

An Insight into Halitosis

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ABSTRACT

Halitosis has a large economic and social impact on life of an individual. For the majority of patients having bad breath, affects their social communication and life and also causes embarrassment. Now a day's diagnosis of halitosis is permitted by modern analytical and microbiological techniques. Management of oral malodor is directed at reducing and managing the bacterial load from oral cavity by including proper oral hygiene measures, possibly the adjunctive use of antiplaque agents and control of tongue flora by brushing or scraping. This article provides a review on problem of the era i.e. oral malodour.

KEYWORDS: Diagnosis, Halitosis, Mouthrinse

INTRODUCTION

Halitosis, oral malodor, *fetor oris*, or bad breath are the general terms used for an unpleasant breath emitted from a one's mouth regardless of whether the odorous substances in the breath originate from oral or non-oral sources.¹ Non-oral sources of the odor are generally due to some systemic problems or medications. Conditions such as diabetes, liver and kidney disorders, and pulmonary disease may contribute to offensive breath odor. This is also due to some medications, which reduce salivary flow such as antidepressants, decongestants, narcotics, antipsychotics, antihistamines, and antihypertensives.²

Word halitosis is a Latin word which is derived from halitus means breathed air, and the osis means pathologic alteration and it is used to describe any unpleasant or disagreeable bad odor emanating from the mouth breath.³ Almost 50 percent of the population suffers from halitosis, and among these 50 percent individuals around 25 percent experience such a severe problem which affects their social functioning. For example, individuals may avoid social contacts and intimate relationships and may feel nervous and embarrassed in the presence of other people. Thus, Locker refers halitosis as impairment that can lead to a decrease in the quality of life.⁴ Various commercial products merely cosmetic such as chewing gum, drops, pastilles, films and mouth rinses only mask the odour temporarily.⁵

Definition: Halitosis is often defined as breath that is offensive to others, caused by a variety of reasons including but not limited to bacterial coating of tongue, periodontal disease, systemic disorders and different types of food.³

Aetiology: Oral malodor is generally produced due to the presence of odoriferous volatile compounds in exhaled air. These are mainly volatile sulfur compounds (VSCs),

especially methyl mercaptan (CH₃SH) and hydrogen sulphide (H₂S), but also short-chain fatty acids, such as butyric, valeric acids, propionic, and polyamines, such as putrescine and cadaverine. These complex compounds are produced by the proteolytic degradation of sulfur-containing peptides and amino acids by oral bacteria in saliva, gingival crevicular fluid, desquamated epithelial cells and blood.

It appears from in vitro research that odor formation is caused by the gram-negative anaerobic microflora. *Treponema denticola*, *Bacteroides forsythus*, *Prevotella intermedia*, *Eubacterium*, *Porphyromonas gingivalis*, *Fusobacterium nucleatum*, and other subgingival species produce large amounts of CH₃SH and H₂S from cysteine, methione, or serum proteins. The dorsal surface of the tongue harbours some of the potentially malodorous bacterial species.⁶

Pathologic oral malodour may be reported due to some non-oral causes, like diabetic ketosis and acidosis, hepatic and renal failure, uremia and regurgitations, and certain types of cancer, such as leukemia. Bad breath, from the nasal passages, produces the telltale odour which may be smelt most strongly from the nose, rather than the mouth. In few cases, craniofacial anomalies, like cleft palate, may be involved. A typical nasal malodor usually has a slightly cheesy odour which differentiates it appreciably from other types of bad breath. Extraoral halitosis can be a manifestation of a systemic disease, such as hepatic cirrhosis, hiatus hernia, or diabetes mellitus. An elevation in VSC has been reported in premenopausal women, around menstruation and during mid-cycle. Bacteria feed on this blood creating odorous volatile sulfur particles. Alcohol and tobacco consumption are other Social habits and behaviors which could increase the risk of suffering from halitosis.⁷

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CLASSIFICATION

I. Based on etiology, (Dominic *et al* 1982):

- Local factors of pathological origin
- Systemic factors of pathological origin
- Local factors of non-pathological origin
- Systemic factors of non-pathological origin.⁸

II. Based on causes (Bogdasarian 1986):

- Normal breath and physiologic mouth odour
- Odours from oral conditions
- Odours from Pharynx, Nasopharynx, and Lungs
- Odours excreted via the Lungs.⁹

III. Glickman 1894:

- Local Causes
 - Pathologic, Non Pathologic
- Systemic Causes
 - Pathologic, Non Pathologic¹⁰

Besides the above classification, Halitosis is also classified as under:

IV. Classification of halitosis with corresponding treatment needs¹¹ (Miyazaki *et al*):

Classification	Treatment Need	Description
I. Genuine halitosis: An obvious malodour, with intensity beyond socially acceptable level, is reported.		
I.A. Physiologic halitosis	TN-1:	1) Malodour arises due to putrefactive process within the oral cavity. Neither specific disease, nor pathologic condition is found. Origin is mainly from the dorso-posterior region of the tongue. 2) Temporary halitosis due to dietary factors like garlic should be excluded.
I.B. Pathologic halitosis (i) Oral	TN-1 and TN-2:	1) Halitosis caused by disease, malfunction of oral tissues, or pathologic condition. 2) Halitosis due to coating of tongue, modified by pathologic condition for e.g., xerostomia, periodontal disease is included in this type.
(ii) Extraoral	TN-1 and TN-3:	1. Malodour from pernasal, nasal, or laryngeal regions. 2. Malodour arising from upper digestive tract or pulmonary tract. 3. Malodour arising from other body disorders, whereby, the odour may be blood borne and emitted via the lungs (e.g., hepatic cirrhosis, diabetes, uremia, internal bleeding).
II. Pseudo-halitosis	TN-1 and TN-4:	1. Others do not perceive obvious malodour but patient complains of its existence. 2. Condition is improved by counseling and simple oral hygiene measures. Counseling can be done by using explanation of examination results, literature support, and patient education.
III. Halitophobia	TN-1 and TN-5	1. The patient persists in believing that he/she has halitosis even after treatment of pseudo-halitosis, or genuine halitosis. 2. Neither physical nor social evidence exists to prove that halitosis is present. ^{3,11}

Category	Description
TN-1	• Explanation of halitosis and instructions for oral hygiene
TN-2	• Oral prophylaxis, professional cleaning and treatment for oral diseases like periodontal diseases.
TN-3	• Patient must be referred to physician or medical specialist.
TN-4	• Explanation of examination data, education, further professional • Instruction and reassurance.
TN-5	• Referral to a psychiatrist, clinical psychologist, or other psychological specialist. ¹¹

MECHANISM OF HALITOSIS

Normal saliva has a Ph of 6.5, and this acidic range suppresses the growth and proliferation of gram -negative and anaerobic bacteria. Alkaline state favors the growth of gram-negative bacteria and allows activation of enzyme required for putrefaction of amino acids whose end products are sulphur containing compounds. Other compounds in the saliva causing halitosis are histamine, putrescine, cadaverine, indole, and skatole.¹²

DIAGNOSIS

Organoleptic Measurement: Organoleptic measurement can be simply carried out by sniffing the patient's breath and scoring the level of odour. A translucent tube which is 10 cm length, 2.5 cm diameter is inserted in the patient's mouth and the person is asked to exhale slowly, the breath, undiluted by room air, is then evaluated and assigned an organoleptic score.^{12,13} However, a privacy screen is often used to separate the examiner and the patient, to prevent the patient from seeing the examiner sniffing from the tube. The tube is inserted through a privacy screen. Using a privacy screen allows the patient to believe that they have undergone a specific malodour examination.

For reliable diagnosis, the oral malodour assessment should preferably be carried out on two or three different days, if possible. This is especially important when either pseudo-halitosis or halitophobia is suspected.¹³

ORGANOLEPTIC SCORING SCALE	
Category	Description
0: Absence of odour	Odour not detected
1: Questionable odour	Odour detected, but not recognized as malodour by the examiner
2: Slight malodour	Odour exceeds the threshold of malodour recognition
3: Moderate malodour	Malodour definitely detected
4: Strong malodour	Strong malodour detected, but it can be tolerated by examiner
5: Severe malodour	Overwhelming malodour detected which cannot be tolerated by examiner (instinctively examiner averts the nose) ¹⁰

VSC monitoring: The commonly detected malodorants in halitosis are VSC, which include methyl mercaptans and hydrogen sulfide, among others. VSC monitors have been developed, such as the **Halimeter** (Interscan, Chatsworth, USA) which can be used chairside and provides an idea of the breath situation to both the professional and the patient.¹⁴

Values:

- Less than 100 is normal,
- 100 to 180 is minor halitosis &
- Greater than 250 is chronic halitosis.¹⁵

These VSC assessments, as well as other breath diagnostic tools, are subjected to huge variation, especially between different hours of the day. These are strongly affected by confounders also. They may give a false positive result due to the presence of other volatile vapours, such as ethanol, acetone, and methanol which never contribute to halitosis.^{14, 15}

Three species with periodontal disease, *Treponema denticola*, *Porphyromonas gingivalis* and *Tannerella forsythia*, produce both VSC and volatile fatty acids. These organisms can be detected by the presence of an enzyme that degrades a synthetic trypsin substrate i.e. benzoyl-DL argininaphthylamide (BANA), forming a colored compound.¹⁶ Kozlovsky et al. concluded “**BANA test** is a simple, adjunct assay together with volatile sulphide determination in order to provide additional quantitative data which contribute to the overall association with odor-judge estimation.” The BANA test provides additional information on compounds that contribute to halitosis other than the VSC.¹⁷

Gas chromatography (GC) is preferred if precise measurements of specific gases is required and is considered by many to be the method of choice for quantifying and differentiating the VSC and this can also distinguish other classes of compound like indole.¹⁸

Traditional laboratory GC or GC-MS machines are clinically impractical because they need inert column carrier gas (gas cylinders of nitrogen or helium) and require specialists or technicians with adequate training.

A newly developed portable GC (OralChroma™, Abilit, Osaka, Japan; Envin Scientific Ltd. Technology House, Chowley Oak, Tattenhall, Chester, Cheshire, UK) to measure VSCs is also available now. It uses air instead of special carrier gas. It is highly sensitive yet relatively low cost compared with a standard gas chromatograph.¹⁸

A full periodontal examination is essential to diagnose halitosis. Gingival sulcus is the area associated with the production of VSC. **The Periotemp**, an automated periodontal probe with a disposable thermocoupler tip, detects temperature change in the sulcus, in addition to providing probing depth and bleeding sites. This instrument can detect minimal change in temperature related to early inflammation, VSC production and changes in epithelial barrier.¹⁹

MANAGEMENT

Cost effective and reliable management of halitosis includes regular tooth brushing, flossing, and cleaning of coatings of tongue.²⁰

Oil pulling or oil swishing is the ayurvedic way of maintaining oral health and improving overall immune system. Oil pulling is a procedure where mouth is rinsed with approximately one tablespoon of ordinary cooking oil for about 3-20 min, and then it is spit out. Various oils like coconut oil, sunflower oil, palm oil, rice bran oil, sesame oil, corn oil, soybean oil, etc can be used for swishing the oral cavity. Oil pulling is incredibly effective in brightening teeth, healing gums, quenching inflammation, preventing bad breath, and healing oral infections.²¹

Mechanical approach like scaling and root planning of the root pockets, and tongue cleaning can be used. Tongue cleaning is the mechanical removal of the furry tongue coating, but it should be performed thoroughly and gently. In a periodontally healthy individual, mechanical removal of the tongue coating reduces VSC concentration by 52% in the mouth air.²²

Mouthwashes: A range of over the counter mouthrinses for controlling mouth odour are also available now. Chlorhexidine-containing mouthrinses have been shown to be successful in reducing antibacterial activity in supragingival plaque as well as the bacterial load on the tongue and thus are seen as potentially effective agents in controlling halitosis.²³

Blom T et al in a review concluded that nearly all mouthwashes with active ingredients had beneficial effects in reducing oral malodor in both long and short term studies. The most compelling evidence was provided for chlorhexidine mouthwashes and mouthwashes containing a combination of cetyl pyridinium chloride and zinc on oral malodor.²⁴

Aleman L F J et al conducted a study to determine the effectiveness and sustainability of three commercial mouthwashes against the halitosis and concluded that a decrease in VSC and organoleptic levels after use of mouthwashes for 1st and 3rd hours. Results obtained in that study indicate that mouth rinsing with essential oils, cetylpyridine chloride and triclosan represents a positive option for the treatment of halitosis.²⁵

The results of study conducted by Malstrom H indicates that the herbal extract rinse and essential oil reduced the mouth malodor significantly more and for longer duration as compared to chlorhexidine gluconate and water when assessed organoleptically. The effect on oral and tongue malodor after a single rinse with the herbal extract and essential oil could last for 5 hours.²⁶

Masking agents: Masking agents have been developed to decrease the odor, when it is not possible to direct the treatment approach to the cause. The use of chewing gum may decrease halitosis, especially through increasing

salivary secretion. These approaches should be only used temporarily in order to improve satisfaction of the patient.^{16, 27}

Dietary advice focuses onto reinforcing mouth cleaning after eating or drinking dairy products, fish, meat, garlic, onion, coffee, smoking and the avoidance of odourous food eating fresh fibrous vegetables, and drinking plenty of liquids.²²

Tulsi: Tulsi is known as the “Queen of plants” and “The mother medicine of nature”. Tulsi or *Ocimum sanctum* is a plant with enormous properties for preventing and curing diseases. Oil of *O. sanctum* has shown the presence of five fatty acids (palmitic, stearic, linoleic oleic, and linolenic acids). It is also a good source of calcium, beta carotene, vitamin C and it contains volatile substances (including linalool, estragol, methyl chavicol eugenol, and small quantities of methyl cinnamate, cineole, and other terpenes), camphor, flavonoids, tannins, triterpene: urolic acid. Chewing tulsi leaves helps clear infections and ulcers of the mouth. As mouthwash, it is useful for maintaining healthy gums and reducing against bad breath.²⁸

Herbal formulation comprising of herbs, known to contain antimicrobials, such as sage; echinacea; lavender and mastic gum was formulated as a muco-adhesive tablet. The clinical trials showed a significant decrease in halitosis assessments, and may be an effective means of treatment for halitosis.²⁹

Clove oil: The Chinese used cloves over 2000 years ago to get rid of bad breath. Synergistic effects of clove oil along with other oils of cilantro, dill, coriander, and eucalyptus showed a higher level of inhibition on Gram-negative bacteria's, thus proving that the synergism aggravates the antimicrobial activity of clove oil. Clove oil can be short term remedy for halitosis since it is antimicrobial, but cannot be used long term because it lacks the probiotic activity.³⁰

Green tea (*Camellia sinensis*): It can be used as a mouthwash or gargle in the treatment of halitosis, laryngitis, sore throat, plaque buildup, tonsillitis, and dental caries. Green tea catechins can transform VSC to nonodorous compounds through the reaction with sulphhydryl and amino groups of VSC. The ability of green tea mouthwash in reducing oral malodor may result from an antimicrobial activity of green tea catechins, especially on *P. gingivalis*. It can be used as a new and safer method for the treatment of oral diseases as it is free of side effects when compared to chemical mouthwashes.^{28, 31}

Probiotics: Halitosis is not a disease but a discomfort, probiotics are marketed for the treatment of both mouth- and gut-associated halitosis. Only a few clinical studies have proved different probiotic strains or products to be efficacious. The studied strains are *E. coli* Nislé 1917, *S. salivarius* K12, three *Weissella* confuse isolates, and a lactic acid-forming bacterial mixture, not specified by the authors of that work.³²

DO'S & DONT'S IN HALITOSIS

Do's	Dont's
<ul style="list-style-type: none"> • Visit your dentist regularly • Have your teeth cleaned periodically by a dental professional • Floss or otherwise clean between your teeth, as recommended by your dentist • Choose unscented floss so that you can detect those areas between your teeth that give off odours, and clean them more carefully • Brush your teeth and gums properly • Ask your dentist to recommend a tongue cleaner. Clean your tongue all the way back gently, but thoroughly • Drink plenty of liquids. • Chew sugar-free gum for a minute or two at a time, especially if your mouth feels dry, chewing parsley, mint, cloves, or fennel seeds may also help. • Clean your mouth after eating fish, meat, garlic, onion, drinking milk products, coffee, and smoking. • Unless your dentist advises otherwise, soak dentures overnight in antiseptic solution. • Get control over the problem. Ask a family member to tell you whenever you have bad breath. 	<ul style="list-style-type: none"> • Let your concern about having bad breath ruin your life. Do not be passive • Be depressed. Get help. Do not ignore your gums—you can lose your teeth as well as have bad breath • Drink too much coffee—it may make the situation worse • Give mouthwash to very young children because they can swallow it • Clean your tongue so hard that it hurts • Rely on mouthwash alone—practise complete oral hygiene²²

CONCLUSION

Chemical agents have been used widely to prevent and treat oral malodor. Long term use of antiseptic agents such as CHX may result in complications like development of microbial resistance and staining of teeth. Various natural products have been marketed for treating and preventing oral malodor, and an increasingly diverse range of strategies for reducing oral malodor is available. More research has to be done to clarify the exact pathophysiological mechanism of halitosis.

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