Effects of Pre-conditioning and Delay Light-activation on Bonding of RMGIs
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Objectives: Polymerization of resin-modified glass-ionomers (RMGIs) is mediated through two competing mechanisms: An acid-base reaction and a light-dependent resin polymerization. Pre-conditioning with acid has resulted in an increase in enamel bond strength of some RMGIs. This in vitro study evaluated the effect of pre-conditioning and/or delayed irradiation on bond strength of three RMGIs to enamel. Materials and Methods: In this in vitro study, 144 enamel surfaces of human molars were flattened using consecutively finer abrasives up to 600-grit silicon carbide paper. Each surface was rinsed and gently air-dried (n=12). The RMGIs [Fuji II LC (Improved), GC; Ionolux, Voco; and Vitremer, 3M ESPE] were bonded to enamel surfaces using the following protocols: (1) based on manufacturers’ instructions; (2) pre-conditioning with phosphoric acid for 30 s; (3) 2-min delay irradiation; (4) pre-conditioning with phosphoric acid for 30 s plus 2-min delay irradiation. After 24 h of water storage at 37°C followed by 500 cycles of thermocycling, the samples underwent shear bond strength (SBS) test. Data were analyzed with three-way ANOVA and Tukey HSD test (α =0.05).

Results: There were significant differences between the study groups (p<0.001). Preconditioning with phosphoric acid significantly increased SBS of Fuji II LC; significantly decreased SBS of Vitremer; and had no effect on SBS of Ionolux. Ionolux and Vitremer exhibited decreased SBS after delay in light activation (p<0.05). Two-minute delay in light activation combined with phosphoric acid pre-conditioning increased SBS of Fuji II LC. Conclusions: Within the limitations of the present study, the effects of phosphoric acid pre-conditioning and delay irradiation on SBS of RMGIs to enamel was material-dependent. Clinical Significance: Delay light activation and/or phosphoric acid pre-conditioning may affect the adhesion of RMGIs to enamel and should be considered during restorative treatment.