

## TO EVALUATE THE EFFECT OF TEA AND ORANGE JUICE ON NANOHYBRID RESIN COMPOSITE

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### ABSTRACT:

**Aim:** To evaluate the effect of Tea and orange juice on Nanohybrid resin composite. **Materials and methods:** 50 specimen of Nanohybrid resin composite were prepared. Before immersion baseline data was evaluated by Vicker's microhardness. Specimen divided into two groups and were immersed in 25 ml for beverage for 5sec and in 25ml of saliva for 5s for 20 times. Specimen were stored in saliva for 24 h. This was repeated for 28 days. After immersion, specimen were evaluated by one way (ANOVA), and Posthoc test: Bonferroni-Holm test.

**Results:** Microhardness significantly decreased after being immersed in the tea and orange juice.

**Conclusion:** The surface of restorative materials depended upon the exposure time and chemical composition of the restorative materials and beverages.

**Keywords:** Nanohybrid composite resin.

### INTRODUCTION:

The newer resin composite i.e. Nanohybrid combines the physical, mechanical and esthetic properties.<sup>[1]</sup> The compressive and diametral strength, and the fracture resistance of the Nanohybrid resin composite is equivalent to or higher than those of other composites (hybrid, microhybrid, and microfilled-resin composite). Particle size distribution of Nanohybrid is 5-100 nm and it incorporates a high volume fraction of filler particles.<sup>[1]</sup> Consumption of tea or orange juice can result in surface damage and decrease hardness, esthetic quality, and properties of resin composite.

During consumption, drink contacts only shortly with the tooth surfaces before it is washed away by saliva. This study was designed to simulate the washing effect of saliva of an individual drinking by cyclic specimen immersion. Therefore, the objectives of this study were to evaluate the effect of Tea and orange juice on Nanohybrid resin composite.

### MATERIALS AND METHODS:

50 specimen of Nanohybrid resin composite were prepared with the customized dimensions of (5mm x 5mm) for surface microhardness profile measurement in metal mould. A

mylarstrip were then placed over the filled mould to provide smooth and flat surface, after which light pressure (20 N) was applied and specimen were polymerized for 40s. Mechanical alteration and preparation of specimens were not performed. The pH and titratable acidity measurements of tea and orange juice was done to measure the free and undissolved hydrogen ion present in beverages.

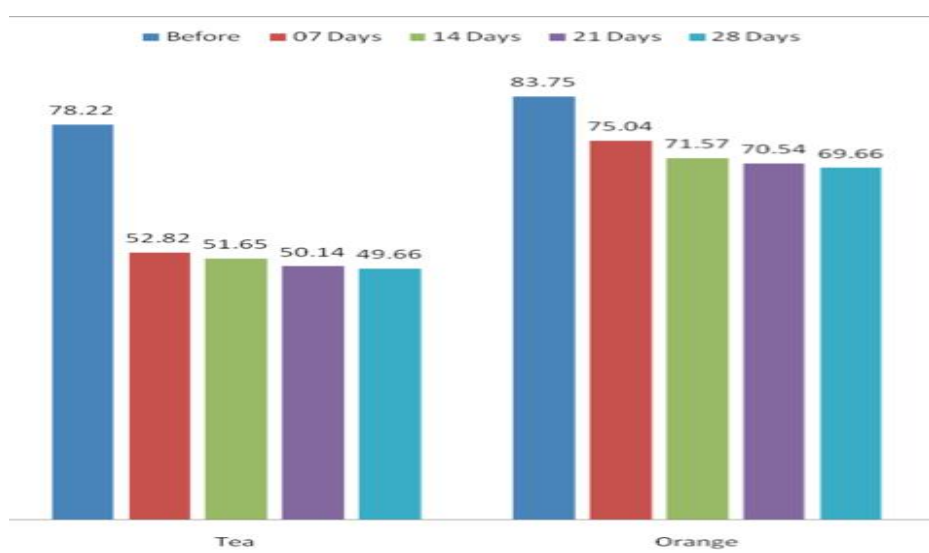
Specimens were divided into 2 groups of 25 each. To obtain a baseline value each specimen was subjected to surface microhardness measurement. The hardness value ( $\text{kg}/\text{mm}^2$ ) of each specimen was determined using a microhardness tester (DVH 3000 operation manual, chroma system) with a diamond Vickers indenter. After that, at room temperature (about  $25^\circ\text{C}$ ), the specimens were alternately immersed in 25 mL of a beverage for 5 seconds and in 25 mL of artificial saliva for 5 seconds for 10 cycles. The same protocol was done for 28 days consecutively. The beverages were refreshed daily in order

to maintain the original pH level. The specimen immersion protocol simulated an individual eating acidic food, sour fruits, and drinks. After the immersion sequence was completed, the specimens were rinsed with deionized water, blotted dry, and subjected to post-immersion surface microhardness testing. The surface hardness test was carried out at the following intervals, before immersion and then subsequently at 7, 14, 21, and 28 days. Gradual changes in surface microhardness were recorded at each time interval.

### RESULTS:

Mean microhardness and standard deviations (SDs) of materials tested immersed in different beverages at different times ( $\text{Kg}/\text{mm}^2$ )

**Result:** The decrease in microhardness was found in both orange juice and tea. Bar chart showing microhardness of materials tested immersed in different beverages at different times ( $\text{Kg}/\text{mm}^2$ )



	Before	07	14	21	28
TEA	82.61 ± 2.36	76.74 ± 4.48	74.18 ± 1.52	72.69 ± 1.46	71.92 ± 0.96
ORANGE	83.75 ± 6.79	75.04 ± 1.65	71.57 ± 4.04	70.54 ± 2.43	69.66 ± 2.22

**Result:**Microhardness values of both groups decreased from the initial week of immersion until the end of the 28 days period and the greatest change in hardness occurred within the first 7 days.

### DISCUSSION:

Both groups decreased its microhardness from the initial week of immersion until the end of the 28 days period and the greatest change in hardness shown occurred within the first 7 days. The specimens were not exposed to any mechanical forces so any observed change in hardness would be from a chemical reaction or dissolution. The decreasing in microhardness can be related to the pH and the titratable acidity of beverages.

Orange juice are composed of citric acid while aerated drink is composed of phosphoric acid and carbonic acid. Phosphoric acid softens materials more than citric acid and carbonic acid. However, citric acid has been shown to be aggressive for dental

hard tissues and resin based restorative materials.<sup>[8]</sup>

This present study also showed that microhardness decreased in tea. Although the pH of tea is nearly 7 and tea is composed of water, and the effect of water uptake can degrade polymer materials.<sup>[6]</sup> When polymer materials absorb water, coupling agents cause hydrolysis and loss of chemical bond between filler particles and the resin matrix. Filler particles dislodge from the outer surface of the material which cause decrease in hardness.<sup>[9]</sup>

### CONCLUSION:

The effect of these beverages on the surface of restorative materials will also depend upon the exposure time and chemical composition of the restorative material and beverages.

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