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The effect of remineralization pre-treatments on the enamel bond strength of demineralized and sound enamel

Farzaneh Shirani

Isfahan University of Medical Sciences, Iran

The purpose of this study was to evaluate the effect of remineralizing pretreatments with casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) or casein phosphopeptide-amorphous calcium fluoride phosphate (CPP-ACFP) on the bond strength between composite resin and sound or demineralized enamel surfaces. One hundred and forty-four enamel surfaces were prepared and randomly divided into 12 groups (G1-G12). Surfaces of G7-12 were demineralized to create a lesion (L), while G1-6 was assigned to the sound (S) enamel group. Three pretreatment protocols were considered during a 10 day pH-cycling period: CPP-ACFP, CPP-ACP, or no pretreatment (for the control groups). A composite rod was bonded to the surfaces using a self-etch or total-etch bonding system. Shear force was applied at a rate of 1 mm/min and the bond strengths of the specimens were calculated. The sound (S) groups (33.81 ± 8.48 MPa) showed a significantly higher bond strength compared to the lesion (L) groups (25.77 ± 6.69 MPa; $P < 0.001$). Among the pretreatments, CPP-ACFP pretreated groups had the highest bond strengths (33.86 ± 8.87 MPa). The mean bond strengths for the self-etch and total-etch bonded specimens were 25.77 ± 6.50 and 33.81 ± 8.62 , respectively ($P < 0.001$). Pretreatment of early caries lesions with CPP-ACFP before a composite restoration not only remineralizes the lesion but also increases the bond strength of the restoration.

fshirani48@yahoo.com