CASE REPORT

Effectiveness of Botanical Oral Health Products in Reducing Pathogenic Bacterial Overgrowth and Improving Gingival Health: A Case Report

Ariana Ebrahimian, DDS; Shawn Manske, ND; Christopher R. D'Adamo, PhD; Kristen Klos-Maki, DC

ABSTRACT

This case report evaluates the effectiveness of botanical oral health products in managing bacterial overgrowth and enhancing gingival and periodontal health in a 34-year-old female patient with mild-to-moderate gingivitis. The patient presented with bleeding on probing and positive pathogenic bacterial culture testing. The treatment regimen included a botanical toothpaste and oral rinse (Dentalcidin® and Dentalcidin® LS), oral probiotic, and dysbiosis protocol (Bioclear® Microbiome Detox Program). Post-treatment assessments revealed significant reductions in bleeding on probing and a marked decline in bacterial colony counts, indicating improved microbial balance. The bleeding index was reduced from 21% to 4% after six months, and from 4% to 1% during the subsequent three months using a botanical toothpaste and oral rinse. Periodontal pathogens that were present pre-treatment at high-risk levels were reduced to low-risk levels. These findings suggest that botanical oral health products can reduce bacterial overgrowth and improve periodontal parameters, offering a viable alternative to conventional therapies. (*Altern Ther Health Med.* 2026;32(1):60-64).

Keywords • case report, oral microbiome, biofilm, oral dysbiosis, *Tannerella forsythia*, *Fusobacterium nucleatum*, herbal (botanical) medicine

Ariana Ebrahimian, **DDS**, Ebrahimian Integrative Dentistry, Scotts Valley, CA. **Shawn Manske**, **ND**, Bio-Botanical Research, Inc., Watsonville, CA. **Christopher R. D'Adamo**, **PhD**, University of Maryland School of Medicine, Baltimore, MD. **Kristen Klos-Maki**, **DC**, Bio-Botanical Research, Inc., Watsonville, CA.

Corresponding author: Kristen Klos-Maki, DC
E-mail: drklosmaki@biocidin.com

INTRODUCTION

The importance of oral health is well-established. In recent years, research has expanded our understanding of the oral microbiome and its importance in determining not only oral health but also systemic health. Oral dysbiosis, including microbiota composition changes, loss of beneficial microorganisms with relative growth of pathogens, and loss of diversity, affects the health of the gums, periodontal tissue, teeth, and alveolar bone.[1,2]

According to the National Institute of Dental and Craniofacial Research, nearly 90% of adults aged 20 to 64 years and 96% aged 50 to 64 have experienced tooth decay. Approximately 2% of adults aged 20 to 64 years have no teeth, a predictor of early mortality.[3]

Periodontal disease (PD) encompasses gingivitis and periodontitis, two chronic oral inflammatory conditions. They are the most common inflammatory illnesses globally, affecting nearly 50% of adults 30 years and older and 70% of adults 65 years or older.[4]

Maintaining good oral care habits, such as brushing and flossing daily, helps to keep the oral microbiome balanced.[5] However, despite excellent hygiene, many people continue to experience oral health concerns.

Oral Microbiome

The oral cavity is the second most heavily colonized part of the human body, after the gastrointestinal tract. The oral microbiome comprises approximately 700+ species of bacteria and other microbes such as fungi, archaea, and viruses. While most oral microbes are harmless or even beneficial, some can cause or contribute to disease throughout the body.[6]

Oral microbial communities are one of the most complex microbial floras in the human body, and include several key pathogens such as *Streptococcus mutans* (Sm), *Porphyromonas gingivalis* (Pg), *Tannerella forsythia* (Tf), and *Aggregatibacter actinomycetemcomitans* (Aa). These pathogens are involved in the etiology of dental caries and periodontal disease.[7]

The oral microbiome may serve as a source for pathobionts (microorganisms that normally reside in the

body—often as part of the commensal microbiota—but have the potential to cause disease under certain conditions) that can either contribute to or exacerbate disease at remote body niches or organ systems. Oral pathogens influence immune responses and disease pathogenesis outside of the oral cavity through three primary routes:[8]

1. Translocation from the periodontal pockets into the bloodstream and colonization in systemic tissues, causing transient bacteremia. Their ability to colonize ectopic sites depends on the current state of health at that site.
2. Movement of bacterial products (e.g., lipopolysaccharides and virulence factors) through the gingiva and into the bloodstream.
3. Transfer of inflammatory mediators from host defense that originated in the mouth or as a response to bacteremia. These may include cytokines, chemokines, arachidonic acid, and proteolytic enzymes.

Dental plaque, an easily recognizable "oral biofilm," has long been associated with periodontal problems and, to a lesser extent, dental caries, depending on the bacteria residing within it.[9]

Oral biofilm, a significant cause of PD, is a community of microorganisms found on the tooth surface or within the sulcus (periodontal pocket) and embedded in a matrix of polymers of host and bacterial origin. As bacteria multiply, they create an intricate network of layers and channels that develop into a biofilm designed to protect the microbes.[9]

The connection between the health of the oral cavity, the oral microbiome, and systemic health cannot be overstated. The American Dental Association reports 200 possible connections between systemic diseases and oral health.[9] It is vital to ensure that patients are adequately assessed for oral health and educated about its importance to their overall health and wellness. Both medical and dental practitioners need to encourage daily oral hygiene and effective strategies for creating balance in the oral microbiome as essential components of healthcare.

This case report describes the examination and assessment of a female patient regarding her oral health and the presence of oral pathogenic bacteria. Evaluation included measures of calculus index - a measure of the amount and location of dental calculus (mineralized plaque) on the teeth – and bleeding index - a measure used to assess gingival inflammation by recording bleeding that occurs when a periodontal probe is gently inserted into the gum sulcus. A treatment plan was developed, which included oral hygiene recommendations, the use of botanical-based dental products, and products to address microbial imbalance in the gastrointestinal tract based on its relationship to and influence on the oral cavity (Table 1). The manuscript was prepared following the CARE guidelines of the EQUATOR network for case reports.[10,11] Written informed consent was obtained from the patient, which included the possible publication of the case study.

Table 1. Timeline of Patient's Visit for Treatment

Time	Description
2022-04-05	Initial visit with comprehensive examination, diagnosis, and treatment plan.
2022-04-07	In-office visit including baseline salivary test and full mouth scaling with Dentalcidin® LS irrigation. The patient was given a home care kit that included a Waterpik™, Dentalcidin® toothpaste, Dentalcidin® LS, and a bottle of oral probiotics.
2022-04-13	The results of the salivary test were received, which showed moderate levels of *Tannerella forsythia* (Tf) (1.8×10^5) and high *Fusobacterium nucleatum* (Fn) (6.87×10^7). The patient was prescribed the Bioclear® Microbiome Detox Program with Biocidin® Liquid for 60 days as an alternative to oral antibiotics.
2022-04-14	In-office visit where the patient had a second full-mouth scaling with Dentalcidin® LS irrigation. Her home care program was reviewed, and she was found to be compliant with her home care instructions.
2022-06-14	In-office follow-up salivary testing was completed. Upon receipt, testing results showed that the patient had successfully lowered her bacterial levels to low-risk levels (Tf = 2.16×10^2 and Fn = 6.08×10^5).

Narrative

The 34-year-old female patient presented at the clinician's dental office without specific symptoms or concerns but was interested in a holistic approach to dental care. Her medical history revealed mild snoring, hypothyroidism, occipital and temporal headaches multiple times per week, tubes in her ears as a child, tinnitus since childhood, and several past musculoskeletal injuries. Allergies and food sensitivities include gluten, dairy, almonds, peanuts, trees, and grasses. The patient was married and trying to conceive. Her prior at-home oral routine involved brushing twice daily with an electric toothbrush (toothpaste brand not reported) and flossing five times per week.

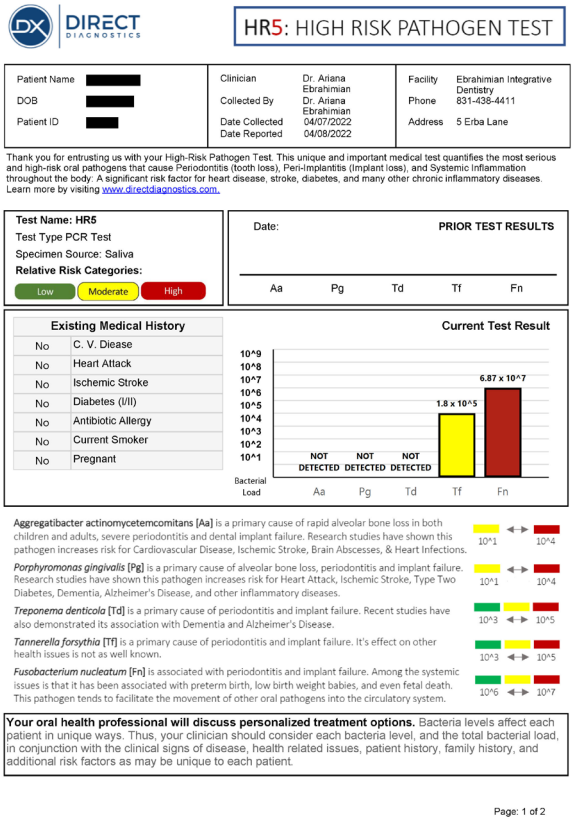
A comprehensive oral examination at the first visit revealed pink, firm gingiva; normal periodontal probing with moderate bleeding; 21% bleeding index; mild plaque; and mild, localized supragingival (above the gumline) calculus. No radiographic bone loss was noted. The diagnosis was generalized, mild-to-moderate chronic gingivitis with an excellent prognosis. The patient was prescribed a treatment plan to help reduce oral pathogen levels, plaque formation, bleeding index, and gingival inflammation.

She was provided with an in-office full-mouth scaling with Dentalcidin® LS irrigation. Her at-home treatment included the use of a Waterpik™, Dentalcidin® toothpaste (Biocidin Botanicals®), Dentalcidin® LS oral rinse (Biocidin Botanicals®), and oral probiotics. The patient was instructed to brush her teeth twice daily with Dentalcidin® toothpaste (Biocidin Botanicals®), use a Waterpik™ once daily during evening oral hygiene routine, swish Dentalcidin® LS mouth rinse (Biocidin Botanicals®) for two minutes every morning, and take 1 ProBiora® Professional Strength oral probiotic (2.5 billion CFU) lozenge every evening after oral hygiene routine, before bedtime.

Salivary polymerase chain reaction (PCR) testing (Direct Diagnostics HR5®) was used for the baseline assessment (before the intervention) of the top five high-risk oral pathogens, which included *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Treponema denticola*, *Fusobacterium nucleatum*, and *Tannerella forsythia*. Testing results showed moderate levels of *Tannerella forsythia* (1.8×10^5) and high levels of *Fusobacterium nucleatum* (6.87×10^7). (Figure 1)

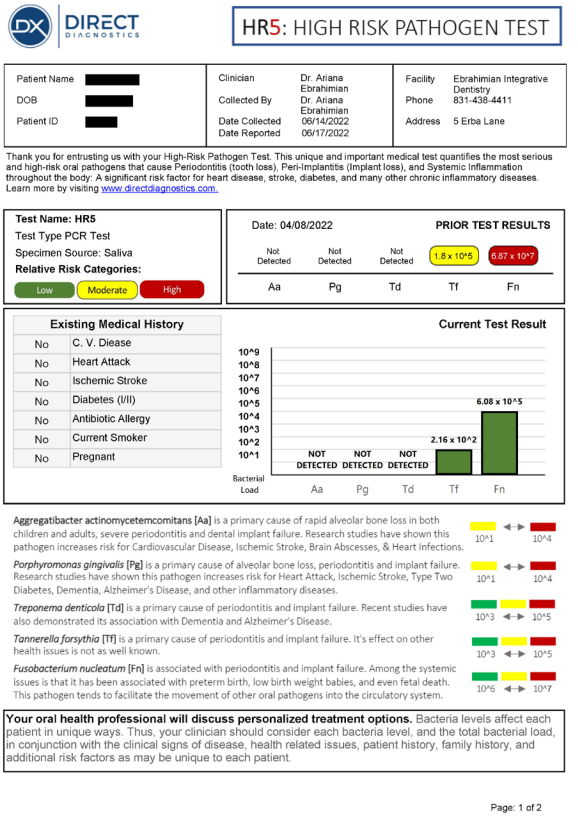
To address the elevated oral pathogenic bacteria found upon testing, the patient was prescribed the Bioclear®

Figure 1. Baseline HR5® Test Results



Note: Direct Diagnostics HR5® Test - Pre-test 04-07-22

Figure 2. Post-Treatment HR5® Test Results



Note: Direct Diagnostics HR5® Test - Post-test 06-14-22

Microbiome Detox Program (Biocidin Botanicals®) for a 60-day treatment. The program includes Biocidin® Liquid (Biocidin Botanicals®), started with one drop, three times daily before meals, and titrated up to five drops, three times daily; G.I. Detox®+ (Biocidin Botanicals®), 2 capsules daily (1-2 hours away from medications, supplements, and food); and Proflora® 4R (Biocidin Botanicals®), 1 capsule daily taken with a meal.

Approximately one week after the initial exam, the patient returned for a second in-office full-mouth scaling with Dentalcidin® LS irrigation to further help reduce the plaque and calculus. Her at-home care program was reviewed, and the patient reported full compliance. The patient was advised to continue the at-home protocol until her next office visit.

Two months later, HR5® salivary testing was repeated, and results showed reduced bacterial levels (low-risk levels) of both *Tannerella forsythia* (2.16×10^2) and *Fusobacterium nucleatum* (6.08×10^5), as shown in Figure 2. Throughout the treatment plan, the patient's periodontal bleeding index improved from 21% to 4% after six months, and further to 1% during the subsequent three months after the active treatment was concluded. The periodontal probing measurements remained within normal limits, and there was no evidence of bone loss.

Patient Perspective

The patient reported excellent compliance with the recommended at-home treatment plan, including the Bioclear® Microbiome Detox Program, although she noted that the program was "hard on her stomach." Despite this, she continued the protocol, and by the end of the 60-day treatment, she felt that her digestive discomfort had resolved. Upon completion of the plan, the patient has continued using the Dentalcidin® toothpaste and an oral probiotic.

DISCUSSION

The case report presented here suggests the potential role of using botanicals as a targeted intervention for oral dysbiosis, supporting oral microbial balance and oral health. Significant improvements in oral health outcomes were observed after addressing the patient's underlying microbial imbalances through comprehensive assessment and tailored treatment.

The prevalence of periodontal disease and its associated systemic implications highlight the importance of proactive oral care practices. Through a holistic approach that combines professional intervention with patient education and home care, it is possible to mitigate the risk of oral infections and their potential systemic consequences.

Proper, routine oral hygiene, regular oral examinations, and treatment by a trained and licensed dentist or dental hygienist are essential for maintaining oral health. These oral care measures reduce the risk of developing oral health conditions, including oral biofilm (plaque) accumulation, dental caries, bleeding gums, gingivitis, and periodontitis, along with their potential contributions to systemic illnesses.[12]

Integrating advanced diagnostic tools, such as salivary testing for high-risk oral pathogens, can provide valuable insights into individualized treatment strategies.[13] In this case, targeted interventions, including a botanical, broad-spectrum antimicrobial toothpaste, mouth rinse, and oral probiotic supplementation, effectively restored the oral microbiome, leading to notable reductions in pathogenic bacteria levels and improvements in periodontal health.

Microbial oral biofilm, commonly known as dental plaque, can harbor both beneficial (commensal) and pathogenic microorganisms. The state of a person's oral health is dependent upon the balance of microbes both within the biofilm and the oral cavity in general. Oral biofilm formation and continued development can be a slow process as the resident species and structure change over time. This follows a stepwise process whereby the initial attachment of early colonizers – notably, *Streptococcus* (including *S. salivarius*), *Actinomyces, Gemella, Veillonella, Rothia,* and *Neisseria* species – binds to the surface of the teeth after brushing or cleaning and supports later colonization by *Fusobacterium nucleatum*, which acts to bridge early and late colonizers (Figure 3). Continued growth and development of plaque eventually leads to increases in anaerobes, such as *Porphyromonas, Fusbobacterium, Prevotella,* and *Capnocytophaga.*[14]

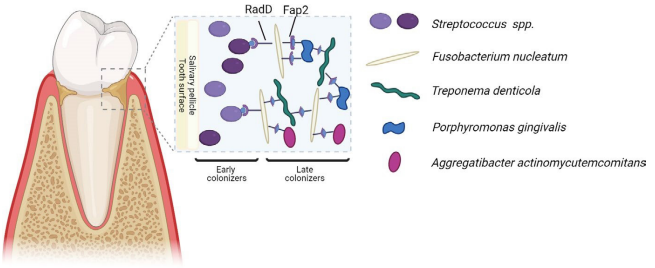
Oral biofilms contain key pathogenic species that are involved in the development of periodontal disease: the red complex bacteria (most important pathogens in adult periodontal disease – *Tannerella forsythia*, *Treponema denticola*, and *Porphyromonas gingivalis*), are often found together in periodontal pockets, suggesting that they may destroy the periodontal tissue.[15] This may be due to their ability to restructure the microbiota (making them keystone pathogens) and promote inflammation (Figure 3).[14]

The oral examination can be supported and validated through oral microbiome evaluation, which provides insight into a range of oral bacteria, including pathogenic and commensal organisms. In the present case study, PCR testing identified pathogenic contributions to this patient's general, mild to moderate gingivitis, allowing early and effective intervention in oral and gastrointestinal conditions.

Addressing the microbial balance for this patient resulted in clear clinical improvement and may have set the stage for good outcomes in oral and systemic health. Addressing the GI tract and gut microbiome utilizing botanical and nutraceutical formulas further benefited the overall clinical outcome. While these treatments may take time to reduce pathogenic microbes to acceptable or desired levels, it is important to note that the goal is not complete eradication of pathogens. It is about finding the microbial balance so that the commensal microorganisms can flourish and support health. More importantly, for the patient, the goal is clinical improvement in oral and systemic health.

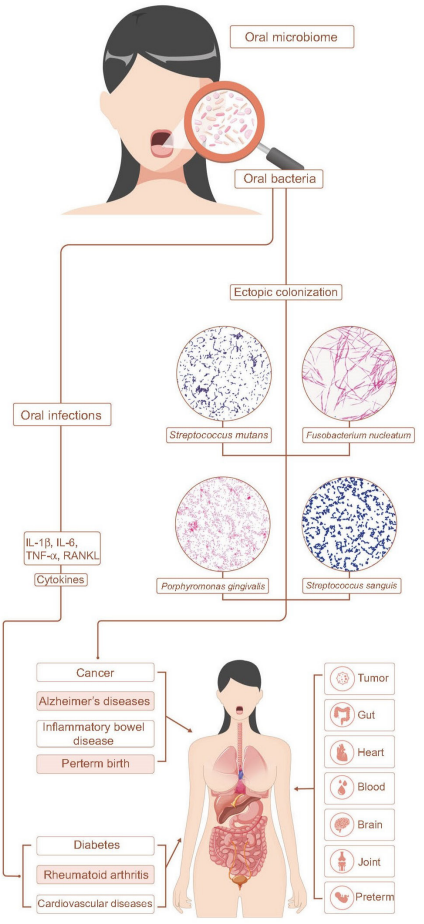
Had this patient not received intervention, she may have experienced gradual worsening of gingivitis, with progression to periodontitis. Gingivitis-related inflammation is typically reversible; however, periodontitis can cause permanent damage to the periodontal tissues and alveolar bone, resulting in tooth loss.[14]

Figure 3. Major Oral Biofilm Pathogens



Note: Oral biofilm major pathogens with *Fusobacterium nucleatum* acting as a bridging organism in dental plaques.[18]

Figure 4. Oral Microbiota in Human Systemic Diseases



Note: Graphical representation of the oral microbes in human systematic diseases.[16]

Advances in microbiome research have found an association between oral pathogens and numerous human chronic diseases. The systemic implications of oral dysbiosis are far-reaching, encompassing conditions ranging from cardiovascular disease to neurodegenerative disorders and autoimmune diseases. The bacteria evaluated in this case study have been associated with systemic illnesses such as Alzheimer's disease, dementia, cardiovascular disease, diabetes, cancer, preeclampsia, preterm birth, low birth weight, neonatal sepsis, and gestational diabetes, among others (Figure 4).[16] This

underscores the need for interdisciplinary collaboration between medical and dental professionals. By addressing oral dysbiosis and promoting oral health, healthcare providers can potentially mitigate the risk of systemic diseases and improve overall patient well-being.

The patient's medical history included illnesses with an inflammatory component, such as chronic and recurrent headaches, tinnitus, and sciatica, along with multiple food sensitivities and environmental allergies. Addressing oral dysbiosis may reduce this inflammatory burden and improve quality of life. Furthermore, gastrointestinal dysbiosis, the imbalance of microorganisms in the gut, may contribute to or exacerbate her presenting concerns. Adding treatments intended to address this GI dysbiosis may have provided further improvement to the desired outcomes.

Under the direction of her dental provider, both gastrointestinal and oral microbial balance were addressed using botanical and nutraceutical-based formulations, along with an effective daily oral care routine. The patient was able to reduce the overgrowth of oral pathogens revealed by salivary testing and improve the bleeding index score and overall gingival health.

This case study, although informative and supportive of further investigative research into the benefits of botanicals and probiotics in addressing oral and systemic health, does have limitations. Due to the multiple modalities used as treatments, it is not clear which outcomes can be attributed to which specific interventions. However, it is crucial to note that there is published literature on the individual botanicals, as well as probiotics, and their microbiome-modifying effects, some of which are specific to the oral microbiome. Additionally, the Biocidin® formula, which is part of the Dentalcidin® toothpaste (Biocidin Botanicals®) and the Dentalcidin® LS oral rinse (Biocidin Botanicals®), is included in the Bioclear® Microbiome Detoxification Program (Biocidin Botanicals®), which reportedly addresses biofilm formation and reduces the growth of pathogenic microorganisms.[17]

CONCLUSION

This case serves as a compelling example of the importance of personalized, integrative approaches to oral health management. Considering these findings, both medical and dental practitioners must prioritize oral health assessment and education as integral components of patient care. By promoting awareness of the intricate interplay between oral and systemic health, we can empower individuals to prioritize their oral health as a cornerstone of their overall wellness.

AUTHOR DISCLOSURE STATEMENT

Dr. Ariana Ebrahimian and Christopher R. D'Adamo both serve as Scientific Advisors for Biocidin Botanicals®. Dr. Shawn Manske and Dr. Kristen Klos-Maki are both employed by Bio-Botanical Research, Inc.

The subject of this case report was treated by Ariana Ebrahimian at Ebrahimian Integrative Dentistry in Scotts Valley, CA.

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