

Comparison of Various Methods of Disinfecting Acrylic Dentures

Soni Kumari^{1*} Umesh G. Parmar² Shilpi Verma³ Aditya Sharma⁴ Soni Kumari⁵ Aastha⁶

¹MDS, Department of Prosthodontics, Crown Bridge and Implantology, Patna Dental College and Hospital, Patna, Bihar, India.

²MDS, Prosthodontics, Private Consultant, Rajkot, Gujarat, India.

³MDS, Prosthodontics, Private Consultant, Patna, Bihar, India.

⁴PG Student, Department of Conservative Dentistry and Endodontics, Government Dental College, Jamnagar, Gujarat, India.

⁵Senior Lecturer, Department of Orthodontics, Hazaribagh College of Dental Sciences and Hospital, Jharkhand, India.

⁶Private Consultant, Patna, Bihar, India.

ABSTRACT

Background: The aim of this study was to investigate different procedures to check for the most effective and most dimensionally accurate disinfection method for acrylic dentures. Two commercially available disinfectant solutions (Sodium hypochlorite and Sodium perborate) and one herbal product will be used.

Keywords: Disinfectant, acrylic dentures, sodium hypochlorite.

INTRODUCTION

A study was conducted to evaluate the effectiveness of disinfectant solutions 1% Sodium hypochlorite, 2% Chlorhexidine, 2% Glutaraldehyde, 100% Vinegar, tablets of Sodium per borate-base denture cleanser and 3.8% Sodium perborate in the disinfection of acrylic resin specimens contaminated in-vitro by *Candida albicans*, *Streptococcus mutans*, *Streptococcus aureus*, *E. Coli* or *Bacillus subtilis* as measured by the residual colony forming unit. The study concluded that, 1% Sodium hypochlorite, 2% Glutaraldehyde, 2% Chlorhexidine di gluconate, 100% Vinegar and 3.8% Sodium perborate are valid alternatives for the disinfection of acrylic resin.²⁰ The efficacy of different extracts of neem leaf on seed borne fungi *Aspergillus*, *Rhizopus* and chemical characterization of the neem leaf extracts were studied in vitro on the culture medium. The growth of both the fungal species was inhibited significantly ($p < 0.01$) and controlled with both alcoholic and water extract of all ages and of the concentrations used. The alcoholic extracts of the neem leaf were most effective in comparison to aqueous extract for retarding the growth of *Rhizopus* and *Aspergillus*. The crude aqueous and alcoholic leaf extracts of

neem was more effective in inhibitions of growth of the fungi *Aspergillus* in comparison to inhibitory effects on *Rhizopus* growth in the artificial culture medium.

MATERIALS AND ARMAMENTARIUM

Two commercially available disinfectant solutions (Sodium hypochlorite and Sodium perborate) and one herbal product will be used.

Inclusion criteria:

1. Healthy cooperative patients above 40yrs of age wearing complete dentures for

More than 6 months.

2. Sex; males and females.

3. Patients free of any localised or systemic disease.

4. Patients with informed consent.

Exclusion criteria;

Received: Jan. 21, 2021; Accepted: Mar. 16, 2021

*Correspondence Dr. Soni Kumari.

Department of Prosthodontics, Crown Bridge and Implantology, Patna Dental College and Hospital, Patna, Bihar, India.

Email: sonisudhansh@gmail.com

1. Patients with any systemic condition and/or oral habits
2. Patients with root stumps, embedded tooth fragments or any other foreign body (implants, metal plates etc) in the oral cavity.
3. Patients wearing appliances or dentures other than complete dentures.
4. Highly uncooperative patients.
5. Patients without informed consent.

MATERIALS AND METHODS

Evaluation of effectiveness of disinfectants

BEFORE DISINFECTION [CLINICAL STRAINS AND INCUBATION]

- The microbial samples will be collected by rubbing the tissue surface of denture using a sterilized tooth brush with saline (10 ml) for 1 minute.
- The resulting solution is transferred to a sterile test tube using a pipette
- 0.01 ml of resultant suspension will be cultured on blood agar plate and incubated at 37°C for 24 hours and the number of colony forming units will be counted.

GROUPING: -

- The dentures [RPD\CD] will be collected from selected patients and subjected to grouping :

Group	Sample size	Disinfectant	Duration
A	30	Herbal product(optimum concentration)	10 mins
B	30	1% sodium hypochlorite	10 mins
C	30	3.8% sodium perborate	10 mins

Total number of samples (n=30)= 90

After Disinfection

- Dentures will be immersed in the respective solutions allotted to their groups for the recommended time.

- The samples will then be placed in sterile distilled water for 2 seconds to facilitate the removal of excess disinfectant.
- Subsequently the sample will be collected by rubbing the tissue surface of the denture using a sterilized tooth brush with saline (10 ml) for 1 minute.
- The resulting solution is transferred to a sterile test tube using a pipette.
- 0.01 ml of resultant suspension will be cultured on blood agar plate and incubated at 37°C for 24 hours and the number of colony forming units will be counted.

RESULTS

- Growth of microorganism on dentures will be assessed as CFU/ml as mentioned below;

GROUP	GROWTH OF MICRO ORGANISMS ON BLOOD AGAR	
	BEFORE DISINFECTION (CFU/ML)	AFTER DISINFECTION (CFU/ML)
A (1-30)	A 1 A 2 A 3 . . A 30	A 1 A 2 A 3 . . A 30
B (1-30)	B 1 B 2 B 3 . . B 30	B 1 B 2 B 3 . . B 30
C (1-30)	C 1 C 2 C 3 . . C 30	C 1 C 2 C 3 . . C 30

Results will be compared using ANOVA and paired t-test with each solution for comparing the amount of microorganisms using CFU before and after disinfection.

DISCUSSION

Edentulousness is not a disease entity by itself, but rather a consequence of pathology. Increasing incidence of edentulous over the recent years has

questioned the adequacy of dental treatment. Yet the mainstay for the management of a complete or partially edentulous state, till date remains to be an acrylic denture. The treatment of these individuals with artificial dentures not only rehabilitates them functionally, but esthetically and psychologically.²

It is known that the prosthesis may become contaminated with microorganisms at various stages of denture fabrication, while wearing by the patient and during post insertion checkup stages. This contamination prosthesis can spread microorganisms to other materials, equipment, and personnel through contact or air borne during adjustments. Possible mechanisms of prevention of such spread of microorganisms have also been investigated¹⁷.

According to the centers of disease control, blood and saliva should be thoroughly and carefully cleaned from material that has been used in the mouth, especially before trimming and polishing the prosthesis. Contaminated materials, impressions, and intra-oral devices should also be cleaned and disinfected before being handled in the dental laboratory and before they are placed in the patient's mouth.³⁶

In our country disinfection of dentures are not done as a routine procedure either in the dental office or by the patient during the tenure of using the dentures in the mouth. It is therefore highly recommended that disinfection of the dentures should be done at a periodic time interval to keep the dentures free from microorganisms. This is particularly significant for the health of the contacting mucosa, which is in constant contact with the denture base. Further the accumulation of food and microbial plaque certainly affects not only the health of the tissues, but also the oral hygiene of the patient. Dental Practitioners should be able to decide the choice of disinfectant solution for the patient.

Generally the chemicals used as disinfectant are sodium hypochlorite, sodium perborate, glutaraldehyde, chlorhexidine etc. Sodium hypochlorite is available only as aqueous solutions, which are usually prepared by adding chlorine to caustic soda. Chlorine disinfectants can react readily with all types of organic matter.

According to Rudd et al (1984), full strength sodium hypochlorite has been shown to be effective against microorganisms including spores. Moreover it was effective against hepatitis virus. They recommended that the usage of full strength sodium hypochlorite (6.25%) at a 5 minute immersion time was very effective.¹¹

From other studies, it has been noted that Neem can be regarded as a valuable plant source for the rationalization of its use in traditional medicine for modern drug development⁴⁸. Meanwhile, Neem's different parts such as the bark, leaves, seeds and flowers are widely used in traditional indian medicine. Earlier reports have shown that dicotyledonous plants, their bark and pulp contain tannin- like substance inhibits bacterial growth⁴⁸. The selection of Neem extract for the present study was based on a number of factors. It is most common in Indian subcontinent region; it is very cheap and reported to have antiplaque and many pharmacological properties⁴⁷.

But in individuals with systemic illness the oral microflora generally changes e.g. diabetic patients are more prone towards fungal infections because the oral microflora generally predominates candida species.^{49,53,54}

In cancer patients oral microflora generally shifts towards gram negative bacilli and yeast.⁴⁹ This study also showed the similar microflora on the Patients denture.

CONCLUSION

Based on the observation made, following conclusions will be drawn from the present study:

1. Whether Immersion of dentures in 1% sodium hypochlorite solution showed significant reduction in microbial colonies.
2. Whether Immersion of dentures in the herbal disinfectant solution showed significant reduction in microbial colonies.
3. Whether Immersion of dentures in 3.8% sodium perborate showed reduction in microbial colonies.
4. whether Both Herbal product and sodium hypochlorite can be effectively used as denture cleansers.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Gordon SR. Older adults: demographics and need for quality care. J Prosthet Dent 1989;61(6):737-41.
2. Douglass CW, Gammon MD and Atwood DA. Need and effective demand for prosthodontic treatment. J Prosthet Dent 1988;59:94.
3. Kulak Y, Arikan A, Albak S et al. Scanning electron microscopic examination of different cleaners: surface contaminant removal from dentures. J Oral Rehabil 1997;24:209.
4. Apurva K. Pathak Anti-candida activity of aqueous extracts of some herbals Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231-6345 2012 Vol. 2 (2) April-June,
5. Chaturvedi R, Razdan MK, Bhojwani SS (2003). Production of haploids of neem (Azadirachta indica A. juss.) by anther culture. Plant Cell Rep., 21: 531-537.
6. Subapriya, R.; Nagini, S. (2005). Medicinal properties of neem leaves: a review. Curr. Med. Chem. Anticancer Agents, 5 (2), 149-160.
7. Bartels, klenry A. and Blechman Ilarry. "Survey of yeast populatiori in saliva and an Evaluation of some procedures for identification of Candida albicans". J. Denf. Res, 41 : 1386, 1962.
8. Cawson R.A. T o l e of candida". Ilej7r. Prucii, 1965, 16 ; 138-142
9. Olsen Ingal; "Denture stornatitis ; occurrence and distribution of fungi". Acia. Od ~ l ~Src.a nd. 32, 329-333, 1974.
10. Bnsti::~r~Ri oss J. "Delllure sore 1nout11- Etiological aspects and treal~nent". Alrslral. D. J, 21 : 5, 375-377 (Oct), 1976.
11. Robert W.Rudd, Steve Senia, Ferne K. Mccleskey and Ernest D Adams. Sterilization of complete dentures with Sodium hypochlorite. J Prosthet Dent 1984; 51:318-321.