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Study of bad breath

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Abstract

About 15 to 65% of the population suffers from bad breath. This can lead to anxiety, depression, complicate daily life, create discomfort and social difficulties, and is often a cause for low self-esteem. Cases of pseudohalitosis, in which patients constantly complain that they have bad breath, but in practice none is felt, are not rare.

In about 80% -85% of cases the cause of bad breath is in the oral cavity and in the other cases it is considered to be due to disorders of the nose, sinuses, lungs, the digestive or urinary systems, or is associated with endocrine disorders.

Testing with devices is an easy method to determine this condition. Some of these methods offer an effective, easy and fast way to detect bad breath. Working with such devices does not require prior training. Interpretation of the results is greatly facilitated by the numerical value that appears on the display. The method can be easily applied when we want to determine the levels of bad breath.

Keywords: bad breath, halitosis, halimeter, volatile sulfur compounds

Introduction

Bad breath (malodor) refers to a characteristic, disgusting or unpleasant odour perceived by stimulation of the olfactory receptors in the nose by gaseous chemicals. Its bearer does not always feel it themselvehimself. About 15-25% [1] to 55-65% of the population suffer from bad breath [2]. In 95% of people it has occurred at least once. It can cause anxiety among the affected. Bad breath also may also be associated with depression and symptoms of obsessive compulsive disorders [3]. It hampers daily life, creates personal discomfort and social difficulties in half of the affected patients. It is often the cause of poor self-esteem, of self-isolation of its holder in society. The cases of pseudohalitosis, in which patients constantly complain that they have bad breath, but in practice it is not felt, are not rare. With advancing age, its values increase [4].

In about 80%-85% of cases, the cause is in the oral cavity [3]. It is usually due to bacteria on the back of the tongue that break down proteins and produce malodorous compounds (indole, skatole, volatile sulfur substances, hydrogen sulfide, methyl mercaptan) [5]. The remaining cases (10-15%) are thought to be due

to disorders of the nose, sinuses, throat, lungs, the esophagus, liver or stomach, pancreas, kidney failure, endocrine disorders, infections, or are drug-induced [6, 7]. Bad breath may be due to general disease, such as liver failure, pulmonary problems, ketoacidosis. False cases are those in which the patient feels that he has bad breath, but actually does not feel it. This condition accounts for between 5% and 70% of cases of bad breath [8, 9].

Olfaction and taste are interrelated and cannot function completely independently. Impairment of one sense blocks the function of the other and all anatomical structures must be intact for the normal functioning of taste and smell [5].

Bad breath is frequently reported by patients and is an important clinical syndrome that facilitates the identification of disease. Various terms are used to characterize it [5].

The term halitosis was proposed in 1921 by the Listerine Company, which produced an antiseptic mouthwash created by John Lister. Halitosis is characterized by 4 conditions - ososstomia, stomatodysodia, halitosis and fetor ex ore.

Most commonly malodorous breath is associated with hydrogen sulfide (H_2S) and mercaptan (CH_3SH), as well as dimethyl sulfite (CH_3-S-CH_3). It is due to the increase in the amount of volatile sulphur containing substances (VSC) and the mercaptan/hydrogen sulphide ratio. Bacterial enzymes decompose cystine, cysteine and methionine to mercaptan [10].

Aim

Explore options for easy, quick and effective measurement of bad breath in the outpatient settings.

Material And Methods

Using bad breath measurement devices (Fig. 1), we measured the exhaled breath levels of 55 healthy patients by repeating the test three times. We used the HC-212M and HC-212SF FitScan Breath Checkers, Tanita Corporation of America, Inc. The devices quantified volatile sulfur compounds: hydrogen sulfide (H_2S), mercaptan (CH_3SH), as well as dimethyl sulfite (CH_3-S-CH_3) and hydrocarbon from exhaled air on a scale of 0 to 5. It contains an integrated semiconductor gas sensor.

Figure 1. Apparatus for the the quantification of volatile sulphates (Tanita Corporation of America)

The test result is classified into six grades respectively –
0: odorless,
1: barely noticeable,
2: mild,
3: moderate,
4: strong,
5: very strong.

After activating the device, you must wait about five seconds for its automatic calibration. The display shows the values from 5 to 0 in a sequence and the instrument beeps. The patient is invited to exhale in front of the sensor from a distance of about one centimetre. If not exhaledation does not occur immediately, the device displays an error. After 500 consecutive samples, including the errors, the apparatus stops working as it is considered that the reliability of the data will no longer be high.

Results

Analysis of the results of 3 consecutive readings show similar values. In nearly 70% (38 pcs) of 55 samples there was a match of the 3 samples. In 29% (16 pcs) the difference was one unit, and in only one sample wase a difference reported a difference of two units (1.81%) (Fig. 2).

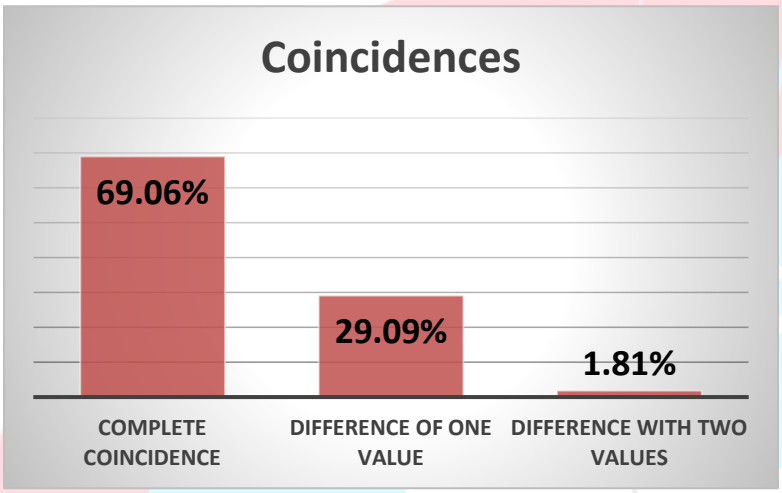

Figure 2. Coincidences after three tests for bad breath

One measurement is quite sufficient to establish the value of exhaled breath. Repeating the test is not necessary except when we know that the patient did not blow at the right time or on the right place. After activating the device, we must wait five seconds for calibration. If the patient does not exhale immediately after the beep the apparatus displays an error.

On each subsequent examination, the bad breath values rise slightly. This is most likely due to expiration of air from the more distal compartments of the lungs (Table 1).

Table 1. Values from three consecutive measurements

	First measurement	Second measurement	Third measurement
Median	1	1	1
Mean value	0,77	0,8	0,81
Rank	0-3	0-3	0-3

Discussion

The main methods of diagnosing bad breath are:
1. Organoleptic or human sense of smell;
2. Monitoring of sulfides;
3. Gas chromatography.

All of these methods have drawbacks and limitations. An ideal method capable of detecting bad breath is not yet available.

Organoleptic methods

Organoleptic measurement is a test evaluated based on the basis of the subjective perception of the investigator. One of its variants is self-assessment. Determining one's own breath is often very difficult

because of habituation, but many people with bad breath are able to detect it in others. Self-assessment of halitosis is not objective and easy because we always have preconceived ideas. Some people mistake bad breath in the presence of altered taste (metallic, sour). Some studies point to organoleptic measurement as the most reliable and practical method [11].

TESTING WITH AN APPARATUS

Halimeter

Halimeters are portable, compact devices used to analyze sulfur emissions (specific, for hydrogen sulfide) in exhaled air. The instruments analyse the total sulphur content. These devices can be very effective for determining the levels of certain sulfur compounds produced by bacteria. They also have some drawbacks in clinical application, as some common sulphides (mercaptan) are not captured, which may lead to an erroneous result. Foods such as onions and garlic produce sulphur for prolonged periods of up to 48 hours and may lead to erroneous readings [12; 13]. These devices are very sensitive to alcohol andor mouthwash with alcohol should be avoided for at least 12 hours before such a measurements. They lose sensitivity over time and require periodic calibration [14]. The Halimeter (Interscan Co., Chatsworth, CA) has high sensitivity to hydrogen sulfide and low sensitivity to methyl mercaptan, which is a major contributor to bad breath caused by periodontal disease.

Gas chromatography

These devices are equipped with a photometric detector for the detection of sulfur in the mouth. Gas chromatography is considered the gold standard for measuring bad breath because it is specific for volatile sulfur compounds. The equipment is not compact and the procedure requires considerable prior training prior [15]. An option for gas chromatography is OralChroma-to digitally measure molecular levels of the three major volatile sulfur compounds in exhaled air samples (methyl mercaptan, hydrogen sulfide, and dimethyl sulfide). The method accurately determines the sulfur components in exhaled breath and can provide visual results in graphical form.

Other tests

The Bama test is aimed at detecting salivary enzyme levels that indicate the presence of certain bacteria associated with bad breath.

In β-galactosidase test salivary levels of this enzyme correlate with bad breath [16].

Conclusion

The presented method represents a very effective, simple and rapid option for the determination of bad breath in all conditions. The devices are easy to use, small, light and compact. Operating the deviceon does not require prior training. Interpretation of the results is greatly facilitated by the numerical value displayed. The method can easily be applied when we want to detect bad breath levels.

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