



RESEARCH ARTICLE

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HALITOSIS AND PROSTHETIC STATUS OF PATIENTS A CLINICAL SURVEY

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ABSTRACT

The objectives of this study were to assess the oral malodor in patients and analyze its association with prosthetic status of them. The study comprised 94 patients (60 males and 34 females) between the ages of 34 and 68 years old. This cross-sectional survey was carried out at the ENT department of the Metaxas Cancer hospital. Oral malodor was assessed by two clinician judges using the organoleptic method. There was agreement between the two clinicians. The prevalence of malodor was high (43,33%) in the men who worn complete or partial dentures. Ten patients (16,66%) with faulty fixed partial dentures had bad breath. There was a high percent (47, 05%) of the halitosis in females who worn unclean removable dentures.

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INTRODUCTION

Halitosis is a Latin word which derived from halitus (bread air) and the osis (pathologic alteration) and it used to describe an unpleasant odor emanating from the mouth air and breath (Loesche, 2000). Halitosis is very common in general population and nearly more than 60% of general population has malodor (Debaty, 2002). Microbial degradation in the oral cavity is the main cause of oral malodor. Due to this process volatile sulphur compounds (VSCs) are formed. The most important VSCs involved in halitosis are hydrogen sulphide (H₂S) methyl mercaptan (CH₃SH) and dethyl sulphide (CH₃)₂S). These VSCs are mainly produced by Gram-negative anaerobic oral bacteria (Rayman, 2008; Bollen, 2012). The origin of halitosis cases 85% is found in the oral cavity. A clinical evaluation of 200 patients showed that 76% of these patients had oral causes; tongue coating 43%, gingivitis/periodontitis (11%) or combination of the two (18%) (Quirynen, 2009; Ratcliff, 1999).

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Poor oral hygiene, dental plaque, dental caries accumulation and putrefaction of food remnants and unclean acrylic dentures contribute to bad breath (Nalcaci, 2008; Myatt, 2002). Xerostomia often shows an increased volume of plaque on teeth and tongue. The lack of salivary flow, leads to disappearance of the antimicrobial activity of the saliva and the transition from Gram-positive bacteria to Gram-negative species (Kleinberg, 2002; Astor, 1999; Nikolopoulou, 2003). Malodor can be caused by stomatitis, intraoral neoplasia, peri-implantitis (12). Dental conditions are that affect teeth and gums include, tooth decay, tooth infection, impacted tooth, canker sores and faulty prosthetic restoration. (Tonzetich, 1977; Porter, 2006; Murata, 2002). Nearly 8% of the halitosis cases caused from an extra-oral source. Respiratory system problems can be divided into upper and lower respiratory tract problems. They are sinusitis tonsillitis and rhinitis were frequently associated with the oral halitosis (Feller, 2005; Tangerman, 2010). A recent study in elderly population found the accumulation of bacterial plaque on the tongue, oral dryness, burning mouth, overnight denture wear, and lower educational levels to be significantly related to oral malodor (Almstahl, 1999). There are several reasons for the scientific data. First there is the difference in cultural and racial appreciation of odors as for patients as well as for investigators. Second there

is absence of uniformity in evaluation methods as for organoleptical and as for mechanical measurements (Locker, 2003). Systemic disease can cause malodor. The gastrointestinal tract can only indirectly (haematologenic) influence bad breath.(20)Diabetic ketoacidosis leads to a typical breath odor. Diabetes type 2 demonstrates a typical sweet and fruit odor (Scully, 2012). Liver can involved in oral malodor, due to a reduced liver function, waste. Products are eliminated through the lungs causing the fetor hepaticus a sweet excremental odor (the breath of death) (22) Bisphosphonates can contribute to oral malodor. Bisphosphonate induced osteonecrosis since 2003 a common problem. The product is used systemically in cases of malignant bone tumors and their metastases. Often this results in jaw bone necrosis, a clear origin for a filthy odor (Porter, 2011).

MATERIALS AND METHODS

The methods of defecting or diagnosing halitosis are organoleptic or human sense of smell, sulfide monitoring and chromatography. The Halimeter is an instrument that is used for measurement for bad breath scientifically. All these methods have limitations and disadvantages. In the organoleptic method, the oral malodor is evaluated at various distances from the oral cavity by the examiner's sense of smell. The organoleptic method is ease of performance and low cost (24) In this survey the organoleptic method was used. This cross-sectional study conducted between January 2012 and July 2015 by the ENT clinic of the Metaxas Anti-Cancer Hospital. The sample comprised 94 subjects, 34 females and 60 males aged between 35 and 68 years old. The strength of odor was measured using organoleptic scale, scored from 0 to 5 (although many others scales have been proposed) (21, 25, 26)

Table 1 Organoleptic scoring scale

0	No detectable odor
1	Hardly detectable odor
2	Light odor
3	Moderate odor
4	Strong odor
5	Extremely strong odor

Two judges scored breath odor levels using the 0-5 organoleptic scale as outlined by Rosenberg(1991) and modified in term of odor descriptive by Greenman (2004) (25, 26) Prior to organoleptic diagnostic testing the patients should refrain from:

- Eating spicy foods, drinking beverages especially garlic and onions for 24 prior to tests.
- Using tobacco products in the morning of the appointment.
- Beverages using oral rinses or using breath fresheners in the morning of assessment.
- drinking water within 1 hour before their appointment
- Wearing cologne, perfume or strongly scented cosmetics to their appointment.

Patients who used antibiotics, it was generally advised that treatment must be completed four weeks ago. Antibiotics can potentially interfere for many reasons, including their various breakdown products in the liver and bloodstream, some of which are volatile and can reach the lungs and be excreted in the breath. Antibiotics may also change or disturb the

microbial colony of the subjects' oral or gut flora (Scully, 2012). The patients were seated upright and instructed to relax and head slightly backwards. They instructed to close their mouth and breathe through their nose and hold the breath in their mouth for up to 2 min whilst breathing through their nose. Then the patient was asked to open his mouth whilst the organoleptic judge approaches with his/her nose approximately 10 cm away from the patient's mouth. The clinician sniffed two or three times from the open mouth of the patient. In the similar manner the patients were instructed to breathe through the nose. The judges reported the score, and after the dental examination the prosthetic status of patients was recorded.

RESULTS

All eligible subjects agreed to participate for this clinical study. At the initial visit at the Anti-cancer Hospital Metaxas, the patient's chief complaint was the malodor. There was agreement between two clinicians. The table 2 and the table 3 show us the high of malodor (43,33%) in the men. They wore unclean complete and partial dentures. Ten patients (16,66%) with faulty fixed partial dentures had malodor. Table 4 shows that the prevalence of halitosis in females who wore removable dentures was high (47,05%). Sixteen females with the organoleptic score (Rayman, 2008; Bollen, 2012; Quirynen, 2009). Only 2 females (5,88%) who wore faulty fixed dentures had bad malodor.

DISCUSSION

Differentiation between intra-oral and extra-oral halitosis can easily done by examining mouth as well as nose breath. Patients with intra-oral halitosis only have bad breath from the mouth but not from the nose (Tangerman, 2010). As proven in the past, self-assessment of oral malodor is notoriously unreliable. Therefore, other methods such as the organoleptic assessment and the measurement of VSCs have been proposed and are now common practices for diagnosis of bad breath. In this study a clinical evaluation of the halitosis of 94 patients carried out at the ENT clinic of Metaxas Hospital. The measurement of the halitosis of sample was conducted by organoleptic method. Until today, an organoleptic assessment is still the 'gold standard' for diagnosis of breath malodor. This method is easy to perform (Rosenberg, 1992; Silva, 2018). One of the most important disadvantages is that the assessment clearly has a certain degree of subjectivity. In attempt to obtain objective evaluation of the breath, relatively expensive portable sulphur detectors like the Halimeter and the oral chroma were developed (Vandekerc Khove, 2009). A lot of studies have shown good correlations between the organoleptic assessment and the Halimeter method (Porter, 2006; Rosenberg, 1991; Rosenberg, 1996; Rosing, 2011; Dadamio, 2013). Differences in correlation coefficients may be explained by variability in patients group (inclusion criteria) and study conduct (the equipment used calibration) and the organoleptic method (calibration of judges, number of judges etc). This organoleptic method in our cross-sectional study showed that the prevalence of malodor in men (score 3, 4, 5) was 63,33%. Twenty four females (70,58) had bad malodor. The men who wore unclean removable dentures suffered from halitosis. (43,33%). Goldberg *et al* demonstrated that the enterobacteria could contribute to denture malodor. These authors found a high prevalence of these micro-organisms in the oral cavities of denture wearers.

Table 2. Organoleptic Measurement of halitosis in study sample

Variables	Organoleptic score									
	0	1	2	3	4	5				
Males	10	16,66%	12	20%	8	13,33%	10	16,66%	20	33,33%
Females	4	11,76%	6	12,64%	5	14,70%	5	14,70%	14	41,17%

Table 3. Prosthetic status and halitosis for men

Prosthetic Status	Organoleptic score					
	0	1	2	3	4	5
Complete dentures	0	0	0	3	5	12
Partial dentures	0	0	0	15%	25%	60%
Faulty fixed partial	0	5	4	233,33%	0	466,66%
Dentures, crowns		26,31%	21,05%	15,78%	15,78%	21,05%
Period. decay, destroyed teeth	0	5	26,31%	8	53,33%	0

Table 4. Prosthetic status and halitosis for Females

Prosthetic Status	Organoleptic score									
	0	1	2	3	4	5				
Complete dentures	0	0	0	2	33,33%	2	33,33%			
Partial dentures	0	0	3	23,07%	4	30,76%	2	15,38%	4	30,76%
Faulty Fixed Partial Dentures	0	0	2	50%	0	0	2	50%		
Period., decay, Destroyed teeth	0	0	5	45%	2	18,18%	1	9,09%	3	27,27%

They also reported that there was correlation between the organoleptic assessment and Halimeter method (Goldberg, 1997). Denture is another significant source of oral malodor. This odor is somewhat sweet but unpleasant. It is readily identifiable, particularly after the dentures are placed in plastic bag for several minutes (Nalcaci, 2008; Settineri, 2014). It has been found a significant source of oral malodor in dentures' wearer overnight (Mitchell, 2005; Verran, 2006). They also referred that the denture adhesives provided the denture wearer with a noticeable improvement in breath (Myatt, 2002). It has been reported that the accumulation of bacteria plaque on the tongue, denture quality, wearing denture overnight were significantly related to oral malodor in elderly (Tingxi Wu, 2015; Snel, 2011). Little work has been published on malodor associated with dentures. The microbiology of the denture wearers has not been specially studied (Tingxi Wu, 2015; Snel, 2011; Zigurs, 2005). Teeth adjacent to partial dentures are more susceptible to caries and periodontal diseases, perhaps due to an increased plaque buildup at the prosthesis/tooth interface (Tingxi, 2015; Zigurs, 2005; Resa Derafshi, 2017). Others investigators found that non-oral pathogenic bacteria were detected from the saliva of denture wearers, considering the possibility that the oral cavity may act a potential origin of pathogenic species that may cause infection on other body sites (Resa Derafshi, 2017). There is a need for further work in this field, in order to assess the reasons of malodor and faulty prosthetic appliances.

REFERENCES

- Almstahl, A., Wikstrom, M. 1999. 'Oral micro flora in subjects with reduced salivary secretion. *J Dent Res.*, 78(8): 1410-1416
- Astor, F. C., Hanft, K.L., Ciocon, J.O. 1999. 'Xerostomia a prevalent condition in the elderly *Ear Nose Throat J.*, 18(7): 476-9
- Bollen CM., Beikler T. 2012. 'Halitosis: the multidisciplinary approach' *Int J Oral Sci.*, 4(2): 55-63
- Brunner F., Kurmann M, Philippi A. 2010. 'The correlation of organoleptic and instrumental halitosis measurements. *Schweiz Monatsschr Zahnmed.*, 2010; 120(5): 402-8
- Dadamio, J I Laleman, S De Geest, *et al.*, 2013. 'Usefulness of new malodor-compound detection portable device in oral malodor diagnosis; *J Breath Res.*, 7(4) 946005 doi 10, 1088/1752-7155/7/4/046005
- Debaty B, Rompen E 'Origin and treatment of bad breath. *Rev Med Liege.*, 2002; 57(5):324-9
- Delanghe, G., Ghyselen J, Van Steenberghe D *et al* 1997. 'Multidisciplinary breath-odor clinic' *Lancet* 350(9072) : 187
- Feller, L, Blignaut, E. 2005. 'Halitosis: a review *SADJ.*, 60: 17-19
- Goldberg S Cardash, H Browning H 3rd *et al.* 1997. 'Isolation of enterobacterial from the mouth and potential association with malodor' *J Dent Res.*, 76(11):1770-1775
- Greenman, J., Duffield, J., Spencer P. *et al.* 2004. 'Study on the organoleptic intensity scale for measuring oral malodor' *J Dent Res.*, 83:81-85
- J Verran 'Malodour in denture wearers: an ill-defined problem' *Oral Dis.*, 2005; 11Suppl 1:24-8
- Kleinberg J, Wolff M S, Codipilly D M 'Role of saliva in oral dryness, oral feel and oral malodor' *Int Dent J* 2002, 52(Suppl 3): 236-240
- Locker D 'Dental status, xerostomia and the oral health-related quality of an elderly institutionalized population' *Spec Care Dent.*, 2003; 23(3): 86-93
- Loesche WJ, Kazor C Microbiology and treatment of halitosis. *Period.*, 2000; 28:256-79
- Mitchell S C. 2005. 'Trimethylaminuria (fish-odor syndrome) and oral malodor' 2005; *Oral Dis* 11(Suppl1):10-13
- Murata T, Yamaga T, Iida T *et al* 2012. 'Classification and examination of halitosis' *Int Dent J.*, 52(Suppl3):212-6
- Myatt, G J Hunt, S A Barlow AP *et al.* 2002. 'A clinical study to assess the breath protection efficacy of denture adhesive' *J Contemp Dent Pract.*, 3(4) :1-9

- Nalcaci R, Baran I 2008. 'Oral malodor and removable complete dentures in the elderly. *Oral Surg, Oral Med, Oral Path, Oral Radiol Endod.*, 105(6): e5-9
- Nikolopoulou, F. 2013. T Tasopoulos, R Janger 'The prevalence of xerostomia in patients with removable prostheses' *Int J Prosth.*, 26 (6):525-526
- Porter SR 2011. 'Diet and Halitosis' *Curr Opin Clin Nutr Metab Care*, 14(5):463-8
- Porter SR, Scully C 2006. 'Oral malodor (halitosis)' *B M J* 23:333(7569):632-5
- Quirynen M, Dadamio J, Van den Velde S *et al* 2009. 'Characteristics of 2000 patients who visited halitosis clinic. *J Clin Period.*, 36(11): 970-975
- Ratcliff PA, Johnson PW 1999. 'The relationship between the oral malodor, gingivitis, and periodontitis. A review' *J Periodontol.*, 70(9): 485-9
- Rayman S, Almas K. 2008. 'Halitosis among racially diverse populations: un update. *Int J Hyg.*, 6:2-7
- Resa Derafshi, Abdollah Bazargani, Jannan Ghapanchi 'Isolation and identification of non- oral Pathogenic bacteria in the Oral Cavity of Patients with Removable Dentures' *J Int Soc Rrev Community Dent*, 2017; 7(4):107-201
- Rosenberg M 'Clinical assessment of bad breath: Current Concepts *J Am Assoc* 1996; 127(4):475-82
- Rosenberg, M. CA McCulloch 'Measurement of oral malodor, 1992; 63(9): 775-782
- Rosenberg, M., Kulkami CY, Bosa A *et al* 'Reproducibility and sensivity of oral malodor measurements with portable sulphide monitor' *J Dent Res*, 1991; 70:1436-1440
- Rosing CK, Loesche W 'Halitosis: An overview of epidemiology, etiology, and clinical management. *Braz Oral Res* 2011; 25(5):466-71
- Scully C Greenman J 'Halitology (breath odor) aetiopathogenesis and management' *Oral Dis* 2012; 18(4):333-345
- Settineri S, Jitetta A, Mento C, Gugliotta SC *et al* 'Self – reported halitosis and emotional state: impact on oral conditions and treatments. *Health Qual Life Outcomes* 2010; 8:34
- Silva, M F., Leite, F R., Ferreira, LB. *et al*. 2018. 'Estimated prevalence of halitosis: systematic review and meta-regression analysis' *Clin Oral Invest*, 22: 47-55
- Snel J, Burgering M, Smit B *et al* 'Volatile sulphur compounds in morning breath of human volunteers' *Arch Oral Biol* 2011; 56:29-31
- Struch F., Wallaschofski H 'Self-reported halitosis and gastro-esophageal reflux disease in general population.' *J Gen Intern Med* 2008; 23(3): 260-266
- Tangerman A, Meuwese- Arends Mt, Jansen JB 'Foetor hepaticus' *Lancet* 1994, 18343(8912):1569
- Tangerman, A., Winkel, E G. 2010. 'Extra- oral halitosis: an overview' *J Breath Res.*, 4:(017003 6pp) doi 19, 1058/1752-7155/4/1/017003
- Tingxi Wu, Xuesong he, Hongvang Lu *et al* 'Development of in vitro denture biofilm Models for Halitosis Related Bacteria and their application in testing the efficacy of Antimicrobial agents' *Open Dentistry J* 2015; 9 :125 -131
- Tonzetich J 'Production and origin of oral malodor. A review of mechanisms and methods of analysis.' *J Periodontol* 1977; 48:13-20
- Vandekerc Khove, B., Van den Velde, S., Menke De Smit J Dadamo *et al*. 2009. clinical reliability of non organoleptic oral malodor measurements ' *J Clin Period.*, 36 (11):964969
- Zigurs G Vidris A, Brinkmane A 'Halitosis manifestation and prevention, means for patients with fixed teeth dentures. *Stomatologija*, 2005; 7:3-6
