

The effectiveness of various home needs used as denture cleansing agents on Candida albicans- An In-Vitro study

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Abstract

Prosthesis hygiene is crucial to the health of the rehabilitated edentulous patient. Many a time, patients are uninformed on how to care for their dentures. Denture cleansing includes removal of Candida from denture surfaces as Candida albicans remains the most commonly associated opportunistic infection associated with denture stomatitis². Therefore, a direct correlation between the growth of Candida albicans on dentures and the efficacy of alternative materials used as denture cleansers can be drawn. The objective of the study was to evaluate the effectiveness of four domestically prepared solutions and one commercially available solution on the growth of denture associated Candida albicans. Normal growth was seen in the control group i.e Distilled water. No growth was observed in remaining 3 solutions i.e in Group A Clinsodent, Group B Clotrimazole, Group C Vinegar lime concoction. Easily available home needs can thus be employed to

serve as denture cleansers to avoid compromised denture hygiene in geriatrics.

Keywords: Candida Albicans, Denture Cleansers, Denture Stomatitis, Geriatric Dentistry.

Introduction

The microporous surface of acrylic denture conveniently acts as a conducive environment that invites microorganisms that can threaten the health of a geriatric patient. Prosthesis hygiene is crucial to the health of the rehabilitated edentulous patient. Many a time, patients are uninformed on how to care for their dentures. Hence patient education on the need for denture hygiene is a basic consideration to prosthodontics treatment protocol¹. Due to ignored denture cleaning practice reinforcement among the Indian population and also the non-availability of commercial denture cleansing agent’s in common pharmaceutical outlets, interest has been drawn towards the use of alternative materials to maintain denture hygiene. In an effort to simplify

procurement and minimize hygiene ignorance, in this study an attempt has been made to employ commonly available home needs to be an alternative to commercially available denture cleansers³. Denture cleansing includes removal of *Candida* from denture surfaces as *Candida albicans* remains the most commonly associated opportunistic infection associated with denture stomatitis². Therefore, a direct correlation between the growth of *Candida albicans* on dentures and the efficacy of alternative materials used as denture cleansers can be drawn.

Objective of the study

To evaluate the effectiveness of four domestically prepared solutions and one commercially available solution on the growth of denture associated *Candida albicans*.

Methodology

Stone molds were made by investing rectangles of wax of dimensions 65mm × 10mm × 3mm. After the stone set, the molds were de-waxed. A conventional heat-cured resin was packed and the molds were cured. Specimens of conventional heat cure acrylic were trimmed and polished. These specimens were inoculated with *Candida albicans* species for 48 hours at 37 degrees centigrade in tryptic soy broth. The inoculated specimens were divided into 5 groups and placed into 5 different solutions Group A to E (Figure 1) (Group A – Clinsodent, Group B Clotrimazole, Group C Vinegar lime concoction, Group D Home bleach, Group E Distilled water). The content of the solutions and their preparation are described in Table 1.

These plates were then dipped in 10ml of tryptic soy broth, shaken vigorously for two minutes, this suspends the candida in the broth, and the acrylic plates were removed. From this suspension, 100µl was added on the tryptic soy agar plates and uniformly spread on it and

incubated for 48h at 37 degrees centigrade. Post incubation the plates were observed for any growth of candida. Colony forming units of *C. albicans* were counted to determine the effectiveness of these solutions.

Result

Two CFU/ml was observed in Home bleach treated plates. Normal growth was seen in the control group i.e. Distilled water. No growth was observed in remaining 3 solutions i.e. in Group A Clinsodent, Group B Clotrimazole, Group C Vinegar lime concoction. (Figure 2).

Discussion

The first reported use of hydrogen peroxide in dentistry was in 1913, to control plaque formation and gum disease. The mechanism of action is by the release of oxygen. Another mechanism of action is the effect the hydrogen peroxide has on the debridement of bacterial call walls. Clinsodent contains Potassium per-sulphate and Sodium perborate as its main anti-fungal components which work under alkaline environment imparted by trisodium phosphate or sodium carbonate (has a pH of 11.5-11.9). Clinsodent also contains Everlase as a proteolytic enzyme. The enzyme functions through the digestion of the mucoprotein component of deposits. Clotrimazole was discovered in 1969 and it is on the World Health Organization's List of Essential Medicines as one of the most effective and safe medicines needed in a health system. Clotrimazole binds to phospholipids in the cell membrane and inhibits the biosynthesis of ergosterol and sterols required for cell membrane synthesis altering the permeability of the fungal cell wall which leads to the cell's death via loss of intracellular elements. The absence of significant drug interactions with topical clotrimazole support the chances that it could be safe to be used as a denture cleanser. Vinegar is used in food mainly as a

preservative item by inhibiting fungal growth on vegetables. It was also used as a cleaning agent in folk culture for the treatment of wounds by inhibiting the growth of fungi and bacteria owing to its medicinal properties^{4,5}. It is also cheap, easily available and with minimum toxicity, hence this study aimed also evaluates its in vitro antifungal property on *Candida albicans*. Acetate can inhibit 14 α -lanosterol demethylase. Acetic acid is permeable to intact cell membranes, facilitating its access to the molecular target and causing an increase of its concentration within the cell so that it becomes toxic. This situation leads to activation of H⁺ + ATPase.^{7,8} The results of the study opens up scope for further research on pharmacokinetic parameters such as determination of cidal and/or static doses etc. Apple cider vinegar showed MIC of 2500 μ g/ml on all strains tested. It showed a fungistatic effect at MIC and MICx2 concentrations, whereas at MICx4 a fungicidal action was observed after 30 minutes of exposure. It also hampered the adherence of *C. albicans* to the acrylic resin, in addition to not promoting significant changes on the surface roughness and color of the acrylic resin after 2 hours of exposure⁹. Alkaline hypochlorite can be used as denture cleansers as they dissolve mucin and other organic substances are bactericidal and fungicidal and remove stains. Hypochlorite does not dissolve calculus, but it may inhibit calculus formation on dentures by dissolving the plaque organic matrix [6]. In this study, hypochlorite was used in the form of home bleach. However, growth was seen in the concentration used. Further studies could be conducted to evaluate the MIC for using home bleach as denture cleansers. Also, it should be noted that *Candida* thrives in more of an alkaline pH than that in that of an acidic environment which could bring us to a debate on how efficient home

bleach will be in the removal of *Candida* as a denture cleanser.

Conclusion

Within the limitation of this in vitro study, it can be concluded:

Vinegar lime concoction can be used as effectively as commercially available denture cleansers and or antifungal drugs such as clotrimazole.

Home bleach although showed some amount of fungal growth, further studies can be done on its optimum concentration to be used as a denture cleanser.

Easily available home needs can thus be employed to serve as denture cleansers to avoid compromised denture hygiene in geriatrics.

Dental staff is obligated to have a working knowledge of the techniques available for cleaning dentures and maintaining hygiene so that they are able to translate and reiterate to the patients repeatedly. The combination of mechanical and chemical methods is ideally recommended for denture cleansing.

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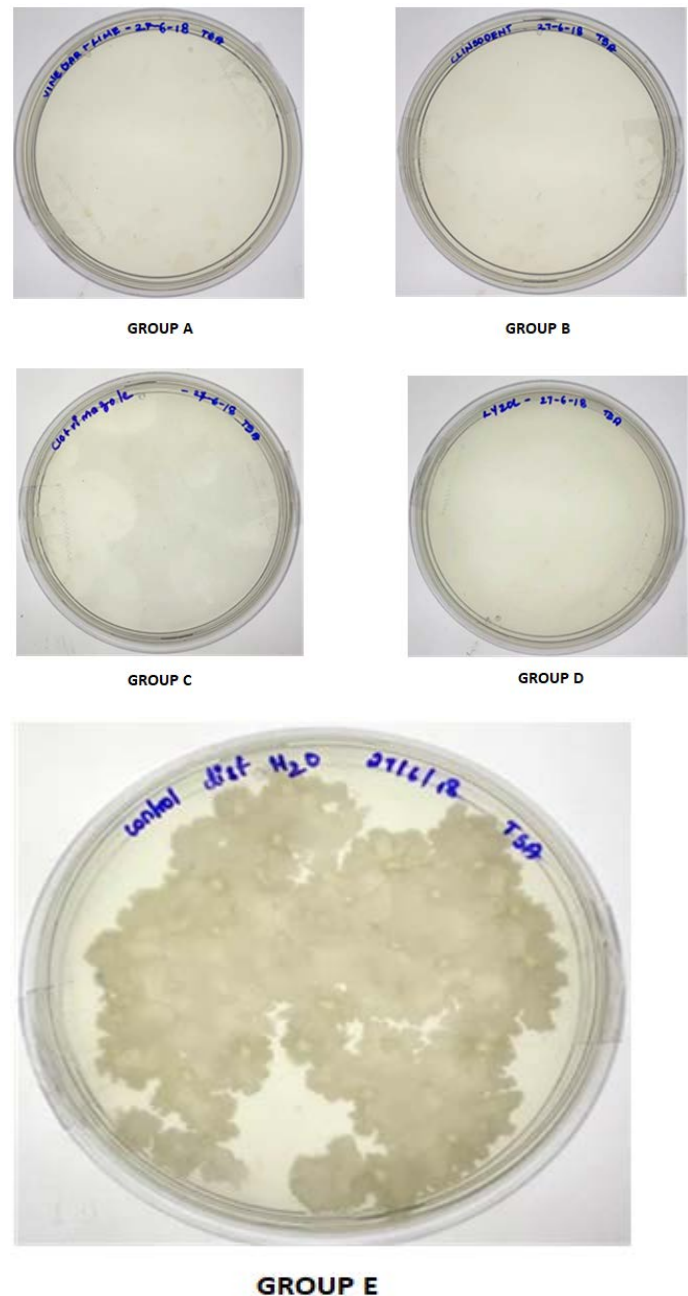
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Legend Figure and Table



Fig 1: Acrylic strips placed in 5 solutions



Tables 1

Group	Content	Preparation
Solution A	Clinsodent	1 Tab in 100ml of distilled water
Solution B	Clotrimazole	1 Tab in 100ml of distilled water
Solution C	Vinegar Lime concoction	10 ml Vinegar + 90 ml of distilled water + juice of 1 lemon
Solution D	Home Bleach	10ml Home bleach + 90 ml of distilled water
Solution E	Distilled water (Control)	Distilled water 100ml