Surface Topography and Color Changes of Recent Glass Ceramics After Acidic Media Exposure

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Abstract

Objective: To investigate the changes induced by two acidic beverages on the surface topography and color stability of two widely used computer-aided design/computer-aided manufacturing (CAD/CAM) ceramic materials.

Materials and Methods: Sixty samples of two CAD/CAM ceramic materials, lithium disilicate (IPS e-max CAD) and zirconia-reinforced lithium silicate (Vita Suprinity), were fabricated in accordance with the manufacturer's specifications.

The samples were submerged in one of three media (fake saliva, orange juice, and H3PO4-containing carbonated beverage) and thereafter incubated at 37 °C for 24 hours.

The surface roughness (Ra) of the samples was evaluated using a profilometer before and after immersion in various media, while color characteristics were quantified using the VITA Easyshade Advance 4.01. Surface topography was examined utilizing a scanning electron microscope (SEM), and the surface mineral composition was analyzed pre- and post-immersion.

The results were analyzed using paired sample t-test to determine the change in Ra before and after immersion. The effect of materials and immersion media on the mean ΔRa and mean ΔE was analyzed using tTwo-way analysis of variance. Tukey's honest significant difference posthoc test was used for multiple comparisons at a level of significance (α<0.05).

Results: immersion in the two investigated acidic media resulted in a significant increase in Ra and a decrease in the color stability of the two ceramic materials compared to artificial saliva. SEM and energy-dispersive X-ray results showed changes in the matrix of the ceramic material and the exposure of silicate crystals.

Conclusion: The pH of different acidic media affects the surface topography and color stability of glass ceramics.