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**FILE: ■ Oral Malodor
■ Bad Breath
■ Antimicrobial Herbs**

HC 070682-365

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RE: Herbal Formula Used Locally is Effective in Fighting Bad Breath and Reduces Volatile Sulfites and Microbial Growth as Well as Common Antimicrobial Agents

Sterer N, Nuas S, Mizrahi B, Goldenberg C, et al. Oral malodor reduction by a palatal mucoadhesive tablet containing herbal formulation. *J Dent.* Jul 2008;36(7):535-539.

Oral malodor (halitosis or "bad breath") is usually caused by anaerobic Gram-negative bacteria in the mouth (e.g., *Porphyromonas gingivalis*), which break down proteins and their amino acids into foul-smelling volatile sulfide compounds (VSCs). Conventional treatment includes tongue scraping and mouthwashes. This study examines the effect of an adhesive tablet containing an herbal formulation for oral malodor. The mucoadhesive tablet adheres to the palate (roof of the mouth). It contains an herbal formulation made from equal parts of echinacea (*Echinacea angustifolia*), lavender (*Lavandula angustifolia*), mastic (*Pestacia lentiscus*) gum, and sage (*Salvia officinalis*) dried powders (Herbalife Co., Lod, Illinois).

A total of 56 subjects were included in the clinical portion of the study. In the oral malodor reduction experiment, the subjects were randomized to receive the local herbal treatment tablet (n=15) or a placebo tablet (n=11) made only with the adhesive polymers carbopole (50 mg) and hydroxypropyl cellulose (200 mg). Baseline measurements of oral malodor were made by 2 trained and calibrated odor judges, blinded to each other's scores and other data, and a sulfide monitor. The measurements were taken again at 60 and 120 minutes following application of the adhesive tablets. In a second experiment, the volunteers were randomized into 4 groups. The groups received adhesive tablets containing 10 mg zinc gluconate (n=7), the herbal formulation (n=8), 0.12 % w/w chlorhexidine gluconate (n=7), or no active ingredients (placebo) (n=8). Baseline levels of VSCs were measured with a sulfide monitor, and then the adhesive tablets were applied. The VSC measurements were repeated 60 and 120 minutes following the application. In an agar diffusion test, the antimicrobial activities of ethanolic extracts of lavender, sage, mastic gum, and echinacea were tested in concentrations of 0.5, 1, 2, and 4% (w/v) along with a positive control (Listerine® Cool Mint®, Warner-Lamber, Inc., NJ) and a negative ethanol control against 3

known oral pathogens: *Streptococcus mutans*, *Candida albicans*, and *Porphyromonas gingivalis*.

The results indicate that treatment with the herbal tablet significantly reduced malodor ratings by 67% and VSC levels by 64%, when compared to the control treatment ($P < 0.001$ for both). The efficacy was approximately equivalent after 1 and 2 hours. The herbal, chlorhexidine, and zinc tablets all significantly reduced VSC levels in the second experiment ($P = 0.001$, $P = 0.032$, and $P = 0.024$, respectively). In the agar diffusion test, the 4% sage extract and the 1-4% lavender extracts were shown to possess significant antimicrobial activity against *S. mutans*, when compared to the negative control ($P < 0.001$ and $P = 0.021-0.001$, respectively). When compared to the positive control, the 4% sage extract showed significantly greater activity ($P = 0.027$). Both the 4% lavender extract and the 0.5-4% mastic gum extracts showed significant activity against *P. gingivalis* ($P < 0.001$ for both), while the positive control was ineffective. All extracts and controls were active against the *C. albicans*. These three microbial pathogens are implicated in diseases of the oral cavity including dental caries, periodontal disease, and thrush, so the application of this formula may extend beyond halitosis.

The authors conclude that the herbal adhesive tablet "is effective in reducing oral malodor and VSC levels" and that the herbal ingredients demonstrated antimicrobial activities, which may benefit other oral conditions. They state that further research concerning duration of the observed effects, recommended dosages, and dissolving time is on-going.

—Marissa Oppel, MS

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