

Effect of Food and Oral Simulating Fluids on Dentin Bond and Composites Strength

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Abstract

The effect of up to 30 days' immersion in 75% ethanol solution and in an artificial saliva (Moi-Stir) on the dentine shear bond strength (SBS) of three adhesive/composite systems (Tenure/Marathon One, Scotchbond Multi-Purpose/Z100 and Optibond/Herculite XRV) was evaluated. Two control series were stored either in 100% humidity or in air. Diametral tensile specimens (DTS) of the composites studied were stored in 75% ethanol for up to 30 days. The fracture mode and morphology of the failure interface were examined by scanning electron microscopy (SEM). Data were analysed using ANOVA and the Tukey LSD test. The SBS for all systems stored in Moi-Stir (24.8 +/- 3.0 MPa) and air (28.3 +/- 3.0 MPa) was not influenced by length of storage. Microscopic (SEM) examination of the debonded air, and Moi-Stir stored specimens showed that failure had primarily occurred through the dentine. Significant decreases (30-50%) in the SBS of all systems occurred after immersion in 75% ethanol. There was no significant difference among brands. The DTS of the composites showed significant decreases as a function of ethanol exposure. Marathon One and Herculite XRV showed significantly lower DTS after 14 days' storage while Z100 showed no reduction in DTS until after 30 days. The decrease in both SBS and DTS after storage in ethanol was a function of the square root of time ($P < 0.001$) and followed Fick's laws of diffusion. Ethanol diffusivity was approximated as $1.8 \times 10^{-6} \text{ cm}^2 \text{ s}^{-1}$ for both SBS and DTS specimens, suggesting that alcohol attack in SBS specimens occurred primarily in the composite system. (ABSTRACT TRUNCATED AT 250 WORDS)