VISCOELASTIC CREEP BEHAVIOUR OF A THERMO-VISCOUS RESIN-COMPOSITE

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Objectives. To investigate the effects of material composition and storage condition on compressive creep deformation and recovery of different resin-based composites (RBCs) and to determine the effect of pre-heating time on compressive creep behaviour of *Viscalor*.

Methods. A creep apparatus was used to measure creep deformation and recovery of RBCs. *Viscalor* was pre-heated using a Caps Warmer (VOCO, Germany) in T3 mode (at 68 °C) for 30 s (T3-30s) and 3 min (T3-3min), respectively. The measurement was made under a constant compressive stress of 20 MPa for 2 h and an additional 2 h after removing the load to permit creep recovery. Cylindrical specimens of each material were prepared for measuring at 5 min post-cure (n=3) and after 7 days of storage in tap water at 37 °C (n=3). The maximum strain, permanent set and percentage creep recovery were recorded. Data were analysed using one-way ANOVA, two-way ANOVA, independent T-test and Tukey *post-hoc* tests ($p<0.05$).

Results. There was a significant interaction between the effects of material type and storage condition ($p<0.001$). The maximum strain, permanent set and percentage recovery of studied RBCs were significantly different under two storage conditions ($p<0.001$). 7 days of water storage only significantly reduced the maximum strain of *Viscalor* (no heat, T3-30s and T3-3min) ($p<0.005$). The permanent set significantly decreased ($p<0.05$) after 7 days of water storage, whereas the percentage creep recovery significantly increased ($p<0.01$). There were strong correlations between filler content (wt.%) and the measured creep parameters after 7 days of water storage. Different pre-heating times had no significant influences on *Viscalor* creep behaviours ($p>0.05$).

Significance. The creep behaviour varied with composites. 7 days of water storage beneficially reduced elastic deformation and enhanced the percentage creep recovery of all tested RBCs. Pre-heating had no adverse influence on the viscoelastic stability of *Viscalor*.