Anti-adhesion Effect of Chlorhexidine (CHX) against *Candida tropicalis* to Acrylic Denture Plates

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Abstract

*Candida tropicalis* is one of the oral microorganism species that form the microbial plaque which can accumulate on the fitted surfaces of dentures. Chemical cleaning methods are more effective for daily denture cares because it’s usually contains chlorhexidine gluconate which is an antimicrobial agent. The objectives of this study is to determined the anti adhesion effect of chlorhexidine (CHX) against *Candida tropicalis* to acrylic denture plates. Oradex is a commercialized oral rinse that contains 0.12% chlorhexidine gluconate as the active compound. The supernatant of saliva was collected and used in the experiment. The denture plates were washed with CHX and sterile distilled water before immersing in saliva. The plates were then tested with undiluted CHX, diluted CHX and distilled water as the control. After that, they were immersed in *Candida tropicalis* suspension, transferred into saline solution and sonicated. The resulting suspensions were then incubated at 37°C for 2 days before calculating the CFU. The plates that were immersed in undiluted CHX had the lowest CFU followed by the diluted CHX. The control plates that were immersed in distilled water had confluent growth indicating the absent of anti adherence capability. The findings suggest that CHX is useful for controlling the adhesion of *C. tropicalis* against acrylic denture plates and thus, oral rinses containing CHX agent can be used to soak the denture plates in order to control microbial adhesion.

Introduction

Microbial plaque that accumulates on the fitted surfaces of dentures is composed of several oral microorganism species, including *Candida tropicalis*. Several denture cleaning methods are used clinically for the reduction of denture plaque, debris and stains and these are generally divided into mechanical and chemical cleaning methods. It has been proven that chemical cleaning methods are more effective and indispensable for daily denture care. There are two types of oral rinse that is medicated and non-medicated oral rinses. Medicated oral rinse usually contains chlorhexidine gluconate. Chlorhexidine is an antimicrobial agent which has a wide spectrum of antibacterial activity encompassing Gram positive and Gram negative bacteria, yeast and other microbes.

Objectives

The study was carried out with the objective of determining the anti-adhesion effect of CHX against *C. tropicalis* to acrylic denture plates.
Materials and Methods

Oral rinse

Commercialized oral rinse used in the experiment is Oradex containing 0.12% chlorhexidine gluconate as the active compound.

Collection of saliva

Volunteers were required to rinse their mouth with distilled water, followed by chewing a piece of rubber band to stimulate the salivary glands to produce excess saliva. The saliva was then collected in an ice chilled tube and was centrifuged at 17,000g for 30 minutes. Supernatant was obtained and used in the experiment.

Disinfection of acrylic resin denture plates

Firstly, the denture plates were soaked in CHX for 20 min to ensure the sterility of the denture plates. Secondly, the denture plates were washed with sterile distilled water thrice and stored in sterile containers containing sterile distilled water.

Saliva coating of acrylic resin denture plates

The sterile denture plates were immersed in saliva prepared as above, for 2 min, after which the saliva was decanted and the denture plates were rinsed with sterile distilled water. The denture plates are now coated with the experimental pellicle from saliva.

Exposure of CHX treated denture plates to Candida tropicalis

The saliva-coated denture plates were divided into 3 test groups. The first group was tested with undiluted CHX containing 0.12% CHX. The second group was tested with 2 times dilution of CHX. And the last group was using only distilled water as the control group. The treated denture plates were immersed in these solutions for 1 minute. Following this exposure, the denture plates were immersed in 2 x 10^7 cfu/ml of Candida tropicalis suspension for 2 h at 37°C. The denture plates were then washed 3 times with normal saline. The final wash was retained and sonicated for 15 min, after which the resulting suspensions were plated on SDA plates. The SDA plates were incubated at 37°C for 48 h. Finally, the CFU counts were carried out.

Results and Discussion

Currently in the field of dentistry, there is a need to apply innovative methods and techniques which could assist in reducing and preventing microbial colonization on denture plates. Studies have indicated that denture wearers, especially elderly people had a high Candida sp. accumulating on the denture plates which could finally lead to other dental problems (Arita et al., 2005). As reported by Arita et al. (2005), a few studies have been carried out elsewhere to develop a cheap and reliable apparatus that is easy to use.

In our study, we prepared the acrylic resin denture plates by coating with saliva to mimic the actual oral surfaces in the oral environment. These saliva-coated denture plates were then treated with CHX and finally immersed in the 2x10^7 Candida tropicalis. The usage of CHX was selected as this antimicrobial agent has been reported in many studies to have good antimicrobial effect against oral microorganisms (Arita et al. 2005). The steps finally involved sonication of the denture plates in order to detached the adhered C. tropicalis to the treated denture plates. The anti-adhesion effect of chlorhexidine (CHX) against C. tropicalis adhering
to acrylic resin denture plates were confirmed by the numbers (CFU/mL) of *C. tropicalis* growth on Sabouraud agar (SDA).

The results showed that when acrylic denture plates were soaked in distilled water, a high number of *C. tropicalis* were able to adhere to the plates, which was shown by a confluent growth of the microbes on SDA. This was possibly due to the absent of anti-adhesion effect in distilled water which could assist in inhibiting the adherence of *C. tropicalis* to the denture plates.

In contrast, when the plates were coated with CHX, the adherence of *C. tropicalis* was reduced tremendously to only 100 CFU/mL of microbes (Figure 1). However, when two times dilution of CHX was used to coat/treat the acrylic denture plates, an increase amount of 300 CFU/mL of *C. tropicalis* were found to be able to adhere to the CHX-treated denture plates. The increased in *C. tropicalis* population when using diluted CHX-treated denture plates indicates that less anti-adhesion effect was exhibited in the experiment.

![Number of Candida tropicalis (CFU/mL)](image)

**Figure 1**: Anti-adhesion effect of different concentration of CHX against *Candida tropicalis* to acrylic denture plates

**Conclusion**

The findings suggest that CHX is useful to control adhesion of *C. tropicalis* against acrylic denture plates and thus, oral rinses containing CHX agent can be used to soak the denture plates in order to control microbial adhesion.

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References


