

Oral Malodor: A Common Oral Problem

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Abstract

Oral malodor, also called halitosis or bad breath, is universally experienced condition that has a variety of etiologic factors. It is extremely common and majority of adult population have had it at some point in time. Halitosis may be physiological, pathological, and sometimes psychological also. Although numerous non-oral sites and many different causes have been correlated to bad breath, an estimated 80 percent to 90 percent of all bad breath odors originate from the mouth, and bacteria are directly responsible for most of the offensive gases. Specific groups of bacteria have been identified with the production of oral malodor, in particular, gram- negative, anaerobic bacteria. The unpleasant smell of breath mainly originates from volatile sulfide compounds (VSCs), especially hydrogen sulfide (H₂S), methylmercaptan (CH₃SH), and dimethylsulfide [(CH₃)₂S] result from the proteolytic degradation of peptides present in saliva, shed epithelium, food debris and gingival crevicular fluid (GCF). This article reviews the etiology, diagnosis, and treatment of oral malodor and gives a brief description of Halitosis Associated Life-quality Test (HALT) questionnaire, a specific 20-item quality-of-life measure for halitosis.

Keywords: Oral malodor; Halitosis; Volatile sulfide compounds (VSCs)

Introduction

Oral malodor has been recognized in the literature since ancient times, but in the last five to six years it has increasingly come to the forefront of public and dental professional awareness [1]. Approximately 40-50% of dentists see 6-7 self-proclaimed oral malodor patients per week [2]. Oral malodor is the subjective perception after smelling someone's breath. It can be pleasant, unpleasant, or even disturbing, if not repulsive. It is extremely common and majority of adult population have had it at some point in time [3]. At least 50% of the population suffers from a chronic oral malodor condition by which individuals experience personal discomfort and social embarrassment leading to emotional distress. The consequences of oral malodor may be more than social; it may reflect serious local or systemic conditions [1].

Who seeks help?

Halitosis may be physiological or pathological [4]. Physiologic oral malodor is transient in duration as it can be controlled to varying degrees in most individuals by oral hygiene measures. In a special patient category, subjects imagine they have breath malodor; this is called imaginary breath odor or halitophobia. The latter has been associated with obsessive- compulsive disorders and hypochondria (psychological) [5]. Most have been oblivious to the problem and studies show that people are poor judges of their own breath odor (adaptation/desensitization due to chronic exposure) [6].

Where does it come from?

The etiology of oral malodor is multifactorial. The unpleasant smell of breath mainly originates from volatile sulphide compounds (VSCs), especially hydrogen sulfide (H₂S), methylmercaptan (CH₃SH), and dimethylsulfide [(CH₃)₂S], (make up more than 90 percent of the putrid odors from the mouth [7]) as first discovered by Tonzetich [3]. Nonsulfur-containing compounds such as cadaverine, putrescine, indole, skatole, and volatile fatty acids such as butyric or propionic acid have also been implicated in the foul smell of oral malodour [8]. Most

of these compounds result from the proteolytic degradation by oral microorganisms of peptides present in saliva, shed epithelium, food debris, gingival crevicular fluid (GCF), interdental plaque, postnasal drip, and blood. In particular, gram- negative, anaerobic bacteria possess such proteolytic activity.

Proteolysis of proteins → peptides → aminoacids → free thiol groups and volatile sulphides

Main causes of halitosis

Halitosis can be subdivided into intra-oral and extra-oral halitosis, depending on the place where it originates. Most reports now agree that the most frequent sources of halitosis exist within the oral cavity and include bacterial reservoirs such as the dorsum of the tongue, saliva and periodontal pockets, where anaerobic bacteria degrade sulfur-containing amino acids to produce the foul smelling volatile sulfur compounds (VSCs), especially hydrogen sulfide (H₂S) and methyl mercaptan (CH₃SH). Tongue coating is considered to be the most important source of VSCs [9,10].

Intra- oral causes

Some of the intra-oral causes that can cause halitosis are deep carious lesions with food impaction and putrefaction, extraction/healing wounds filled with a blood clot, crowding of teeth, acrylic dentures especially when kept in mouth at night or not regularly cleaned, periodontal infections, gingivitis, plaque coating on the

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dorsum of the tongue, restorative crowns which are not well adapted, cysts with fistula draining into the mouth, oral cancer and ulcerations. Oral malodor may be aggravated by a reduction in salivary flow (patients with xerostomia) [11].

The tongue plaque coating

Research suggests that the tongue is the primary site in the production of oral malodor. The dorsoposterior surface of the tongue has been identified as the principal location for the intraoral generation of VSCs [12]. A variety of index systems for tongue coating has been developed over the years. Miyazaki et al divides the tongue into three sections and the presence or absence of tongue coating is registered as follows: Score 0 = none visible, Score 1 = less than one third of tongue dorsum is covered, Score 2 = between one and two thirds, Score 3 = more than two thirds [13]. Winkel et al divides the tongue into six sections, three in the posterior and three in the anterior part of the tongue. Each sextant is categorized as: Score 0 = no coating present, Score 1 = presence of a light coating, Score 2 = presence of a distinct coating. The resulting Winkel tongue coating index (WTCl) is obtained by adding all six scores (Figure 1) [14].

The tongue is a haven for the growth of microorganisms since the papillary nature of the tongue dorsum creates a unique ecological site that provides an extremely large surface area, favoring the accumulation of oral bacteria. The proteolytic, anaerobic bacteria that reside on the tongue play an essential part in the development of oral malodor. The presence of tongue coating has been shown to have a correlation with the density or total number of bacteria in the tongue plaque coating [15].

Microbiota associated with oral malodor

Specific groups of bacteria have been identified with the production of oral malodor. Putrefaction is thought to occur under anaerobic conditions, involving a range of gram-negative bacteria such as *Fusobacterium*, *Veillonella*, *T. denticola*, *P. gingivalis*, *Bacteroides* and *Peptostreptococcus* [16]. Studies have shown that essentially all odor production is a result of gram-negative bacterial metabolism and that the gram-positive bacteria contribute very little odor [17]. *Fusobacterium nucleatum* is one of the predominant organisms associated with gingivitis and periodontitis and this organism produces high levels of VSCs. The nutrients for the bacteria are provided by oral fluids, tissue and food debris. Isolates of *Klebsiella* and *Enterobacter* emitted foul odors in vitro which resembled bad breath with concomitant

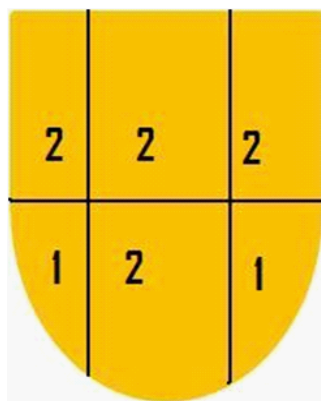


Figure 1: Winkel Tongue Coating Index (WTCl).

production of volatile sulfides and cadaverine, both compounds related to bad breath in denture wearers [8]. The amount of volatile sulfur compounds (VSCs) and methyl mercaptan/hydrogen sulfide ratio in mouth air from patients with periodontal involvement were reported to be eight times greater than those of control subjects [18].

Extra-oral causes

Extra-oral causes include.

Otolaryngology and respiratory diseases

Halitosis is a very common complaint among ENT patients. The main causes of halitosis related to the oronasal cavity are acute viral or bacterial pharyngitis, chronic/purulent tonsillitis, retropharyngeal abscesses, deep crypts of the tonsils, caseous retention, chronic/purulent sinusitis, postnasal drip, cancer of the pharynx, foreign body in nasal or sinusal cavity. Postnasal drip is often associated with chronic sinusitis or regurgitation esophagitis, in which the acidic content of the stomach reaches the nasopharynx and causes mucositis. This rather common condition is perceived by patients as a liquid flow in the throat, originating from the nasal cavity [11,19, 20]. Nasal obstruction leads to mouth breathing causing dryness of the mouth. A dry mouth causes more epithelium cells exfoliation, xerostomia, tongue coating and therefore increases the production of volatile sulfur compounds (VSCs) [21].

The deep crypts of the tonsils have to do with caseous retention. Chronic caseous tonsillitis is a pathology, which symptoms are described by patients as a foreign body in the throat, throat irritation, and halitosis complaint is very high [22].

Concerning the bronchi and lungs, there are some pathologies such as chronic bronchitis, bronchial carcinoma, bronchiectasis that cause tissue necrosis and ulcerations, producing malodorous gases, which are expired causing halitosis [23].

In addition, objects aspirated accidentally can lead to lung abscess formation and consequently produce halitosis bodies [21].

Digestive diseases related to halitosis

Many digestive diseases are traditionally associated with halitosis. Reflux esophagitis, hiatal hernia, Zenker diverticulum, achalasia are associated. Actually, steatorrhea or other malabsorption syndromes, which cause excessive flatulence, are the most important causes of halitosis concerning gastrointestinal diseases [19,21].

Specialists often require gastroenterological assessment when facing a halitosis complaint. Endoscopy is one of the most widely requested tools in halitosis investigation [24].

Endoscopy is important to assess gastroesophageal reflux disease (GERD) and hiatal hernia, gastritis, duodenitis, ulcers, carcinomas and helicobacter infection [25].

In GERD, an improper function of the gastroesophageal inferior sphincter allows acid and non-acid stomach contents to flow back into the esophagus. This alteration could result in esophageal mucosal break down. These areas can be inhabited by bacteria, causing the production of volatile Sulfur compounds. In some cases, esophagus sphincter pathologies can cause halitosis due to putrefaction of the trapped food debris and food stasis [21,25].

The *Helicobacter pylori* infection has been associated with breath malodor; however, it is still controversial [24-27]. Some studies

correlate *H. pylori* infection and altered VSC halitometries. There is some evidence that halitosis complaint in *H. pylori*-positive non-ulcer dyspepsia could mean *H. pylori* eradication [24]. Nevertheless, *H. pylori* has a high urease activity, which explains the pH increase and the lowered solubility of many malodorants [25]. This fact does not prove that *H. pylori* causes halitosis by itself. Indeed some authors believe that there is no convincing evidence that oral malodor can be linked to *H. pylori* infection [26].

The presence of clots or bleeding points at any part of the digestive system can cause halitosis due to the deterioration of blood [21]. Therefore, any causes of gastrointestinal bleeding (tumors, inflammatory diseases, parasites) can cause halitosis [19].

Liver cirrhosis is characterized by the irreversible damage of the liver parenchyma resulting in the accumulation of ammonia. Ammonia reaches lungs through expired air, causing characteristic halitosis [3]. Generally, patients in hepatic encephalopathy have a characteristic breath scent.

Other causes

Renal impairment is normally a result of a chronic glomerulonephritis, which damage the glomerular function, leading to an increased urea level in the blood. Breathed air is described as ammonium-like breath and generally is accompanied by complaints of dysgeusia (salty taste) [21].

Diabetes can result in accumulation of ketone bodies, which are breathed out producing a very characteristic halitus, moreover, diabetes causes dry mouth. In addition, diabetes and other insulin-resistance states are related to impaired secretion of body fluids, like tear and saliva. There is a decrease in saliva production and xerostomia can occur [28].

Trimethylaminuria or “fish odor syndrome” is a genetic metabolic disorder characterized by a failure in the oxidation route from trimethylamine (TMA) to trimethylamine N-oxide (TMA-O) in the liver. High levels of TMA in urine and others body fluids confer that typical unpleasant, intermittent characteristic fishy odor to the breath [21].

Tumor lesions in any part of the body also produce volatile gases due to the necrosis process. These gases are expired in the breathed air

causing halitosis and that is the reason why halitosis can indicate the presence of serious diseases [21].

Radiation therapy, Sjogren’s syndrome, and certain types of carcinomas such as leukemia can also contribute to oral malodour [11,29].

Medications such as antimicrobial agents, antirheumatic, antihypertensive, antidepressants and analgesics may cause altered taste and xerostomia. The main causes of halitosis are summarized in (Table 1) [19].

Specific character of breath odor

- A “rotten eggs” smell is indicative of VSCs.
- A sweet odor, as that of “dead mice” has been associated with liver insufficiency; besides VSCs, aliphatic acids (butyric, isobutyric, propionic) accumulate.
- The smell of “rotten apples” has been associated with unbalanced insulin-dependant diabetes, which leads to the accumulation of ketones.
- A “fish odor” can suggest kidney insufficiency characterized by uremia and accumulation of dimethylamine and trimethylamine [30].

Diagnosis of oral malodor

Oral malodor is a ubiquitous and common condition. Since this is a distressing symptom for patients, the need to diagnose the underlying cause is very important. Once diagnosed, the appropriate therapy can be instituted. The cause, if possible, should be defined by the treating doctor so as to help the patient.

The proper diagnostic approach to a malodor patient starts with a thorough questioning about the medical, dental and halitosis history. It is necessary to determine whether the patient’s complaint of bad breath is due to oral causes or not. It is important to determine the source of oral malodor; complaints about bad taste should be noted. In most cases, patients that complain of bad taste may not have bad breath. The taste disorders may be due to other causes [31]. The patient’s history should be discretely and intermittently noted. The clinician should ask about the frequency (e.g., every month), time of appearance within the day (e.g., after meals can indicate a stomach hernia), whether others (nonconfidants) have identified the problem (excludes imaginary breath odor), what medications are taken, and whether the patient has dryness of the mouth or other symptoms [30].

There are a number of methods, from simple to sophisticated, used to detect or diagnose the presence of oral malodor. These are:

Self-examination

When an intraoral cause has been identified, involve the patient in monitoring the results of therapy by self-examination. The following self-testing can be used:

- Smelling a metallic or nonodorous plastic spoon after scraping the back of the tongue.
- Smelling a toothpick after introducing it in an interdental area.
- Smelling saliva spit in a small cup or spoon.
- Licking the wrist and allowing it to dry [30].

LOCALIZATION	FREQUENCY	DISEASES
MOUTH	90%	Dental caries, periodontal diseases, tongue coating, exposed tooth pulps, healing wounds, interdental food impaction, dentures not cleaned properly, restorative crowns not well adapted, ulcerations, Dry mouth, fistula, and oral cancer.
ENT AND RESPIRATORY SYSTEM	8%	Pharyngitis, tonsillitis, sinusitis, foreign body in nasal or sinus cavity, bronchitis, bronchial carcinoma, bronchiectasis
DIGESTIVE SYSTEM	1%	Regurgitation esophagitis, Hiatal hernia, Helicobacter pylori infection
OTHERS	1%	Kidney insufficiency, Hepatic failure, Diabetes, Psychogenic factors, Halitophobia, Starvation, Trimethylaminuria, Some foods such as garlic, onions, meat, fish, and cheese, Habits: smoking, alcohol

Table 1: Main Causes of Halitosis.

Professional Diagnosis

If bad breath is persistent, and all other medical and dental factors have been ruled out, specialized testing and treatment is required. Some of several laboratory methods for diagnosis of bad breath are:

Organoleptic rating

Even though instruments are available, organoleptic assessment by a judge is still the “gold standard” in the examination of breath malodor. In organoleptic evaluation, a trained “judge” sniffs the expired air and assesses whether or not this is unpleasant using an intensity rating, normally from 0 to 5, as proposed by Rosenberg and McCulloch [32]. It is solely based on the olfactory organs of the clinician: 0 = no odor present, 1 = barely noticeable odor, 2 = slight but clearly noticeable odor, 3 = moderate odor, 4 = strong offensive odor, and 5 = extremely foul odor. Individuals are instructed to refrain from using any dental products, eating or using deodorants or fragrances four hours prior to the visit to the clinic. Individuals are also advised to bring their confidante or friends to assess their oral malodor.

In order to create a reproducible assessment, subjects are instructed to close their mouth for two minutes and not to swallow during that period. After two minutes the subject breathes out gently, at a distance of 10 cm from the nose of their counterpart and the organoleptic odors are assessed [33]. In order to reduce inter-examiner variations, a panel consisting of several experienced judges is often employed. A study on the inter-examiner reproducibility indicates that there is some correlation, albeit poor [34]. Gender and age influence the performance of an organoleptic judge. Females have a better olfactory sense and it decreases with age. Dentists and periodontists may not be ideal judges if they do not use masks on a daily basis [35]. The main disadvantage of this method is that it is subjective to the judge's olfaction.

Portable sulfide meter

The portable sulfide meter (Halimeter®) has been widely used over the last few years in oral malodor testing. The portable sulfide meter uses an electrochemical, voltametric sensor which generates a signal when it is exposed to sulfur gases (to be specific, hydrogen sulfide) and measures the concentration of hydrogen sulfide gas in parts per billion. The halimeter is portable and does not require skilled personnel for operation. The main disadvantages of using this instrument are it fails to detect other odorants which contribute to halitosis, such as volatile short-chain fatty acids, polyamines, alcohols, phenyl compounds, alkanes, ketones, and nitrogen-containing compounds [34]. Certain foods such as garlic and onions produce sulfur in the breath for as long as 48 hours and can result in false readings. The measurements may be affected if the subject is wearing perfume, hair spray, deodorant, etc. The Halimeter is also very sensitive to alcohol, so one should avoid drinking alcohol or using alcohol-containing mouthwashes for at least 12 hours prior to being tested. This analog machine loses sensitivity over time and requires periodic recalibration to remain accurate [32].

Gas chromatography

Gas chromatography is the preferable method if quantitative measurements of specific gases are required. This is a highly reproducible, objective, and reliable method in which the concentration of volatile sulphur-containing compounds in samples of saliva, tongue coating or expired breath is measured by producing mass spectra and analyzed by a gas chromatograph [36]. The main disadvantages of using this instrument are the equipment is expensive and requires skilled

personnel to operate it. This equipment is also cumbersome and the analysis is time consuming. As a result, gas chromatography cannot be used in the dental office and is not always used in oral malodor clinical trials. Recently a closed-loop trapping system followed by off-line high resolution gas chromatography ion trap detection was used for detection of compounds from saliva and tongue coating samples [37]. Numerous volatile components were detected ranging from ketones to alkanes and sulphur-containing compounds to phenyl compounds.

Saliva incubation test

The analysis of the headspace above incubated saliva by gas chromatography reveals hydrogen sulfide, methylmercaptan, dimethylsulfide, indole, skatole, lactic acid, methylamine, diphenylamine, cadaverine, putrescine, urea, ammonia, dodecanol, tetradecanol, and others. These components are elevated in the presence of periodontitis, although this does not necessarily prove they play a role in odor production. By adding some proteins, such as lysine or cysteine, the production of cadaverine or hydrogen sulphide is dramatically increased. Organoleptic evaluation of the saliva headspace offers promising perspectives for monitoring treatment results [38]. It is a less invasive test, especially for the patient, than smelling breath in front of the oral cavity.

Bana test

The BANA (Benzoyl-DL-arginine-2 naphthylamide) test has been used to detect *T. denticola* and *P. gingivalis*. The two organisms that may contribute to oral malodor can be easily detected by their capacity to hydrolyze BANA, a trypsin-like substrate. BANA scores are associated with a component of oral malodor, which is independent of volatile sulfide measurements, and suggest its use as an adjunct test to volatile sulfide measurement [39]. Higher mouth odor organoleptic scores are associated with heavy tongue coating and correlate with the bacterial density on the tongue and it also correlates to BANA-hydrolyzing bacteria- *T. denticola*, *P. gingivalis*, and *Bacteroides forsythus* [16].

β-galactosidase test

Salivary levels of this enzyme were found to be correlated with oral malodour [40].

Dark-field or phase-contrast microscopy

Gingivitis and periodontitis are typically associated with a higher incidence of motile organisms and spirochetes, so shifts in these proportions allow monitoring of therapeutic progress. Another advantage of direct microscopy is that the patient becomes aware of bacteria being present in plaque, tongue coating, and saliva. High proportions of spirochetes in plaque have been associated with a specific acidic malodour [30].

The electronic nose

The “Electronic Nose” is a hand held device, being developed to rapidly classify the chemicals in unidentified vapor. Its application by scientists and personnel in the medical and dental field as well as it is hoped that this technology will be inexpensive, miniaturizable and adaptable to practically any odor detecting task [41]. If the Electronic Nose can learn to “smell” in a quantifiable and reproducible manner, this tool will be a revolutionary assessment technique in the field of oral malodor. This device is based on sensor technology that can smell and produce unique fingerprints for distinct odors. Preliminary data

indicates that this device has a potential to be used as a diagnostic tool to detect odors.

The tests described above show that from a practical viewpoint, halitosis detection for the common practitioner is quite intriguing with a large discrepancy among tests. Likewise, monitoring a patient's progress is even harder, with only organoleptic testing assessing halitosis subjectively in a specific time frame. These factors of cumbersome detection and monitoring halitosis may play a role in a relative reluctance of treating halitosis [42,43].

Moreover, halitosis is an important negative factor in social communication affecting quality-of-life (QOL) and also appears as a contributing factor in other chronic diseases such as sinusitis or following irradiation. Hence, an incorporation of a valid QOL tool in reporting halitosis treatment results will allow standardization of conclusions and improvement in the accuracy, with direct clinical relevance of treatment assessment. As no current quality of life (QOL) exists for measurement of halitosis, formulation of such a questionnaire can enable a measurement of subjective halitosis with change observed over time or with intervention [44].

Halitosis associated life-quality test (halt)

A model used by many for health status is dictated by the Institute for Medical Rehabilitation and Research hierarchy. Using this conceptual model, physical impairments, functional limitations, disabilities, and social limitations are described [45-47]. This model is not always concordant with the condition-specific QOL. As QOL is purely subjective and relates to personal experience rather than health status, a tool must be devised that can capture and measure the QOL of healthy individuals with halitosis as a solitary health burden, as well as measure the QOL impact of halitosis on less healthy individuals. Therefore, as in other QOL tools, a rather narrow halitosis-specific focused QOL tool was devised [48]. The Halitosis Associated Life-quality Test (HALT) is a de novo designed tool based on patient interviews and literature review. This new tool is devised to measure oral malodor (halitosis) and associated quality of life (QOL) [44].

Questions
Q1. Mainly mouth breathing
Q2. Frequent tonsillar infections
Q3. Frequent sinus infections
Q4. Worrying about or self conscious about your mouth breath
Q5. Miserable or tense due to halitosis
Q6. Difficulty chewing or limiting certain food due to halitosis
Q7. Change of taste
Q8. Problems speaking (or mouth covering) due to halitosis
Q9. Appearance affected due to halitosis
Q10. Depressed due to mouth breath
Q11. Problems concentrating due to halitosis
Q12. Embarrassed due to halitosis
Q13. Spending time related to halitosis
Q14. Talking from afar due to halitosis
Q15. Avoid going out due to halitosis
Q16. Communication problems due to halitosis
Q17. Mentioned about halitosis
Q18. Suffer financial loss due to halitosis
Q19. Suffer social/personal loss due to halitosis
Q20. Reduced life satisfaction due to halitosis

Table 2: Halitosis QOL Questionnaire.

HALT is a QOL questionnaire with 20 items, each item graded on the commonly accepted Likert scale of 0-5; a higher score indicated a worsening of that single measure. This questionnaire consists of 20 questions covering functional limitation, physical discomfort, psychological discomfort, physical disability and social disability. (Table 2) This tool can immensely help monitoring one's treatment progress. Assessment of treatment or monitoring is generated by a difference produced between an initial score and any following. HALT can be used in reporting, establishing, and continuing treatment both in the routine clinical practice and in the investigational setting. HALT is easy to read as well as to fill out. It can be used as a single tool or combined with other tools for measuring therapeutic effectiveness and response [44].

Treatment of Oral Malodor

Oral malodor is a multifactorial problem that requires a well-defined approach to diagnosis and treatment. Successful treatment is associated with the ability to identify the major and minor contributing factors and to address them with appropriate and effective therapy [49].

The ultimate goal of treatment for oral malodor should be directed at eliminating or at least reducing the causative microorganisms and associated substrates. If the microorganisms quantity and plaque maturity are controlled, then their capabilities to produce VSCs are greatly reduced. The substrate available for metabolic breakdown should likewise be eliminated or reduced with good oral hygiene and control of periodontal inflammatory disease [49].

Following general treatment strategies can be applied:

1. Mechanical reduction of intraoral nutrients and microorganisms: tongue cleaning, interdental cleaning and toothbrushing are essential mechanical means of dental plaque control [50].
2. Chemical reduction of oral microbial load: Mouthwashes have been used as chemical approach to combat oral malodor. Antibacterial components in oral rinses such as cetylpyridinium chloride (CPC), chlorhexidine, triclosan, essential oils, quaternary ammonium compounds, benzalkonium chloride and hydrogen peroxide have been considered along with mechanical approaches to reduce oral malodour [51-53]. Any successful mouthrinse formulation must balance the elimination of the responsible microbes while maintaining the normal flora and preventing an overgrowth of opportunistic pathogens. Most commercially available mouthrinses only mask odors and have only a temporary reducing effect on the total number of microorganisms in the oral cavity. Even when these mouthrinses do contain antiseptic substances, the effects are usually not long-lasting [54,55].

• Identification and treatment of contributing factor
• Avoid foods like onions, garlic and spices
• Avoid habits that may worsen breath odor such as alcohol and tobacco
• Brush your teeth regularly and after meals and keep oral hygiene regular and good
• Rinse at least twice daily with chlorhexidine, triclosan, essential oils or other mouthwashes
• Brush your tongue with tongue scraper
• Keep your mouth as moist as possible
• Dentures should be kept out at night in hypochlorite or chlorhexidine

Table 3: Points for patients: Control of Halitosis.

3. Rendering malodorous gases non-volatile: zinc salt containing mouthwashes [56], baking soda dentifrices [57], and chewing gum formulated with antibacterial agents and tea extracts like epigallocatechin [58].
4. Masking the malodor: mouth sprays and lozenges containing volatiles with a pleasant odor.

A few points that must always be remembered for the control of halitosis are summarized in Table 3.

Conclusion

Breath malodor has important socioeconomic consequences and can reveal important diseases. Therefore, halitosis must be treated as a serious condition, a multifactorial and a rational approach are essential for good results. A proper diagnosis and determination of the etiology allows initiation of proper etiologic treatment. An estimated 80 percent to 90 percent of all bad breath odors originate from the mouth and are caused by bacteria. Anaerobic bacteria, oxygen depletion, alkaline pH and sulfur-containing substrates are some of the requirements for oral malodor to occur. Management of oral malodor is therefore dependent on diagnosing the foul breath as physiological or pathological and therapy should then be appropriately and specifically directed to the cause of the oral malodor to ameliorate or totally eliminate the condition.

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