

***The Effect of Light Curing Tip Distance on the
Curing Depth of Bulk Fill Resin Based
Composites
(In vitro study)***

A thesis

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Abstract

Energy of the light emitted from a light-curing unit decreases drastically when transmitted through resin composite, leading to a gradual decrease in degree of conversion of the resin composite material at increasing distance from the irradiated surface. Decreases in degree of conversion compromise physical properties and increase elution of monomer and thus may lead to premature failure of a restoration or may negatively affect the pulp tissue. The aims of our study are to measure and compare the effect of light curing tip distance (0, 2, 4, 6 and 8 mm) on the depth of cure by measuring vickers microhardness value on two recently launched bulk fill resin based composites Tetric EvoCeram Bulk Fill and Surefil SDR Flow with 4 mm thickness in comparison to Filtek Z250 Universal Restorative with 2 mm thickness. In addition, measure and compare the bottom to top microhardness ratio with different light curing tip distances.

One hundred fifty composite specimens were obtained from two cylindrical plastic molds the first one for bulk fill composites (Tetric EvoCeram Bulk Fill and Surefil SDR Flow) with 4 mm diameter and 4 mm depth, the second one for Filtek Z250 Universal Restorative with 4 mm diameter and 2 mm depth.

Each specimen was light-cured using WOODPECKER LED CURING LIGHT for 20 sec. Polymerization was performed with the light tip positioned in direct contact, 2 mm, 4 mm, 6 mm and 8 mm distant from the top surface of the sample.

After one day of storage in distilled water in a light proof container at 37°C , the hardness on the bottom and top surfaces of each specimen was tested using the Digital Micro Vickers Hardness Tester. Then the Data were analyzed statistically by **ANOVA test, LSD test and t-test.**

All experimental groups show top microhardness higher than bottom microhardness with high significant difference with all light tip distances. At 0 mm light tip distance all groups give the highest microhardness value. Filtek Z250 Universal Restorative shows accepted bottom to top microhardness ratio at all light tip distances. Surefil SDR Flow shows accepted bottom to top ratio only at 0, 2 and 4mm light tip distances while Tetric EvoCeram Bulk Fill shows the bottom to top microhardness ratio less than the accepted value with all light tip distances.

From the results of this study we can conclude that the polymerization of bulk fill composite depends greatly on the distance from light curing tip, Tetric EvoCeram Bulk Fill composite not recommended to be used as bulk fill restoration in deep cavities and need further studies, while Surefil SDR Flow not recommended to be used in deep cavity when curing tip distance (6-8 mm), in addition we can conclude that the thickness of the increments is more important than light curing tip distance.