

Halitosis: a review of basic principles

Naila Aparecida de Godoi Machado¹; Paulinne Junqueira Silva Andresen Strini²; Mario Olavo Pena Carneiro¹; Roberto Bernardino Júnior³; Alfredo Júlio Fernandes Neto³

¹ DDS Graduate student, Dental School, Federal University of Uberlândia, Brazil

² DDS Master's degree student, Dental School, Federal University of Uberlândia, Brazil

³ DDS, MSc, PhD Professor, Dental School, Federal University of Uberlândia, Brazil

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Abstract

Halitosis, also known as bad breath or oral malodor, is the general term used to describe any disagreeable odor in expired air, regardless of whether the odorous substances originate from oral or non-oral sources. Bad breath can be detrimental to one's self-image and confidence, causing social, emotional and psychological anxiety. This paper provides a comprehensive review of the historical background, prevalence, social aspects and pathological causes of halitosis as well as the dental professional's responsibility.

Key Words

halitosis, bad breath, oral malodor.

Introduction

Halitosis is the general term used to describe any disagreeable odor in expired air, regardless of whether the odorous substances originate from oral or non-oral sources. Other names used are *fetor ex ore*, fetor oris, bad or foul breath, breath malodor and oral malodor. The latter term is reserved for halitosis from the mouth¹. Although halitosis is one the most common medical conditions, relatively little is known about this embarrassing and sometimes debilitating problem². This paper provides a comprehensive review of the historical background, prevalence, social aspects and pathological causes of halitosis as well as the dental professional's responsibility.

Historical background

The importance of oral malodor goes beyond the knowledge of its cause, diagnosis and therapy because this condition interacts with other sociological issues such as culture, religion, race, gender and social taboos. Innumerable ancient folk remedies are still in use. In the Bible, the book of Genesis mentions ladanum (mastic), a resin derived from the *Pistacia lentiscus* tree, which had been used in Mediterranean countries for breath freshening for thousands of years³. Chewing of natural products for breath freshening has long been practised worldwide, such

as cloves (Iraq), parsley (Italy), anise seeds (Far East), cinnamon (Brazil), and guava peels (Thailand)¹. Mouthwashes containing flavored elements like menthol, eucalyptol and methyl salicylate are also widely used⁴.

Knowledge and written reference to this condition date back to ancient cultures. References were found in papyrus manuscripts dating back to 1550 BC. The Hebraic liturgics (the Talmud), dating back more than two thousand years ago, clearly state that the terms of a marriage license (the Ketuba) may be legally broken in case of malodor of one of the partners⁵.

Prevalence and Social Aspects

Halitosis affects a large proportion of the population and may cause significant social or psychological impairment to those suffering from this condition⁶. Information regarding its prevalence is scarce. It is very difficult to determine the exact number or percentage of people who have bad oral breath because there is a lack of epidemiological studies addressing this issue⁷.

Malodor is a condition that has health and social implications rendering it an area of oral science that spans medical and psychological issues. Current social guidelines emphasize the importance of personal image and interpersonal relationships. In this context, halitosis may be an important factor in social communication and hence the origin of concern due not only to a possible health condition, but also to psychological alterations leading to social and personal isolation⁸.

Pathological Causes of Halitosis

The production of halitosis is multi-factorial and may involve both oral and non-oral sources. Non-oral sources

Correspondence to:

Alfredo Júlio Fernandes Neto
Av. Pará, 1720, Campus Umuarama, Bl 2B, Sala 2B01,
CEP: 38400-902 - Uberlândia, MG, Brazil
Phone: + 55-34-3218-2222
E-mail: alfredon@ufu.br

are generally related to systemic problems and/or medications. Several extraoral diseases, including bronchial and lung infections, kidney failure, different types of carcinomas, metabolic dysfunctions and biochemical disorders, can cause halitosis. However, taken together, all these diseases affect only a very small percentage of people experiencing oral malodor⁹. Some medications, especially those that reduce salivary flow such as antidepressants, antipsychotics, narcotics, decongestants, antihistamines, and antihypertensives¹⁰, may also be the source of this condition. Certain foods, tobacco, alcohol and some prescription or over-the-counter drugs may cause halitosis¹¹.

An estimated 90% of halitosis cases originate within the oral cavity⁴. In most of these cases, halitosis occur primarily as a result of oral microbial metabolism, in which volatile sulfur compounds (VSC) and other volatile components are produced through deglycosylation, proteolysis and putrefaction of glycoproteins and proteins¹². Concentration of VSC can be measured using a portable sulphide monitor¹³. Halitosis of oral origin is associated with poor oral hygiene, dental plaque, dental caries, gingivitis, stomatitis, periodontitis, tongue coating and oral carcinoma. Dry mouth (xerostomy) might also be the cause, although a correlation is not always observed¹⁴.

In addition, to the most common intraoral sites of bad breath production (tongue, interdental and subgingival areas), other foci may include faulty restorations (e.g.: as overhanging restorations and leaking crowns), sites of food impaction and abscesses. Carious cavities are usually not necessarily malodorous, unless large enough to entrap food. Dentures, particularly those are worn overnight, are another common cause of halitosis. Dentures usually have a somewhat sweet but unpleasant and characteristic odor that is readily identifiable, especially if the dentures are placed in a plastic container and smelled following several minutes^{3,9}.

In people with rigorous oral hygiene, clean and sound dentition and a healthy periodontium, the source of bad breath is likely to be the back of the tongue. Although the anterior part of the tongue usually smells (a simple test is to lick one's wrist, left dry for a few seconds and then smell the area), the main source of odor is usually farther back in the posterior region. Some studies have shown that simply brushing the tongue reduced bad breath measurements by 70%^{11,15}. The posterior area of the dorsal surface can be readily assessed by a gentle but thorough scraping using a disposable plastic spoon. Afterwards, the spoon can be smelled to compare with the overall mouth odor.

The diagnosis of halitosis is established based on a detailed clinical interview that reviews the history of the disease, previous dental/medical treatment, severity and the impact of the disease on the patient's everyday life, systemic changes and emotional issues and dietary habits. Clinical examination should evaluate the patient's oral hygiene, presence of caries, periodontal status and plaque retention sites. The presence of dental caries, alveolar bone defects

and defective restorations should be assessed radiographically. Special tests are performed to detect the foul-smelling VSCs with the associated bacteria. Different diagnostic techniques are currently available, including organoleptic measurement, halimeter examination and gas chromatography, which are described below^{7,16}.

Organoleptic measurement is based on the subjective sensation of the examiner to the mouth odor. It is recorded on a point scale according to the examiner's perception of the intensity of halitosis from the air expelled through a straw at a specific distance. The examination is simple to conduct and does not require any specific equipment. In some cases, organoleptic measurement accurately reflects the severity and intensity of halitosis, but it is considered a subjective technique because the smelling capacity of the evaluator may oscillate. A potential risk of the organoleptic measurement is the transmission of diseases via expelled air⁷. The halimeter is a portable instrument that measures the VSC concentration in the oral cavity. It is sensitive to volatile compounds and has to be calibrated to the background air prior to making a reading. The patient is instructed not to drink, smoke, eat, chew gum, suck confectionary, use mouthwash or breath fresheners, or perform oral hygiene for at least 4 hours before being tested. Also, the use cosmetic products like perfumes, after-shave and scented lipstick should be avoided. Just before the measurement, the patient is instructed to keep the mouth closed for 3 minutes. A straw connected to the halimeter is gently placed over the dorsum of the tongue without touching and the patient is asked to keep the mouth wide open. A measurement is taken once a peak reading has been reached. There may be false-positive results due to other volatile vapours, such as acetone, ethanol, and methanol, which do not contribute to oral halitosis⁷. Gas chromatography is a method that uses a specific sulfur detector to identify the source of intraoral and extraoral halitosis. However, this method requires expensive equipment and trained personnel. A newly developed portable gas chromatograph (OralChroma™; Abilit Corporation, Japan) has been developed for measuring VSCs in the same way as standard gas chromatographs. This device can become the choice for diagnosis of oral breath and can perfectly differentiate between intraoral and extraoral blood-borne halitosis. The equipment is very sensitive and presents advantages in relation to the halimeter, which that detects only intraoral halitosis. Its hardware, though, needs revision¹⁶. Halitosis can also be assessed by the analysis of saliva viscosity, color and amount of secretion. In some cases, laboratory tests may be necessary to investigate possible systemic causes and microbiological tests can also be performed in outbreaks of disease⁷.

The Dental Professional's Responsibility

Dental practitioners have traditionally neglected halitosis, in spite of its high priority for the public. However, interest in halitosis has recently increased. Dentists are increasingly

being called on to help patients with complaints of bad breath and should consider psychological and physiological factors in diagnosing and treating such cases¹⁷.

Patients who do not visit a dentist regularly are at high risk of having halitosis from dental plaque, dental caries or periodontitis. It is important to ascertain whether it is subjective or objective halitosis. Most cases are objective, but subjective halitosis may occur due to use of medications, such as lithium, zinc deficiency or in association with some psychoses¹⁸.

The general dentist is frequently the first health professional to examine and treat patients with halitosis of extraoral etiology, and is their responsibility to refer these patients to an otorhinolaryngologist in order to rule out the presence of chronic tonsillitis or chronic sinusitis. If the otorhinolaryngologist does not detect alterations in the examined regions, the patient should be referred to other medical specialists to explore other organs and systems: the digestive system, to rule out gastric pathology, obstructions or inflammatory gastrointestinal processes; the liver, to rule out hepatic insufficiency or cirrhosis; the endocrine system, to exclude diabetes or trimethylaminuria; the airways, to rule out bronchiectasis or pulmonary abscesses; and the kidney, to exclude renal failure. Finally, if no systemic pathology is detected, the possibility of halitosis of psychiatric etiology should be considered and requires evaluation of the patient's psychological profile by a specialist¹⁹.

One of the most intriguing issues regarding halitosis is the apparent incapacity to determine whether someone has this condition and to what extent. Several people have bad breath for years without being at all aware of it. Others overestimate their own oral malodor and are more prone to developing an obsessive behavior, avoiding social interactions². People who complain about having halitosis may harbor a self-perception that does not reflect objective findings. To deal with these patients, clinicians should investigate not only the physiological causes of malodor and associated parameters, but also the nature of the subjective complaint. In addition, because of the multifactorial complexity of the problem, patients with halitosis should be treated individually, rather than categorized. Instead of informing a patient that he/she does not have halitosis, clinicians can suggest that there might be an odor, but that it is barely detectable and is not evident at the time of consultation. The dentist can then recommend appropriate oral hygiene measures, again providing the patient with a sense of increased control over the problem¹⁷.

In such cases, a condition that causes malodor can be originated from dry mouth (xerostomy) and associated with uncomfortable symptoms of altered taste, mucosal roughness and burning tongue, characterizing a sort of pseudo-halitosis. Recognizing this condition is of importance in patient care because treatment of pseudo-halitosis as genuine halitosis, i.e., with oral products like alcohol-containing mouthwashes, can aggravate the case. Xerostomia can be caused by a number

of factors, including some medications and stress, which lead to salivary gland secretion and effects on the production of volatile sulfur compounds and malodor²⁰.

Unfortunately, most halitophobic patients, those with imaginary halitosis, refuse to acknowledge that they may have a psychological problem, which prevents them from receiving adequate psychological treatment and prolongs their suffering and social isolation. Additional guidance from mental health professionals will help dentists providing support to these patients¹⁸.

It is important that dental professionals have in mind the treatment protocol and/or products to be prescribed for patients with halitosis should be based on an individualized evaluation rather than in remedies and standardized regimens available for sale to patients. Dentists can play a major role in helping these patients by eliminating caries and periodontal diseases, with an approach based on counseling and clinical procedures that include⁴: 1. oral hygiene instructions to reinforce toothbrushing, flossing and denture hygiene; 2. scaling and root planing on regions of periodontal pockets, and tongue cleaning; 3. chemical control of biofilm with mouthwashes; 4. dietary advice to reinforce mouth cleaning after eating or drinking dairy products, fish, meat, garlic, onion, coffee, and after smoking. Asking an experienced health professional is always the best way to confirm a breath odor problem. This, however, can be awkward and embarrassing for both the patient and the dentist, who has historically been hesitant to broach the subject. Since the dental office is the most indicated place to investigate and treat halitosis, it is important that dentists develop their communication skills and knowledge in order to respond to patients that seek information and treatment for halitosis. Because certain medical conditions or medications can be the source of this problem, making a comprehensive review of medical/dental history, including questions about breath complaints, can lay the groundwork for open dialogue about breath problems. When patients initiate a dialogue about their breath concerns, dental professionals should be comfortable with explaining the etiology of and treatments for oral malodor¹⁰.

Health-care professionals should be aware that the patient seeks not only treatment for his/her condition, but also support and understanding. It is the patient's right to be offered all currently available treatment options and be given full information to understand his/her condition and make a decision in his/her best interest.

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