



## Evaluation of the effect of sodium hypochlorite on the transverse strength of acrylic denture base resin

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### Abstract

This study evaluated the transverse strength of polymerized acrylic resin after immersion in sodium hypochlorite (NaOCl) for 20 minute, 3times a day for 15 days. 40 rectangular specimens were prepared from heat polymerized acrylic resin; 20 specimens were immersed in 0.5% NaOCl as experimental group and 20 specimens were immersed in distilled water as control group. The transverse strength was measured using a 3 –point bending test in a universal testing machine. The study showed that there was no statistically significant differences ( $p>0.05$ ) between groups. It may be concluded that immersion in NaOCl solution did not influence the transverse strength of heat polymerized acrylic resin.

### Introduction

The immersion of complete denture in chemical solution should not alter the physical and mechanical properties of the denture base resin<sup>1</sup>. A decrease in transverse strength of denture base acrylic resin can result in greater fracture incidence by impact or occlusal forces<sup>2</sup>.

Sodium hypochlorite (NaOCl) solutions have been used for a long time as denture cleansers and several studies assessed NaOCl as disinfecting agent for dental clinic and laboratories to reduce cross contamination of dentures<sup>3, 4</sup>. Among the several available methods, soaking in sodium hypochlorite (NaOCl) diluted in water has been indicated for complete denture hygiene, this method is effective in reducing candida albicans in patients with denture induced stomatitis<sup>5</sup>. Certain chemical product can alter bulk properties of denture base, immersion in denture cleansers and disinfecting solution may decrease the transverse strength of acrylic resin

<sup>6</sup>. Robinson et al.<sup>7</sup> believed that denture base resin treated with sodium hypochlorite had presented reduced transverse strength in association with whitening, also Devlin<sup>8</sup> believed that using sodium hypochlorite in high concentrations are able to damage the resin. While Oliveira<sup>9</sup> and Pavarina et al.<sup>10</sup> reported that immersion in sodium hypochlorite did not influence the transverse strength of acrylic resin.

The aim of this study was to evaluate the transverse strength of acrylic resin after immersion in 0.5% Sodium hypochlorite for 20minute, 3times a day for 15 days.

### Material and methods

#### Specimens grouping:

Forty specimens were prepared from pink heat-cure acrylic resin denture base for transverse strength test.

Specimens were grouped as following:

**Group 1** contains (20) specimens were immersed in distilled water as control group.

**Group 2** contains (20) specimens were immersed in 0.5% NaOCl as experimental group.

### Specimens Fabrication:

Metal patterns were constructed [65mm x 10mm x (2.5±0.03mm)] length, width, and depth respectively (figure1). According to the ADA specification No.12, 1999. The lower portion of the dental flask was filled with dental stone mixed according to manufacturer instructions (i.e. 31ml/100gm); a layer of stone mix was place on metal block to avoid trapping of air when inserting the metal block into the stone mix after coating with separating media.

After stone was set, both the stone and pattern were coated with separating media. The upper half of the flask was then positioned on top of lower portion and filled with stone. Stone was allowed to harden for 60 minutes before the flask was opened. The metal pattern was invested each time when the samples are to be prepared. The flask was then opened and metal patterns were removed from the mould carefully.

Then the acrylic resin was prepared according to manufacturer instructions then dough was packed in the mould in the conventional method, all specimens were finished and polished. All the tested specimens were conditioned in distilled water at 37°C before they were tested according to ADA specification NO.12 (1999).

### Immersion Procedure:

The specimens were divided into two groups ;( 20) experimental specimens immersed in 0.5 % sodium hypochlorite (NaOCl) solution and the

specimens should be completely covered by solution.

We leave the experimental specimens for about 20 minutes then remove and rinse well under running water before put it into distilled water, the soaking trials were carried out 20 minutes, 3times a day for 15 days<sup>9</sup>.(20)control specimens were stored in distilled water at room temperature, the water being changed at every day.

The transverse strength of specimens was measured by three points bending on an Instron transverse testing machine. The tests were carried with a constant cross head speed of 5mm/minute+1mm/minute, the length was measured by a compression load cell of a maximum capacity of 5kv.

The transverse strength was calculated using the following equation:-

$$S=3PI/2bd^2$$

S= transverse strength (N/mm<sup>2</sup>)

P=the load at fracture (N)

I=distance between supports (mm)

b=width of a specimen (mm)

d=depth of a specimen (mm)

### Result

The descriptive statistics (mean and standard deviation) for transverse strengtof the control and experimental groups used in the present study shown in table(1),and figure (2).

Through the application of T-test between two groups (control and experimental) . It was found that there is a non significant difference between two groups at (P > 0.05) as shown in table (2).

### Discussion

The daily short immersion of the removable prosthesis in commercial bleaching agent is indicated for domestic use, because it is an inexpensive and simple hygiene

method<sup>11</sup>. Sodium hypochlorite is recommended for denture hygiene, it is able to decrease the pathogenicity of microorganisms present on its surface<sup>4</sup>. Sodium hypochlorite can reduce the clinical signs of denture stomatitis<sup>12</sup>.

The result of this study showed that there is no difference in the mean value of transverse strength between the control and experimental groups, and there are observations illustrated that, there is a non significant difference at ( $P>0.05$ ) between groups. This findings comes in agreement with Oliveira<sup>9</sup>, and Pavarina et al.<sup>10</sup> they showed that 0.5% and 1% sodium hypochlorite did not affect the transverse strength of acrylic resin. Finally, it may be concluded that immersion in 0.5 % sodium hypochlorite (NaOCl) for 20 minutes does not influence the transverse strength of polymerized acrylic resin. So that using sodium hypochlorite in low concentration and for short immersion time could be recommended for the patient.

## References

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Table (1): Descriptive statistics for transverse strength of the control and Experimental groups.

Studied groups	No.	Mean	Std. Dev.	Mini.	Maxi.
Control	20	68.16	1.118	66.72	69.22
Experimental	20	67.23	1.067	65.12	68.62
Total	40				

Table (2): T-test for transverse strength of studied groups

Studied groups	No.	t-value	P-value
Control	20	1.108	N.S
Experimental	20		
Total	40		



Figure (1): Acrylic pattern for transverse strength test.

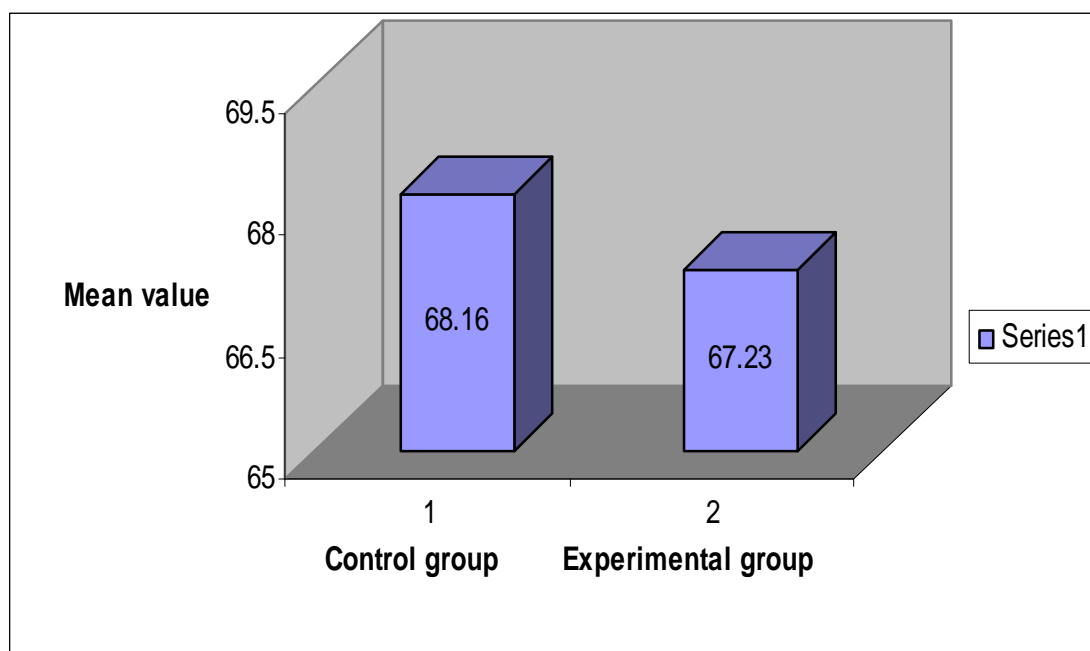


Figure (2): mean values of transverse strength of control and experimental group