

Effect of heat sources on the mechanical properties of GICs

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Objectives: To compare: 1) the output temperature of two LED light-curing devices with an average intensity of 1400mW/cm^2 along 60 seconds; 2) the biaxial flexural strength (BFS) of three glass-ionomer-based restorative cements, treated with the two heat sources at 10, 30 and 60 seconds and; 3) the effect of time of light-curing on the BFS of the tested cements. **Methods:** Output temperature of ECCO-light (SD Dental, Córdoba, Argentina) and GCP-CarboLed (GCP Dental, Vianen, The Netherlands) was measured five times for each curing unit every ten seconds during a one minute period, using a thermometer filled with red colored ethanol (LED Lamp Test kit, GCP Dental, Eimshorn, Germany). Twenty disc-shaped samples ($2.1(\pm 0.5)\text{mm}$ thick, $13(\pm 0.5)\text{mm}$ diameter) of Equia-Fil (GC Tokio, Japan), Chemfil Rock (Dentsply/De Trey, Konstanz, Germany) and Glass Carbomer-Fil (GCP Dental, Vianen, The Netherlands) were prepared for each treatment group: 1) auto curing (control); 2, 3 and 4) heat-cured with ECCO-Light 10", 30" and 30"; 5, 6 and 7) heat-cured with CarboLed 10", 30" and 60" respectively, starting immediately after each disc was filled. BFS test was performed with a Universal Testing Machine (Digimes MX5000) at a crosshead speed of 1mm/min , loading the specimens centrally with a 4mm diameter ball-indenter. Chi-square, ANOVA and Bonferroni correction were used for comparing output temperatures and the BFS of the three cements by time of exposure ($\alpha=0.05$). **Results:** At all exposure times, output temperature of CarboLed was statistically significantly higher than those of ECCO-Light ($p=0.05$; Bonferroni). The output temperature for CarboLed at 10" was about equal to that of ECCO-Light at 30". Significant higher BFS values in all three cements were obtained when heated for more than 30" both using CarboLed and ECCO-Light. Highest mean values were: Glass Carbomer-Fil heated with CarboLed either for 30" or 60" (85.4 and 86.1MPa) and with ECCO-Light for 60" (84.9MPa); Equia-Fil heated with CarboLed for 60" (85.2MPa) and Chemfil Rock heated for 30" and 60" with the two units (between 77.5 and 80.7MPa). **Conclusions:** CarboLed generates more heat than ECCO-Light although both curing units produce an increase of BFS on glass-ionomer-based materials after 30" of exposure to the source.