REVIEW ARTICLE

HALITOSIS: A SEVERE SOCIAL STIGMA

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ABSTRACT

Halitosis is a subjective perception after smelling someone's breath. It can be pleasant, unpleasant or even disturbing. It can lead to personal discomfort and social embarrassment and remains one of the biggest taboos in the society. There is no single cause that attributes to development of halitosis. In addition, there is no universal objective method for the diagnosis of a halitosis patient. The dental hygienist, dentist, and periodontist are the most appropriate professionals to diagnose and treat this condition.

INTRODUCTION

Many patients consult a specialist physician regarding halitosis complaints. Halitosis which originates from Latin halitus (breath) and Greek suffix osis (pathological process) means bad breath in English. The history of sources related to halitosis is based on ancient Greek and Roman periods (Mediterranean countries), parsley (Italy), carnivorous (Iraq), guava shell (Thailand) and egg shell (China) have been used in ancient times for halitosis treatment. Thus, halitosis emerges as a problem that occurs every century and occurs universally in both genders. More than 50% of the general population suffer from halitosis.

There are many sources causing halitosis of the oral cavity such as tongue coat, poor oral hygiene, food impaction, periodontal disease, pericoronitis, oral ulcers, irregularly arranged teeth, defective restorations, exposed necrotic pulp, acrylic moving prosthesis at night, unclean dentures, and tonsillitis. The reasons of absence of scientific data are dissimilarity appreciation of odors for patients and investigators like cultural and racial differences. In addition, there is no universal objective method for the diagnosis of a halitosis patient.

PREVALENCE OF HALITOSIS

As a large part of the population is affected by this situation, it has become a source of concern for many people over the last few decades. In the general population, halitosis has a prevalence ranging from 50% in the USA, 6% to 23% in China, Indian ranging from 21.7% in males to 35.3% in females. Miyazaki et al1 has shown in his research that the incidence of halitosis increases with age. Halitosis could be seen at all ages, but has different prevalence rates in children and the general population. Approximately two-thirds of the population is halitosis affected during part of the day, 5% of the population suffers from severe halitosis, which requires immediate intervention.

ETIOLOGY OF HALITOSIS

Despite the fact that the etiology of halitosis is based on many different causes, its main reason is the disintegration of organic compounds caused by proteolytic anaerobic bacteria in oral cavity. Volatile sulphur compounds (VSCs) are products of this putrefaction and also significantly related to the severity of the odour. VSCs which cause halitosis are formed due to pathologic and physiologic reasons that originates from oral or extraoral source.

Sulphur compounds, aromatic compounds, nitrogen-containing compounds, amines, short-chain fatty acids, alcohols or phenyl compounds, aliphatic compounds, and ketones are volatile compounds. Hydrogen sulfide, methyl mercaptan and dimethyl sulfide are the most significant examples of VSCs. Few categories of halitosis are as follows-

Genuine Halitosis	Malodor that can be verified objectively
Physiologic Halitosis	Transient and caused by physiologic factors
Oral Malodour	Originating from the oral cavity
Extraoral halitosis	Pathologic conditions outside the oral cavity
Pseudohalitosis	Cannot be perceived objectively even though the patient complains of its existence
Halitophobia	No malodor that can be perceived objectively after treatment of halitosis

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GENUINE HALITOSIS:

- Physiological halitosis- Food intake (e.g., garlic, spices), smoking, or medications.
- Pathological halitosis-

a. **Intra oral causes**: Tongue coating, periodontal infections, odontogenic infections, xerostomia, mucosal lesions, candidiasis in case of unclean acrylic dentures.

b. **Extra-oral causes**: Gastrointestinal disorders such as gastroesophageal reflux disease (GERD), Respiratory disorders like sinusitis, cleft palate, etc and Drug induces halitosis.[2]

PATHOPHYSIOLOGY OF HALITOSIS

Decrease in salivary flow causes a negative effect on the self-cleaning effect of saliva and volatile compounds that cause halitosis are produced. Proteolytic bacterial growth is related to mucin precipitation and alkalization of the oral environment.

Therefore, causes of the xerostomia such as mouth breathing, dehydration, salivary gland diseases and certain drugs are known as reason for halitosis. Approximately 10% of patients with severe periodontitis have oral malodour. Periodontal and gingival inflammation is one of the main causes of halitosis. In addition, periodontal diseases associated with plaque may increase the degree of halitosis.

The primary reason for the oral malodour is dorsum of tongue. This is why the morphology of tongue papillae is a favourable structure for the life of microorganisms. *Veillonella* spp, *Prevotella* spp. and *Fusobacterium* spp. are the most common types of anaerobic bacteria in children. Mucosal surface is dry due to decrease saliva in individuals who have mouth breathing. Children with halitosis were found to have mouth breathing in 40% of the cases. Postnasal drip and tonsillitis from respiratory related infections in children are common, which means more bacteria with an increase in mucus and phlegm accumulation. *Klebsiella ozenae* prevents the self-cleaning feature of the nasal mucosa and causes atrophic rhinitis. Streptococcal species cause acute pharyngitis and sinusitis to source to the formation of bad breath.

DIAGNOSIS OF HALITOSIS

Diagnostic methods of halitosis enable differentiation of genuine halitosis, pseudo-halitosis and halitophobia. Therefore, assessment of diagnosis and severity of halitosis is important to prevent incorrect or unnecessary treatment.

1. Organoleptic Measurement

Organoleptic method is accepted as the gold standard for halitosis measurement. The results of organoleptic measurements showed a strong correlation with the breath VSCs levels. The advantages of this method are that it is cheap, that no equipment is needed and that there is a wide range of odour. On the other hand, the test has disadvantages such as subjectivity, nasal saturation, the lack of quantification and the repeatability of the test. In addition, the measurement method is unpleasant for practitioner and patient.

2. Gas Chromatography

Gas chromatograph (GC), which is an objective, reproducible and reliable method, analyses air, incubated saliva, tongue debris or crevicular fluid for VSCs. GC has a high specificity that can detect VSC even at low concentrations. In this method the measurements are carried out with instruments equipped with a flame photometric detector or mass spectrum. The concentration of VSC (10 ng/mL) is assessed on the basis of hydrogen sulfide and methyl mercaptan preparations prepared as standard. In practice, the patient is told to close his mouth and hold his breath for 30 seconds. After the aspiration with the help of a gas-tight syringe of breath is injected into the GC column at 70 °C various disadvantages are expensive, requires trained staff, takes up a lot of space, is not suitable for daily practice and application takes much time.[3]

3. Sulfide Monitoring using portable sulfur monitor

In this method, the patient's mouth is first closed for 5 minutes. Then the disposable tubes of the device are placed in the patient's mouth and nose. At the same time when the air in the mouth is collected, the patient is asked to breathe through the nose. Sulfur components in the breath are detected by electrochemical reaction. This method is reproducible and easy to use. However, the ability to detect only sulfurcontaining compounds can lead to an incorrect assessment of the source and intensity of oral malodour. As oral malodour may also contain substances other than VSCs.

4. Chemical Sensors

Chemical sensors and sulfur monitors have a similar working principle. The probes of chemical sensors are sulphur sensitive. Sulphur components detected by the probe produce electro-chemical voltage. The voltage measured by the electronic unit is shown as digital scores on the device's screen. Chemical sensors, also known as electronic nose, could

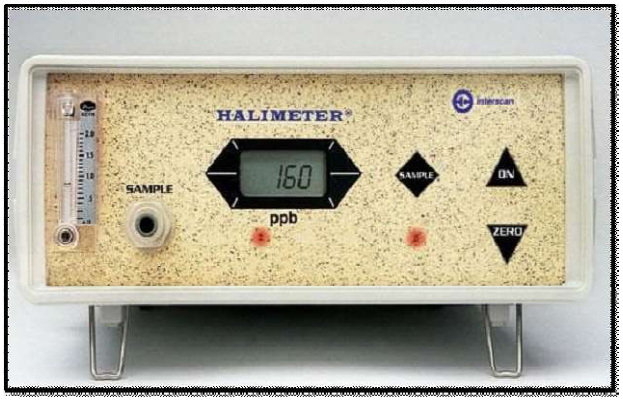


Fig: Portable sulfide monitor

measure ammonia, methyl mercaptan compounds and each volatile sulphurcontaining compound from breath air. The sensitivity of the sensors has positive correlation to gas chromatography and organoleptic scores.

INDIRECT MEASUREMENTS OF THE BREATH COMPONENTS

1. Salivary Incubation Test: Halitosis could be diagnosed with salivary incubation test. In this method, saliva is accumulated in a glass tube then the tube is incubated at 37 degrees in an anaerobic chamber which has 80% of nitrogen, 10% of carbon dioxide and 10% of hydrogen environment for 3-6 hour. Finally, practitioner measures the smell. The most important advantage of this method according to the organoleptic method is that it is less affected by external factors such as smoking, onion garlic eaten, spicy foods. Also, unpleasant measurement conditions in the organoleptic method are not found in this method. Salivary incubation test shows significant relation with organoleptic measurement.[4]
2. Benzoyl-DL-Arginine-A-Naphthylamide Test (BANA): BANA test is very useful for clinical practice. Samples taken with a cotton swab from the tongue surface to detect halitosis and subgingival plaque samples taken with curette for periodontal risk assessment are placed on the BANA test strip. The samples placed in the incubator are heated at 55 °C for 5 minutes. The presence of *Treponema denticola, Porphyromonas gingivalis* or *Bacteroides forsythus* is proved when the test strip turns blue. There is a positive correlation between the darkness of the blue and microorganism concentration. While organoleptic measurements with BANA test give similar results, sulphur monitor measurements can give different results, quantifying â-galactosidase activity. Several studies have shown that â-galactosidases are effective in the production of VSCs. Thus, measuring the efficacy of this enzyme can be used to diagnose halitosis.
3. Polymerase Chain Reaction (PCR): It not only gives information about the microflora on the dorsum of the but also the possibility determination VSC produced by the organism. When using molecular techniques, the most common species were found as *Streptococcus, Veillonella, Provetella* and *Actinomyces*. *Streptococcus* spp. are not identified by culture methods since the culture method was used only for detection of gram-negative species. *Veillonella and Prevotella* species can be detected both by culture method and by molecular technique. But *Fusobacterium* is determined by the molecular method. PCR and culture method give similar results to a limited extent.[5]
4. Ammonia Monitoring: In this method halitosis measurements can be made with a portable monitor that detects the amount of ammonia produced by the oral bacteria. Physicians ask patients to stop eating and drinking at least 2 hours before measurements. Then patients use the mouth rinse containing urea solution for 30 seconds and close the mouth for 5 minutes. A disposable mouth piece attached to an ammonia gas detector containing a pump that draws 50 mL of air through a tube is placed in the mouth of the patient. Ammonia measurement results are taken from the scale in the detector tube. Ammonia monitoring measurements show similar results with gas chromatographic method and different results with organoleptic method.

TREATMENT OF HALITOSIS

Proper diagnosis is essential for effective treatment of halitosis. If there is significant periodontal diseases and dental caries, which contribute to halitosis it should be treated. Ensuring adequate oral hygiene is the most important element for oral malodour treatment.

MANAGEMENT OF GENUINE HALITOSIS

Regular hygiene procedure to reduce food accumulation and malodour producing oral bacteria is of primary importance. The following dental aids are required for maintaining good oral hygiene.

- Tooth brush and interdental floss.
- Tongue cleaners
- Mouth washes
- Chewing gums and oxidising lozenges

Among methods of treatment are chemically and

mechanically reducing the number of microorganisms, products that mask the odour, and chemical neutralization of VSCs. Although there was a decrease in the number of bacteria with toothbrushing, some studies did not find any difference between regular toothbrushing and oral malodour. [6] The differences of the devices used have been declared as relation for the percentage of VSCs, such as a normal toothbrush will be 33%, a specially designed cleaner for tongue and plus to that periodontal health status, exactly a number of 51.8% with patients with halitosis than patients without periodontal disease and also 49% to patients with periodontitis.

The primary objective of antimicrobial therapy is to reduce proteolytic, anaerobic flora on the tongue surface. Treatment management should include components such as a tongue scraper that reduce the mechanical load and antimicrobial mouth rinse that reduce the chemical load. Frequently used antimicrobial mouth rinse are chlorhexidine (CHX), essential oils, triclosan and cetylpyridinium chloride (CPC), metal ions and oxidizing agents.

The gold standard CHX is also accepted for mouth rinse used for halitosis treatment. Combined use of CHX and CPC resulted in both a reduction of aerobic and anaerobic bacterial load and a further decrease in VSCs level. In a study using a combination of zinc at 0.3% concentration and CHX at 0.025% concentration were observed to 0.16% drop at 1 hours, 0.4% drop at 2 hours, and 0.75% drop after 3 hours at H2S levels. It has also been shown that consumption of daily tablets containing probiotic *Lactobacillus salivarius* may help control factors associated with oral malodour.

Recently, Halita mouthwash-first scientific treatment was developed for the control of oral halitosis.[7] This mouthwash-

a. Eliminates the layer of bacteria that produce malodorous gases and prevents their subsequent growth.

b. Combination of chlorhexidine digluconate (0.05%), cetylpyridinium chloride (0.05%) and zinc lactate (0.14%) reduces bacterial growth.

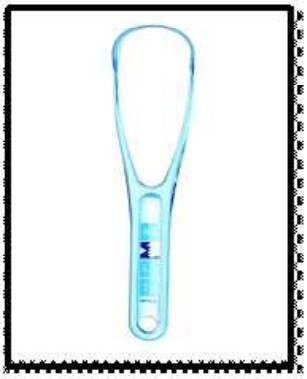
CONCLUSION

❖ Social relationships are one of the pillars of the quality of life. Halitosis can be a crippling social problem and therefore needs to be considered a serious problem. As dentists, we need to make sure each patient visits the clinic every six months for their routine oral check-ups. Correct way of brushing methods and use of mouthwashes need to be emphasised in every visit to make sure patient doesn't develop halitosis. If halitosis is due to extra oral causes, it is important to refer the patient to an appropriate specialist. Halitosis associated with medication needs to be discussed with patient's physician. There are some of the natural care or home remedies recommended for halitosis like chewing cloves, fennel seeds, or aniseeds. Their antiseptic qualities help fight halitosis-causing bacteria.

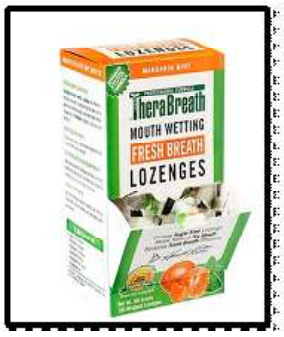
CHX MOUTHWASH

HALITA MOUTHWASH

TOOTH BRUSH



TONGUE SCRAPER



OXIDISINGLOZENGES

INTERDENTAL FLOSS

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