

ORIGINAL RESEARCH

Evaluation of the Influence of Three different Temperatures on Microleakage of Two Self-etch and One Total-etch Adhesives

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ABSTRACT

Aim: To evaluate the bonding temperature effect on dentin-restoration microleakage.

The null hypothesis of the study is that the score of microleakage is identical among different adhesive bondings at different temperatures.

Materials and methods: Ninety caries free maxillary premolars were selected. Class V cavities were prepared on the cemento enamel junction (CEJ) of the buccal sides with enamel margins on occlusal sides and cementum margins on gingival sides. The specimens were divided into 3 groups: G1, single bond adhesive + Z250 composite; G2, P90 adhesive + Filtek Silorane composite; and G3, Clearfil SE bond + Clearfil APX. All groups were divided into three subgroups based on the adhesive temperature: A—4°C; B—25°C; and C—40°C. After coating the specimens with nail polish 1 mm beyond the margin of the restorations, they were stored in 0.5% basic Fuchsin dye solution for 24 hours. The teeth then were buccolingually sectioned and observed under a stereomicroscope.

Results: There was no significant difference between microleakage of occlusal and gingival margins in each group. Clearfil SE bond and Adper single bond displayed lower microleakage than P90 adhesive at 4°C and 25°C. The most and least microleakage score for Adper single bond was at 40°C and 25°C respectively. Clearfil SE bond showed less microleakage at 25°C than 4°C and 40°C.

Conclusion: Clearfil SE bond and Adper single bond displayed less microleakage at 25°C while there was no significant difference among for P90 adhesive microleakage at three temperatures.

Keywords: Adhesive temperature, Microleakage, Silorane composite.

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INTRODUCTION

Intimate contact between composite and dentin is critical for clinical success of composite restoration. Microleakage between tooth and composite causes diffusion of fluids and microorganisms through it, which can lead to restoration failure.¹⁻³

Self-etch adhesives, are classified as two-step and one-step systems. These kinds of adhesives have more complex formulations, and are more users friendly as well.⁴ As the self-etch monomers have less acidity for dissolving dental minerals than phosphoric acid, they leave more minerals attached to dentin collagen fibers which can cause additional chemical adhesion between dentin and adhesive monomers and less microleakage as a result. There are different types of self-etch adhesives according to their pH value: Ultramild (pH ≈ 2.5), mild (pH ≈ 2), intermediary strong (pH ≈ 1.5), and strong (pH ≤ 1).⁵ There was reported that mild self-etch adhesives shows lower nanoleakage than strong ones.⁶

Due to low viscosity, adhesive agents have more wettability and penetration in dental substrate.⁷ The vapor of adhesive solvent depends on temperature.⁸ Increasing the temperature might increase more solvent evaporation and decrease the monomers viscosity.^{9,10} It was reported that low temperature can decrease solvent evaporation. Besides, it increases polymeric material viscosity.⁴

Several studies evaluated resin composite temperature effect on bond strength before using on dental substrate. They showed that prewarming to 55 to 60°C could increase monomer conversion.^{11,12} The effect of temperature on some adhesive agents has been studied as well.^{13,14} Some studies showed higher bond strength of self-etch adhesives was in cold temperature while others reported that the highest bond strength for these adhesives was in heated temperature.^{4,14,15} Since the bond strength value does not necessarily correlate with marginal adaptation and there are not specific results reported for microleakage of adhesives in different temperature, a microleakage study seems to be necessary.¹⁶

Silorane composites are recently introduced for clinical use. Their bonding agent is a two bottle self-etch

