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Halitosis Concepts and Management -Revisited

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Abstract: *Halitosis or bad breath is one of the widely reported patient complaints in the Periodontics Outpatient Department.This condition has physical,social,psychological and professional relevance.Many of the professionals are feeling lack of confidence as a result of this condition.The commonly identified cause is due to poor oral hygiene.There are an umpteen number of other etiological factors too.Different treatment modalities are available for the management of halitosis.This paper reviews thehistory,etiology, pathophysiology of halitosis and the various methods to detect halitosis and the management modalities including modern treatment as well as herbal agents.*

Keywords*: Bad breath,ElectronicNose,Organoleptic scoring scale,Gaschromatography,Volatile Sulphur Compounds.*

I. Introduction

''Good manners and bad breath will get you nowhere"-Elvis Costello

The above quote itself says it all,the importance of having a pleasant breath.Halitosis or bad breath is one of the most severe problem affecting a majority of people in our society.The sad part is that many of them are unaware of it and even their close friends and relatives sometimes feels it bad to point out the same.As a result many of them will be approaching the dentist at a very later stage or sometimes it may be a serendipitous discovery on the part of dentist during routine oral examination or oral prophylaxis.The word "halitosis" comes from the Latin "halitus", which means "breath" and the Greek suffix "osis", to specify a condition or a process. According to more recent published studies, bad breath is anything but abnormal. The problem of halitosis has been reported for many years. References were found in Papyrusmanuscripts dating back to 1550 BC[1]Almost every individual awakes with bad breath each morning. One experiences oral malodor after any prolonged period of decreased salivary flow[2] as in fasting or sleeping[3]therefore any drugs which diminish salivation may have the same effect. While ordinary healthy breath has been described as smelling like "blooming chestnuts"[4]offensive breaths manifests itself in a variety of ways depending on the cause. Mouthwash is a generally well accepted and popular way of dealing with oral malodour.The species of microorganisms implicated most often in oral odor are Bacteroides, Fusobacterium, and Klebsiella, although other species can also be involved. These anaerobic organisms multiply in the mouth where the lack of oxygen supports their survival. They thrive on dental plaque, the sticky substance which gathers on teeth, in mouth areas such as the gingival crevice which is the space between the surface of a tooth and the overlapping gum, and the tongue. They also multiply in any saliva that becomes trapped in periodontal defects, or in any area outside of the mainstream of salivary flow.

History

The problem of halitosis has been reported for many years. As mentioned the references were found in papyrus manuscripts dating back to 1550 BC. Hippocrates mentioned that any girl should have a pleasant breath, making sure always to wash her mouth with wine, anise and dill seeds.The Romans used mechanisms to hide halitosis, such as perfumed tablets, chewing leaves and stalks of plants. In Antiquity, having a fragrant breath meant exhaling the sweetness of life and asserting the purity of a person's soul. During Christianity, the devil's supreme malignant odor smelled of sulfur, and it was presumed that sins produced a more or less bad smell[5]This association is complex, as the predominant smell in halitosis is often sulfur.Archeological excavations in garbage deposits from the 19th century found earthenware pots with tooth powders. Announcements at that time disseminated the properties of "Chinese tooth powders", "tooth elixirs", "tooth opiates", confirming special interest in the elimination of bad breath and in cleanliness of the mouth[6]During the 19th century, emanations of the body's internal activity, relatively tolerated until then, became unbearable. The ideology of cleaning forced the full domestication of odors and products deriving from metabolic processes. A new body etiquette emerged, whose motto became discretion.Another example comes from the Talmud, dating back more than two thousand years, which reports that, in view of some conditions, such as one of the partner's bad odor for example, the matrimonial license, called Ketuba can be legally broken.A treaty in Islamic literature

from the year 850 talked about dentistry, referring to the treatment of fetid breath, and recommended the use of siwak* when breath had changed or at any time when getting out of bed[7] This recommendation was probably aimed at minimizing the smell or morning or physiological halitosis.The Hindus consider the mouth as the body's entry door and, therefore, insist that it be kept clean, mainly before prayers. The ritual is not limited to teeth brushing, but includes scraping the tongue with a special instrument and using mouthwash. Buddhist monks in Japan also recommended teeth brushing and tongue scraping before the first morning prayers·It is noticeable that oral hygiene in combination with tongue scraping has been performed for many years but that, despite its efficacy, dentists rarely prescribe and teach this scraping practice.The only treaty about halitosis was written in 1874 by Howe. This author affirms that the importance of offensive breath derives from the fact that it becomes a constant source of unhappiness to the patient, and gets even worse when it destroys communication among friends and the pleasures of social contact·Nowadays, it is known that multiple causes can produce halitosis, making it impossible to indicate one single treatment; after the diagnosis, the initial behavior adopted is the removal of possible causes

Etiology Of Halitosis

Accumulation of bacteria and food residues at the posterior part and in the furrows of the tongue has considered the major cause[8] Inter-dental plaque and gingivitis may also play a fundamental role, and although periodontal pockets may produce putrid odours, which are still unclear. Halitosis causing bacteria are the primary sources of volatile sulphur compounds, and the chief components are methyl mercaptans and hydrogen sulphide[9]Volatile sulphur compounds and other additional odours such as putrescine, indole, skatole, and cadaverine[10]are generated during the bacterial metabolic degradation of food debris, saliva proteins, desquamated cells, dental plaque and microbial putrefaction[11]The periodontal pocket also provides an ideal environment for volatile sulphur compounds production . The intensity of clinical halitosis has been revealed to be considerably associated with the amount of intraoral volatile sulphur compounds level and directly with periodontal health status[12,13] It can be for the ease can be classified as[14]·

Physiological

1. Infancy
2. Pregnancy
3. Old age
4. Hunger breath
5. Habits-use of alcohol,chronic use of garlic,lemonetc

Pathological

It can again be localised or generalised

Local

1. Stomatitis and Glossitis
2. Smoking and tobacco chewing
3. Deep carious lesions
4. Denture and orthodontic appliances
5. Mouth breathing
6. Chronic tongue coating
7. Food impaction
8. Pericoronitis
9. Noma
10. ANUG

Generalised

ENT Related

1. Adenoids
2. Chronic sinusitis
3. Tonsillitis
4. Otitis
5. Pharyngitis

GIT Related

1. GERD
2. Peptic ulcers

3. Malignancies

Respiratory
1. Lung abscess
2. Tuberculosis
3. Bronchitis
4. Pneumonia

Miscallaneous
1. Anemia
2. Diabetes
3. Dehydration
4. Renal failure
5. Leukemia

Mechanism Of Halitosis

Normal saliva has a Ph of 6.5 and this acidic range suppresses the growth and proliferation of gram negative and anerobicbacteria.Alkaline state favours the growth of gram negative bacteria and allows activation of enzyme required for putrefaction of amino acids whose end product s are sulphur containing compounds.Other compounds in the saliva causing halitosis are putrescine,cadaverine,histamine ,indole and skatole[14]

Diagnosis

Many methods have been advocated in the diagnosis of halitosis.They include Halimeter,Saliva odour test,Gaschromatography,SpoonTest,Organoleptic scoring test ,Dental Floss odour test and the latest advance is the Electronic Nose.Organoleptic scoring system is considered as the gold standard.Objective measurement of the breath components is rarely used in regular clinical practice, as it is time consuming and cost effective. Volatile sulphur compounds can be measured by using a portable sulphide monitor, but as oral malodour may comprise agents other than volatile sulphur compounds this may provide an inaccurate assessment of the source and intensity of oral malodour. However, the potential method of determining the components of halitosis is gas chromatography, but this is not of practical clinical application. Correspondingly, dark field microscopy, the detection of trypsin-like activities of bacteria the benzoylargininenaphthylamide test, and real time quantitative polymerase chain reaction detection of possible causative oral microbes falls outside the routine clinical assessment of halitosiis. Organoleptic measurement by trained clinicians is considered to be the reference, and the most reliable way of evaluating malodour, although this has been contested by studies showing that measurements with the halimeter appear to be more reproducible[15] Measurement of volatile sulphur compounds levels can be carried out by a variety of methods. Organoleptic which are considered subjective by some clinicians but are the ones of most relevance to patients and the more complex gas chromatography techniques[16]

Furthermore, portable computerized volatile sulphur compound monitors or halimeters are now available, which are easy to use and relatively economical.[17] However, the limitations of halimeters are that they have low sensitivity for one of the other sources of malodour, methyl mercaptan and nevertheless a high sensitivity for hydrogen sulphide

Electronic nose

An electronic nose (e-nose) is a device that identifies the specific components of an odor and analyzes its chemical makeup to identify it. An electronic nose consists of a mechanism for chemical detection, such as an array of electronic sensors, and a mechanism for pattern recognition, such as a neural network .The electronic nose was developed in order to mimic human olfaction that functions as a non-separative mechanism: i.e. an odor / flavor is perceived as a global fingerprint. Essentially the instrument consists of head space sampling, sensor array, and pattern recognition modules, to generate signal pattern that are used for characterizing odors.Electronic noses include three major parts: a sample delivery system, a detection system, a computing system.The sample delivery system enables the generation of the headspace (volatile compounds) of a sample, which is the fraction analyzed. The system then injects this headspace into the detection system of the electronic nose. The sample delivery system is essential to guarantee constant operating conditions.The detection system, which consists of a sensor set, is the "reactive" part of the instrument. When in contact with volatile compounds, the sensors react, which means they experience a change of electrical properties.In most electronic noses, each sensor is sensitive to all volatile molecules but each in their specific way. However, in bio-electronic noses, receptor proteins which respond to specific odor molecules are used. Most electronic noses use sensor arrays that react to volatile compounds on contact: the adsorption of volatile compounds on the sensor surface

causes a physical change of the sensor. A specific response is recorded by the electronic interface transforming the signal into a digital value. Recorded data are then computed based on statistical models.[18]Bio-electronic noses use olfactory receptors - proteins cloned from biological organisms, e.g. humans, that bind to specific odor molecules. One group has developed a bio-electronic nose that mimics the signaling systems used by the human nose to perceive odors at a very high sensitivity: femtomolar concentrations.[19]The more commonly used sensors for electronic noses include

1.Metal–oxide–semiconductor (MOSFET) devices - a transistor used for amplifying or switching electronic signals. This works on the principle that molecules entering the sensor area will be charged either positively or negatively, which should have a direct effect on the electric field inside the MOSFET. Thus, introducing each additional charged particle will directly affect the transistor in a unique way, producing a change in the MOSFET signal that can then be interpreted by pattern recognition computer systems. So essentially each detectable molecule will have its own unique signal for a computer system to interpret.

2.Conducting polymers - organic polymers that conduct electricity

3.Polymer composites - similar in use to conducting polymers but formulated of non-conducting polymers with the addition of conducting material such as carbon black.

4.Quartz crystal microbalance - a way of measuring mass per unit area by measuring the change in frequency of a quartz crystal resonator. This can be stored in a database and used for future reference

5.Surface acoustic wave (SAW) - a class of microelectromechanical systems (MEMS) which rely on the modulation of surface acoustic waves to sense a physical phenomenon.Some devices combine multiple sensor types in a single device, for example polymer coated QCMs. The independent information leads to vastly more sensitive and efficient devices.[20]

Management

The efficient management of halitosis appears to be pivotal on the reduction of volatile sulphur compounds levels, and some other foul volatiles, hence the majority focus on chemical and mechanical options. Mechanical interventions like brushing, flossing and tongue scraping are intend to reduce the reasonable amountof bacteria which produces of volatile sulphur compounds, persistent food matter and cellular debris from the gingiva and tongue. In a recent systematic review explained the effectiveness of tongue scraping for treating halitosis.However, the authors concluded that the mechanical tongue cleaning with tongue scrapers appeared to have very limited and short come benefits for the patients in controlling halitosis. However, the limitations of mechanical methods like tongue scarping have been effective if removal of volatile sulphur compounds producing bacteria from all oral biological sites. The option of mouthrinses may be more effective in reaching the less accessible parts of the oral cavity. Moreover, their greater social acceptance and ease of use has led to the development of a large number and range of over the available mouthrinses[21] A number of mouthrinsescontain antibacterial agents in addition to flavoring agents. Components which neutralize can further be divided into those that affect the bacteria directly or the chemical compounds they produce and include chlorhexidine, triclosan, alcohol, chlorine dioxide, phenol, and metal ions like zinc [22, 23]Furthermore, some of the odour masking agents consists of essential oils, which can also provide a competing and purely temporary smell that is capable of disguising the unfavorablemalodour.A variety of herbal agents have also found to be have significant effects in the management of halitosis.

1. Peppermint

A large majority of toothpastes contain peppermint flavoring, and this isn't by accident. Peppermint has the ability to give the mouth a fresh, clean feeling. Essential oils from peppermint (real peppermint, not flavoring) does much more than create a fresh feeling. One study showed that peppermint oils actually help reduce bad breath more effectively than a lab-produced chemical rinse.[24]

2. Tea tree

Tea tree oil has been long known among natural health practitioners for its toxicity to harmful, bad breath causing organisms. With these powerful properties, researchers have examined the effectiveness of tea tree oil extract in mouth rinses. One such study found tea tree oil eliminated a wider range of microorganisms than the chemical chlorhexidine.[25]Another study found that Solobacteriummoorei, a bacteria associated with halitosis, was highly susceptible to the effects of tea tree oil.[26] Included in a rinse, it offers a complete cleansing

effect in the battle against bad breath. Tea tree oil has also been found successful in addressing Candida, which can cause bad breath. [27]

3. Sage

Sage has been known since ancient times as a healing herb. Modern research has only validated its effectiveness against harmful organisms and its powerful halitosis fighting abilities. Sage has been shown to be effective against bad breath causing organisms such as Candida albicans, Streptoccocusmutans, and Porphyromonas gingivalis.[28]

4.myrhh

Myrrh has been used for thousands of years in a myriad of ways. For those looking to battle bad breath – whatever the cause – myrrh is a potent natural remedy because it helps cleanse the mouth of germs and also addresses conditions that may encourage future growth.[29,30]

5.clove

In Chinese medicine, bad breath is considered a result of Qi stagnation. According to the Chinese, clove encourages Qi flow and clove has a long history in Chinese medicine for remedying bad breath. Modern studies have found clove to be an effective component of mouth rinses. In one study, participants preferred it to a chemical based mouth rinse in terms of taste, after-taste and ease of use.[31]The authors of this study also noted that mouth rinses using herbs like cloves also presented viable alternatives for individuals who could not use chemical rinses.

6. pine

Pine resins and oils have been used historically for a range of medicinal therapies. Pine naturally contains terpene alcohols which are potent cleansing agents and toxic to harmful organisms. Researchers have also determined pine oils offer powerful antioxidantproperties.[32] As a component of a mouth rinse, pine needle supports overall mouth health.

7. Eucalyptus

For reducing bad breath, eucalyptus has demonstrated remarkable effectiveness. In a 2010 study, eucalyptus was found to eliminate mouth malodor by significantly reducing volatile sulfur compounds.[33]The success of eucalyptus in this study demonstrated that its cleansing effects worked both in the lab, as well as in practice.

II. Conclusion

The dental surgeon with a thorough understanding of these basic pathophysiology and the various methods for detecting halitosis effectively.He should try his best in investigating the patient and find out what exactly is the cause pertaining in each individual patient among these umpteen etiological factors.The dentist should update his knowledge in regard to the recent advances happening in the detection as well as treatment part of halitosis.By delivering proper cure a dentist can not only give him a good breath but also help the individual a positiveness and charisma in his social life too.

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