

The influence of the degree of saturation of acidulated buffer solutions in dentin demineralization

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I. Objectives

Recently root caries is reported as an increasing oral disease. Many researchers studied in vivo and in vitro enamel lesions but due to its particular structure and different chemical composition compared to the enamel, little effort has been made to root caries study.

The purpose of this study is to compare and to evaluate the effects of the degree of saturation on the progression of artificial root caries lesion.

II. Materials and Methods

A total of 8 human premolars without any defects and cracks were selected and were removed cementum and were cleaned with ultrasonic device and pumice without fluoride.

Each tooth was sectioned into 6 pieces and they were ground with #800 sandpaper until they had a thickness of 200 μm . Specimens were applied with nail varnish except for the 2-3mm window area before application of bonding agent. Under the constant pH, the specimens were divided into 6 groups (degree of saturation; 0.1415, 0.1503, 0.1597, 0.1676, 0.1771, 0.1977). Each group was immersed in acid buffer solution for 1,2,3,5 days under controlled temperature (25 $^{\circ}\text{C}$) and were imbibed in water and examined using the polarizing microscope.

III. Results

1. The body of the lesion in the dentin showed higher degree of positive birefringence compared to sound dentin.
2. Although the degree of saturation of demineralization solution decreased, the depth of mineral loss in the dentin was constant.
3. As the degree of saturation in the acid buffer solution decreased, the reaction was faster.
4. As the degree of saturation of demineralization solution decreased, the zone of band in the dentin, dentinal tubule got clear.
5. In all groups, the lesion progressed rapidly at the initiation of the experiment, but increased gradually as time elapsed.

IV. Conclusions

As the degree of saturation in the acid buffer solution decreased, the depth of mineral loss in the dentin was constant, but the reaction was faster.