

Halitosis and Its Relationship to Periodontal Disease: Microbial Causes and Nonsurgical Treatment Approaches

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INTRODUCTION:

- Halitosis (bad breath) is a common condition that affects people socially, emotionally, and professionally.
- One major cause of halitosis is periodontal disease, a progressive bacterial infection of the gums and supporting tooth structures. (Chen et al., 2016)
- Periodontal disease forms deep gum pockets that produce anaerobic bacteria such as *Porphyromonas gingivalis* and *Treponema denticola* (Izidoro et al., 2023).
- These bacteria release volatile sulfur compounds (VSCs) like hydrogen sulfide and methyl mercaptan, which are responsible for bad breath (Izidoro et al., 2023).
- Bacteria inside gum pockets are difficult to remove with regular dental cleanings.

OBJECTIVE:

Understanding how bad breath (halitosis) is linked to periodontal disease and reviewing how well nonsurgical treatments, like scaling and root planing (SRP), mouthwashes, probiotics, laser therapy, and oral microbiota transplantation (OMT) work in treating it or even reducing it. Previous research has shown that certain bacteria in gum pockets are the main cause of bad breath in people with periodontitis. My goal is to look at those past studies and compare how each treatment helps reduce those bacteria and improve breath, so we can better understand what options might work best for long-term results.

METHODS AND MATERIALS:

- This study is based on a literature review of research articles focused on the connection between halitosis and periodontal disease.
- Articles were collected using PubMed, ScienceDirect, and Google Scholar.
- Sources were selected based on relevance to the topic and scientific quality.
- A total of 20 primary research articles were reviewed to compare treatment outcomes, understand microbial causes, and summarize clinical findings.

RESULTS:

- **Scaling and Root Planing (SRP)** was the most effective non-surgical treatment for halitosis caused by periodontal disease. It helped remove bacteria that are inside the gumline and lowered VSC levels, improving breath and helping patients with getting a healthy gum (Izidoro et al., 2023).



Figure 1: The different between scaling and root planing. In the right image, Root planing is cleaning beneath the gum, and left image where scaling is just cleaning on the gum line.

<https://www.implantperiocenter.com/wp-content/uploads/2022/10/scaling-vs-root-planing-illustration.jpg>

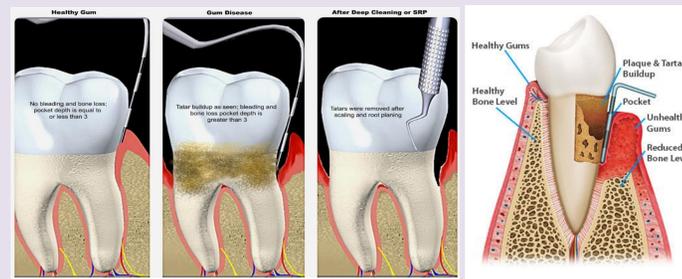


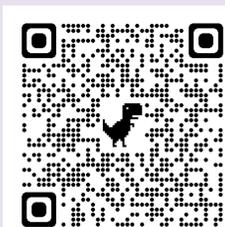
Figure 2: The progression of gum disease. The first picture shows healthy tooth and gums. In the second, plaque builds up and the gums become red and swollen, which is an early sign of gum disease. The third picture shows that after having deep cleaning, the tartar is removed. The last image on the right explains what's happening underneath: tartar buildup, gum inflammation, and bone loss around the tooth.

- **Antimicrobial mouthwashes**, like chlorhexidine, help reduce bad breath, but only for a temporary period of time, so it is considered a short solution because it doesn't reach the bacteria inside the gum (Poormoradi et al., 2021).

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REFERENCES:



- **Probiotics** showed some success in lowering bacteria and improving gum health, but the results depended on how much was used and how consistently patients took them. (Penala et al., 2016)
- **Laser therapy** helped reduce bacteria and bad breath with less pain than SRP, but it's very expensive and not used in most dental offices. (Poormoradi et al., 2021)
- **Oral Microbiota Transplantation (OMT)** is still experimental, but it may help balance oral bacteria in the future by introducing healthy microbes into the mouth (Huang & Cheng, 2024).

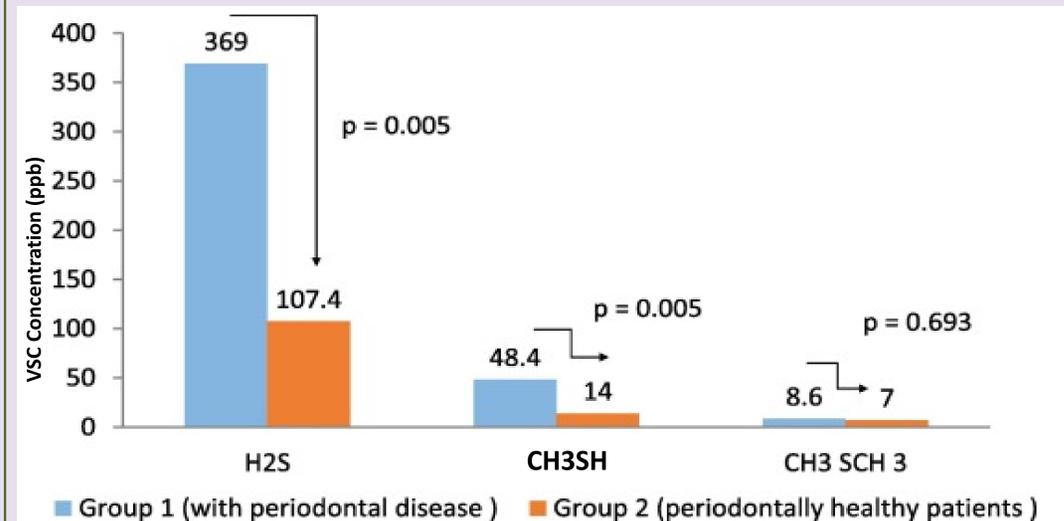


Figure 3: VSC scores of the study population. The average levels (ppb) of hydrogen sulfide (H₂S), methyl mercaptan (CH₃SH), and dimethyl sulfide (CH₃SCH₃) in two groups: Group 1 (periodontitis patients; blue) and Group 2 (healthy controls; orange). VSCs were measured using a portable gas chromatograph (Oral Chroma), and the y-axis shows the concentration in ppb. Group 1 had significantly higher levels of H₂S (369 vs. 107.4 ppb, p = 0.005) and CH₃SH (48.4 vs. 14 ppb, p = 0.005). CH₃SCH₃ levels were similar between groups (8.6 vs. 7 ppb, p = 0.693). An independent t-test was used for comparison, where the results show that VSCs is related to periodontal disease (Alzoman, 2021).

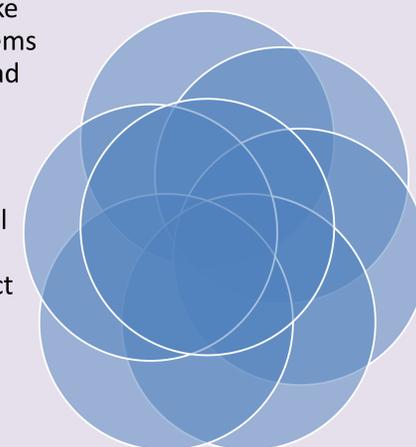
FUTURE DIRECTIONS:

Improve long-term treatments that prevent bacteria from coming back after SRP and mouthwash use.

Look into how diseases like diabetes or immune problems affect gum disease and bad breath.

Develop new antibacterial treatments that kill bad breath bacteria but protect the good ones.

Explore if combining laser therapy with probiotics or OMT gives better results.



Study Oral Microbiota Transplantation (OMT) to find the best healthy bacteria and make results last longer.

Run more clinical trials on OMT to make sure it's safe and effective for dental use.

Make laser therapy more affordable and easier to access in regular dental offices.