Dynamic Ultra-micro Hardness Evaluation of the Surface Deterioration of Resin Composite in Mouthrinse

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Abstract: The effects of mouthrinse on the surface properties of resin matrix in a light-curing resin composite, immersed in several types of mouthrinse, were investigated by dynamic hardness measurement. A Bis-GMA-based resin composite Z250, an alcohol-containing mouthrinse Listerine® and a non-alcohol mouthrinse Orā² were used in this study. As a reference for the mouthrinses, distilled water and 20% ethanol were used. Disk-shaped specimens cured by irradiation of visible light were immersed in either mouthrinses or reference solutions. Then the dynamic hardness, Knoop hardness, elastic modulus, as well as plastic deformation and elastic deformation, were measured using a dynamic ultra-micro hardness tester. The immersion conditions were set as follows: 1) six cycles of 30 sec immersion at 6 hr intervals, 2) six cycles of 10 min immersion at 6 hr intervals, and 3) consecutive 60 min immersion.

The dynamic hardness and elastic modulus of the specimens immersed in either Listerine® or 20% ethanol were significantly decreased, regardless of the immersion conditions, compared to the immersion in water. The immersion in Orā² caused no significant change in the surface properties. These results suggested that the deterioration of the resin surface was caused by the action of ethanol as a component, and that daily use of ethanol-containing mouthrinses could soften the surface of the resin, lower its frictional resistance and accelerate the deterioration of the resin composite surface.

Key words: Light-curing resin composite, Mouthrinse, Dynamic hardness, Surface deterioration