CLBA2012
8 e 9 de novembro
Rio de Janeiro, Brasil
Associação Brasileira de Adesão e Adesivos - ABAA
Associação Portuguesa de Adesão e Adesivos - APAA
http://clba.cefet-rj.br

Bond performance and viscosity of composites with different filler content

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Objectives: The aim of this study was to evaluate the effect of glass and silica filler content on the push-out bond strength to dentin and film thickness of experimental composites cured with polywave and single-peak LEDs and how this can interfere in adhesive interface. Methods: Experimental composites containing BisGMA, BisEMA, UDMA and TEGDMA as organic matrix were manipulated, with the camphorquinone/amine system as the initiator. For the inorganic filler, four different composites were investigated: only Br-Al-Si glass fillers (C1), Br-Al-Si glass/SiO2 90:10 (C2), Br-Al-Si glass/SiO2 80:20 (C3) and Br-Al-Si glass/SiO2 70:30 (C4). The viscosity evaluation was done by film thickness of the non-polymerized experimental composites between glass plates (n=4) [1]. For the push-out bond strength, cavities were made on the buccal surface of bovine teeth (n=10) [2]. After that, teeth were restored with each one of the experimental composites (C1-C4) and photocured by LEDs (Bluephase G2 – polywave or Radii - Cal – single-peak). The energy dose was standardized at 36 J. After 24 hours, specimens were tested using the Inston machine. Data were submitted to ANOVA and Tukey tests (α=0.05). Results: the polywave and single-peak LEDs showed no difference for the bond strength values. However, C4 presented the higher bond strength values compared to C1 and C2 ($p \leq 0.001$). The C3 composite showed similar bond strength results compared to C4, C1 and C2. The film thickness showed statistical differences in the decreasing way C4 > C3 > C2 > C1. Conclusions: The LED curing units did not influence the bond strength of the experimental composites. The higher the content of colloidal silica, higher the viscosity of the resin composite and push-out bond strength values. The characteristics of the composites appear to be directly linked to maintaining the adhesive interface.

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