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ORIGINAL ARTICLE

Comparison of oral malodors before and after nonsurgical periodontal therapy in chronic periodontitis patients

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Abstract *Background/purpose:* Periodontal diseases have been considered as a source of oral malodor or halitosis. Improvement of oral malodor in chronic periodontitis patients has recently been observed after nonsurgical periodontal therapy in combination with tongue cleaning and/or chlorhexidine mouth rinsing. The present study, however, evaluated the impact of nonsurgical periodontal therapy alone on the oral malodor in chronic periodontitis patients by comparing the intraoral concentrations of volatile sulfur compounds (VSCs) before and after nonsurgical therapy.

Materials and methods: Using a sulfide monitor, the total VSCs in exhaled breath were measured in 80 patients with chronic periodontitis prior to and 1 month after nonsurgical periodontal therapy (re-evaluation phase). Malodor was defined as a VSC score $>$ 75 parts per billion (ppb) and $>$ 110 ppb, respectively.

Results: Significantly lower level of VSCs was recorded at periodontal re-evaluation (55 ± 9.7 ppb) than before treatment (89 ± 16.3 ppb). Before treatment, 27 (34%) patients were considered to have malodor, defined as VSCs $>$ 75 ppb. After treatment, 16 patients (20%) had VSC scores $>$ 75 ppb, including 10 of 27 patients with baseline VSC scores $>$ 75 ppb and six of 53 patients with baseline scores $\leq$ 75 ppb. The risk of malodor differed significantly before and after treatment ($P = 0.035$, McNemar's test). However, when malodor was defined as VSCs $>$ 110 ppb, the difference in risk showed only borderline significance ($P = 0.077$).

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Conclusion: On the basis of our findings, we suggest that nonsurgical periodontal therapy has a mild impact on oral malodor.

Introduction

Oral malodor, or halitosis, is a concern for many individuals, and may affect their interpersonal social communication with ensuing personal discomfort and social embarrassment.[1] Because bad breath is usually emitted from the mouth itself, the dentist or healthcare professionals are the professionals to whom individuals turn for help.[2,3] It has been shown that oral malodor may rank behind dental caries and periodontal disease as the third leading cause of patient visits to the dentist.[4]

Even though the existence of the oral malodor has been recorded in the literature, it has been a neglected problem until recently. In fact, most physicians and dental practitioners are inadequately informed about the causes and treatments for malodor. Reasons for the lack of scientific research in this area include differences in cultural and racial appreciation of odors for patients and investigators, and the absence of uniform standards in evaluation methods.[2] Moreover, there are no universally accepted standard criteria, objective or subjective, that define an oral malodor patient.

Among the various methods introduced for the measurement of oral malodor, organoleptic measurement has been suggested as a feasible chairside test for the diagnosis of intraoral halitosis in exhaled breath.[5] Moreover, organoleptic measurement is a subjective method evaluating the strength of oral malodor using a scale from 0 to 5.[6] In the present study, the portable volatile sulfur compounds (VSCs) monitor was used, based on its characteristic high sensitivity, high consistency, high accuracy, ease of use, and capacity to measure cumulative amounts of various VSCs in order to provide reliable diagnostic measurements. Recently, periodontal diseases have been considered as a major source of oral malodor,[7] and nonsurgical periodontal therapy in combination with tongue cleaning could provide improvements for the halitosis.[8–10] The present study was designed to examine whether or not the oral malodor/halitosis can be improved with nonsurgical periodontal therapy alone without tongue cleaning or mouth wash.

Materials and methods

Experimental design

A total of 80 patients (49 male and 31 female) with chronic periodontitis were included in this study. The diagnosis of chronic periodontitis was based on the American Academy of Periodontology Classification of Periodontal Diseases.[11] The mean age of the patients was 62.5 ± 10.1 years, ranging from 32 years to 78 years. The periodontal status of the patients at baseline and at the post-treatment phase, or so-called re-evaluation phase, is summarized in Table 1. Probing depth, clinical periodontal attachment level, gingival recession, and sites with plaque and bleeding upon probing were also measured at baseline and at re-evaluation. Using a sulfide monitor (Halimeter; Interscan Corporation, Chatsworth, CA, USA), the combined total sum of the VSCs in exhaled breath was measured,[12] and each patient was instructed to sit quietly without talking for 3 minutes prior to the measurement. A plastic straw was attached to the air inlet of the monitor and inserted approximately 2.5–5 cm into the oral cavity. The patients were then asked to close their mouths for 3 minutes prior to sampling to allow a full buildup of any VSC present. A series of three separate 30-second samples were collected from each patient. The peak parts per billion (ppb) values were displayed at the end of each sample period, after which an average peak ppb value for all three samples was displayed. There was a 3-minute restabilization period before each sample was taken. The VSC recorded during the first and second visit for nonsurgical periodontal therapy was used as the baseline score. All patients then received oral hygiene instructions and full mouth scaling and root planning with specific instructions not to use tongue scraping or chlorhexidine mouth rinse. When patients presented for periodontal re-evaluation in 4 weeks after the last root planning, VSCs were recorded again. A VSC score of 75 ppb was defined as the socially acceptable level as suggested in previous studies,[13,14] whereas a VSC score of ≤ 110 ppb was also considered normal according to the manufacturer's instructions (www.halimeter.com/calibration-procedure/).[15] This study received Institutional Review Board approval

Table 1 Demographics and clinical parameters of study population (n = 80) at baseline and after treatment.

	Baseline	Post-treatment	P
Age (y), mean ± SD	62.5 ± 10.1		
Sex			
Female (n, %)	31 (39)		
Male (n, %)	49 (61)		
PD (mm)	3.9 ± 0.7	3.4 ± 0.6	< 0.001*
CAL (mm)	4.7 ± 1.0	4.4 ± 0.6	< 0.001*
Rec (mm)	0.9 ± 0.5	1.0 ± 0.6	< 0.001*
Site with plaque (%)	71 ± 15	37 ± 20	< 0.001*
Site with BOP (%)	43 ± 22	26 ± 16	< 0.001*

BOP = bleeding on probing; CAL = clinical periodontal attachment level; PD = probing depth; Rec = gingival recession; SD = standard deviation.
* Significantly different measurements obtained at baseline and post-treatment.