

CLINICAL IMPLICATIONS OF CHLORHEXIDINE IN PERIODONTOLOGY

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ABSTRACT

Chlorhexidine is effective in reducing plaque and gingival inflammation. It is Useful in patients with poor manual dexterity who cannot maintain proper oral hygiene. Periodontitis, being a chronic inflammatory disease caused by microbial biofilm, requires both mechanical and chemical plaque control. In this context, chlorhexidine plays a valuable adjunctive role in the prevention and management of periodontal disease.

Keywords: chlorhexidine, plaque, gingival inflammation.

Introduction

A bisbiguanide is a class of antiseptic chemical compounds, the most well known and widely used bisbiguanide is Chlorhexidine recognized as the “gold standard” chemical plaque control agent in dentistry. Since its introduction in the 1950s, it has been extensively used in periodontics because of its potent antimicrobial action, substantivity, and role in preventing plaque accumulation. Periodontitis, being a chronic inflammatory disease caused by microbial biofilm, requires both mechanical and chemical plaque control. In this context, chlorhexidine plays a valuable adjunctive role in the prevention and management of periodontal disease.

Properties of Chlorhexidine

- Broad-spectrum antimicrobial: Active against Gram-positive and Gram-negative bacteria, yeasts, and some viruses.
- Substantivity: Binds to oral tissues and is slowly released over 8–12 hours, ensuring prolonged action.
- Modes of use: Available as mouth rinses (0.12–0.2%), gels, sprays, chips, and varnishes.

Role in Periodontitis

1. Adjunct to Mechanical Therapy: Scaling and root planing (SRP) is the cornerstone of periodontal therapy. Chlorhexidine rinse used post-SRP reduces microbial recolonization and promotes healing of inflamed gingiva.
2. Pre- and Post-Surgical Use: Used before surgery to reduce intraoral microbial load. After periodontal flap surgery, chlorhexidine rinses enhance wound healing by controlling bacterial contamination.
3. Management of Periodontal Pockets: Chlorhexidine chips (e.g., PerioChip®) inserted into periodontal pockets deliver local high concentrations of the drug, reducing pocket depth and improving clinical attachment levels.

4. Implantology: Reduces peri-implantitis risk when used after implant placement or maintenance therapy.

5. Management of Acute Periodontal Conditions: Useful in necrotizing ulcerative gingivitis (NUG) and peri-implant mucositis where mechanical cleaning is difficult due to pain.

Clinical Advantages

Effective in reducing plaque and gingival inflammation. Useful in patients with poor manual dexterity who cannot maintain proper oral hygiene. Provides an antimicrobial shield in the healing period after surgery. Different formulations allow both short-term rinsing and long-term local delivery.

1. Plaque Control and Gingivitis Prevention

The most common use of chlorhexidine is as a mouth rinse for plaque inhibition. Numerous clinical trials have demonstrated its efficacy in reducing plaque accumulation and gingival inflammation when used as an adjunct to regular oral hygiene practices. CHX mouth rinses (0.12%–0.2%) significantly decrease the bacterial load, especially in patients unable to maintain adequate oral hygiene, such as post-surgical cases, physically challenged individuals, or those with orthodontic appliances.

Studies have shown that twice-daily use of 0.12% CHX mouthwash can reduce plaque indices by up to 60–70% compared to placebo rinses. It effectively controls gingivitis by reducing the inflammatory response and bleeding on probing, especially in early stages of periodontal disease.

2. Postoperative Use in Periodontal Surgery

After periodontal surgical procedures such as flap surgery, bone grafting, or implant placement, mechanical brushing is often restricted to prevent tissue trauma. During this critical healing period, chlorhexidine serves as an effective chemical plaque control agent. Rinsing with 0.12–0.2% CHX twice

daily helps maintain a plaque-free surgical site, reduces microbial colonization, and promotes faster healing.

Chlorhexidine has also been incorporated into gels and sprays for local application around surgical wounds, minimizing infection risk and postoperative inflammation. Its use is particularly beneficial during the first two weeks post-surgery, when tissue healing is underway and plaque accumulation must be minimized.

3. Use in Periodontal Maintenance Therapy

In patients undergoing supportive periodontal therapy, CHX serves as a valuable adjunct to maintain disease remission. Regular use of CHX mouthwash or gels reduces microbial recolonization and reinforces oral hygiene measures. It is especially beneficial for patients with limited dexterity or those prone to recurrent gingivitis.

4. Management of Periodontal Pockets

Chlorhexidine is used as a local drug delivery system in periodontal pockets to enhance the results of scaling and root planing. CHX chips (e.g., PerioChip®), containing 2.5 mg of chlorhexidine gluconate, are inserted into periodontal pockets measuring ≥ 5 mm. These biodegradable chips slowly release the drug over 7–10 days, maintaining a high concentration at the site of infection.

Clinical studies have reported significant reductions in pocket depth and gains in clinical attachment levels when CHX chips are used as adjuncts to conventional therapy. They are particularly effective in areas where mechanical instrumentation is challenging, such as furcations or deep narrow pockets.

5. Chlorhexidine in Implantology

Peri-implant diseases, including peri-implant mucositis and peri-implantitis, are bacterial infections similar in nature to periodontal diseases. CHX mouth rinses and gels are commonly used during implant placement and maintenance to control bacterial contamination. Preoperative rinsing with CHX reduces the microbial load at the surgical site, lowering the risk of postoperative infection. Furthermore, CHX gels can be applied around healing abutments to promote tissue health and minimize inflammation during the osseointegration phase.

6. Use in Orthodontic and Prosthodontic Patients

Patients wearing orthodontic appliances or prostheses often

experience increased plaque retention and gingival inflammation. Chlorhexidine mouthwash or gels can significantly reduce microbial accumulation on brackets, wires, and denture bases. In removable prosthodontics, immersion of dentures in CHX solutions helps control *Candida albicans* growth and prevent denture stomatitis.

Additional Clinical Benefits

1. Broad-Spectrum Antimicrobial Activity

Chlorhexidine is effective against a wide range of Gram-positive and Gram-negative bacteria, yeasts, and some viruses. Its ability to target periodontopathogens such as *Porphyromonas gingivalis*, *Tannerella forsythia*, and *Aggregatibacter actinomycetemcomitans* contributes to its success in periodontal therapy.

2. Anti-inflammatory Effects

In addition to its antimicrobial role, CHX exhibits mild anti-inflammatory properties. By reducing bacterial endotoxin levels and gingival inflammation, it aids in controlling tissue destruction associated with periodontitis.

3. Prevention of Halitosis

Chlorhexidine also helps in reducing volatile sulfur compounds produced by anaerobic bacteria, thereby preventing oral malodor—a frequent complaint among periodontal patients.

4. Role in Oral Wound Healing

Although high concentrations may temporarily delay epithelialization, appropriate use of CHX aids in maintaining a clean wound environment, promoting uneventful healing after periodontal or oral surgical procedures.

Limitations and Adverse Effects

Despite its widespread use, chlorhexidine is not free from drawbacks:

- Tooth and tongue staining with prolonged use.- Taste alteration (dysgeusia).
- Mucosal irritation and delayed wound healing in long-term or high-concentration use.
- Cytotoxicity to fibroblasts and osteoblasts, which may affect periodontal regeneration.

Clinical Recommendations

- 0.12–0.2% mouth rinse twice daily is most commonly prescribed.
- Recommended duration: 1–2 weeks post-surgery or during

active periodontal therapy.

- Not a substitute for mechanical plaque control—should always be an adjunct.

- Local delivery (chips, gels) may be considered for persistent deep pockets.

Conclusion

Chlorhexidine endures one of the most salient chemotherapeutic agents in periodontics due to its demonstrated efficacy in plaque control, gingival health, and surgical wound healing. Its affinity and broad antimicrobial action make it a reliable adjunct to conventional periodontal therapy. However, its lasting use is limited by side effects such as staining and cytotoxicity. Therefore, judicious, short-term use of chlorhexidine: especially in postoperative care, acute periodontal infections, and in patients with limited oral hygiene ability—ensures maximum benefit with minimal

complications.

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