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Influence of the Addition of Zinc on Physicochemical Properties of a Dental Adhesive

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A previous study reported that incorporation of zinc into an etch-and-rinse dental adhesive has demonstrated to exert a protective effect on matrix metalloproteinases-mediated collagen degradation, thereby becoming a promising novel strategy for stabilization of resin-dentin bonds. **Objectives:** To evaluate the influence of addition of zinc into a dental adhesive (Adper Single Bond Plus [SB] – 3M ESPE) in terms of water sorption (WS), solubility (SO), ultimate tensile strength (UTS) and modulus of elasticity (E). **Methods**: Six groups were prepared: 1) SB; 2) SB + $ZnCl_2$ (1 wt%); 3) SB + $ZnCl_2$ (2 wt%); 4) SB + ZnO (5 wt%); 5) SB + ZnO (10 wt%) and; 6) SB + ZnO (20 wt%). Ten polymerized disk-shaped and ten dumbbell-shaped specimens for each group were prepared. Disks were immersed in water for 7 days and WS and SO were measured using a modification of the ISO 4049 standard. The dumbbell-shaped specimens were used to obtain the E by three-point flexural bending test and the UTS by microtensile test. Data were analyzed by ANOVA and Bonferroni test (α=0.05). **Results**: Same letters in columns indicate no significant differences.

Adhesive blends	**WS (µg/mm³)**	**SO (µg/mm³)**	**E (GPa)**	**UTS (MPa)**
SB	256.5 (13.7)^{c}	84.5 (11.0)^{a}	1.82 (0.48)^{a}	20.7 (5.5)^{a}
+$ZnCl_2$(1%)	279.3 (14.3)^{d}	116.4 (9.1)^{b}	2.59 (0.32)^{b}	16.6 (5.8)^{a}
+$ZnCl_2$(2%)	280.3 (7.3)^{d}	142.3 (5.0)^{c}	2.70 (0.35)^{b}	22.7 (3.0)^{a}
+ZnO (5%)	250.6 (13.9)^{bc}	84.2 (4.3)^{a}	2.49 (0.57)^{ab}	17.5 (7.3)^{a}
+ZnO (10%)	227.3 (16.5)^{ab}	77.5 (7.2)^{a}	2.42 (0.43)^{ab}	18.7 (7.6)^{a}
+ZnO (20%)	213.1 (11.4)^{a}	73.9 (7.2)^{a}	2.26 (0.29)^{ab}	23.9 (7.7)^{a}

Conclusion: Addition of zinc into a dental adhesive altered WS, SO and E values.

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