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Staining-dependent translucency of 3D-Printed Temporary Resins

Objectives: To compare the translucency parameter (TP) of five 3D-printed temporary resins exposed to staining.

Methods: Disc-shaped specimens, 10 mm in diameter and 2 mm thick, were manufactured using five 3D-printable temporary resins: Asiga DentaTooth (AD), Dentona Optiprint Lumina (DO), Pro3dure Printodent (PP), Bego VarseoSmile Temp (BV), and GC Temp Print (GC). The specimens were printed using a 3D-printer (ASIGA MAX UV) following manufacturers' instructions for printing and post-print processing. Specimens were finished using silicon carbide abrasive papers #240, #320, and #600 for 10 seconds each (EcoMet 6 grinder-polisher under water cooling) and polished using PoGo disks for 40 seconds. TP measurements were performed before and after exposure to 3.8-day staining (equivalent to a year of service with 15-minute exposure per day) in coffee (C), red wine (W), black Tea (T), Dr. Pepper (P) and distilled water (D, control) using a benchtop spectrophotometer. The CIEDE2000 translucency differences (ΔTP_{00}) were calculated. A two-way ANOVA was used to compare the effect of material and staining solutions, while a Tukey's post-hoc multiple comparison test was used to assess differences among levels within each variable ($\alpha=0.05$).

Results: CIEDE2000 mean (sd) Translucency Parameter Change (ΔTP_{00}) of 3D-printed temporary resins after staining in different solutions.

Materials	C	W	T	P	D
AD	1.1(0.3)	1.3(0.5)	1.1(0.5)	-0.4(0.6)	0.0(0.3)
DO	0.1(0.2)	0.3(0.3)	-0.1(0.3)	-1.2(0.3)	-1.1(0.2)
PP	2.1(0.8)	2.9(2.3)	1.6(0.3)	0.4(0.4)	0.4(0.2)
BV	1.8(0.3)	2.2(1.9)	1.0(0.3)	-0.1(0.5)	0.2(0.6)
GC	0.4(0.4)	0.7(0.4)	0.3(0.3)	-0.2(0.2)	-0.1(0.3)

Statistically significant effects of the material and staining solution were recorded ($p<0.001$), with no significant interaction effect between the variables ($p>0.05$).

Conclusion: Translucency parameter changes upon staining of 3D-printed temporary resins were material- and staining solution-dependent.