Chiang Mai Dental Journal

Original Article

Effect of Silane Coupling Agent on the Shear Bond Strength Between Lithium Disilicate Glass Ceramic and Composite Resin

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Received: October 11, 2020 • Revised: January 14, 2022 • Accepted: March 7, 2022

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Abstract

Objectives: To evaluate the shear bond strength of various concentrations of silane coupling agents between lithium disilicate glass (LDS) ceramic and composite resin.

Methods: Seven groups (n=7) of experimental silane coupling (ESC) agent, including 1%, 3%, 6%, 9%, and 12% (v/v) concentrations, were prepared for silanization and non-silanization (NS) and commercial silane coupling (CSC) agent groups served as controls. The shelf life of ESCs was evaluated at 0, 1, 2, 4, 8, 16, and 32 days after hydrolysis. Shear bond strength test was performed. The mode of failure, fracture surface topography, and elemental analysis were evaluated.

Results: The mean shear bond strength of NS, CSC, and ESC groups in non-thermocycling and thermocycling ranged from 7.3 to 26.3 and 1.8 to 18.2 MPa, respectively. The results were statistically analyzed using Two-way ANOVA, followed by Tukey's multiple comparison test (α=0.05). These results showed that the shear bond strength of the NS group (1.8 MPa) after thermocycling was significantly lower than that of the ESC and CSC groups, while the 6% ESC group (18.2 MPa) showed a higher shear bond strength than the other groups. The mean shear bond strengths after 0, 1, 2, 4, 8, 16, and 32 days of hydrolyzing 6% ESC ranged from 13.7 to 18.2 MPa.

Conclusions: The 6% ESC group had the highest shear bond strength. The shear bond strength decreased significantly after the thermocycling. The shear bond strength of the hydrolyzed silane coupling agent gradually decreased after being hydrolyzed over time after hydrolysis.

Keywords: composite resin, lithium disilicate glass ceramic, shear bond strength, silane coupling agent, silanization