



HALITOSIS: AN UPDATE FOR DENTAL PRACTITIONERS

Dentistry

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ABSTRACT

Halitosis is a common condition with social and health implication. Halitosis is considered as the third most prevalent cause for individuals seeking oral and dental care. This is of great importance to dental professionals since 90% of the cause of this condition originate from oral cavity. Halitosis originates mainly due to the production of volatile sulphur compounds by bacteria in oral cavity. Diagnosis of halitosis is usually done by organoleptic rating (gold standard), gas chromatography and portable sulphide monitor. The treatment modalities may be mechanical reduction, chemical reduction, masking of bad breath, probiotic treatment and referral to appropriate specialist. Among these methods reduction of bacterial load by proper oral hygiene measures stays the mainstay of halitosis treatment. This review aims to provide an update of the aetiology, diagnosis and newer treatment strategies for halitosis for effective management of the condition.

KEYWORDS

Halitosis, malodour, volatile sulphur compounds. Organoleptic rating

INTRODUCTION:

Halitosis, also known as fetor ex ore, fetor oris, bad or foul breath, breath malodour, and oral malodour, is as an odour from the mouth which is perceived as unpleasant by others.^{1,2,3} Halitosis may be considered as a community health problem causing severe psychosocial embarrassment.^{4,5} Dr Joseph William Howe, 1874 was the first person to use the term 'Halitosis'.⁴ Halitosis may result in psychological problems, namely anxiety, depression and social isolation.⁶ Halitosis may be broadly classified into Genuine halitosis(80-90%), pseudo halitosis and halitophobia.^{6,7} A universally accepted standard criteria for halitosis assessment is absent leading to an absence of uniformity in evaluating methods.⁸ This review aims to provide dental practitioners with an up to date information regarding halitosis to provide the essential preventive care and the most effective treatment for their patients.

Epidemiology:

A strong data for halitosis prevalence does not exist, even though a varied prevalence rate has been reported in the literature.^{9,10} Halitosis prevalence of 44.2% was reported in a cross-sectional study among 661 participants in Ethiopia.¹¹ Jordanian population reported 78% halitosis prevalence of which 57.6% were completely unaware of their condition.¹² According another study by Salik A et al in India, halitosis prevalence of 63% was reported.¹³ Study by Hussein H in Egyptian population revealed a halitosis prevalence of 76.1%.¹⁴ In a study by Sunar S and Kumar J, the percentage of halitosis in smokers was higher (56.25%).¹⁵ Sen DO et al discovered a halitosis prevalence rate of 34.2%.¹⁶ In a study done in China by Zhang H et al, the prevalence rate was found to be 33.9%.¹⁷ In another study done in China by Du M et al, a score of ≥ 2 was reported in 65.9%.¹⁸ In India, a study was done among halitosis patients in which rhinosinusitis was detected in 38.7%, periodontitis in 19.39% and tonsillitis in 4.84%.¹⁹ Self-perceived halitosis was detected in 52.5% in another study conducted in Punjab.²⁰ In a study among 787 students from 5 dental colleges in Kerala, self-perceived halitosis was reported by 42.2% male students and 32.6% female students.²¹ In a study to find halitosis among children, study conducted in India, 36% of parents noticed that their child is having halitosis.²²

Classification

Halitosis may be considered under genuine, pseudo and halitophobia,⁴ of which genuine halitosis may further be classified as physiologic and pathologic.⁸ Pathological variant may be further classified as intra-oral & extra-oral.⁸ A malodour perceived as beyond socially acceptable level may be considered as genuine halitosis.⁸ If even in the absence of any pathological condition, putrefactive process in the mouth arises which result in malodour, it may be referred to as physiologic.⁸ A certain type of halitosis which the patient consistently complains, but not perceived by any other comes under pseudo-halitosis.⁸ If the patient continuously believe that the halitosis is still present even after the required management and treatment procedures, in spite of any social or objective evidence, it is considered as halitophobia.^{4,8}

Based on aetiology, Halitosis may be classified as

- 1) Exogenous/transient - due to certain food items likely onion and garlic.⁴
- 2) Endogenous - due to certain medicines and systemic infection.⁴
- 3) Psychogenic, Pseudo Halitosis and Halitophobia.⁴

Another classification was proposed by Miyazaki;1999, based of treatment needs (Table 1)⁴

Table 1: Miyazaki 1999 Classification Of Halitosis Based On Treatment Needs

Classification	TN	Description
Genuine Halitosis	TN 1	Explanation of foul breath along with suggestions for maintaining good oral hygiene
Physiologic Halitosis	TN 1	Explanation of halitosis, oral hygiene advice
Pathologic Halitosis		
	Oral	TN 1 and TN 2
	Extra-Oral	TN 1 and TN 3
Pseudo-Halitosis	TN 1 and TN 4	Explanation of bad breath and guidelines for oral hygiene, dental cleaning, and treatment of oral conditions, particularly periodontal diseases
Halitophobia	TN 1 and TN 5	Explanation of bad breath and guidelines for oral hygiene, additional professional training, education, and reassurance
		Referral to a clinical psychologist, psychiatrist, or other psychological specialist

Aetiology

The bacterial species which are the most potent Volatile Sulphur Compounds (VSC) producers are mentioned in table 2.⁸

Table 2: VSC Producing Bacterial Species

Hydrogen sulphide from cysteine	Mercaptan from methionine	Hydrogen sulphide from serum	Methyl mercaptan from serum
Peptostreptococcus anaerobius	Fusobacterium nucleatum	Prevotella intermedia	Treponema denticola
Microprevotii Eubacterium limosum	Fusobacterium periodontium	Prevotella loeschei	Porphyromonas gingivalis
Bacteroides Species	Eubacterium species	Porphyromonas gingivalis	Porphyromonas endodontalis
Centipedia periodontii Selenomona artemidis	Bacteroides Species	Treponema denticola	

These VSC can cause breakdown of connective tissue which is further accelerated by increasing the amount of cathepsin b, interstitial collagenase and interleukin 1.⁴

INTRA-ORAL HALITOSIS

Coated Tongue

Fusobacterium periodonticum, *Neisseria mucosa* and *Aggregatibacter segnis* are the bacteria mostly associated with tongue coating.³ In tongue coating of children affected by halitosis, *Leptotrichia wadei*, *Peptostreptococcus stomatis* and *Prevotella shahii* were found in increased amount.³

Periodontal Diseases

The chief factors found in association with bad breath and periodontal diseases were VSC, oral microflora and inflammatory response.³ Among the bacteria associated with increase in progression of periodontal disease and halitosis, *Porphyromonas gingivalis*, *Treponema denticola* and *Tanarella forsythus* were found to be leading cause.³

Xerostomia

Decrease salivary flow is associated with decreased escape of VSC, which increase bad breath.⁴ The halitosis intensity is further increased due to the decrease of natural antibacterial and cleansing action of saliva, salivary stagnation and decreased breakdown of glycoprotein.⁴

Faulty Dental Restorations

Improper teeth restoration can increase severity of halitosis causing increased plaque accumulation leading to increased bacterial multiplication.⁴

Smoking

Numerous Studies have shown increased prevalence of halitosis among smokers, which decreased on cessation of habit.^{2,15}

Alternate Nicotine Delivery Products

Electronic vapor products and heated tobacco products have reported halitosis, decreased taste sensation and metallic taste on tongue.²

EXTRA-ORAL HALITOSIS

The extraoral cause of halitosis are given in Table 3.⁴

Table 3: Extra-oral Causes Of Halitosis

Extra-Oral Cause	Source
Non-Blood borne	
Upper & Lower respiratory infections	Lung Cancer, Lung Diseases
Gastro-Intestinal Tract	Gastric Diaphragmatic hernia
Blood borne	
Kidney	Uraemia, Kidney failure
Liver	Hepatocellular failure
Diabetes mellitus	Ketone build up
Metabolic diseases	Fishy odour of breath, urine, sweat, etc
Hormonal cause	Menstruation, post menstrual cycle
Medications	Antidepressants, Antihypertensives, Narcotics, Decongestants, Anti-histamines, Anti-psychotics

Diagnostic Methods

Direct Measurement Methods

1. Organoleptic Rating

Considered as gold standard of halitosis assessment, in this technique,

an experienced judge sniffs the breath through a tube at varying distances and scores the breath based on an intensity scale.^{4,8,10}

2. Gas Chromatography

This method analyses VSC in gingival crevicular fluid, saliva, tongue debris and air, even at low concentrations with high specificity.¹⁰ Due to the extreme cost, requirement for trained staff, bulkiness of equipment and the time required, this method is usually not used for routine practice.^{8,10}

3. Portable Sulphide Monitor

A portable electronic device called Halimeter, may be used to measure VSC in breath, but have the disadvantage of being insensitive or less sensitive to various sulphur compounds.^{4,10}

Indirect Measurement Methods

1. Benzoyl DL Arginine α Naphthylamide (BANA) Test

In the presence of BANA, a synthetic trypsin substrate, bacteria from subgingival plaque and tongue scrapings namely *Treponema pallidum*, *Porphyromonas gingivalis* and *Tanarella forsythus* turns into a blue coloured compound, enabling their detection within 5 – 10 minutes.^{8,10}

2. Ammonia Monitoring

This method detects the total quantity of ammonia produced by bacteria. The oral cavity of patient is allowed to rinse with urea and is asked to blow into a disposable tube which is in turn inserted to ammonia gas detector.^{8,10}

3. Quantifying beta-galactosidase activity

The beta galactosidase enzymatic activity, which is essential for bad breath production can be ascertained by a colour change on the chromatography paper when the substrate is added onto the paper.⁵

4. Ninhydrin method

The amines and polyamines are identified using this method.¹⁰ Sample from patient is mixed with isopropanol and centrifuged, after which it is read by a spectrometer.¹⁰

5. Polymerase Chain Reaction (PCR)

This recently introduced method is highly rapid, specific and sensitive for VSC identification from various oral sources.^{8,10}

6. Salivary Incubation test

After the Saliva from the patient is incubated for several hours at 37°C in the presence of nitrogen, carbon dioxide and hydrogen, the odour is evaluated by the researcher.⁸

Management

Mechanical reduction

1. Tongue Cleaning along with Tooth Brushing

Usually, tongue cleaning is recommended during night time before bed using cold water, firm tooth brush without tooth paste.⁴ Studies have demonstrated that, tongue cleaning when combined with tooth brushing resulted in greater reduction of halitosis occurrence.²³

2. Interdental Floss

Special stress should be given to clean the interdental space with interdental floss for the effective control of plaque and bacterial colonies.¹⁰

3. Replacement of defective restorations and prosthesis.

Renewing or replacing old restoration and prosthesis which causes obstruction to oral hygiene measure and attracts bacteria should be replaced.^{8,10}

4. Non-Surgical Periodontal Therapy

Studies have shown that full mouth scaling and root planning have significantly reduced the organoleptic rating score.²³

5. Photodynamic Therapy

The reactive oxygen species formed during photodynamic therapy destroys the bacterial cells, which resulted in reduction of halitosis which was statistically significant.²³

6. Laser

Laser treatment of chronic fetid tonsillitis has shown to reduce bad breath²³

Chemical Reduction

1. Mouth Rinse solution

Mouth wash solutions with ingredients namely chlorhexidine, triclosan, essential oils, cetylpyridinium chloride are shown to inhibit VSC production.²³ Among these agents, chlorhexidine is considered as the most effective which also acts against dental plaque.^{10,23}

2. Herbal methods

Reduction of halitosis to some extents have been found by the use of Ela, Triphala, Tulsi Clove, green tea.²³ Other herbal formulations consisting of Echinacea augustifolia, Pestacia lentiscus, Lavandula augustifolia and Salvia officinalis have proven to have antimicrobial properties.²³

Masking Halitosis

Some oral rinses, lozenges, oral sprays, having orange juice, chewing gum and proper liquid intake may also help to mask halitosis for a short period of time.²³

Probiotics

Probiotics like *S.salivarius*, *Lactobacillus salivarius*, *Lactobacillus reuteri* and *Weissella cibaria* have been demonstrated to decrease halitosis.^{6,8,23}

Referral To Appropriate Specialist

Halitosis due to nonoral causes and with any systemic diseases like respiratory, gastrointestinal tract, renal, hepatic, hematologic, endocrine, etc should be referred to an appropriate specialist.¹⁰ Whereas patients with halitophobia may require referral to psychologists or psychiatrists.¹⁰

CONCLUSION

Halitosis can affect psychosocial relationships and life of patients.^{16,23} Identification of exact aetiological agents and accurate diagnosis should be followed by appropriate treatment.²³ Health professionals should be properly trained for exact diagnosis and management.

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