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# Halitosis (Causes of halitosis and symptoms and methods of treatment)


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# Dedication

Praise be to Allah for His blessings, and gratitude to Him for His inspiration.

After thanking Allah, His Messenger, and His saints, as well as all those who have supported us—family, teachers, friends, and loved ones—we dedicate the fruits of this research to the Guardian of Allah and His Remnant on Earth, our Master Imam Muhammad ibn al-Hasan (peace be upon him). May this be the first step on our path to serving him through knowledge and testimony.

To the bearer of the great religious authority, whose call we answer; to those who sacrificed their lives and worldly comforts for faith and homeland; to those whom death revives, welcomed by angels before kin and people.

To our Holy Mobilization Forces and their valiant soldiers—before your generosity, our efforts pale. We offer only the years we have strived in safety, made possible by your sacrifices, as our humble gift to you today.

With deepest respect and gratitude.

# Gratitude and Appreciation

In the name of Allah, the Most Gracious, the Most Merciful .

All praise is due to Allah, Lord of the worlds, who blessed us with the knowledge, patience, and ability to complete this research. Peace and blessings be upon the noblest of prophets, Muhammad, and upon his family and companions .

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We are also grateful to our university for providing us with the necessary resources and facilities to conduct this research .

To our beloved families, we owe immense gratitude for their unwavering support, prayers, and encouragement during the challenging phases of this work. Their love and patience have been our greatest strength .

Finally, we thank all those who directly or indirectly contributed to the completion of this research. May Allah reward everyone who supported us in this endeavor .

All praise is to Allah, by whose grace all good things are accomplished.

## 1. Introduction:

Halitosis, also known as oral malodor or bad breath, has a worldwide prevalence ranging from 22% to 50%, representing the third most common reason for contacting a dentist. Although there are a series of factors that can contribute to the presence of halitosis, such as otorhinolaryngological diseases, gastrointestinal disorders, metabolic disorders, or chronic medication, in most cases, halitosis has an oral etiology with incorrect tongue brushing being the main factor that leads to this condition, followed by other intra-oral factors such as unstimulated salivation volume, periodontal conditions, caries, fixed orthodontic brackets, or debris accumulation.[(1)]

The classifies this condition into three categories: genuine halitosis, pseudo-halitosis, and halitophobia. Genuine halitosis indicates the presence of malodor as a result of dental investigations such as organoleptic tests with sulfur portable reading devices. On the other hand, pseudo-halitosis and halitophobia cannot be measured objectively, being described only by a subjective complaint by the person who seeks medical help. While genuine halitosis requires a set of measures to control it, pseudo-halitosis can be improved through simple oral hygiene measures. Halitophobia, on the other hand, implies the psychological dimension more, as people that believe they are suffering from halitosis tend to feel this way even after they take measures to improve their oral health.[(2)]

Regardless of its type, halitosis has a great impact on a person's quality of life, making it difficult to navigate through social interactions, as it is a condition that is highly noticed by other individuals and close contacts, and less by the person that experiences it. Following the social difficulties that arise from having this condition, people may experience a series of mental health problems, such as depressive or anxious symptoms, reduced self-esteem, and social isolation. Being a condition that can be directly perceived by other people, it often leads to social discrimination,

stigma, and affects perceived body image and self-confidence. In other words, the physiological impact is less significant compared to the psychological barriers that are created. The affected individuals with halitosis not only experience difficulties when it comes to their everyday lives and people with whom they come in contact, but also when it comes to their intrapersonal life, as there can be a significant decline in their mental health.[(3)]

There is a growing number of systematic reviews and meta-analyses that focus on the prevalence of halitosis, its medical factors, and potential treatment, only a few of them target the psychosocial aspects of this condition, although many studies state the major effect that it has on a person's quality of life. When it comes to younger populations, there are no systematic reviews that describe the psychosocial impact that halitosis has on this target group, although this segment of age can be very vulnerable when confronted with social interactions in their private life or in school settings. Thus, the present review focuses on the emotional and social impact of halitosis on adolescents and young adults… [(4,5)]

## 1.2 Types :

### 1.2.1 True Halitosis

True halitosis refers to chronic halitosis that persists despite brushing, flossing, or rinsing. Potential causes include oral infections, gum disease, dry mouth, smoking, certain foods or medications, or systemic diseases like diabetes or kidney failure. True halitosis can adversely affect an individual's social and professional life and may indicate a severe health issue requiring medical attention.[(7)]

### 1.2.2 Physiological Halitosis

Physiological halitosis arises from the decay of organic matter in the mouth, often manifesting as a white coating on the tongue's posterior region. This type accounts for approximately 90% of true halitosis cases and is typically temporary, depending on oral conditions. Patients can often improve physiological halitosis through oral hygiene practices, particularly tongue cleaning.[8]

### 1.2.3 Pathological Halitosis

Pathological halitosis results from diseases or disorders affecting the body, either originating in the mouth or elsewhere, such as the nose, sinuses, lungs, stomach, liver, or kidneys. Examples of conditions causing pathological halitosis include oral cancer, tonsillitis, sinusitis, bronchitis, gastritis, diabetes, or kidney failure. Dentists or physicians can diagnose and treat pathological halitosis by identifying and addressing the underlying condition.[9]

### 1.2.4 Intra-Oral Halitosis (IOH)

IOH encompasses situations where halitosis is caused or exacerbated by diseases or pathological conditions related to oral tissues, such as periodontal disease progression. Contributing factors like xerostomia and tobacco use may also play a role in IOH.[10]

### 1.2.5 Extra-Oral Halitosis (EOH)

EOH originates from diseases or pathological conditions involving body tissues other than the oral cavity. Possible associated conditions include those affecting the nasal, paranasal, laryngeal, lower respiratory, upper gastrointestinal tract, and systemic diseases. In the following section, we will explore the formation of halitosis from the oral cavity and digestive tract.[11]

### 1.2.6 False Halitosis

False halitosis refers to a phenomenon where individuals erroneously believe they suffer from halitosis, often due to heightened self-awareness, anxiety, or excessive concern about oral hygiene. This condition encompasses two distinct subtypes: pseudo halitosis and halitophobia. Pseudo halitosis describes cases where patients are convinced of having bad breath, although no objective evidence is present. On the other hand, halitophobia represents a pathological fear of halitosis that can lead to social avoidance, obsessive oral cleaning, and frequent treatment-seeking behaviors. Proper education, psychological intervention, and reassurance can help address these misconceptions and alleviate patients' concerns.[12]

### 1.2.7 Pseudo Halitosis

Pseudo halitosis, also called false halitosis, occurs when individuals perceive themselves as having halitosis despite normal oral conditions and the absence of detectable breath odor issues (by olfactory or scientific tests). Pseudo halitosis accounts for approximately 15% of halitosis cases and can be attributed to psychological factors such as anxiety, depression, low self-esteem, or obsessive-compulsive disorder. A study published in *Nature* suggests that reassurance, education, and behavioral therapy can effectively treat pseudo halitosis.[13]

### 1.2.8 Halitophobia

Halitophobia refers to the excessive fear or phobia of having halitosis even after successful treatment of genuine or pseudo halitosis. Halitophobia refers to an unwarranted fear or phobia of having halitosis even after successful treatment of genuine or pseudo halitosis. This category includes patients who perceive breath issues despite successful treatment of their genuine halitosis condition or, in the case of pseudo halitosis, misconstrue

others' behaviors (e.g., opening windows, sniffing, touching nose) as indicative of halitosis. Like pseudo halitosis, halitophobia can also stem from psychological factors such as anxiety, depression, low self-esteem, or obsessive-compulsive disorder.[13]

### 1.2.9 Symptoms of halitophobia

:include fear of exhalation, depression, and social isolation, potentially leading to relationship termination, divorce, or suicidal thoughts. The root cause is often psychological, with patients experiencing comments or teasing about halitosis resulting in psychological trauma. This typically begins in childhood and persists into adulthood, accompanied by feelings of rejection or ridicule. Other contributing factors to halitophobia may include hypochondriasis or obsessive-compulsive disorder. The consequences of halitophobia can exacerbate psychological problems, potentially leading to delusional mental illnesses such as schizophrenia or bipolar disorder, or the development of a halitosis phobia. In these cases, the patient's treatment should be overseen by a psychologist[13]

## 2. Definitions:

Halitosis is a term coined from the merger of the Latin halitus (breath) and Greek osis (pathological process) to describe a condition that meant an unpleasant odor from the mouth or "bad breath," as we commonly call it. Understandably so, it is a serious concern for the patient as it could lead to social embarrassment and leave the individual reclusive or occasionally even stigmatized. It is sometimes discovered by the dental practitioner or primary care physician during a routine examination, and the individual may have been unaware. As social awareness of dental hygiene continues to rise, more people seek medical guidance to help cure this distressing ailment ..[6]

## 3. Research Objective:

This research aims to:

1. Analyze the main causes of halitosis, whether caused by oral factors (such as bacterial buildup on the tongue or gum disease) or systemic factors (such as gastrointestinal disorders or liver disease).
2. Evaluate the effectiveness of current diagnostic methods and treatments (such as antibacterial mouthwashes, natural remedies, or modern medical techniques).
3. Study the psychosocial effects of halitosis on individuals, such as low self-esteem or social isolation.
4. Develop proactive recommendations for prevention by promoting oral hygiene habits and raising awareness of the importance of regular checkups.
5. Fill in the knowledge gaps in the scientific literature on halitosis and suggest future research areas to improve patients' quality of life.

## 4.Causes of halitosis :

4.1. Halitosis primarily stems from stomatological conditions, accounting for over 80% of cases. These include calculus, chronic gingivitis, periodontitis, caries, and inadequate oral hygiene, particularly of the tongue, which harbors food particles, epithelial cells, and saliva components due to its broad and segmented structure. Other contributing factors include bacterial and fungal stomatitis, mucosal and bone inflammation, tumors, mucosal and tongue developmental changes, and piercings. [(14)]

4.2. Laryngological origins constitute 5–10% of cases, encompassing acute and chronic inflammatio0n, tonsillolithiasis, tonsil pockets, rhinosinusitis, nasal polyps, nasal duct obstruction (such as septal deviation), foreign bodies (especially in children), salivary gland diseases, and tumors affecting the nasopharynx, sinuses, upper respiratory, and digestive tracts. [(14)]

4.3. Gastrointestinal causes, making up 5% of cases, include GERD, Crohn's disease, and ulcerative colitis. GERD is the leading gastroenterological cause, as acid reflux can damage the oral cavity and esophageal epithelium. (14)

4.4. Systemic diseases also play a role in halitosis. Diabetes can produce an acetone-like odor, chronic renal diseases lead to a fishy smell, and hepatic failure, Sjogren's syndrome, and ketosis (due to starvation) contribute to bad breath. (14)

4.5. Xerostomia significantly affects oral odor, with dryness resulting from conditions such as psychosis, depression, stress, hyperthyroidism, GvHD post-transplant reactions, vitamin A and B6 deficiencies, AIDS, anemia, iron deficiency, hormonal imbalances, sarcoidosis, amyloidosis, head and neck radiotherapy, and long-term use of medications. Approximately 400 drugs, including diuretics, TLPD, antihistamines, hypotensives, neuroleptics, inhaled steroids, B-adrenomimetics, cholinolytics, chemotherapeutics, antibiotics, anxiolytics, cytostatics, opioid painkillers, and interferon, reduce saliva production, exacerbating halitosis. (14)

4.6. Poor hygiene and dietary habits contribute significantly. Rare brushing, lack of flossing or mouth rinses, and plaque accumulation encourage bacterial growth. Immediately after brushing, a pellicle forms on teeth, which thickens over time due to organic and inorganic waste, providing an environment for bacteria, excoriated epithelial cells, leukocytes, and food debris. (15)

4.7. Certain foods and addictions influence mouth odor. Excessive consumption of salty foods, onions, and coffee can dry oral mucus, while garlic's allyl methyl sulfide lingers for up to 72 hours. Diets triggering fat metabolism release odor through the lungs, and protein-rich foods, like meat, promote halitosis. Smoking plays a major role, causing xerostomia, periodontal diseases, and smoker's breath by reintroducing cigarette-derived molecules into the bloodstream. Alcohol's drying effects also contribute, as bacteria such as

*Streptococcus salivarius, S. intermedius*, and *S. mitis* metabolize ethanol into acetaldehyde. **(15)**

4.8. Drug addiction, particularly to amphetamines and methamphetamines, affects saliva flow. Additional factors include mouth breathing, dry air exposure during sleep, and oral pH imbalances. **(15)**

4.9. The oral cavity houses thousands of bacterial species that thrive in anaerobic conditions, feeding on food debris, exfoliated epithelium, and blood serum. These anaerobic bacteria produce malodorous compounds: hydrogen sulfide from cysteine (*Peptostreptococcus anaerobius, Eubacterium limosum, Bacteroides* spp.), methyl mercaptan from methionine (*Fusobacterium nucleatum, Fusobacterium periodonticum, Eubacterium* spp.), and hydrogen sulfide from blood serum (*Prevotella intermedia, Porphyromonas gingivalis, Treponema denticola*). Others, such as *Treponema denticola, Porphyromonas endodontalis*, and *Porphyromonas gingivalis*, generate mercaptan, while dimethyl sulfide is linked to *Eubacterium* and *Fusobacterium*. Additional bacterial species involved include *Campylobacter rectus, Prevotella oralis, Leptotrichia buccalis, Enterobacter cloacae*, and *Fusobacterium periodonticum*.**(Murata et al)** categorized halitosis into intraoral (IOH) and extraoral (EOH) types. Over 85% of cases result from intraoral factors such as tongue coating and poor hygiene. According to Silveira et al., volatile sulfur compounds (VSCs) produced by bacteria are the main culprits. Gram-negative bacteria, particularly *Fusobacterium nucleatum* and *Streptococcus* spp., accumulate in the posterior tongue's cratered surface, facilitating bacterial retention. **(15)**

4.10. Fixed orthodontic appliances, large caries, and other plaque-retaining factors exacerbate IOH by enabling bacterial VSC production. Dry mouth also contributes, as reduced saliva flow promotes anaerobic bacterial putrefaction of food debris. **(15)**

4.11. EOH accounts for 5%-10% of cases, with ear, nose, and throat diseases contributing 10% and gastrointestinal disorders responsible for 5%. Systemic conditions such as diabetes, liver disease, and kidney disease are also implicated. Physiological factors, including dehydration, starvation, aging, and specific dietary choices, can lead to halitosis. Smoking has a well-documented correlation with increased halitosis risk and [(15)]

4.12. Oral halitosis results from periodontal disease, infections, pericoronitis, mucosal ulcers, food retention, and tongue coating. While even those with healthy gums may experience halitosis, periodontitis is a significant contributor. Neglected food particles decay, producing odor, while inadequate dental care encourages plaque accumulation. If plaque hardens into tartar, bacterial irritation of the gums leads to gingivitis, characterized by inflammation, bleeding, redness, and pain. Untreated gingivitis progresses to periodontitis, worsening halitosis due to microbial substrate spoilage. [(15)]

4.13. Halitosis results from microbial imbalances in the oral ecosystem, where anaerobic bacteria increase, releasing sulfur-containing protein metabolites. The degradation of the oral matrix leads to VSCs and other malodorous organic compounds, including indole, polyamines, skatole, pyridine, and methyl pyridine. Hydrogen sulfide ($H_2S$), methyl mercaptan ($CH_3SH$), and dimethyl sulfide [$(CH_3)_2S$] are the primary VSCs, with $H_2S$ and $CH_3SH$ constituting 90% of intraoral cases. [(15)]

4.14. The composition of a person's oral microbiota determines halitosis severity, influenced by hygiene, diet, and bacterial populations. Patients with different microbial structures exhibit varying concentrations of $H_2S$ and $CH_3SH$[(15)]

## 5. Diagnosis:

5.1. The patient history should include the main complaint, medical, dental, and halitosis history, along with details about diet, habits, and third-party confirmation to establish an objective basis for the complaint. Halitosis history

should be recorded discreetly and intermittently, addressing factors such as frequency, duration, time of occurrence, whether others have noticed the issue (to differentiate pseudo-halitosis from genuine halitosis), medications taken, habits like smoking and alcohol consumption, and related symptoms such as nasal discharge, anosmia, cough, pyrexia, and weight loss. An investigative protocol for diagnosing oral malodor has been designed for use in clinical practice, benefiting family healthcare practitioners. **(16)**

5.2. Clinical assessment of oral malodor typically involves a subjective organoleptic examination, where the exhaled air from the mouth and nose is compared. This method, considered the "gold standard" for diagnosing halitosis, helps determine the source of the odor. If the odor is present only in the mouth, it is likely of oral or pharyngeal origin, whereas odor from the nose alone suggests a nasal or sinus source. In cases where the odor intensity is similar from both the nose and mouth, a systemic cause may be suspected. Organoleptic scoring is advantageous as it is inexpensive, requires no equipment, and can detect a wide range of odors. **(16)**

5.3. A trained judge or clinician assesses different air samples from the patient. Oral cavity odor Is checked while the patient refrains from breathing, and the examiner smells the expired air at a 10 cm distance. The patient counts from 1 to 10 to facilitate the release of volatile sulfur compounds (VSCs). The saliva odor test involves licking the wrist, allowing it to dry for 10 seconds, and then scoring the odor. Nasal breath odor is evaluated while the patient breathes normally with a closed mouth. A tongue dorsum scraping is taken using a nonodorous spoon for further assessment. If direct odor assessment is uncomfortable, the patient may exhale into a paper bag for later examination. This method has limitations, including subjectivity, lack of quantification, nasal saturation, and inconsistent reproducibility. **(16)**

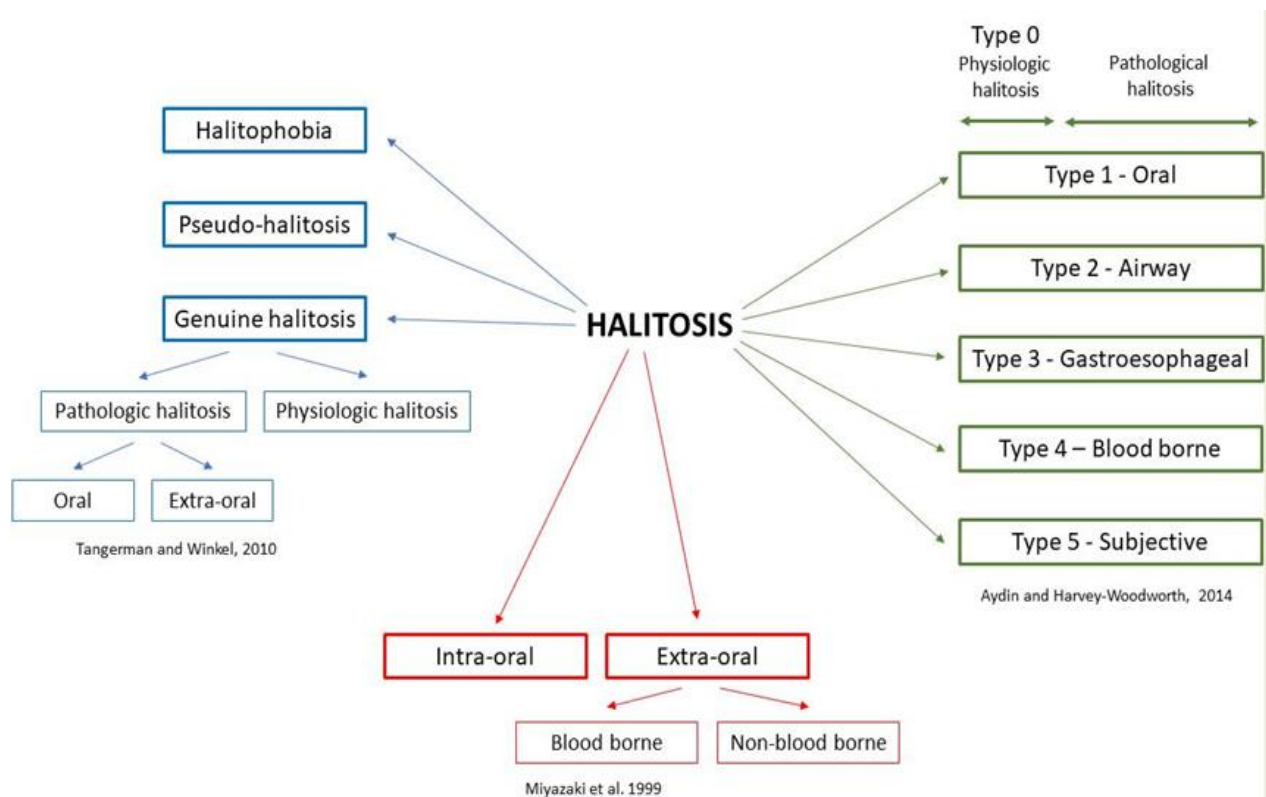
5.4. Gas chromatography (GC) offers an objective and reliable method for analyzing air, saliva, tongue debris, or crevicular fluid for volatile components. It is highly specific to VSCs and can detect even low concentrations of odorous molecules. However, its high cost, bulky size, and need for a trained operator make it impractical for daily clinical use, confining it mainly to research. Portable volatile sulfide monitors provide an alternative for detecting sulfur-containing compounds, but since oral malodor may include other agents, these monitors may not always provide an accurate assessment. [17]

**5.5.** Other objective methods for analyzing breath components are rarely used in routine clinical practice due to their cost and complexity. These tests include Dark-field or Phase-Contrast Microscopy, Quantifying β-galactosidase activity, Salivary incubation tests, Ammonia monitoring, the Ninhydrin method, Polymerized Chain Reaction, Taqman DNA, the Tongue Sulfide Probe, and Zinc Oxide Thin Film Conductor Sensors. The Benzoyl-DL-arginine-α-naphthylamide (BANA) test, an enzyme-linked diagnostic tool, identifies proteolytic obligate Gram-negative anaerobes such as Treponema pallidum, Porphyromonas gingivalis, and Tannerella forsythia, which are part of the red complex. This test can be a useful adjunct to volatile sulfur measurement in diagnosing halitosis[17]

5.6. A comprehensive medical, dental, and halitosis history is essential. The medical history should document current medications, systemic diseases, nasal obstruction, mouth breathing, snoring, sleep apnea, post-nasal drip, allergies, tonsillitis, tonsilloliths, dysphagia, past ear, nose, and throat issues, and typical food intake, including vitamin A, B, C, D, and zinc consumption. The dental history should assess the frequency of dental visits, presence and maintenance of dental prostheses, and oral hygiene practices, including tooth brushing, interdental cleaning, and tongue brushing or scraping. [18]

**5.7.** To gather specific halitosis-related data, patients are given a structured questionnaire before their first appointment. The Halitosis Clinic of the University of Basel, Switzerland, provides an online questionnaire that records halitosis type, frequency, time of day, severity, previous treatments, psychological impact, and contributing factors such as diet and smoking. One key question, "How do you know that you have halitosis?" (options: self-reported or reported by others directly or indirectly), helps identify possible psychogenic halitosis. This questionnaire serves as a foundation for the initial consultation with the patient [(18)].

## 6. Classification of Halitosis:




The International Society for Breath Odor Research established a method of classifying halitosis through scientific analyses. The classification system allows the dental team to identify causative factors and establish potential treatment protocols. The significance of these categories and recommended paths of treatment will assist the dental hygienist with treatment planning and prioritization of care

**There are 3 primary assessment measurements for genuine halitosis:**

6.1. **Organoleptic**: A sensory test that is scored by a trained judge or clinician based on the perception of the judge or clinician.

There are several ways to perform this subjective measurement. One method is to insert a tube into the patient's mouth, and while the patient exhales slowly, the examiner smells from the other end of the tube. Often, confidentiality is maintained through use of a screen. The assessment can also be performed by scraping the posterior dorsum of the tongue with a spoon and smelling the contents. Various scoring systems have been designed; however, most are based on a numerical scale of 1 to 5, with 1 being barely noticeable odor and 5 being extremely foul odor. Morning appointments for assessment are preferred. Participants are encouraged to arrive without having had anything to eat or drink, performed oral hygiene, or used perfume or tobacco products. Examiners are also encouraged to refrain from drinking coffee, tea, or juice and abstain from using tobacco or perfume. **(19)**

6.2. **Gas Chromatography**: Considered the method of choice for researchers, it makes a distinction between VSCs that contribute to halitosis and helps the clinician determine intra- or extra-oral origin.

With this device, the measurement of VSCs can be obtained and differentiated with samples from saliva, tongue coating, and breath. This assists in determining the origin of halitosis. Tangerman and Winkel state that without this device, extra-oral blood-borne halitosis may never have been identified. While it is a highly objective measurement device, it is expensive and not financially feasible for most dental practitioners. New, more affordable portable devices are being developed. **(20)**

6.3. **Sulfide Monitoring**: A portable device for monitoring VSCs. These monitors are better at measuring total VSCs instead of determining individual compounds.This portable monitor measures VSCs by an electrochemical

reaction with sulfur compounds found within the breath, which is generated from a tube in the patient's mouth. Electrical current that is generated is directly proportional to the levels of VSCs. The Halimeter® (Interscan Corporation, Chatsworth, Calif.) is the most recognized device for sulfide monitoring. Limitations include an inability to accurately estimate levels of dimethyl sulfide, the compound shown to be most evident in extra-oral halitosis. It is most sensitive for hydrogen sulfide and less sensitive for methyl mercaptan. Also, if VSCs are shown to be low by the monitor, it may not accurately determine halitosis when other factors are involved, such as alcohols, phenyl compounds, and polyamines [(21)].

## 7. Management of halitosis

Pseudohalitosis and halitophobia patients believe they have halitosis, even though offensive oral malodor is absent. A typical symptom of these conditions is that they interpret other people's behavior, such as 'covering the nose,' 'averting the face,' or 'stepping back,' as an indication that they have oral malodor. Pseudohalitosis patients can accept the practitioner's diagnosis that oral malodor does not exist after having undergone treatment and being reinforced by scientific literature support, education, and explanation of examination results. The principle of the management protocol Is as follows:

7.1. The practitioner must display attitudes of acceptance, sympathy, support, and assurance toward the patient to establish rapport between him/her and the patient. [(22)]

7.2. The practitioner should not argue with the patient as to whether their oral malodor exists or not. [(22)]

7.3. The practitioner must explain that other individuals' avoidance behavior is not caused by oral malodor. [(23)]

7.4. The patient must be instructed in proper oral hygiene and care. [(23)]

7.5. The patient must be instructed that he/she must avoid judging his/her oral malodor by other people's attitudes. [(23)]

Halitophobic patients are quite unhappy with their dental practitioners, who diagnose no oral malodor. Sometimes practitioners may lose their rapport with these patients. If the practitioner tries to convince a patient to visit a psychological specialist on account of halitophobia, many patients will refuse the referral because they have no doubt that they have severe oral malodor. They still judge their oral malodor by other individuals' attitudes. Therefore, we counsel that a patient needs psychological assistance to avoid judging his/her breath by other people's gestures rather than the issue of malodor itself. If they cannot accept the referral to a specialist, some patients might develop a personality disorder, which is totally outside the realm of dental treatment [(24)]

## 8. Management of Halitosis in Children.

8.1. Identification of the presence of halitosis, followed by the type and its severity, allows for an effective management protocol. The presence of microorganisms in the oral cavity and their role in the etiology of halitosis are well-documented. Also, poor oral hygiene, tongue coating, dental caries, gingivitis, periodontitis, and periodontal abscess, wherein the microorganisms' role is undeniable, may contribute to halitosis. Therefore, the primary aim of the management in such a scenario would be mechanically reducing the load of the microbial biofilm by enforcing a good oral hygiene regime, such as routine tooth brushing, flossing, tongue cleaning, and mouth rinses. It is also advisable to inculcate the habit of swishing the mouth after eating in children at a young age as a regular practice that would reduce food lodgment, microbial load, and even halitosis caused due to dietary foods, such as onion, garlic, to name a few. At times, the basic protocol followed as above is mostly successful in reducing halitosis to a greater extent in the pediatric population. [(25)]

8.2. Addressing underlying evident pathology for halitosis follows the next step. Nonsurgical periodontal therapy comprising scaling, restoration of decayed teeth, and periodontal and pharmacological treatment as advised based on the oral examination findings is recommended by the practitioners. This would also aid in the reduction of the oral microbial load responsible for halitosis. In children with mouth breathing, identification of the possible etiological factors such as adenoid hypertrophy would aid in addressing the related halitosis. **(26)**

The literature documented that most of the children, who were assessed for halitosis, were of genuine halitosis with predominant oral pathologic causes; however, the severity did vary among them. Amir et al. reported a reduction in halitosis after providing oral hygiene instructions to the 24 children recruited in their study. Similar results were recorded by Nalçaci and Sönmez, whereupon improving oral hygiene and controlling gingival diseases in 30 caries-active children, a reduction of halitosis was noted. Kara et al. reported that the oral hygiene instruction and periodontal scaling were successful in reducing halitosis in 150 Turkish children. Keceli et al. reported significant reductions in both the VSC levels and organoleptic scores after instructing tongue brushing and a good oral hygiene in 69 children. In a study by Yilmaz et al., the authors reported that H. pylori eradication was beneficial in the treatment of children with a positive H. pylori antigen test and with halitosis. Similarly, Hoshi et al. and Sayedi et al. reported metronidazole effectiveness in children halitosis. Recently, AlMadhi et al. investigated the pre- and post-effect of full mouth rehabilitation on 57 children under general anesthesia on halitosis and reported a significant reduction of VSCs level in more than 50% of the sample measured by OralChroma™. Lastly, the importance of providing instructions and counseling to maintain good oral hygiene to the caregivers and the children cannot be emphasized more, as they are the basic steps in the treatment protocol to be followed in the management of halitosis. **(27,28)**

## 9.Treatment of Halitosis :

**9.1.** The choice of treatment is made on the basis of the diagnosis and includes cause-related therapy. The recommendations for the treatment of halitosis are based on publications .After detailed information and explanation of halitosis, each patient is given instructions for oral hygiene. Because the tongue coating is the most common cause of halitosis, the instructions also include mechanical tongue cleaning as a part of daily oral hygiene. Various studies have shown that tongue cleaning leads to reduced levels of VSCs and thus to reduction of halitosis. Many different tongue cleaners are available on the market. A tongue scraper can only remove the upper surface layer of the biofilm, which is why the effect of a tongue scraper is shorter in duration than the effect of a tongue brush. Moreover, cleaning too hard with a tongue scraper is a risk for tongue injury. Additionally, the effect of tongue cleaning may be extended using a tongue paste with active substances. Any kind of electrical device for professional tongue cleaning is not recommended. Animal experiments have shown that mechanical injuries of the tongue may be carcinogenic. Therefore, detailed and comprehensive tongue cleaning instructions are necessary. Tongue cleaning should be carried out gently with low force at the posterior part of the tongue dorsum. Further, the lateral borders should not be cleaned because of the risk of traumatic injury. [(29)]

**9.2.** If tongue cleaning alone is not sufficient, additional mouth rinse can be used. As well as flavoring agents (e.g., mint) for masking odor, mouth rinses often contain antibacterial (e.g., chlorhexidine) or neutralizing components (e.g., zinc), which are able to absorb the VSCs or their precursors, and are responsible for the therapeutic effect. In commercial products, antibacterial and odor-neutralizing agents are often combined. This leads to a strengthening or even synergistic effect. Some patients may experience side

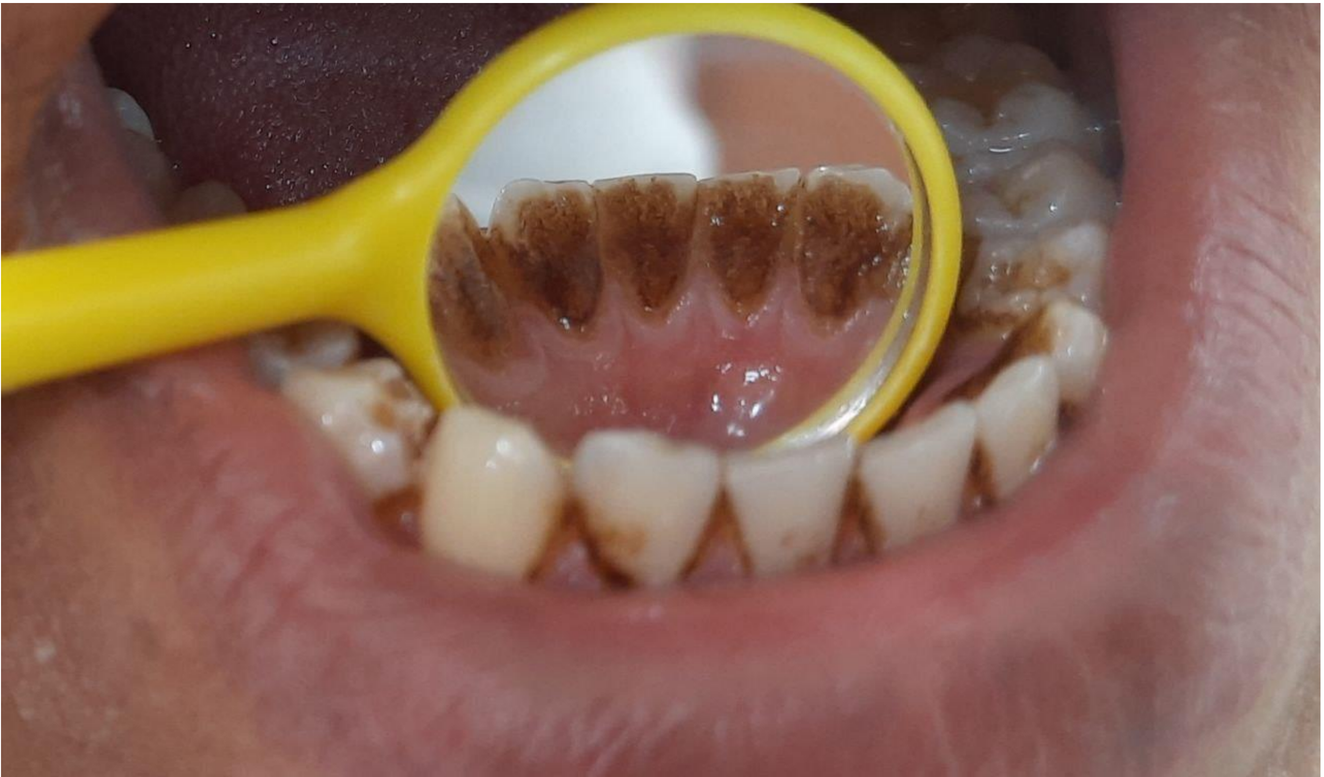
effects such as discoloring and altered taste when chlorhexidine-containing mouth rinses are used for a long period. (30)

**9.3.** In the literature, there is some evidence that probiotics (Greek Pro bios: 'for life') not only have a positive effect in the gastrointestinal tract but also in the oral cavity. With the help of chewing gums, bacteria such as Streptococcus salivarius and Lactobacillus salivarius are introduced into the oral cavity and are aimed at displacing halitosis-associated bacteria. Despite promising results, further research is needed before probiotics can be used to treat oral halitosis. (31)

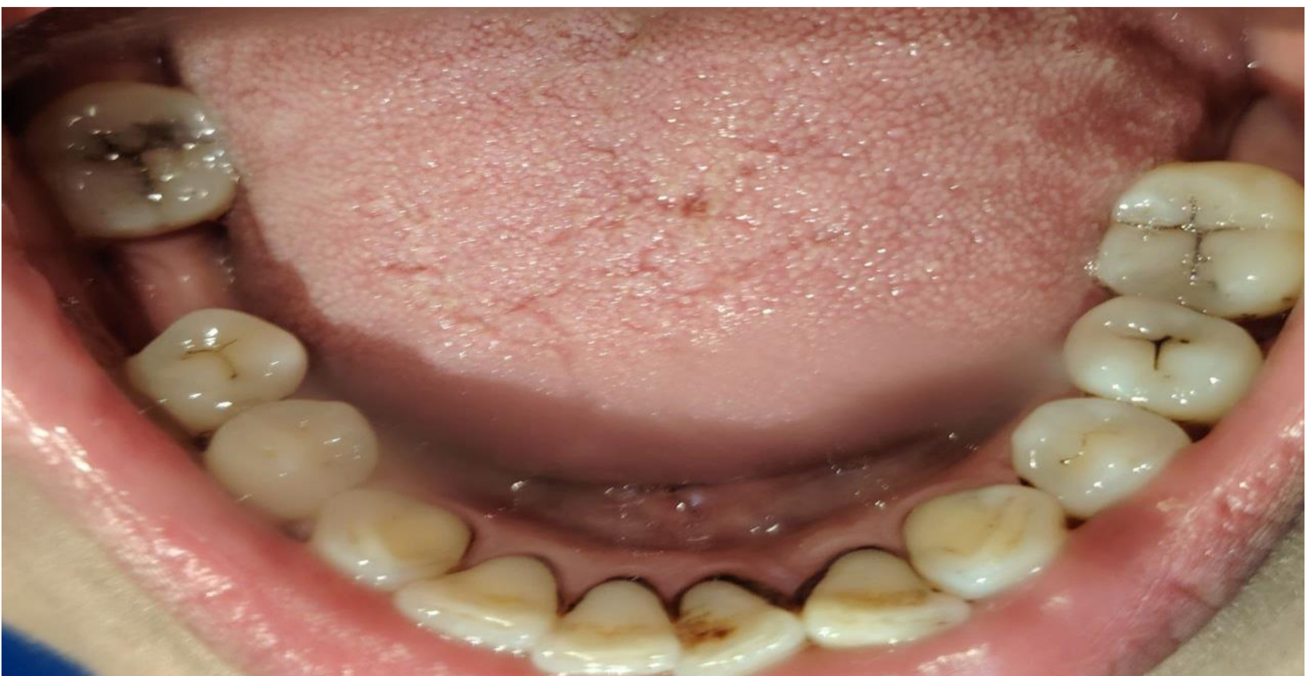
**9.4.** If halitosis originates from another oral cause such as gingivitis, periodontitis, caries, or insufficient dental restorations, corresponding therapy is initiated. In addition, possible co-factors are addressed and, if necessary, adjusted. Sometimes, consultation with a physician is indicated. If extra-oral halitosis is diagnosed, the patient is referred to appropriate specialists such as an otorhinolaryngologist or internist. (31)

**9.5.** If no halitosis is diagnosed upon the first examination, it is recommended that a second appointment at a different time of day should be arranged to avoid any effects of circadian rhythms. In the case of psychogenic halitosis, the diagnosis is communicated at the second appointment. Dealing with patients suffering from halitophobia is difficult and requires a lot of experience. Not every patient takes the advice given in psychological counseling immediately. Any dentist who offers a halitosis consultation should work together with a psychologist or psychiatrist and, if the patient agrees, refer her/him (31)

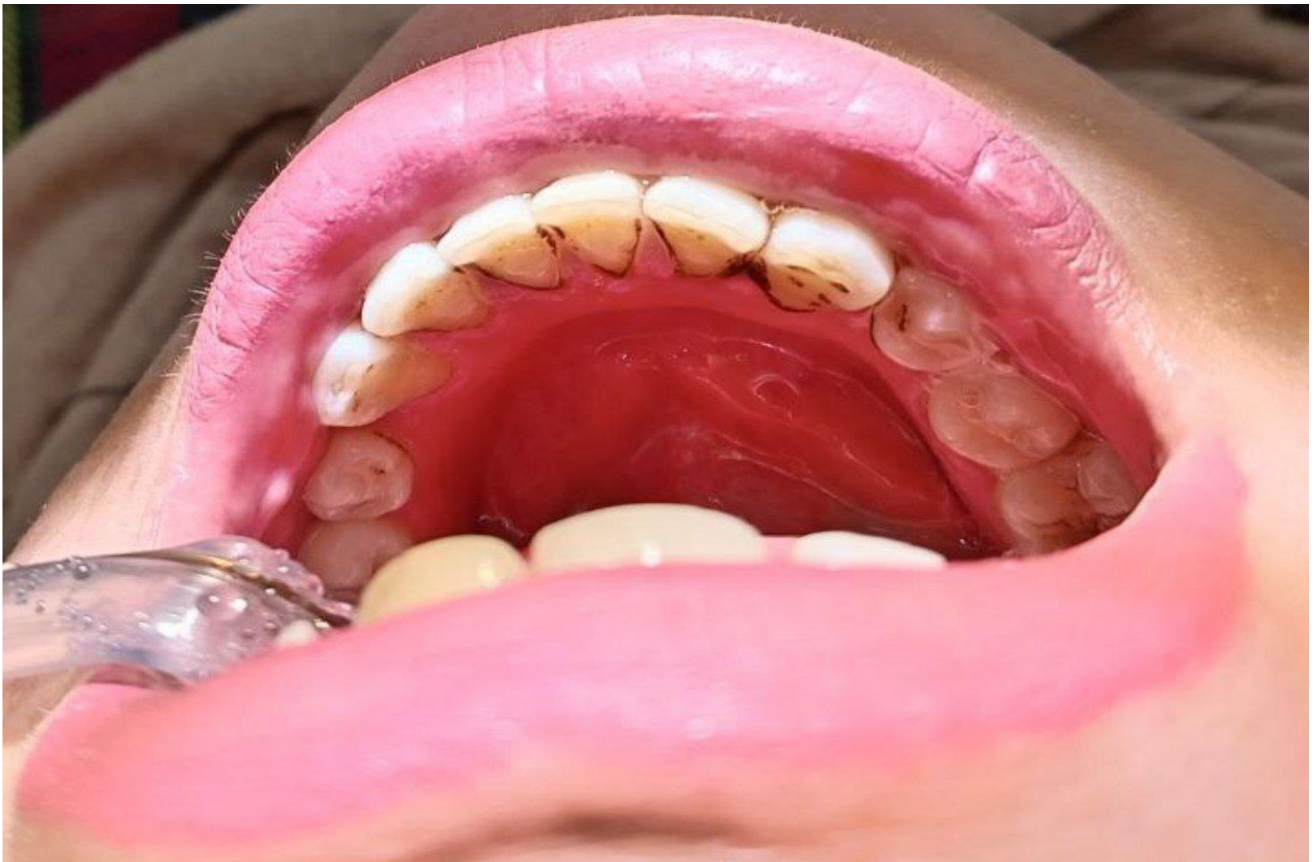
## 10.Clinical cases



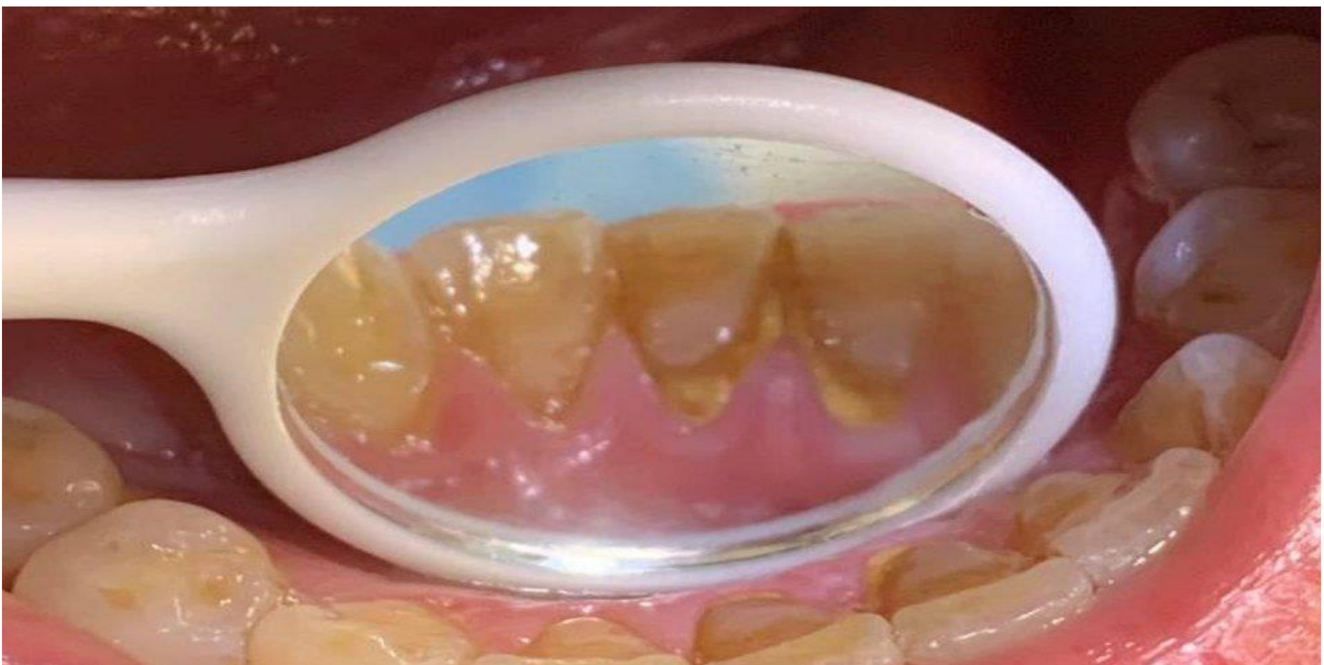
| Age | Gender | Diagnosis |
| --- | --- | --- |
| 23 years old | male | smoker |



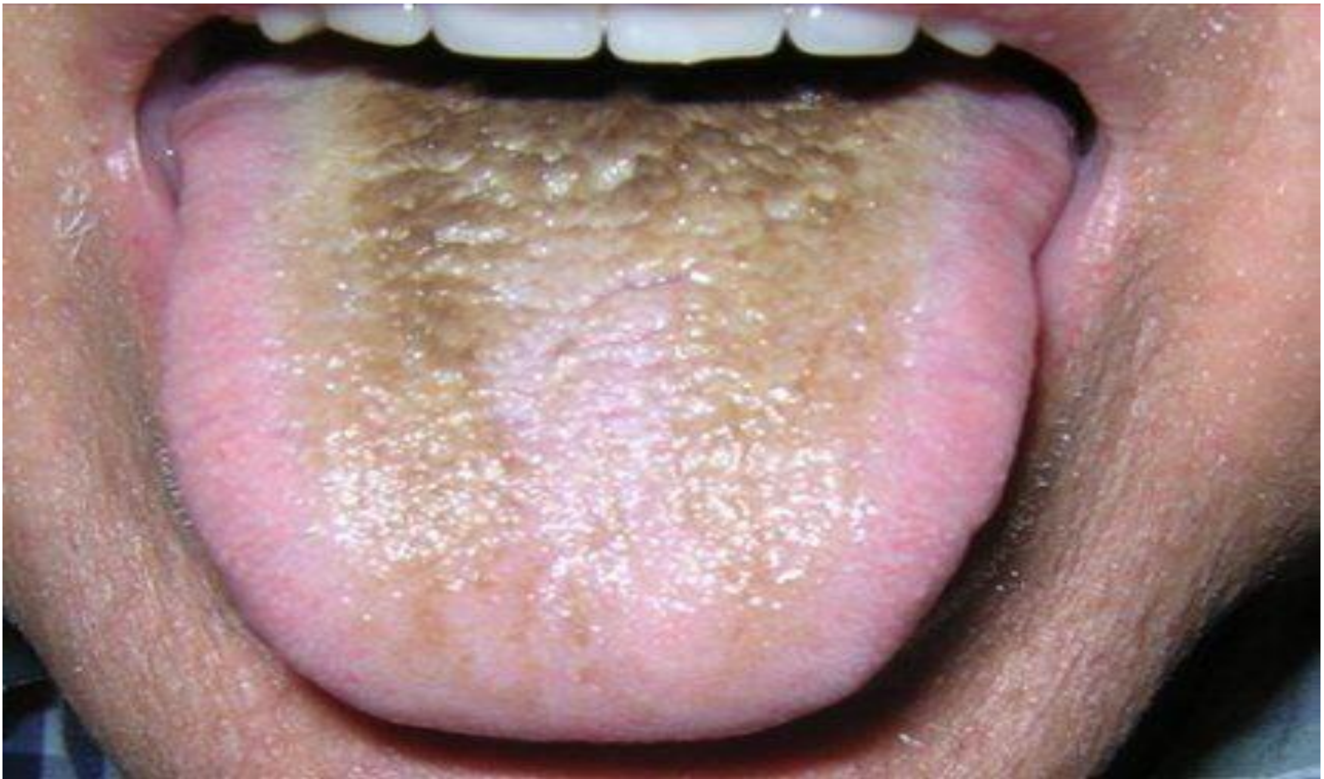
| Age | Gender | Diagnosis |
| --- | --- | --- |
| 54 years old | female | periodontal pocket |



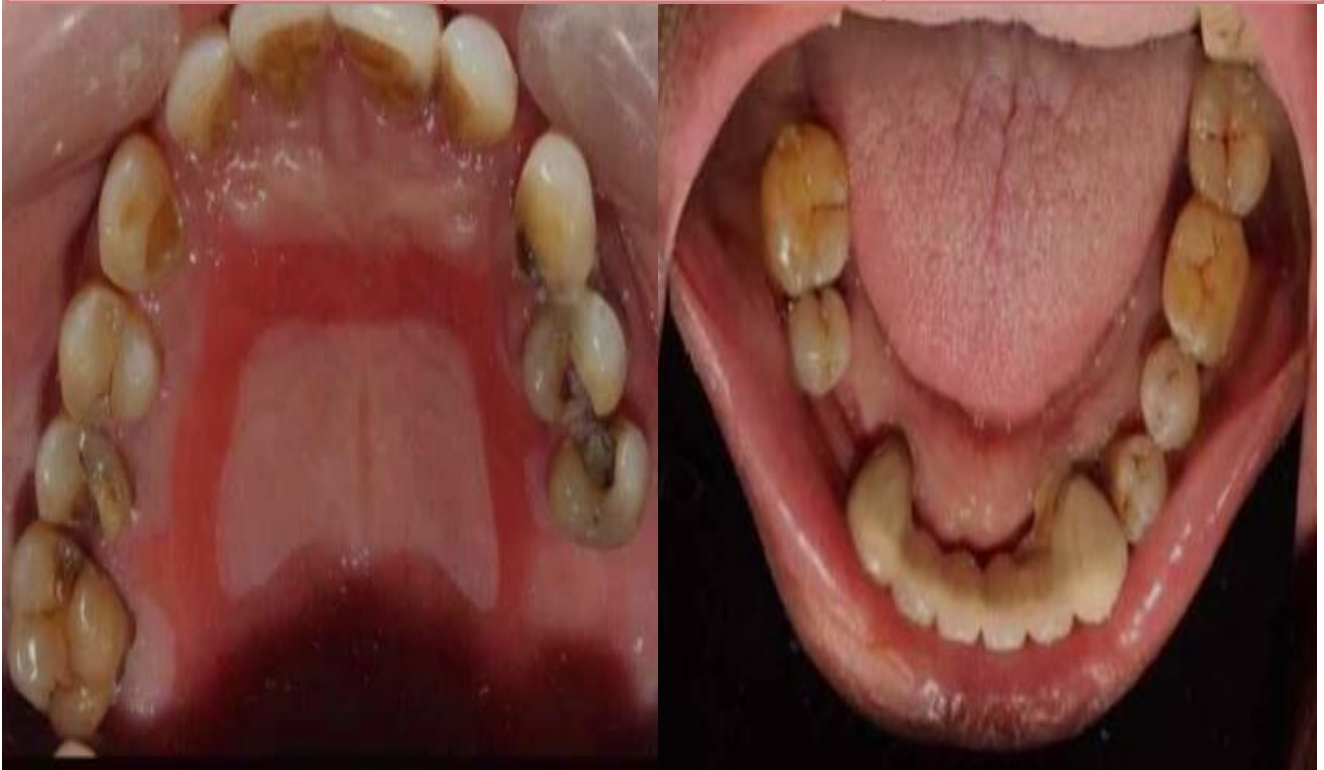
| Age | Gender | Diagnosis |
|---|---|---|
| 36 years old | female | diabetic patient |



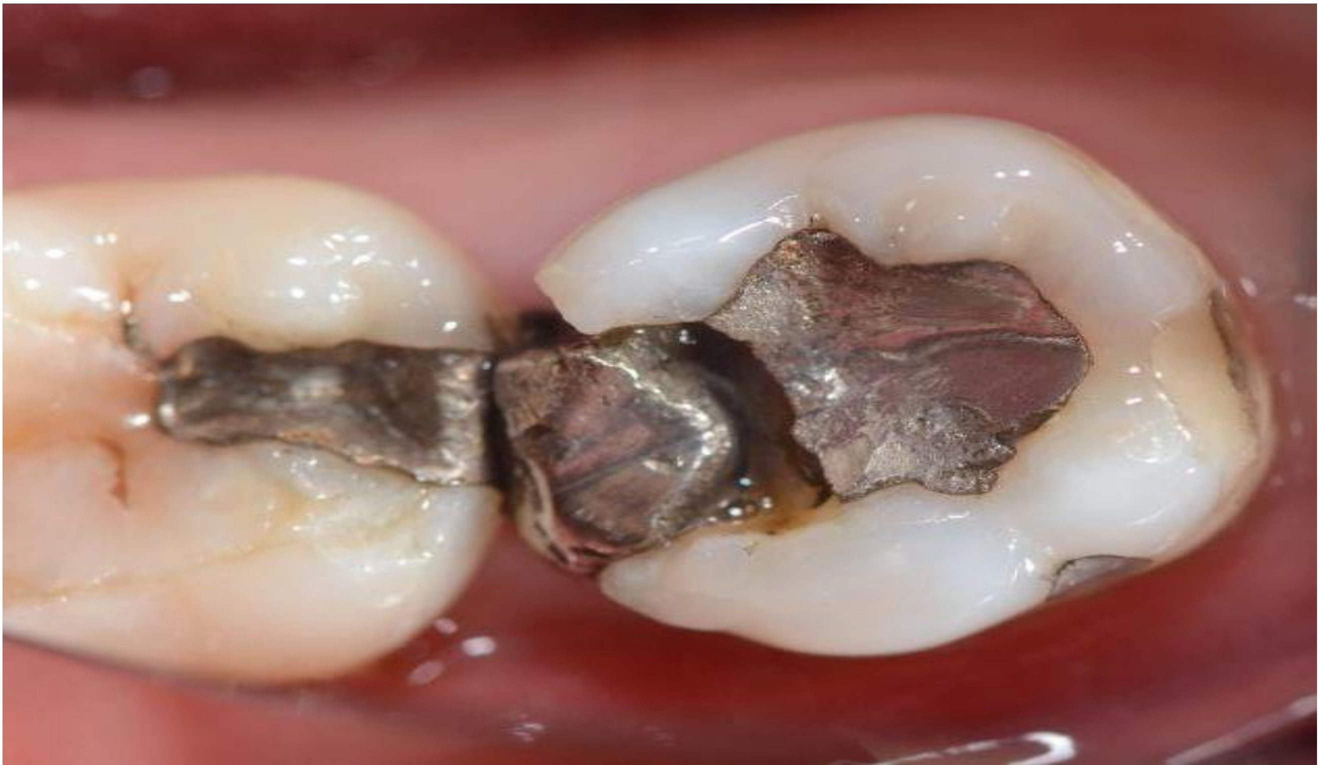
| Age | Gender | Diagnosis |
|---|---|---|
| 24 years old | female | pregnant |



| Age | Gender | Diagnosis |
|---|---|---|
| 24 years old | male | tongue coating |



| Age | Gender | Diagnosis |
|---|---|---|
| 35 years old | male | caries |



| Age | Gender | Diagnosis |
|---|---|---|
| 40 years old | female | failed amalgam restoration |

## 11.Discussion:

Halitosis, or bad breath, is a common issue encountered in clinical practice. In our experience within the clinics, halitosis often results from poor oral hygiene, periodontal disease, dental caries, or systemic conditions like diabetes and gastrointestinal disorders. Smoking and certain diets also contribute significantly.

From our observation, patients most at risk include those with poor oral hygiene habits, smokers, individuals with dry mouth (xerostomia), and patients wearing dentures without proper maintenance. Additionally, individuals with chronic illnesses, such as uncontrolled diabetes or respiratory infections, are more prone to halitosis.

Addressing the underlying cause through proper diagnosis, patient education, and tailored treatment is key to managing this condition effectively.

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