teaching hospitals saw more patients with halitosis (N=36), than those in the state hospitals (N=4), halitosis patients were rarely seen in the Armed forces hospital and private clinics (**Table 5**).

Table 3. List of adverse effects of halitosis (Perception of different groups of dentists).

Adverse Effects	Group A N=38	Group B N=31	Group C N=11
Loss of self esteem	17(44.7%)	21(67.7%)	8(72.7%)
Psychological disturbance	11(28.9%)	18(58.0%)	8(72.7%)
Social withdrawal	7(18.4%)	15(48.4%)	7(63.6%)
Depression	7(18.4%)	14(45.1%)	7(63.6%)

Table 4. Dentists' reasons for limitation of successful treatment of halitosis.

No of dentists that responded	Group A (n=38) 30	Group B (n=31) 21	Group C (n=11) 8
Poor knowledge of halitosis	4(13.3%)	2(9.5%)	1(12.5%)
Patient's psychological factors	10(33.3%)	6(28.6%)	1(12.5%)
Patient's Non- compliance	18(60%)	7(33.3%)	3(37.5%)
Poor facilities for diagnosis	11(36.6%)	5(23.8%)	1(12.5%)
Financial constraints	2(6.6%)	1(4.7%)	0(0%)
Systemic causes	1(3.3%)	0(0%)	1(12.5%)

Table 5. Dentists' reasons for limitation of successful treatment of halitosis.

	Teaching Hospitals (N=62)	State Hospitals (N=12)	Armed Forces hospitals (N=3)	Private clinics (N=3)
Once/a while	(24)38.7%	(2)16.6%	--	--
Weekly	(4)6.4%	--	--	--
Monthly	(4)6.4%	(1)8.3%	--	(2)66.6%
Rarely	(3)4.8%	--	(1)33.3%	--
None	(1)1.6%	(1)8.3%	--	--

Discussion

The majority of our dentists in all categories believed that halitosis is caused by intra-oral diseases such as caries, periodontal diseases, poor oral hygiene. This is in agreement with previous studies that showed that over 90% causes of halitosis originate from oral cavity and are attributed to volatile sulphur compounds (VSC) produced by oro-pharyngeal bacteria [1,18].

Most of our dentists in group A, B, C were from the teaching hospitals, state hospitals and private practices. They used majorly history taking and clinical examination and de sense of smell for diagnosis of the condition. In contrast to this, a Japanese study recently assessed mal-odour intensity using an electronic nose and compared it with the results of actual organoleptic tests and the results did not differ significantly from each other [19]. They concluded that mal-odour intensity expressed as an absolute value using electronic nose is suitable method of mal-odour evaluation. The provision of such electronic device may not be a priority for a developing country like Nigeria in the presence of other competing health equipment needs.

In our study, loss of self esteem followed by psychological disturbance were perceived as adverse effects of halitosis in their patients. A similar study showed that pseudo-halitosis and halitophobia were linked to psychological disturbances. These patients complained of halitosis which did not exit [20]. However, bad breath has been described as a serious social handicap [21]. In order to avoid mismanagement and exacerbation of their condition, it has been advocated that such patients should be referred to the psychologist or psychiatrist for management [22]. Although it has been observed that such patients do not visit the psychologist, because they cannot recognize their own psychosomatic condition [23]. By using a classification system to identify patients with halitophobia, and questionnaire to assess psychological condition, a protocol of referring patients to psychiatrists has been suggested [23].

In contrast to this study, a Swiss study involving Army recruits aged 18-25 years, no correlation between SRH and organoleptic measurement could be detected [24]. Thus age of patients seems to be an important factor in SRH.

The reasons claimed for limitation of successful treatment of halitosis by our dentists included patients' non-compliance with oral health instructions, patients' psychological factors (halitophobia, depression, anxiety) which requires a collaboration between dentists and psychiatrists as noted above and poor knowledge of update on halitosis. Patients' non-compliance with instructions and appointment is a general problem in developing countries including Nigeria and will probably depend on educational and socio-economic status and levels of dental awareness of the patients having halitosis with underlying systemic diseases must be treated for the primary ailment, for example, diabetes, chronic renal disease. In a recent Brazilian study 55% of chronic renal disease patients had halitosis [25].

Most patients with halitosis were reportedly seen by dentists practicing in teaching Hospitals in the study, fewer were seen in State, Armed Forces, and private hospitals. This is probably due to the fact that halitosis patients were more frequently referred for specialist attention to the Teaching Hospitals for diagnosis and management.

Conclusion

We have reviewed the knowledge, diagnostic methods, perception of adverse effects of halitosis among Nigerian dentists and reasons for limitation of successful treatment. A comprehensive update on aetiologic, diagnostic tools, and the latest knowledge based on current research frontiers on halitosis have been discussed. Poor diagnostic facilities and patients financial constraints all border on the failing economy and low availability of funds for the health sector, as standard organoleptic and gas chromatography equipments are not bogus and too expensive. In Korea National University Dental Hospital, a gastight syringe for organoleptic score and a portable sulphide monitor for gas chromatography has been improvised and used in clinical fields and gave reproducible and reliable results [17]. Furthermore, there is a need for constant education and training of dentists in knowledge of aetiology, diagnosis and treatment of halitosis which is increasingly being seen among the patients. Management of halitosis is an interdisciplinary effort among dental specialists, psychologists/psychiatrists and medical practitioners, a collaborative approach should be encouraged to afford the patients a high success rate [26].

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	RAA	OME	GAA
Research concept and design	✓	✓	✓
Collection and/or assembly of data	✓	✓	✓
Data analysis and interpretation	✓	✓	✓
Writing the article	✓	✓	✓
Critical revision of the article	✓	✓	✓
Final approval of article	✓	✓	✓

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