

Halitosis-Common Oral Complaint : A Detailed Review

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Abstract

Oral halitosis is a frequent or persistent unpleasant odor of breath. It is a common and multi-factorial condition. Halitosis is the result of microbial activity in the mouth. The origin of halitosis is related to both systemic and oral conditions. The advice of dental professionals for treatment of this condition occurs with regularity since 90% of halitosis emanate from the oral cavity. This article provides a comprehensive review of its history, etiopathogenesis, diagnosis, and management.

Key-words: Halitosis; Oral Malodor; Periodontitis; Volatile Sulfur Compounds;

Introduction

Halitosis is a general term used to describe an unpleasant or offensive breath regardless of its origin, oral or non oral. Oral malodor is the term used to describe the odor from the oral cavity¹. Feter ex ore, feter oris and stomatodysodia (dysodia in Greek refers to stench) are other terms that have been used in literature to describe halitosis. Although several non-oral sites have been related to bad breath, including the upper and lower respiratory tracts, the gastrointestinal tract, and some diseases involving the kidneys or the liver, it is thought that around 90% of all bad breath odors emanate from the mouth itself². Mouth odor has negative connotations; it does not only affect the patient's self image, but it also affects others attitudes towards the patient.

Oral halitosis is a very common problem in dental patients. In fact, most adult subjects have socially unacceptable bad breath when waking up in the morning. This problem is transitory and attributed to physiologic causes such as reduced saliva flow during sleep. Although these transitory problems are easily controlled, persistent bad breath may be indicative either of oral diseases (i.e., periodontal diseases, the

presence of bacterial reservoirs in the mouth) or indicative of systemic diseases (i.e., hiatus hernia, hepatic cirrhosis, or diabetes mellitus).

However, in spite of this general concern and the possible pathological implications of halitosis, health professionals, including dental professionals, generally lack adequate training on this condition. Therefore, they are unable to treat or properly advise this population³.

Brief History

Also called "feter oris", "mauvaise haleine", the universal medical term "halitosis" used since 1930 comes from "Halitus" meaning "breath", and "-osis" meaning "chronic disorder".

Now if the term "halitosis" is relatively recent, its negative effects go way back to the most ancient times of humanity. In Talmudic Law (2000 years old), mouth malodor of the partner may constitute a founded motive for divorce. Chinese emperors in Old China used to ask their visitors to chew clove before personal meetings⁴. The Islamic theology emphasizes the importance of siwak, a special device for cleaning the teeth and mouth, recommending its use during Ramdhaan fasting period in order to prevent halitosis. Since the beginning of times, wizards, wise men, and doctors had tried to find recipes and cocktails to treat halitosis: Ebert's Papyrus (around 1700 before J-C) mentions a medication used in Old Egypt to alleviate bad breath: the tablets are made out of a cocktail based on incense, cinnamon, myrrh, and honey. Hippocrates (460-377 before J-C) had an exotic recipe based on marble powder for women suffering from bad breath⁵. Old traditional treatments used Guava leafs in Thailand, eggshells in China, parsley in Italy, and urine-based mouth rinse in some European cultures.

However, this condition was not studied

scientifically until the 1940's and 1950's when Fosnick et al developed an instrument called the osmoscopy, which measures the sources of malodor. They demonstrated this problem could be either physiologic or pathologic, and the source of bad breath could originate from the mouth, the nasopharynx, or various other parts of the body. During the last 30 years, our knowledge of this phenomenon has become much greater, and the sources and causes of malodor have become clearer.

Epidemiology and Prevalence of Halitosis:

It is very difficult to determine the exact number or percentage of the population who have oral malodor since there is a lack of epidemiological studies that address this issue. A large study performed in Japan involving 2,672 individuals indicated that 6-23% of the subjects had oral malodor as measured by volatile sulfur compounds (VSCs) higher than 75 parts per billion (ppb) in expired air at some period during the day. Another study in the United States involving individuals older than 60 years found 24% to have been told that they had oral malodour⁶. Another source of indirect information is related to the American Dental Association's 1995 annual session where 92% of the dentists surveyed reported they had patients with chronic bad breath based on the patient's self report. Almost half reported seeing six or more patients weekly with unpleasant breath⁷. On the other hand, bad breath merits concern as virtually all individuals may occasionally experience episodes of malodor. Furthermore, some authors estimate that approximately 50% of middle-aged and older individuals emit socially unacceptable breath, attributed to physiological causes, upon arising in the morning⁸.

No gender-based differences have been found with regard to prevalence and

severity of halitosis⁹. However, it has been observed that women seek treatment more often than men³. This could be explained because women are normally more concerned about their health status and appearance. Moreover a significant age related increase in the mean values of odor-causing VSCs has been reported when different age groups have been assayed³.

In spite of this reported high prevalence of breath malodor, only a few patients visit dental clinics seeking treatment. This fact has been termed the "bad breath paradox" since people suffering from bad breath often remain completely unaware of this fact. Whereas, others remain convinced they suffer from oral malodor, although in some circumstances, no objective basis can be found (pseudohalitosis or halithophobia)¹⁰. This fact does not mean that all patients coming to seek treatment present a psychological component. They frequently are pushed to seek therapy by people living in close contact with them such as a spouse, family member, or friend.

Classification

Halitosis can be broadly classified as genuine, pseudo halitosis and halitophobia¹¹.

are Table 2, 3.

Table 2 : Compounds associated with

Compound	Smell
Hydrogen sulfide(H ₂ S)	Rotten eggs
Methylmercaptan(CH ₃ SH)	Faeces
Skatole	Faeces
Cadaverine	Corpse(Cadaver)
Dimethyl sulfide(CH ₃) ₂ S	Rotten cabbage
Putrescine	Decaying meat
Indole	Small Quantity in perfumes, smelly in large amounts
Isovaleric Acid	Sweaty feet

Halitosis and odor produced¹²

Table 3 : Sources or Predisposing Factors

Oral source (90%)	Medications	Systemic diseases
Periodontal disease (especially acute necrotising ulcerative gingivitis)	Type A: Drugs that cause or predispose to dry mouth, eg antidepressant, antihistamine, anticholinergic drug, some antihypertensive, antiparkinson, antipsychotic, anxiolytic, diuretic, and anorexiants	Nasal sepsis (eg sinusitis, postnasal drip)
Infected extraction site oral sepsis		Diabetic ketosis
Residual postoperative blood (eg gum bleeding)		Gastro-intestinal disease
Debris under dental appliances (eg upper removable appliance, bridge, denture)		Hepatic failure
Ulcers	Type B: Solvent abuse	Renal failure
Dry mouth due to mouth breathing or medication intake		Respiratory infection and sinusitis
Tonsilloliths		Hiatus hernia Trimethylaminuria Fish-odour-syndrome (rare, smells of rotten fish, due to insufficient enzyme to break down trimethylamine) Postirradiation therapy Sjogren syndrome

of Halitosis¹²

Psychogenic disorder and Oral halitosis.

A group of healthy individual complains

thought to be suffering from an olfactory reference syndrome called delusional halitosis¹³ which is a variant of

Classification	Description
A.Genuine Halitosis	Obvious malodor,with intensity beyond socially acceptable level,is perceived.
1.Physiologic Halitosis	Malodor arises because of putrefaction process within the oral cavity. No specific disease or condition causing this is not found. Origin is from dorsoposterior of the tongue. Transient halitosis because of dietary factors should be included.
2.Pathologic Halitosis.	Malodor caused by disease,condition or malfunction of oral tissues.
a) Oral	Halitosis because of periodontal disease or xerostomia is included.
b) Extra oral	Origin other than oral cavity,either from nasal,lungs,liver or because of diabetics.
B.Pseudo Halitosis.	Malodor does not exist, but the patient believes that he or she has it. Condition improved by counselling and simple oral hygiene measures.
C.Halitophobia.	After successful treatment for either genuine halitosis or pseudo-halitosis the patient still believes that he or she has halitosis. No social or physical evidence exists to suggest halitosis is present.

Table 1: Classification of Halitosis.

Aetiology and Pathogenesis

Oral halitosis is brought about by the action of bacteria on food debris and shed epithelial cells, which in turn releases VSCs. The commonly produced VSCs, sources and odors associated with halitosis

of halitosis which cannot be detected by anyone else. Investigation failed to find any relation with local or systemic cause and halitosis becomes an obsession in the patients life. These patients assume to have halitosis by misinterpretation the attitudes of people around them. These patients are

monosymptomatic hypochondriacal psychosis (MHP); that is patients have an olfactory delusion that they emit a foul smell from the mouth.

Microbiota associated with Oral Halitosis

The principle bacteria that are

implicated in the creation of oral malodor include *Fusobacterium nucleatum*, *Prevotella intermedia* and *Tannerella forsythensis*. Other bacteria that have been implicated in the production of VSCs include *Porphyromonas gingivalis*, *Porphyromonas endodontalis*, *Treponema denticola*, *Actinobacillus actinomycetemcomitans*, *Atopobium parvulum*, *Campylobacter rectus*, *Desulfovibrio* species, *Eikenellacorrodens*, *Eubacterium sulci*, *Fusobacterium* species and *Peptostreptococcus micros*. Isolates of *Klebsiella* and *Enterobacter* are reported to have emitted foul odors in vitro which resembled bad breath in denture wearers. These gram-negative proteolytic anaerobes are located in the relatively stagnant areas of the mouth, such as periodontal pockets, posterior dorsal surface of the tongue, and interdental regions¹⁴.

Relationship between Periodontitis and Oral Halitosis

microbes are located in the stagnant areas of the mouth, such as the periodontal pockets, tongue surface, and interproximal areas between the teeth. Patients with periodontal disease having deep periodontal pockets are associated with increased levels of VSCs. The presence of active periodontal inflammation has also been suggested to be more important for the production of oral malodor than just these periodontal pockets.

The relationship between periodontal disease and oral halitosis is a subject of considerable debate. Studies have shown that saliva from patients with periodontitis contains increased amounts of VSCs^{15,16}, whilst others report no direct association^{17,18}.

Danser et al suggest that patients with Periodontitis have markedly increased tongue coating and it may be that the reported association between oral malodor and periodontitis is primarily due to the effects of tongue coating¹⁹.

Volatile Sulfur Compounds and

capable of altering permeability of the gingival tissues and allow lipopolysacrides the bacterial antigens to penetrate the gingival tissues and initiate inflammation²⁰. Methyl mercaptan has the ability to induce secretion of interleukin 1. Studies have shown that periodontal ligament cells exposed to methyl mercaptan will change their intercellular pH and, make them more acidic²¹.

Diagnosis of Oral Halitosis: (Table 4)

Oral halitosis can be assessed using direct and indirect methods:

Direct methods

- a. Organoleptic method²² (whole-mouth breath test, spoon test, floss odor test, salivary odor test and self perception of odor).
- b. Gas chromatography²³.
- c. Sulphide monitors.
- d. "Electronic nose"

Indirect methods

- a. Bacterial culture and smear²⁴.

Table 4 : Table 4 Various Diagnosis tests of Oral Halitosis

Diagnostic Test	Method Category	Measures	Comments
Cupped breath, saliva or Dental Floss	Self Assessment	Olfactory sense of offensive breath, saliva or plaque	Not very reliable unless the source is removed from the body proper
Organoleptic	Subjective measurement	Olfactory sense of offensive breath	Depends on examiner experience
Portable sulfide monitor	Objective instrumental analysis	Quantitative measure of the presence of VSCs in sampled mouth air	Accurately measures total sulfide content
Gas chromatography	Objective instrumental analysis	Quantitative measure of the presence of VSCs in sampled mouth air	Precisely measures each specific compound in the mouth air
Bacterial culture	Indirect measurement	Presence of specific bacteria from periodontal sample	Growth and analysis takes time and expertise. Does not measure oral malodor
BANA hydrolysis	Indirect measurement	Quantitative measure of hydrolysis of N-benzoyl-DL-arginine-2-naphthylamind (BANA)	Detects the presence of bacteria that can hydrolyze BANA. Does not measure oral malodor.

An estimated 90% of halitosis cases originate within the oral cavity, and the VSCs are believed to be produced by gram-negative proteolytic anaerobes. These

Periodontal tissues

VSCs play an important role in pathogenesis of periodontal disease. Hydrogen sulfide and methyl mercaptan are

- b. Enzyme assay²⁵

Management of Halitosis

The first step towards effectively managing oral halitosis is to determine the

cause for halitosis (oral or systemic) and the nature of halitosis. A good medical, dental and diet history will help in determining the origin for halitosis²⁶. After a positive diagnosis for oral halitosis has been made, the treatment plan is implemented. All situations with systemic origins should be treated by the appropriate specialist. If the source is of oral cavity, various treatment modalities include the following:

1. Mechanical reduction of intraoral nutrients and microorganisms by brushing, flossing, tongue scraping, scaling and root planning.

2. Chemical approach of using a mouthwash to reduce oral microbial load.

3. Rendering malodorous gases nonvolatile by using metal salt solutions; baking soda dentifrices.

4. Masking the malodor by mouth sprays, lozenges and chewing gums.

5. Regular Review

The patient with delusional halitosis must be referred to psychological assessment. There is no point of further investigations because no organic or pharmacological treatment will be effective since this is a psychological symptom.

Conclusion

Halitosis is the common and serious problem for the people it affects. Majority of halitosis cases originates from oral cavity other than systemic disease and medications. VSCs are the major components of oral halitosis which are produced by bacterial putrefaction of peptides, blood and salivary products. Oral microbiota from periodontal pockets and dorsum of tongue has found to be capable of producing VSCs. Several reports have related periodontal disease with oral halitosis. Some authors have indicated the

relation of VSCs with the presence of inflammatory process regardless of pocket depth.

Finally, a precise diagnosis of the etiological factors is of prime importance so that can be eliminated. A comprehensive periodontal treatment including extensive oral hygiene instruction and plaque control should be the therapy of choice.

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