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Halitosis-An Update

Rupali Kalsi[1], Mohit Kumar Mathur[2], Nishant Singh Gill[3], Poonam Dutt[4]
[1](Reader, Department Of Periodontics, Shree Bankey Bihari Dental College, Ghaziabad, U.P, India)
[2](Assistant Professor, Department Of General Surgery, School Of Medical Sciences & Research, Sharda University, Greater Noida, U.P, India)
[3](Intern, Sardar Patel Medical College, Bikaner, Rajasthan, India)
[4](Professor & Head, Dept .Of Periodontics, Shree Bankey Bihari Dental College, Ghaziabad, India)

Abstract:*Bad breath can be detrimental to one's self- image and confidence causing social, emotional, and psychological anxiety. With the majority of breath problems having an oral origin, the dental office is the most logical place for patients to seek treatment. The etiology of halitosis is related to release of odiferous compounds like volatile sulphur compounds in the exhaled air. This article reviews the etio-pathogenesis and patho-physiology of halitosis (oral malodor) , various classification systems, methods of detection and its management.*

Keywords: *Halitosis, Oral malodor, Periodontitis, Review, Volatile sulphur compounds.*

I. Introduction

Halitosis is derived from the Latin word "Halitasia" meaning bad breath and the Greek word "Osis" meaning disease or condition.Halitosis is an unpleasant or offensive odour emanating from the oral cavity, leading to discomfort and psychosocial embarrassment.Halitosis is estimated to be the third most frequent reason for seeking dental aid, following tooth decay and periodontal disease.[1]

Various Terminologies/ Classifications Related To Halitosis[2]

Terms Used	Definition	
Halitosis	Any Disagreeable Odor Of Expired Air, Regardless Of Origin	
Bad Breath	Lay Term For Halitosis	
Genuine Halitosis	Where Breath Malodor Can Be Verified Objectively	
	Physiologic Halitosis, Also Termed Transient Halitosis	Pathologic Halitosis
	E.G. Morning Breath	Subclassified Into •Oral Malodor (Foetor Oris Foetor Ex Oris) And •Extra-Oral
Pseudo-Halitosis	No Objective Evidence Of Malodor, But The Patient Thinks They Have It	
Halitophobia	The Patient Persists In Believing They Have Halitosis Despite Firm Evidence For The Absence Of Objective Evidence	

ADA classification based on the etiological pathways involved

- Extrinsic pathways - Tobacco, alcohol and foods like onions garlic and certain spices.
- Intrinsic pathways –
- Oral origin (90 %)
- Systemic origin (10 %)

Classification based on the origin of halitosis (*Dominic 1982*)[3]

1. Due to local factors of Pathological origin
2. Due to local factors of Non-pathological origin
3. Due to systemic factors of Pathological origin
4. Due to systemic factors of Non-pathological origin
5. Due to systemic administration of Drugs and
6. Due to xerostomia.

II. Epidemology

There are few studies evaluating the prevalence of oral malodor in the general population, with reported rates ranging from 22% to more than 50%. In addition, approximately 50% of adults and elderly individuals emit socially unacceptable breath, related to physiological causes, upon arising in the

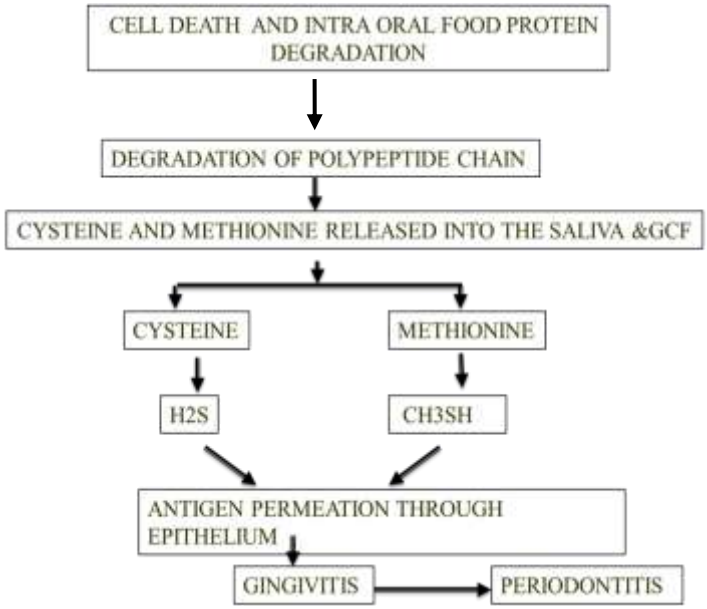
morning.[4]Moreover, there are no universally accepted standard criteria, objective or subjective, that define halitosis in a patient.[5]

A study performed by Miyazaki *et al.*[5] examining oral malodor in 2,672 individuals aged 18 to 64 years observed that there were no significant differences in the VSC between males and females in any age group. In each age group, the measured values of oral malodor were highest in the late morning group (58.6/ ppb in average), followed by the late afternoon group (52.1/ ppb), while lowest values were shown in the early afternoon group (39.4/ ppb). Significant correlation was observed only between VSC values and periodontal conditions and tongue coating status.

III. Odiferous Compounds

Volatile Sulfur Compounds	Methyl Mercaptan, Hydrogen Sulfide Dimethyl Sulfide
Diamines	Cadaverine,Putrescine
Short-Chain Fatty Acids	Butyric Acid ,Valericacid,Propionic Acid
Indoles	Indole, Methyl-Indole (Skatole)

IV. Pathophysiology Of Oral Malodor



Relationship Between Vsc's And Periodontitis[8,9,10,11]

- VSC's alter permeability of gingival tissues (J.E &O.E) to LPS .
- Sulfides may annihilate the opsonization of C3bi and affect its ability to fight bacteriaThey modulate function of fibroblast
- VSC's increase secretion of PGE2 & collagenase
- VSC increase in deep pockets
- Tongue coating 6 times more in periodontitis patients

V. Diagnosis

A saying "Listen to the patient and he will tell you the diagnosis". This is very true for patients with breath odor complaints.

The primary measurement methods are

1. Organoleptic measurement
2. Gas chromatography
3. Alternative methods- BANA test, salivary incubation test, quantifying β-galactosidase activity, ammonia monitoring, the ninhydrin method and the PCR, have yet to be fully established

Apart from this self assessment method can also be done.

Organoleptic Assessment

The clinician sniffs the air exhaled from the mouth and nose and subjectively defines the presence or absence of malodor. This should be performed by two or more different examiners and both the human subject and the examiners should follow some instructions in order to obtain more reliable results

It is advisable that the patient abstains from eating odiferous foods for 48 h before the assessment and that both the patient and the examiner refrain from drinking coffee, tea or juice, smoking and using scented cosmetics before the assessment.[12]

Volatile sulfur compounds can also be detected by HALIMETER (Interscan Corp., Chatsworth, CA), a portable sulfide monitor. This is an electronic device that aspirates the air of the mouth or expired air through a straw and analyzes the concentration of hydrogen sulfide and CH_3SH. However, this machine cannot differentiate between the different types of sulfides and cannot detect other classes of volatile compounds.[13].

Gas Chromatography

It runs with a Mass Spectrometry Detector**.** It used for differentiating and quantifying the VSC and also distinguish other classes of compound Drawbacks of traditional laboratory methods are -cumbersome, need inert column carrier gas (gas cylinders of nitrogen or helium) and require technicians with adequate training.

Recently, trailblazing research was performed by van den Velde *et al.*[14,15] with gas chromatography–mass spectrometry as a tool for differential diagnosis of halitosis, with the possibility to detect extra-oral causes, which often remain undetected unless characterized by a specific smell.

Secondary Tests Associating Measurements of Oral Malodor

Detection of likely causative bacteria and / or microbial enzymatic activity fall outside the routine clinical assessment of halitosis.Examination of the oral flora, can be done using the BANA test or dark-field microscopy Assay for the major glycosidic enzyme-(β-galactosidase) in saliva, which deglycosylates oral mucins, leading to their subsequent proteolysis and putrefaction, may also be useful.[16]

If no malodor can be found during the initial examination, the assessment for halitosis should be repeated on two or three different days.

- the patient can be considered to be affected by imaginary (pseudo-halitosis)
- diagnosis that can be supported by established questionnaires

Diamond probe:

Sensors are integrated into the periodontal probe. Probe is placed directly into the periodontal pocket or tongue. It has an electrical control unit and a disposable sensor tip that combines a standard Michigan 0 dental probe with a sulphide sensor which responds to the sulfides present in the periodontal pocket. [17]

VI. Treatment Of Halitosis

The treatment and management of Halitois can be broadly classified into mechanical microbiological load reduction, use of chemotherapeutic agents (in office or at home) or a combined approach.[2]

Classification	Treatment Needs	Description	Treatment needs
1. Genuine Halitosis		Obvious malodor, with intensity beyond socially acceptable level is perceived.	
a. Physiologic halitosis	TN–1	Malodor arises through putrefactive processes within the oral cavity. Neither a specific disease nor a pathologic condition that could cause halitosis is found. Origin is mainly the dorsoposterior region of the tongue.	Explanation of halitosis and instructions for oral hygiene (support and reinforcement of a patient's own self–care for further improvement of their oral hygiene)
b. Pathologic halitosis			
i. Oral	TN–2	Halitosis caused by disease, pathologic condition or malfunction of oral tissues (tongue coating, modified by pathologic condition like xerostomia)	Oral prophylaxis, professional cleaning and treatment for oral diseases, especially periodontal diseases
ii. Extra–oral	TN–3	Malodor originates from nasal, paranasal and/or laryngeal regions, pulmonary tract or upper digestive tract. Odor is blood–borne and	Referral to a physician or a medical specialist

		emitted via the lungs (e.g. diabetes mellitus, hepatic cirrhosis, uremia, internal bleeding	
2. Pseudo–halitosis	TN–4	Obvious malodor is not perceived by others, although the patient stubbornly complains of its existence. Condition is improved by counseling and simple oral hygiene measures.	Explanation of examination data, further professional instruction, education and reassurance
3. Halitophobia	TN–5	After treatment for genuine halitosis or pseudo–halitosis, the patient persists in believing that he/ she has halitosis. No physical or social evidence exists to suggest that halitosis is present.	Referral to a clinical psychologist, a psychiatrist or other psychology specialist

**TN–1 Is Applicable To All Cases Requiring TN–2 Through TN–5*

Mechanical Reduction of Intraoral Nutrients and Microorganisms

The dorsal surface of most tongues usually has significant observable debris. Brushing studies indicate that the tongue was the main source of CH3SH and H2S. Tongue cleaning has been advocated to reduce the amount of tongue coating and the bacterial load on the tongue surface. People with halitosis are well-advised to repeat the tongue cleaning procedures several times during the day.[18]

Chemical Reduction of Oral Microbial load

Mouth rinsing is a common oral hygiene practice dating back to ancient times. The active ingredient in oral rinses is usually antimicrobial agents such as Chlorhexidine (CHX), essential oils, chlorine dioxide, hydrogen peroxide and triclosan.

CHX can be used alone CHX-Alc (0.2%) or in combination with other formulation like CHX-NaF (0.12% CHX + 0.05% NaF) or Halita/CHX-CPC-Zn (0.05% CHX + 0.05% CPC + 0.14% Zn lactate) or AmF/SnF 2 mouth rinse. All these formulations result in significant reduction in microbial load of tongue and saliva. Essential oils like Listerine can be used as mouthwashes. Plaque reductions of 20- 35% and gingivitis reductions of 25-35% have been reported.[19]

Two-Phase Oil: Water Mouthrinse

These mouthrinses are highly effective in reducing bad breath parameters. A twice daily rinse showed reductions in both VSC and organoleptic rating. Triclosan (2,4,4-trichloro-2-hydroxy-diphenyl ether) is a lipid-soluble antibacterial agent that has be particularly effective in reducing VSC, oral bacteria and oral malodour.[6]

Probiotics and Halitosis

Probiotics are living microorganisms which upon ingestion in sufficient numbers exert health benefits beyond basic nutrition. It has been reported that administration of *Weissella Cibaria*, reduces levels of volatile sulfide compounds produced by *Fusobacterium nucleatum*: the effect could be due to hydrogen peroxide production by *W. cibaria* causing *F. nucleatum* inhibition.[20]*Streptococcus salivarius* also suppress volatile sulfide effects, by competing for colonization areas with volatile sulfide-producing species. [21]

VII. Conclusion

Breath odor has important socio-economic consequences and can reveal important diseases. Thus, a proper diagnosis and determination of the etiology allows initiation of the proper treatment.

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