

DENTURE HYGIENE PRACTICES AND CLEANING METHODS FOR REMOVABLE DENTAL PROSTHESES: A NARRATIVE REVIEW OF MECHANICAL, CHEMICAL AND COMBINED APPROACHES

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ABSTRACT

Maintaining adequate hygiene of removable dental prostheses is essential for preventing local conditions such as denture stomatitis, as well as systemic complications associated with edentulous patients. The objective of this review is to synthesize and evaluate data from the literature regarding the effectiveness of the denture cleaning methods (mechanical, chemical and combined approaches), as well as their impact on acrylic materials and on maintaining oral health. A literature review was conducted based on articles published between 2021 and 2025, selected from databases such as PubMed, Scopus, Web of Science and Embase. Inclusion criteria focused on clinical and in vitro studies that evaluated cleaning protocols, microbial biofilm reduction (especially *Candida albicans*) and patient compliance. Studies were included if they were peer-reviewed original articles, systematic reviews, meta-analyses or clinical studies involving removable dental prosthesis wearers. Eligible studies investigated denture hygiene practices, cleaning methods, biofilm formation, material properties or oral health-related outcomes. The analysis of the studies shows that although mechanical cleaning (brushing) is the most commonly used method by patients, it is often insufficient for complete removal of biofilm and may cause wear of acrylic materials when abrasive toothpaste is used. Most reviewed articles indicate that a combined approach—mechanical cleaning followed by immersion in chemical solutions (low-concentration sodium hypochlorite, peroxides or chlorhexidine)—provides the most effective antimicrobial control. However, combined mechanical–chemical protocols represent the current gold standard. Continuous patient education by dental professionals remains a critical factor in preventing pathologies associated with removable denture wear.

Key words: removable dental prostheses, oral hygiene, biofilm, *Candida albicans*, polymethyl methacrylate.

INTRODUCTION

The increase in global life expectancy has led to a significant proportion of the elderly population, for whom partial or complete edentulism remains a prevalent public health issue. Despite advances in implant dentistry, removable dental prostheses remain one of the most common, accessible and effective treatment options for the functional, phonetic, and aesthetic rehabilitation of the stomatognathic system.

Most removable dentures are made of acrylic resins, particularly polymethyl methacrylate

(PMMA). Although this material offers important biomechanical and aesthetic advantages, its surface is characterized by a certain degree of microporosity. In the warm and moist environment of the oral cavity, these pores facilitate the retention of food debris and rapid plaque accumulation, transforming the denture surface into an ideal substrate for colonization by pathogenic microorganisms, most notably the fungus *Candida albicans*, along with various species of *Streptococcus* and *Staphylococcus*.

Poor denture hygiene has direct and severe

consequences on patient health. Locally, biofilm accumulation is the main etiological factor in the development of denture stomatitis, a chronic inflammatory condition of the underlying oral mucosa, frequently associated with pain, halitosis and accelerated alveolar ridge resorption. Moreover, recent literature highlights a correlation between poor denture hygiene and systemic disease risk, with denture biofilm acting as a reservoir of pathogens that may trigger gastrointestinal infections or respiratory diseases such as aspiration pneumonia—a major cause of morbidity in geriatric patients. To address this issue, numerous hygiene methods have been proposed: mechanical (brushing and use of specific disinfectants or mouth rinses), chemical (immersion in sodium hypochlorite solutions, alkaline peroxides, acids, or enzymes), and physical (ultrasonic cleaners or microwave energy).

However, studies show that an alarming proportion of patients use incorrect cleaning methods—such as hot water or highly abrasive toothpaste—which scratch the acrylic surface, increase surface roughness, and paradoxically promote even greater microbial colonization. Given the wide range of available options and the lack of universal consensus regarding a single care protocol, the aim of this review is to critically analyze recent literature. This study evaluates the effectiveness of current denture hygiene methods, their effects on the physical properties of base materials, and the importance of patient education, with the goal of providing clear, evidence-based guidance for daily clinical practice.

MATERIALS AND METHODS

This paper represents a narrative review of the scientific literature, aiming to evaluate denture hygiene methods and their impact on microbial biofilm, prosthetic materials, and oral health outcomes. Scientific articles were analyzed, including clinical studies, cross-

sectional observational studies, in vitro experimental studies, systematic reviews, and meta-analyses published between 2021 and 2025. Articles were selected from major international databases such as PubMed/MEDLINE, Scopus, Web of Science and Embase, using keywords including: removable dentures, denture hygiene, biofilm, *Candida albicans*, stomatitis, cleaning methods, PMMA.

Inclusion Criteria

Studies were included if they met the following criteria: (Tabel 1)

- peer-reviewed publications in scientific journals;
- clinical, observational, experimental studies, or systematic reviews/meta-analyses;
- studies involving removable denture wearers (complete or partial);
- studies evaluating hygiene methods (mechanical, chemical, or combined);
- studies investigating microbial biofilm formation (especially *Candida albicans*);
- studies evaluating acrylic resin (PMMA) properties or hygiene impact;
- studies assessing oral complications or quality of life (OHRQoL).

Exclusion Criteria

The following were excluded: (Tabel 1)

- non-scientific or non-peer-reviewed articles;
- animal studies;
- studies not directly related to removable dentures;
- articles without clear methodological or clinical data;
- duplicates or incomplete publications.

Main Areas of Analysis

The literature was organized into the following themes:

- patient hygiene behavior and compliance;

- mechanical cleaning effectiveness;
- chemical agents (sodium hypochlorite, peroxides, chlorhexidine, effervescent tablets);
- combined cleaning protocols;
- effects on acrylic materials (PMMA);
- oral complications (e.g., denture stomatitis);
- quality of life (OHRQoL);
- role of patient education and dental professionals.

Table 1. Inclusion and Exclusion Criteria

Category	Inclusion Criteria	Exclusion Criteria
Study type	Clinical, cross-sectional, in vitro, RCTs, systematic reviews, meta-analyses	Animal studies, non-scientific articles
Subjects	Complete or partial denture wearers (adults/elderly)	Orthodontic patients, implant-only studies
Topic	Denture hygiene, biofilm, <i>Candida albicans</i> , denture stomatitis	Studies unrelated to dentures
Interventions	Mechanical, chemical, combined cleaning methods	Non-hygiene-related interventions
Outcomes	Biofilm, denture cleanliness, OHRQoL, PMMA properties	Non-clinical outcomes
Language	English	Other languages without translation
Publication	Peer-reviewed journals	Blogs, non-indexed journals
Time period	2021–2025 (recent evidence focus)	Older or irrelevant studies

RESULTS

The analysis of the included studies highlights a general consensus in the literature regarding the importance of denture hygiene and the superior effectiveness of combined cleaning methods in controlling microbial biofilm.

Denture hygiene and patient behavior

Most observational studies report poor hygiene habits, including:

- reliance on brushing as the sole cleaning method;
- low use of chemical agents (effervescent tablets, hypochlorite, chlorhexidine);

- overnight denture wearing;
- irregular dental check-ups.

Education level and patient instruction were identified as key determinants of proper hygiene behavior.

Mechanical cleaning effectiveness

Brushing remains the most common method but:

- is insufficient for complete biofilm removal;
- may cause microabrasion of PMMA when abrasive toothpaste is used;
- shows limited antifungal activity against *Candida albicans*.

Chemical cleaning effectiveness

Chemical agents show higher antimicrobial efficacy:

- sodium hypochlorite (0.2–1%) shows strong antibacterial and antifungal activity;
- alkaline peroxides (effervescent tablets) significantly reduce microbial load;
- chlorhexidine is effective but may cause staining;
- natural solutions show moderate effectiveness.

Combined methods (current standard)

All reviewed studies converge that:

- mechanical + chemical cleaning is the most effective strategy;
- it significantly reduces bacterial and fungal biofilm;
- it provides the best balance between efficacy and material safety.

Impact on acrylic materials (PMMA)

In vitro studies show:

- generally acceptable effects on PMMA;
- possible minor changes in roughness, color, and mechanical strength;
- improper use of hypochlorite may affect metal components;
- abrasive cleaning increases surface degradation.

Biofilm and oral complications

Biofilm accumulation is associated with:

- denture stomatitis;
- halitosis;
- *Candida albicans* infections;
- increased risk of respiratory infections in elderly patients.

Quality of life (OHRQoL)

- dentures improve quality of life;
- poor hygiene reduces satisfaction;
- education and follow-up improve adaptation and comfort.

Role of patient education

- educated patients show significantly better hygiene;

- lack of instruction correlates with biofilm accumulation;
- continuous education is essential for long-term success.

DISCUSSION

The findings consistently show that denture hygiene practices remain inadequate despite the availability of multiple cleaning methods.

Most patients rely primarily on mechanical brushing, which is insufficient for complete biofilm removal.

Mechanical cleaning alone is limited in its ability to control *Candida albicans*, and the use of abrasive toothpaste may increase surface roughness of PMMA, promoting microbial adhesion.

Chemical agents such as sodium hypochlorite, alkaline peroxides, and chlorhexidine demonstrate superior antimicrobial efficacy, especially when combined with brushing. However, their effectiveness depends on correct usage protocols, including concentration and immersion time, and improper use may negatively affect prosthetic materials.

Physical methods such as ultrasonic cleaning and microwave disinfection show promising results but remain limited in clinical use due to cost and accessibility, thus serving mainly as adjunctive methods.

Patient education is a critical factor, as inadequate instruction leads to improper hygiene practices and increased risk of denture-related complications.

Overall, no single method provides optimal antimicrobial efficacy without affecting material integrity; therefore, combined mechanical and chemical protocols are considered the gold standard.

CONCLUSIONS

1. Denture hygiene is often inadequate among patients due to reliance on simple mechanical methods.
2. Mechanical brushing alone is insufficient and may damage acrylic surfaces when abrasive materials are used.
3. Chemical agents (sodium hypochlorite and effervescent tablets) are more effective, especially when combined with brushing.
4. Physical methods are effective but serve only as adjuncts in clinical practice.

5. Combined mechanical–chemical protocols represent the most effective strategy for denture hygiene.
6. Patient education and professional guidance are essential for improving compliance and preventing denture-related diseases.

In conclusion, maintaining oral health in denture wearers depends on correct hygiene protocols based on combined cleaning methods, supported by continuous patient education and regular dental follow-up.

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