

Original Research

Comparative Evaluation of the Effectiveness of Probiotic, Herbal, and Chlorhexidine Mouthwashes on Clinical Inflammatory Parameters of Gingivitis: A Randomized Controlled Trial

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ABSTRACT

Background: Plaque-induced gingivitis is a significant oral health concern globally. While chlorhexidine (CHX) remains the gold standard for chemical plaque control, its associated side effects necessitate the evaluation of effective and safer alternatives.

Aim: This study aimed to compare the clinical efficacy of probiotic, herbal (HiOra), and 0.2% CHX mouthwashes on inflammatory parameters.

Methods: 90 patients with plaque-induced gingivitis were randomized into three groups: Group A (Probiotic), Group B (Herbal), and Group C (0.2% CHX). Clinical parameters, including the Plaque Index (PI), Gingival Index (GI), and Simplified Oral Hygiene Index (OHI-S), were recorded at baseline and on the 7th, 15th, and 30th days.

Results: All groups showed significant improvement from baseline to 30 days ($p < 0.05$). CHX demonstrated the most significant reduction in PI, GI, and OHI-S throughout the study. Probiotic mouthwash showed considerable clinical improvement, functioning as a potent biologically based adjunct. The herbal mouthwash also exhibited beneficial effects, though they were less pronounced than the other two formulations. **Conclusion:** CHX remains the most effective option for short-term plaque control. However, probiotic mouthwash offers a promising, safe alternative for enhancing gingival health in routine periodontal care.

Introduction

Periodontal diseases are among the most common infectious diseases affecting humankind, potentially leading to the destruction of the periodontal ligament and alveolar bone. Dental plaque is the primary etiological factor in gingival inflammation; therefore, its control is the key to halting disease progression. While mechanical plaque control is a mainstay, the degree of skill and motivation required is often beyond the ability of many patients.^[1-3]

Chemical plaque control methods, such as mouthwashes, serve as vital adjuncts. Chlorhexidine (CHX) gluconate has remained the most effective agent to date due to its high oral substantivity. However, its prolonged use is limited by side effects like extrinsic tooth staining and taste disturbances. This has led to a search for safer alternatives. Probiotics, defined as live microorganisms that confer health benefits, are gaining pace in dentistry

for their ability to reduce harmful bacterial loads.^[4-6] Similarly, herbal mouthwashes utilize phytochemicals to achieve antimicrobial effects without the artificial preservatives or alcohol found in traditional rinses. This study was designed to evaluate the comparative effectiveness of these three distinct classes of mouthwashes.

2. Materials and Methods

2.1 Study Design and Population

This comparative double-blind randomized controlled clinical study was conducted at the Department of Periodontology, People's Dental Academy, Bhopal. The study group comprised 90 systemically healthy patients, aged 18–40 years, diagnosed with plaque-induced chronic gingivitis. Ethical Clearance was obtained from

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the Institutional Ethical Committee of People's Dental Academy, Bhopal.

2.2 Selection Criteria

Inclusion criteria involved patients with chronic gingivitis and no history of systemic disease. Exclusion criteria included smokers, pregnant or lactating women, patients with mal-aligned teeth or orthodontic appliances, and those who had received antibiotic therapy within the previous three months.

2.3 Intervention Protocol

Participants were randomly assigned to three groups:

- Group A (Test): Probiotic mouthwash (Perfora).
- Group B (Test): Herbal mouthwash (HiOra).
- Group C (Control): 0.2% Chlorhexidine gluconate.

At baseline, all subjects received professional supragingival scaling. They were instructed to rinse with 10ml of their assigned mouthwash for 60 seconds twice daily, 30 minutes after brushing, for 14 days. Clinical parameters—Plaque Index (PI), Gingival Index (GI), and Simplified Oral Hygiene Index (OHI-S)—were recorded at baseline and on the 7th, 15th, and 30th days.

2.4 Statistical Analysis

Data analysis was performed using IBM SPSS version 26.0. Quantitative data were analyzed using the ANOVA test and Tukey's post-hoc multiple comparison test. A p-value of ≤ 0.05 was considered statistically significant.

3. Results

3.1 Plaque Index (PI)

All three groups demonstrated significant gradual reductions in PI scores from baseline to the 30th day ($p < 0.05$). At the 30-day follow-up, Group C (CHX) showed the highest reduction (mean 0.1043), followed by Group A (0.4800) and Group B (1.3800). Intergroup comparisons showed significant differences at all follow-

up intervals, establishing CHX as the most effective plaque inhibitor.

3.2 Gingival Index (GI)

Intragroup comparison showed a statistically significant reduction in GI for all groups ($p < 0.05$). Although Group A (Perfora) started with a marginally lower baseline (1.160) than Group C (1.280), the rapid action of CHX resulted in Group C achieving superior reduction by the 7th day (0.780 vs 0.820) and maintaining that lead through the 30-day follow-up (0.0800).

3.3 Simplified Oral Hygiene Index (OHI-S)

The mean OHI-S scores significantly improved in all groups. By the 30th day, the scores were 0.710 for CHX, 2.333 for Probiotic, and 3.443 for Herbal. CHX demonstrated a statistically better reduction compared to the other two groups at every interval.

4. Discussion

The results of this study confirm that 0.2% CHX remains the "gold standard" for chemical plaque control. Its effectiveness is attributed to its ability to bind to salivary mucins and bacterial cell membranes, inhibiting plaque colonization and regrowth for several hours.^[7-14]

The probiotic mouthwash (Perfora) displayed significant therapeutic potential. Probiotics may reduce the load of harmful bacteria and inhibit intercellular plaque matrix formation. Importantly, probiotics lack the side effects associated with CHX and are safe for various age groups. The herbal mouthwash (HiOra) also exhibited anti-plaque efficacy, likely due to ingredients like Pilu (miswak) and Bibhitaka, which inhibit bacterial adherence.

A critical observation was the sustained improvement recorded on the 30th day. Since the active intervention ended on day 14, the 30-day scores reflect the residual benefit and substantivity of the agents. While CHX

remains superior in potency, the herbal and probiotic options represent useful alternatives for long-term use where side effects are a concern.

4.1 Limitations

The study's limitations include a relatively short duration (30 days), which restricts the assessment of long-term sustainability. Additionally, the single-center design and sample size may limit generalizability. Future research should involve larger populations and longer follow-up periods to evaluate persistent therapeutic benefits.

5. Conclusion

This study concludes that chlorhexidine, probiotic, and herbal mouthwashes all produce significant clinical improvements in gingival health. Chlorhexidine remains the most effective option for short-term plaque and gingivitis control. However, probiotic mouthwash is a promising biologically based alternative, and herbal formulations like HiOra serve as beneficial additions to routine oral hygiene regimens, especially for long-term maintenance.

References:

1. Biswas G, Anup N, Acharya S, Kumawat H, Vishnani P, Tambi S. Evaluation of the efficacy of 0.2% chlorhexidine versus herbal oral rinse on plaque induced gingivitis-A randomized clinical trial. *J Nurs Health Sci*. 2014;3(2):58-63.
2. Sharma P, Datta G, Gandhi K, Kumar D. A comparative evaluation of efficacy of probiotic and chlorhexidine mouthrinses on gingival health and plaque accumulation in 6-9-year-old children. *Int J Appl Dent Sci*. 2019;5:156-62.
3. Mathew M, Joyshree C, Ratan VJ, Kartheek V, Thirumalai S, Banothu MN. Anti-plaque efficacy of Hi-Ora mouthrinse and 0.12% chlorhexidine gluconate in patients with chronic gingivitis: A case-control study. *J Oral Maxillofac Pathol*. 2022;26(1):38-43.
4. Jaidka S, Somani R, Bajaj N, Jaidka R, Sharma S, Singh A. Comparative evaluation of various mouthwashes for their effect on oral health: an in-vivo study. *Group*. 2015;100(151.3):64-10.
5. Bhattacharjee R, Nekkanti S, Kumar NG, Kapuria K, Acharya S, Pentapati KC. Efficacy of triphala mouth rinse (aqueous extracts) on dental plaque and gingivitis in children. *J Investig Clin Dent*. 2015;6(3):206-10.
6. Sharma M, Mukherjee M, Singh H, Prasad KRK, Rai R. Comparative evaluation of Herbal Oral Rinse verses a Conventional Chlorhexidine (0.12%) Oral Rinse: An Analytical Study. *IJDSIR*. 2022;5(2):252-256.
7. Vaish S, Ahuja S, Dodwad V, Parkash H. Comparative evaluation of 0.2% chlorhexidine versus herbal oral rinse on plaque-induced gingivitis. *J Indian Assoc Public Health Dent*. 2012;10(19):55-62.
8. Jindal V, Mahajan N, Goel A, Kaur R, Mahajan A, Malhotra PT. Clinical efficacy of probiotic mouthwash in the treatment of gingivitis patients in Himachal population. *J Int Clin Dent Res Organ*. 2017;9(1):41-4.
9. Alahari S, Challa R, Chaitanya K, Afnan L, Khandelwal A, Tirupathi S. Effect of probiotic mouthwashes in comparison to chlorhexidine on periodontal health: Systematic review and meta-analysis. *Int J Health Sci*. 2022;6(S9):2213-28.
10. Deshmukh MA, Dodamani AS, Karibasappa G, Khairnar MR, Naik RG, Jadhav HC. Comparative evaluation of the efficacy of probiotic, herbal and chlorhexidine mouthwash

- on gingival health: A randomized clinical trial. *J Clin Diagn Res.* 2017;11(3):ZC13.
11. Yadav S, Kumar S, Srivastava P, Gupta KK, Gupta J, Khan YS. Comparison of efficacy of three different mouthwashes in reducing aerosol contamination produced by ultrasonic scaler: A pilot study. *Indian J Dent Sci.* 2018;10(1):6-10.
 12. Lorusso F, Tartaglia G, Inchingolo F, Scarano A. Early Response and Clinical Efficacy of a Mouthwash Containing Chlorhexidine, Anti Discoloration System, Polyvinylpyrrolidone/Vinyl Acetate and Sodium DNA in Periodontitis Model: A Triple-Blind Randomized Controlled Clinical Trial. *Dent J (Basel).* 2022;10(6):101.
 13. Sinha R, Shil M, Srivastava B, Narang D, Goswami P, Singh S, et al. Comparison of the Clinical Efficacy of Herbal, Chlorhexidine, and Normal Saline Mouthwash in the Management of Chronic Gingivitis. *Cureus.* 2024;16(2):e54336.
 14. Battula S, Shaikh H, Begum MZ, Anvesh G, Lahari G. Comparative evaluation of anti-plaque efficacy of probiotic, aloe vera and 0.2% chlorhexidine mouthwash: a randomized controlled trial. *Int J Health Sci Res.* 2024;14(11):241-247.