The Effect of Saturated Salt Solution on Disinfection of *C. albicans* for the Maxillary Acrylic Complete Denture (An in vivo study)

**ABSTRACT**

**Aims:** The aim of this study was to evaluate the effect of the natural denture cleanser saturated salt solution on disinfection of *C. albicans* for the maxillary complete denture (An in vivo study). **Materials and Methods:** An in vivo study testing anti fungal efficiency of the natural denture cleaner saturated salt solution on disinfection of *C. albicans* for 60 patient wearing maxillary complete denture by using light microscope with camera and connected to computer. The swab was taken from the fitting surface of the denture of about 2.5 cm following the median line starting from incisive papilla. This study compared the effect of disinfection between before and after immersion in distilled water (Control), saturated salt solution (Iraq), and protefix(Germany). **Results:** The results demonstrated that there were significant differences between salt solution and distilled water, that there were no significant differences between salt solution and protefix at p=0.05. **Conclusions:** saturated salt solution was very efficient for disinfection of *C. albicans* for acrylic denture base material.

**Keywords:** Denture Cleanser. Antifungal. Incisive papilla.

**INTRODUCTION**

Acrylic resin is the most employed material in the construction of removable complete denture. This material has been used since 1930.\(^1\) Chemical cleansing approach is recommended for plaque control.\(^2\) Every surface in the oral cavity natural or synthetic become covered with in 30 minute with 0.5-1.5 µ thickness precipitate of salivary glycoprotein and immunoglobulin that is termed "pellicle".\(^3\)

The pellicle in turn provide a substrate to which oral debris (mucin, food particles and desquamated epithelial cells and microorganisms "bacteria and fungi" readily adhere.\(^4\)

To prevent bacterial cross-contamination among denture patients all dental prosthesis must be disinfected on entering and again on leaving the laboratory.\(^5\)

The worldwide overuse of antibiotics has caused microorganisms to develop resistance to the current antibiotics and to become virulent, therefore, antibiotic resistance is a global problem and dentists must be involved in halting it.\(^6,7,8,9\)

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**References:**


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MATERIALS AND METHODS

An in vivo study testing anti fungal efficiency of the natural denture cleanser saturated salt solution on disinfection of C. albicans for 60 patient attending clinic of Prosthodontic Department- College of Dentistry/University of Mosul having maxillary complete denture for more than 2 years, who are of age ranging from 35 to 65 year and are systemically controlled patients but excluding diabetic patients, and at least after two weeks of receiving antibiotics. The swab was taken from the fitting surface of the denture immediately after removal of the denture from the patient mouth in the afternoon were the patients instructed to wear the denture for whole day time, swab was wiped over an area of about 2.5 cm following the median line starting from incisive papilla, then the swab placed in a screw capped bottle containing (1ml) of nutrient broth as a transparent medium that is incubated for (24hrs at 37°C ), then 0.01 ml of it is taken and plated on SDA. And incubated for (24hrs at 37°C), and counted as (CFU/ml) for the viable C. albicans present. While the denture itself immersed in a salt solution for 8hours, (40gm salt/100ml of tab water), then 0.01 ml of its solution taken and plated on SDA, and incubated for (24hrs at 37°C), then counted as (CFU/ml) for the remaining viable C. albicans colonies by using light microscope with camera and connected to computer (Figure 1).

The culture media were sterilized by using an autoclave at 15 pound / inch² at 121°C for 15min., while glass Petri-dishes, screw cap bottles and tweezers were sterilized by hot air oven at (160-180)°C for 1 hour.

Identification of C. albicans were done by the following diagnostic laboratory tests: (Culture characteristics): On Sabouraud's Dextrose Agar medium with-in (24-48) hrs. at 37 °C, Candida species produce soft creamy-coloured colonies with a yeast odor (Figure 1). Microscopic Examination: The smears that had been obtained from the culture of patient's specimens were examined by light microscopic using a gram's stain technique for pseudohyphae and budding cells (Figure 2).

Germs Tube Test: In this test, a loop-full was taken from each culture, incubated in test tubes containing human serum (0.5-1) ml for about 90 min intervals at
37°C. Microscopic observation made for a smear obtained from each test tube. The yeast cells of C. albicans will begin to form germs tubes or true hyphae after 30 min. After incubation of the bacterial suspension 0.01ml. was taken and plated on Sabouroud agar for counting of C. albicans colonies after incubated for (24hrs at 37°C) to check the count of viable species only.

### RESULTS

The number of samples, mean differences, standard deviation, standard error mean for disinfection of maxillary complete acrylic denture from C. albicans at 8hours of immersion were shown in (Table 1and 2).

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>N</th>
<th>Mean (CFU/ml)</th>
<th>S. D</th>
<th>S. E Mean</th>
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<tbody>
<tr>
<td>Salt</td>
<td>20</td>
<td>28245.0000</td>
<td>26990.57292</td>
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<tr>
<td>DW</td>
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<td>1279.0000</td>
<td>3199.50309</td>
<td>715.43064</td>
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</table>

S.D: standard deviation, S.E: standard error, N: number of samples

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<tr>
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<td>6035.27558</td>
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<td>Prot</td>
<td>20</td>
<td>14915.0000</td>
<td>19093.73761</td>
<td>4269.48952</td>
</tr>
</tbody>
</table>

N: number of samples, S.D: standard deviation, S.E: standard error

T- Test and mean difference for disinfection of maxillary complete acrylic denture from C. albicans at 8hours of immersion, when D.W was the control (Table 3, and Figure 3) showed that there were significant differences between salt and D.W.

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>N</th>
<th>Mean differences (CFU/ml)</th>
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<tbody>
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<tr>
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<table>
<thead>
<tr>
<th>DATA</th>
<th>t</th>
<th>df</th>
<th>Sig.(2-tailed)</th>
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<tr>
<td></td>
<td>4.437</td>
<td>38</td>
<td>.000</td>
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</tbody>
</table>

df : degree of freedom

![Figure 3: The mean differences for the disinfection of maxillary complete acrylic denture (in vivo, D.W as a control)](image-url)
T-Test and mean difference for disinfection of maxillary complete acrylic denture from *C. albicans* at 8 hours of immersion, when Protefix was the control (Table 4 and Figure 4) showed that there were no significant differences between salt and protefix, and (Figure 5) show the result of in vivo disinfection.

Table (4): T-Test for disinfection of maxillary complete acrylic denture (in vivo, Protefix as a control)

<table>
<thead>
<tr>
<th>T</th>
<th>df</th>
<th>Sig.(2-tailed)</th>
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</thead>
<tbody>
<tr>
<td>1.803</td>
<td>34.208</td>
<td>.080</td>
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</table>

df : degree of freedom

Figure (4): The mean differences for the disinfection of maxillary complete acrylic denture (in vivo, Protefix as a control)

Figure (5): Disinfection of maxillary complete acrylic denture from *c. albicans* (in vivo): (a) before and (b) after immersion in saturated salt solution, and (c) before and (d) after immersion in protefix.
DISCUSSION
According to the results of the in vitro study the best prepared natural solution as a denture cleanser (for acrylic denture base material) was saturated salt solution for 8 hours immersion, swap was wiped over an area of about 2.5 cm following the median line starting from incisive papilla. Some authors (17-19) were stated that C. albicans was isolated more frequently from the denture fitting surface than from the corresponding mucosa. Also, other explanation (20) compared between the concentration of microorganisms on the polished surface or glazed surface and the non-polished or tissue surface of the denture, they stated that there is a significant difference between the concentration of microorganisms on the polished surface and the non-polished or tissue surface of the denture. Table (3-4) showed that there were significant differences between saturated salt solution and distilled water (control). So, its considered effective in disinfection of acrylic denture from C. albicans. (21) There were no significant differences between saturated salt solution and protifix that indicate that this simple, cheap, available natural product has same action as the commercial disinfectant. The effects of a cleanser in vivo are constantly challenged by the daily ingestion of food, which may explain at least part of the variability between in vivo and in vitro study. (22-23)

CONCLUSION
According to the results of this study, saturated salt solution was very efficient for disinfection of C. albicans for the acrylic denture base material.

REFERENCES
16. Barlow AJ, Aldersly t, Challaway FW: Factors present in serum and plasma which promote germ tube formation and