

Revisiting the Halitosis Pathogenesis

Elena A. Oleinik, Boris V. Trifonov, Leonid V. Pazhincky and Aleksandr V. Tsimbalistov
Belgorod State University, Pobeda Street, 85, 308000 Belgorod, Russia

Abstract: The halitosis as before is timely a problem. It includes both social and medical aspect: halitosis may indicate pathology of different organs and system of human body, at the same time, bad breath has a negative impact on social and personal aspects of life as it often limits interaction for those suffering from halitosis. Often times breath odors is a concomitant symptom of periodontal disease.

Key words: Halitosis, bad breath, periodontitis, social medical aspect, organs

INTRODUCTION

The halitosis as before is timely a problem. It includes both social and medical aspect: bad breath may indicate pathology of different organs and system of human body at the same time it has a negative impact on social and personal aspects of life as it often limits interaction for those suffering from halitosis (Ulitsvskii, 2004; Arseculeratne *et al.*, 2007; Liu *et al.*, 2006; Nalcaci and Sonmez, 2008; Takeshita *et al.*, 2010).

Today, there is a number of proposed theories of bad breath pathogenesis. Often times breath odors is a concomitant symptom of periodontal disease (Haraszthy *et al.*, 2007; Farrell *et al.*, 2006). In these patients, it is due to the large accumulation of desquamated epithelium and microorganisms in the mouth, a substrates such as blood, gingival fluid and purulent discharge of periodontal pockets (Avraamova, 2004; Ulitsvskii, 2004; Khitrov and Zabolotnyi, 2009). However, some studies show no relationship between halitosis and the periodontal diseases. Purpose of this study was to reveal the relationship between bad breath and the periodontal diseases by using molecular-genetic diagnostic methods.

MATERIALS AND METHODS

We used in study the MicroDent Hain-Lifescience test system (Germany), based on the DNA-STRIP technology and the reverse hybridization principle. The obtained results were read as per the provided template. Clinical material was sampled from the gingival sulcus and the top of the tongue by sterile paper adsorbers and delivered to the laboratory of the Interregional Center for Dental Innovations of Belgorod National Research University, Belgorod. The analysis was conducted in accordance with the PCR protocol (polymerase chain reaction, PCR) ("HAIN-Lifescience", Nehren, Germany).

Directly clinical studies were carried out on the basis of the Interregional Center for dental innovations (Belgorod). We examined 68 people aged 27-42 years having complaints of bad breath. Medical internists were confirming either presence or absence of general somatic pathology. All experimental subjects were divided into 2 groups: Group 1: patients suffering from general somatic pathology (27 people); Group 2: patients having no general somatic diseases (41 people).

Dental assessment of patients was carried out with the use of indices of decayed, sealed, extracted teeth CSR, OHI-S, RMA and orthopantomograms. The objective diagnostics and determination of quantitative criteria was performed with the of haligrams recorded with a portable sulfide monitor or halimeter (Interscan Corporation, USA). We also determined the amount of Sulfur Volatile Compounds (SVC) in parts per billion. The severity of halitosis was assessed with a composite SHU index (by Ulitsvskii). It was calculated by the formula: SHU index = Odor Intensity (OI) index + Odor Duration (OD) index/2. Statistical processing of the results was performed by using the Statistica 6.1 and SPSS 19.0. Software Package.

RESULTS AND DISCUSION

All 68 patients who had complained of bad breath underwent a diagnostic study with Halimeter and were subjected to regular medical check-up of a periodontist of the ICDS being diagnosed with "chronic generalized moderate periodontitis". The 19 people (70.4%) of 27 patients forming the group of general somatic pathology had gastrointestinal diseases, 6 people (22%) had ORL diseases and 2 people (7.6%) had endocrinopathies (diabetes). Halimetric average was 117.53 ± 26.5 ppb. SHU average: 2.5 ± 0.84 ($p < 0.05$) (Fig. 1).

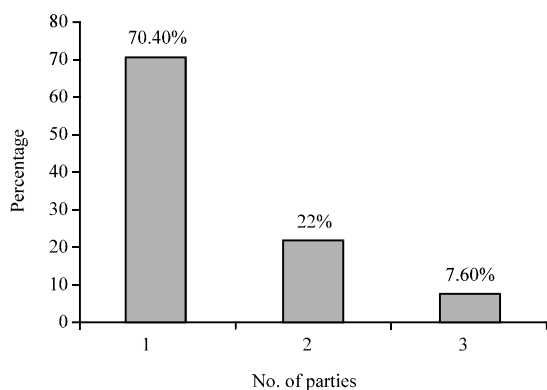


Fig. 1: The structure of general somatic diseases in patients of Group 1 (1 = gastrointestinal pathology; 2 = ORL; pathology; 3 = endocrinopathies)

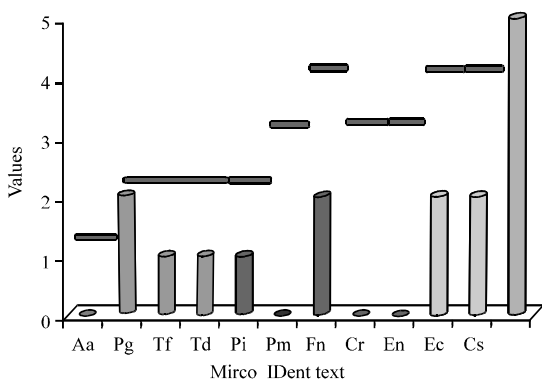


Fig. 2: Micro_Ident test results in a patient of Group 1

In addition, the average value of the hygiene index was 1.6 ± 0.26 which indicates a satisfactory personal oral hygiene, the average value of the CSR index- 6.2 ± 2.45 and the RMA index- $1.2 \pm 0.55\%$ ($p < 0.05$). Only 7 patients (26%) of the study Group 1 had the markers of dangerous red and orange complexes such as *P. Gingivalis*, *Treponema denticola*, *Bacteroides* for sythus at a concentration of 102 found in the material taken from the gingival sulcus and at the the back of the tongue. Same time, patients of Group 2 had the halimetric average equal to 317.53 ± 1.54 ppb which is significantly higher than those of Group 1 (Fig. 2). The average of the RMA index was $24 \pm 0.32\%$, OHI-S index-1.8 (poor oral hygiene). The intensity of the caries process was 8.6 teeth.

Interesting results were obtained during the Micro-IDent tests: the 87.8% of patients (36 of 4 persons) had markers of dangerous strains of red, orange and green complexes at a concentration of >106 detected, mainly in the material sampled from the periodontal pockets and the back of the tongue. The most frequent were *P. Gingivalis* markers (representative of the red complex).

We should note that the patient of Group 2 had the average SHU index (according to Ulitovskii) equal to 4.5 ± 1.6 ($p < 0.05$).

CONCLUSION

Analyzing the above facts, the results of molecular genetic test and clinical and laboratory studies we may conclude that the microbial factor plays a leading role in the pathogenesis of halitosis. Poor oral hygiene of patients, high concentrations of markers of especially dangerous parodontogenic red complex-all these factors contribute to the formation of dental plaque and lead further to both the inflammation processes in the periodontium and bad breath. However, one cannot exclude the effect of general somatic diseases such as pathology of the gastrointestinal tract and ORL pathologies on the halitosis development.

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