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Treatment of Demineralized Dental Enamel with Sesame Seeds

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Natural products have been used for medicinal purposes for years [1]. There is a growing interest in dental research to study the effect of plant derivatives on tooth enamel, both to avoid dissolution and to promote its remineralization. Studies performed using a grape seed extract on artificial enamel caries have shown the remineralizing effect of some organic compounds contained in the seed [2]. Sesame seed is highly valued for its nutritional properties [3] however; there is insufficient information on the effect of its components on the demineralized dental enamel. Therefore, the objective of the work was the mechanical, morphological and topographic characterization of the dental enamel treated with a sesame solution, applying a cyclized regime, using artificial saliva as a conservation medium.

Permanent teeth obtained with the patient's informed consent were used. Samples were prepared by sectioning each crown in two halves in a longitudinal direction by high-speed rotary instruments and thin cylindrical diamond stone. Thirty-six samples were distributed in three experimental groups: water (A), saliva (S) and sesame (SE) in such a way that each group contained a sample treatment and its respective healthy half (AS, SS and SES). An erosion injury created by immersing the enamel 90 min in a soft beverage. Sections of demineralized enamel immersed in a sesame solution for 3 minutes, 4 times a day, 5 days, at room temperature and stored in artificial saliva between cycles. The control group kept in artificial saliva for the same period. After treatment, samples were included in polymer and grounded in a longitudinal plane. Micro hardness tests performed and the percentage of mineral loss was determined. Furthermore, two halves of the same dental crown without inclusion, one cyclized sesame sample and other saliva control analyzed by AFM. These same samples observed by SEM after treatment.

The hardness of the sesame samples (SE) was greater in relation to groups water (A) and saliva (S) (Fig. 1 A). No significant difference ($p > 0.05$) was found between samples A and S. The micro hardness of the healthy samples of all groups showed no difference. A lower percent loss of Vickers hardness in sesame treatment (22.7%) was recorded in relation to the treated with water (25.5%) and with artificial saliva (25.1%). At SEM, the deposit of an irregular material on the surface of the eroded enamel that occluded the pores created by the mineral loss was observed (Fig. 1 B). The organic component of the artificial saliva used created a thin adherent surface layer (Fig. 1 C). At AFM, in 20-µm area, roughness Rq (nm) decreased from 316.75 in the eroded enamel to 97.95 in the sesame treated enamel while in artificial saliva treated enamel, the roughness decreased from 206.25 to 185.75 (Fig. 2). Roughness of sound enamel was 70.87 nm (saliva sample) and 19.65 nm (sesame sample) but roughness of demineralized enamel in sesame sample was higher than saliva.

We conclude that eroded enamel surface exposed to the germinated sesame solution, showed a hardening greater than that produced by artificial saliva. However, as expressed by other authors, the hardness values of sound enamel not restored. The sesame solution produces mechanical, morphological and topographical modifications in the eroded enamel microstructure [4].

References

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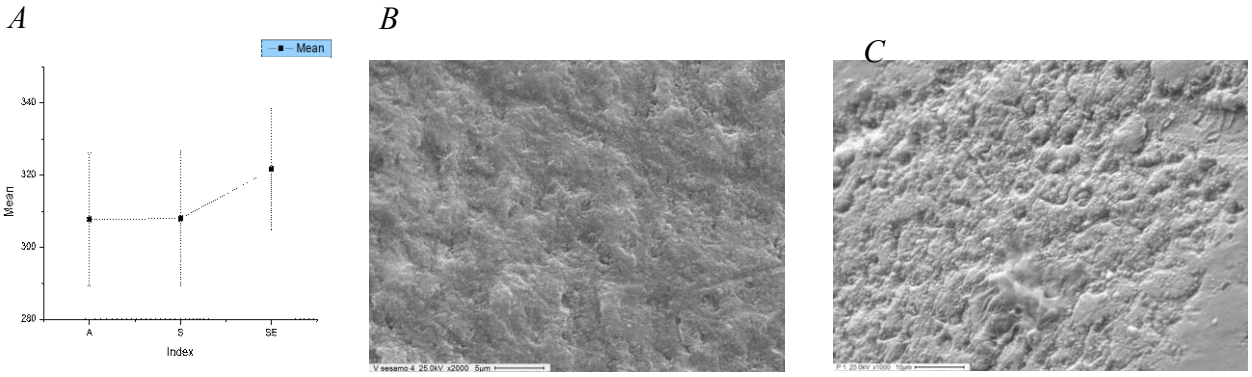

Figure 1. *A*: Mean micro hardness and standard deviation of the different treated groups; A: water; S: artificial saliva; SE: sesame. *B:* Micrograph of enamel eroded treated with sesame (SEM x 2000) and *C:* artificial saliva treatment (SEM x 1000).

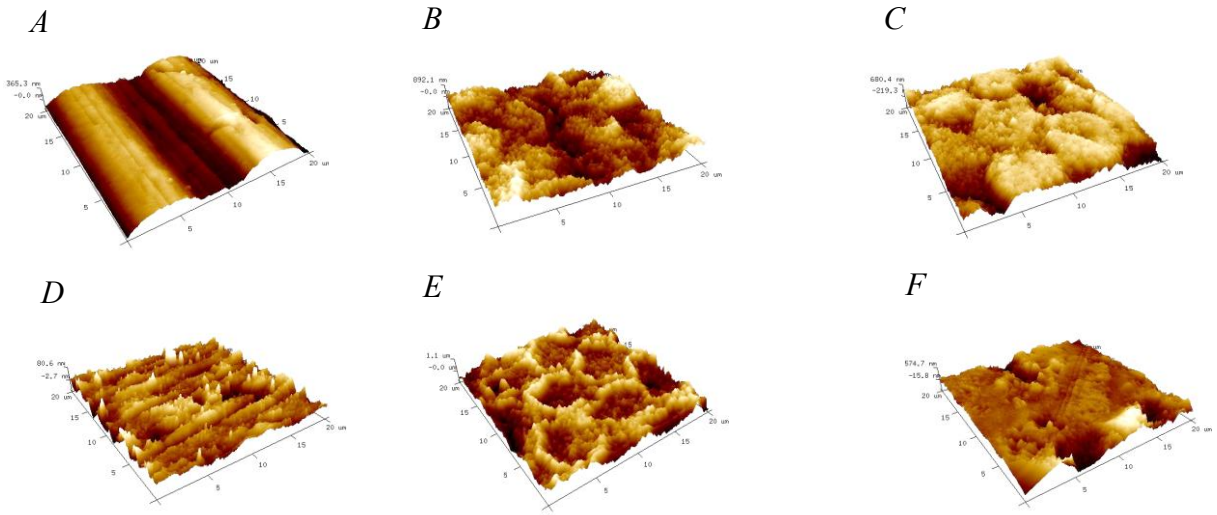

Figure 2. 3D-AFM image of eroded enamel surface in 20-µm area. *A, B* y *C*: artificial saliva. *D, E* y *F*: sesame. *A* y *D:* sound enamel. *B* y *E:* demineralized enamel. *C* y *F:* treatment.