Evaluation of the Surface Structure of a Newly Developed Flowable Resin Composite: Influence of Acidic and Alcoholic Drinks

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Abstract: The purpose of this study was to evaluate a newly developed, higher filler content, non-fluoride-containing flowable resin composite UniFil MI Flow (GC), in terms of surface morphology and roughness after immersion in orange juice, wine and whisky. The tested products were UniFil MI Flow (MIF), Estelite Flow Quick (EFQ, Tokuyama Dental), Clearfil Majesty LV (MJLV, Kuraray Medical), UniFil LoFlo Plus (ULP, GC) and Clearfil Majesty (MJP, Kuraray Medical). Specimens were shaped into a disk form with a diameter of 10 mm and thickness of 1 mm (20 disks per material). All specimen surfaces were ground to 1200 grit and kept in deionized water for 24 hours at 37°C. Specimen surfaces at this stage of the experiment were regarded as standard specimen surfaces. The specimens were then immersed in orange juice, wine and whisky for 14 days, and the surface morphology was observed with a scanning electron microscope (SEM). The surface roughness profiles of each specimen were also taken using a confocal laser scanning microscope.

SEM analysis of standard specimens showed a smooth surface in all of the test materials. After exposure to the drinks, the surface profile of MIF was similar to that of the standard specimen, although immersion in whisky caused a slight degree of erosion. On the other hand, ULP exhibited obvious structural defects characterized by the presence of voids suggestive of filler detachment. EQF and MJLV showed a slight degree of erosion and void formation. Significant differences of the surface roughness (Ra) were detected between MIF and ULP that were immersed in the drinks (p<0.05).

It is concluded that, in comparison with ULP, MIF shows improved resistance to surface degradation after exposure to acidic and alcoholic drinks.

Key words: Flowable resin, Surface degradation, Drinks