



## Full Length Research Article

### CLINICAL EFFICACY OF VARIOUS DENTURE CLEANSERS: A SYSTEMATIC REVIEW

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#### ABSTRACT

**Background:** Complete edentulism is common in elderly population and routinely rehabilitated with removable complete dentures. Poor denture hygiene leads to microbial colonization and subsequent inflammatory changes in oral tissues.

**Objective:** The purpose of this article is to review the available literature with regard to efficacy of various denture cleansers in reducing microbial film formation.

**Materials and Method:** Electronic search of PubMed database was carried out for articles related to efficacy of denture cleansers only. Clinical studies on Human subjects published on or before April 2017 were included. The data extracted from articles included denture cleansing agent or method used, concentration of the agent, mode of action and efficacy of denture cleansing agents.

**Results:** The literature search yielded 49 articles which were independently screened and 13 articles were included in review. Four studies compared the efficacy of peroxide based tablets with abrasive creams. Four studies evaluated different concentrations of Chlorhexidine digluconate. Sodium hypochlorite, enzymes, vinegar etc were other substances used for the purpose of denture cleansing.

**Conclusion:** Denture cleansers correspond to a variety of products designed to safely remove stains, deposits, and debris from the surfaces of dental prostheses, by means of various methods. This systematic review demonstrated that oxidizing agents like alkaline peroxide based tablets are the most common product used for denture hygiene. Antimicrobials such as chlorhexidine have shown similar efficacy.

#### Key words:

#### INTRODUCTION

Despite advances in preventive dentistry, in many countries, complete edentulism is common in elderly population who are commonly rehabilitated with removable complete dentures (Guiglia *et al.*, 2010). However, previous data have shown that poor denture hygiene is common among patients with edentulism<sup>2</sup> and may contribute to biofilm and calculus deposits and the occurrence of inflammatory changes in the oral mucosa. In spite of the increase in dental awareness in patients, many leave the dental office totally uninformed on how to care for their complete dentures. A combination of mechanical and chemical methods is considered the most appropriate choice in terms of denture cleansing, providing mechanical biofilm and stain removal as well as antimicrobial action (Paranhos *et al.*, 2007; Rossato *et al.*, 2011). Denture stomatitis is one of the most common oral disorders in denture wearers<sup>5</sup>. Proper prosthesis cleaning is important not only to prevent mucosal inflammation but also to control the presence of biofilm. The presence of biofilm is closely related to mucosal inflammation and the occurrence of infection by *Candida* spp (Nikawa *et al.*, 1999).

Various chemical agents have been used in past as denture cleansers to safely remove stains, deposits, and debris from the surfaces of dental prostheses as well as for their antimicrobial effect. There are many studies evaluating the clinical efficacy of various denture cleansers. However, so far, no systematic reviews on efficacy of denture cleanser in reducing the formation of biofilm had been reported. Hence, the purpose of this article is to review the available literature with regard to efficacy of various denture cleansers in reducing microbial film formation.

#### MATERIALS AND METHODS

The overall search strategy is shown in Table 1. The assessment criteria were defined in accordance with the Population or Patient, Intervention, Comparison or Control, Outcome and Study type criteria. Articles related to any other effect or property of denture cleansers except reduction in microbial colonization Studies with animal models or experimental *in vitro* studies. The review included all the studies, in which clinical efficacy of denture cleansers were evaluated. There were no restrictions regarding the sex or age of participants. English language peer-reviewed dental literature was electronically searched to identify the relevant scientific article evaluating clinical efficacy of denture cleansers.

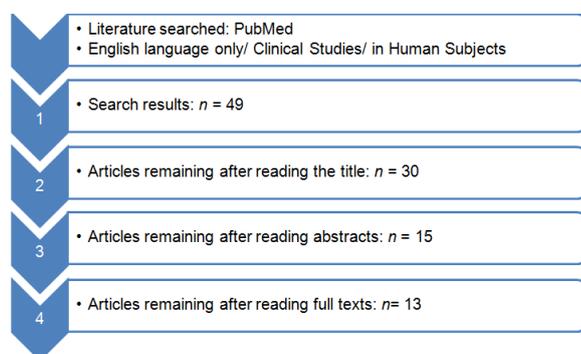
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**Table 1. Systematic search strategy**

<b>Focus question:</b>
In patients wearing complete dentures, which is the most efficacious denture cleanser?
<b>Population</b>
Completely edentulous patients using removable complete dentures
<b>Intervention</b>
Different chemical agents used for the purpose of denture cleansing
<b>Comparison</b>
Efficacy of different chemical agents used as denture cleanser
<b>Outcome</b>
Denture cleanser with maximum reduction in microbial colonization
<b>Search combination</b>
Denture Cleansers
<b>Electronic database searched</b>
PubMed
<b>Selection based on inclusion criteria</b>
Articles in English
Clinical Trial article type
Studies on human subjects
Articles related only to efficacy of denture cleansers
<b>Selection based on exclusion criteria</b>
Articles in languages other than English
Articles related to any other effect or property of denture cleansers except reduction in microbial colonization
Articles with animal models or experimental <i>in vitro</i> studies

PubMed search was carried out by using the “Denture Cleansers” as index word. Filters used included “Clinical Trials” (article type) and “Human studies” (Species) only. There were no restrictions on the year of article publication so that the search could include all the available articles provided in that particular database. Two independent observers independently read the abstracts and later the preselected full-text articles. For studies meeting the inclusion criteria, articles with full text were obtained and evaluated further. The titles and abstracts of all the screened articles were assessed and reviewed for appropriateness so as to fulfill the purposes of the systematic review. Finally, a further manual search, including the citations of the finally obtained articles, was done to improve the electronic search.



**Figure 1. Systematic Search Strategy Flow Chart**

## RESULTS

The electronic search in the PubMed database provided a total of 49 articles that were considered potentially relevant. The text found using the search word “Denture Cleansers” were 483 articles. In the second phase of article selection, filters were used as “Clinical” in article type and “Human” in species. The texts available after applying filters were 49 studies. 19 articles were excluded after studying the title. Subsequently, in the third phase of the study, 15 studies were excluded after reading the abstract, and then a full-text review of articles was eventually carried out. After reading the full text, 2 articles were excluded, and a total of 13 articles were selected for the systematic review.

Out of 13 selected studies, 3 studies compared the commercially available Efferdent® tablets with commercially available denture cleansing abrasive paste Dentu-crème® while 1 study evaluated the efficacy of alkaline peroxide based tablets. 4 studies evaluated efficacy of chlorhexidine mouthwashes as denture cleansers and compared it with other agents. Efficacy of bleaching agents such as sodium hypochlorite has been addressed in 2 studies. 2 studies evaluated effect of enzymes on reduction of biofilm formation. 1 study compared two different dentifrices as denture cleansers.

## DISCUSSION

Several substances have been used for the purpose of reducing microbial colonization of dentures. Oxidizing agents like alkaline peroxides, sodium perborates are effective in removing stains as well as killing the bacteria harboured on the denture’s surface<sup>7</sup>. Household substances like vinegar, NaCl salt solutions, bleaching agents, detergents etc have also been used for denture cleansing (ShivangiGajwani-Jain *et al.*, 2015; Salles, 2015; Basson *et al.*, 1992). Denture cleansing abrasive pastes with soft brush aids in mechanical cleaning of dentures (Panzeri *et al.*, 2009). Different enzymes like dextranase, mutanase and protease have shown to reduce candida albicans and streptococcus mutans colonizing denture surfaces (Budtz-Jorgensen, 1977; Budtz-Jorgensen, 1977). Most commonly used denture cleansers are based on oxidizing agents like alkaline peroxide, sodium perborate etc (ShivangiGajwani-Jain, 2015). Duyck J *et al* reported significant reduction of Candida albicans count after overnight storage in alkaline peroxide based tablet solutions (Duyck *et al.*, 2013).

Oxidizing agents have been shown more potent denture cleansers compared to abrasive denture cleansing pastes (McCabe, 1995; Chan, 1991; Dillis, 1998). Chlorhexidine digluconate mouthwashes are comparatively newer agents to be used for denture cleansing. Moffa EB *et al* reported 2% chlorhexidine digluconate has efficacy similar to sodium perborate based denture cleansers<sup>17</sup>. De Andrade IM *et al* reported 2% chlorhexidine digluconate to be more potent than 0.12% chlorhexinedigluconate and required less time for denture cleansing (De Andrade *et al.*, 2012). Aoun G *et al* reported addition of 0.05% cetylpyridinium chloride to 0.12% chlorhexidine digluconate resulted in significant reduction candida labicans colonizing dentures (Aoun, 2015). In a recent study by Sushma R *et al* reported TriphalaChurna as an antifungal is more efficacious than conventional chlorhexidine digluconate denture cleansers (Sushma, 2017). Reducing agents are also used for reducing the microbial colonization on dentures. Salles MM *et al* reported 0.5% sodium hypochlorite to be more efficacious in reducing microbial colonization as compared to 0.25% sodium hypochlorite or 8% RicinusCommunis solutions (Salles *et al.*, 2015). Basson NJ *et al.* reported sodium hypochlorite to be a better cleanser compared to household products such as vinegar (diluted or undiluted) or 20%NaCl salt solutions (Basson *et al.*, 1992). Budtz-Jorgensen first used enzymes like mutanase, dextranase and protease for reducing microbial colonization on dentures. Combinations of the enzymes were found to be more efficacious than pure enzymes (Budtz-Jorgensen, 1977; Budtz-Jorgensen, 1977).

Panzeri H compared 1% chloramine based dentifrice with 0.05% fluorsurfactant based dentifrice for denture cleansing and found 1% chloramine based dentifrice to be more efficacious (Panzeri *et al.*, 2009).

## Conclusion

Denture cleansers correspond to a variety of products designed to safely remove stains, deposits, and debris from the surfaces of dental prostheses, by means of various methods. Effective cleaning of dentures by mechanical or chemical methods will help in reducing mucosal irritation and denture stomatitis. This systematic review demonstrated that oxidizing agents like alkaline peroxide based tablets are the most common product used for denture hygiene. Antimicrobials such as chlorhexidine have shown similar efficacy. Although the available data on denture cleansers are limited, the combination of mechanical and chemical cleansing is considered most appropriate choice in terms of denture cleansing.

## REFERENCES

- Aoun G, Cassia A, Berberi A. 2015. Effectiveness of chlorhexidine digluconate 0.12% and cetylpyridinium chloride 0.05% solution in eliminating *Candida albicans* colonizing dentures: A randomized clinical in vivo study. *J Contemp Dent Pract.* Jun;16(6): 33-6.
- Basson NJ, Quick AN, Thomas CJ. 1992. Household products as sanitizing agents in denture cleansing. *J Dent Assoc S Afr.* Oct, 47(10): 437-9.
- Budtz-Jorgensen E, Kelstrup J. 1977. Enzymes as denture cleansers. *Scand J Dent Res.* Mar 85(3): 209-15.
- Budtz-Jorgensen E. 1977. Prevention of denture plaque formation by an enzyme denture cleanser. *J Biol Buccale.* Sep, 5(3): 239-44.
- Chan EC, Iugovaz, Siboo R, *et al.* 1991. Comparison of two popular methods for removal and killing bacteria from dentures. *J Can Dent Assoc.* Dec 57(12): 937-9.
- De Andrade IM, Cruz PC, Silva-Lovato CH, de Souza RF, Souza-Gugelmin MC, ParanhosHde F. 2012. Effect of chlorhexidine on denture biofilm accumulation. *J Prosthodont.* Jan;21(1): 2-6.
- Dillis SS, Olshan AM, Goldner S, Brogdon C. 1988. Comparison of antimicrobial capacity of an abrasive paste and chemical-soak denture cleansers. *J Prosthet Dent.* Oct 60(4): 467-70.
- Duyck J, Vandamme K, Muller P, Teughels W. 2013. Overnight storage of removable dentures in alkaline peroxide-based tablets affects biofilm mass and composition. *J Dent.* Dec., 41(12): 1281-9.
- Guiglia R, Musciotto A, Compilato D, Procaccini M, Lo Russo L, Ciavarella D, *et al.* 2010. Aging and oral health: effects in hard and soft tissues. *Curr Pharm. Des.*, 16:619-30.
- Martori E, Ayuso-Montero R, Martinez-Gomis J, Vinas M, Peraire M. 2014. Risk factors for denture-related oral mucosal lesions in a geriatric population. *J Prosthet Dent.* 111:273-9.
- McCabe JE, Murray ID, Kelly PJ. 1995. The efficacy of denture cleansers. *Eur J Prosthodont Restor Dent.* Sep, 3(5): 203-7.
- Moffa EB, Izumida FE, Jorge JH, Mussi MC, Siqueira WL, Giampaolo ET. 2016. Effectiveness of chemical disinfection on biofilms of relined dentures: A randomized clinical trial. *Am J Dent.*, Feb;29(1): 15-9.
- Nikawa H, Hamada T, Yamashiro H, Kumagai H. 1999. A review of in vitro and in vivo methods to evaluate the efficacy of denture cleansers. *Int J Prosthodont.* 12:153-9.
- Panzeri H, Lara EH, ParanhosHde F, *et al.* 2009. In vitro and clinical evaluation of specific dentifrices for complete denture hygiene. *Gerodontology.* Mar 26(1): 26-33.
- Paranhos HF, Silva-Lovato CH, Souza RF, Cruz PC, Freitas KM, Peracini A. 2007. Effects of mechanical and chemical methods on denture biofilm accumulation. *J Oral Rehabil.* 34:606-12.
- Peracini A, Andrade IM, ParanhosHde F, Silva CH, de Souza RF. 2010. Behaviors and hygiene habits of complete denture wearers. *Braz Dent J.* 21:247-52.
- Rossato MB, Unfer B, May LG, Braun KO. 2011. Analysis of the effectiveness of different hygiene procedures used in dental prostheses. *Oral Health Prev Dent.*, 9:221-7.
- Salles MM, Badaro MM, Arruda CN, *et al.* 2015. Antimicrobial activity of complete denture cleansers solutions based on sodium hypochlorite and *ricinus communis* – a randomized clinical study. *J Appl Oral Sci.* Non-Dec 23(6):637-42.
- ShivangiGajwani-Jain, DilipMagdum, AmolKaragir, PoojaPharane. 2015. Denture Cleansers: A Review. *IOSR-JDMS.* Feb14(2):94-96.
- Sushma R, Sathe TT, Farias A, Sanyal PK, Kiran S. 2017. "Nature cures:" An alternative herbal formulation as a denture cleanser. *Ann Afr Med.* Jan-Mar; 16(1):6-12.