

# **Evaluation of Shear Bond Strength of Composite Resin Bonded to CO<sub>2</sub> Laser-Treated Dentin with Three Different Adhesive Systems**

**A Thesis**

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# ABSTRACT

Laser-roughened dentin surfaces have been reported to yield uneven surface and open dentin tubules, both apparently ideal to enhance restorative materials bond strength. This in vitro study examined the influence of laser irradiation of dentin with a CO<sub>2</sub> laser on the shear bond strength of composite resin bonded with three adhesive systems and compared these with that of phosphoric acid 37%-etching.

The buccal surfaces of 60 non-carious, intact, extracted upper premolar (Freshly extracted for orthodontic treatment), were grounded with 600 grit silicon carbide paper to expose dentin surface. Then the specimens were randomly divided into two groups: **Group 1**, 30 teeth were treated with CO<sub>2</sub> laser irradiation at energy density 27.07 J/ cm<sup>2</sup>. **Group 2**, 30 teeth were etched with 37% phosphoric acid for 15 seconds. With three different adhesive systems an acetone-base total-etch Prime&Bond NT, an ethanol-base total-etch Excite, and an ethanol-and water-base total-etch Schotchbond 1.

Shear bond strength is determined by using Instron testing machine. Statistical analysis showed that phosphoric acid-etch group yielded shear bond strength values that were significantly higher than those achieved by CO<sub>2</sub> laser at probability < 0.01.

Excite adhesive system has significantly increase in shear bond strength than Schotchbond 1 adhesive system in the group that treated with CO<sub>2</sub> laser, and highly significant in the group that etched with phosphoric acid (37%).

There were no significant differences between Prime&Bond NT and Schotchbond 1. Also there were no significant differences between Prime&Bond NT and Excite for both groups.