Oral Malodor – Diagnosis and Management

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Abstract — Several terms like oral malodor, breath malodor, bad or foul breath and halitosis are used to prescribe noticeably unpleasant odors exhaled in breathing. Social relationships are one of the pillars of the quality of life. In that respect, halitosis can be a crippling problem & therefore needs to be considered a serious problem. Extraoral halitosis might be a manifestation of a serious disease. It is of paramount importance to differentiate between extraoral & intraoral halitosis. Since in most of the cases of halitosis, the oral cavity is the place of origin, health professionals in medicine & dentistry should be knowledgeable about diagnosis & therapy of this disorder. In most cases, intraoral halitosis can be treated by tongue scraping & the use of chemical solutions such as Chlorhexidine. The dental hygienist, dentist and periodontist are the most appropriate professionals to diagnose and to treat this condition. The present paper focuses on the diagnosis and management of oral halitosis.

I. INTRODUCTION

Breath malodor is a considerable social problem & its incidence remains poorly documented in most countries. Most of the patients complain about breath malodor for several years before seeking proper advice. Because of the complexity of this pathology, a malodor consultation preferably is multidisciplinary, combining the knowledge of a periodontist or dentist, an ENT specialist, eventually a gastroenterologist &/or psychiatrist.

Definition: Breath Odor: It can be defined as the subjective perception after smelling someone’s breath [1].

Classification [2]
Role of volatile sulfur compounds: The unpleasant smell of breath originates from volatile sulfur compounds (VSCs), especially hydrogen sulfide, methyl mercaptan and dimethyl sulfide as first discovered by Tonzetich. However, other compounds in mouth air may also be offensive, such as diamines (Putrescine, cadaverine), indole, skatole and butyric or propionic acid. Most of these compounds result from the proteolytic degradation by oral microorganisms of peptides present in the 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.

Periodontal Infections: Bacteria associated with gingivitis and periodontitis are almost Gram negative (Porphyromonas gingivalis, Prevotella intermedia, Campylobacter rectus, Fusobacterium nucleatum, Actinobacillus actinomycetemcomitans) and are known to produce VSCs. The VSC levels in the mouth correlate positively with the depth of the periodontal pockets (the deeper the pocket, the more bacteria, particularly anaerobic species) and the amount of VSC in the breath increases with the number, depth and bleeding tendency of the periodontal pockets. The low oxygen tension in deep periodontal pockets also results in low pH & activation of the decarboxylation of the amino acids (e.g. lysine, ornithine) to cadaverine and putrescine, two malodorous diamines. Thus, in the presence of gingivitis or periodontitis, besides the prominent role of VSCs, other molecules might play a significant role.

### Causes of Oral Malodor

<table>
<thead>
<tr>
<th>Intra-oral Causes:</th>
<th>Extra-oral Causes:</th>
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</thead>
<tbody>
<tr>
<td>1. Periodontal Infections</td>
<td>1. Ear-Nose-Throat:- Purulent sinusitis, Post-nasal drip</td>
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<tr>
<td>2. Volatile sulfur compounds</td>
<td>2. Bronchi &amp; lungs:- Chronic bronchitis, Bronchial carcinoma</td>
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<tr>
<td>3. Tongue &amp; tongue coating</td>
<td>3. GIT:-Zenker’s diverticulum, Regurgitation esophagitis, Intestinal gas production, Trimethylaminuria</td>
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<tr>
<td>4. Pericoronitis</td>
<td>4. Cirrhosis of liver</td>
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<td>5. Dry mouth</td>
<td>5. Trimethylaminuria</td>
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<tr>
<td>6. Herpetic gingivitis</td>
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<td>7. Major recurrent oral ulcerations</td>
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</tbody>
</table>

### Causes of Blood Borne Halitosis[6]

<table>
<thead>
<tr>
<th>Systemic diseases</th>
<th>Odorant</th>
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</thead>
<tbody>
<tr>
<td>Liver cirrhosis</td>
<td>Dimethyl sulfide</td>
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<tr>
<td>Uremia</td>
<td>Dimethylamine</td>
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</tbody>
</table>

### Metabolic disorders

- Fish odor syndrome: Trimethylamine

### Medication

- Disulfiram: Carbon disulfide
- Cysternine: Dimethyl sulfide

### Food

- Onion: Allyl methyl sulfide
- Garlic: Methyl propyl sulfide

### Some drugs associated with halitosis[7]

- Tobacco
- Alcohol
- Chloral hydrate
- Nitrites & nitrates
- Dimethyl sulfoxide
- Disulfiram
- Cytotoxic agents
- Phenothiazines
- Amphetamines

### Diagnosis of Malodor:

#### A. Self Examination

1. Smelling a metallic or non-odorous plastic spoon after scraping the back of the tongue.
2. Smelling a toothpick after introducing it in an interdental area.
3. Smelling saliva spit in a small cup or spoon (especially when allowed to dry for a few seconds so that putrefaction odor can escape from the liquid).
4. Licking the wrist & allowing it to dry (reflects the saliva contribution to malodor).
B. Laboratory Examination

Organoleptic measurements: Sniffing of expelled air of the patient by using the nose of the examiner, organoleptic scoring, is the usual technique for halitosis examination in daily practice (Fig. 1). Differentiation between intraoral & extraoral halitosis can easily be done by comparing mouth breath with nose breath. [8]

Sulfide monitor: Dental practices & breath clinics now use portable sulfide monitors. E.g. Halimeter™ [9]. It can test the breath air for levels of sulphur emissions. The Halimeter (Fig. 2) has a high sensitivity for hydrogen sulfide but a lower sensitivity for methyl mercaptan, which is a significant contributor to halitosis. It is unsuitable for measuring patients with extraoral halitosis from dimethyl sulfide [10]. According to the manufacturer, human standard (normal) Halimeter readings range between 80-110 ppb. Values over 160 ppb are considered to identify a patient with true halitosis.

Gas chromatography: By far, it is the most appropriate method to detect halitosis of different origins & should be considered as the gold standard.(Fig. 3) It is an objective means of obtaining exact values for the various odorous volatiles. It is extremely sensitive & produces visual results in graph form via computer interface.

Dark-field or Phase contrast microscopy: Gingivitis & periodontitis are typically associated with a higher incidence of motile organisms & 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 & saliva. High proportions of spirochetes in plaque have been associated with a specific acidic malodor.

III. GENERAL TREATMENT STRATEGIES

1. Mechanical reduction of intraoral nutrients & microorganisms: A recommended regime for patients with severe halitosis is to use five strokes of the tongue scraper twice a day. (Fig. 4) Tongue cleaning has additional benefit of improving taste sensation.

2. Chemical reduction of oral microbial load: Chlorhexidine is the most effective anti-plaque agent.

Mechanism Of Action: Disruption of bacterial cell membrane by the chlorhexidine molecules, increasing its permeability & resulting in cell lysis & cell death. Because of its strong antibacterial effects & superior substantivity in the oral cavity, it provides significant reductions in VSC levels & organoleptic ratings.

3. Masking the malodor: A typical example is mint-containing lozenges. It can also be achieved by ensuring a proper liquid intake or by using a chewing gum. To lower the pH, an orange juice may be sufficient, but the effect is short term. (low pH increases the solubility of the VSCs)

REFERENCES


