

Evaluation of the remineralization potential of non-fluoridated remineralizing pastes using scanning electron microscope with energy dispersive X-ray analysis: A randomized controlled in-vitro trial

ABSTRACT

Aim

The purpose of this study was to analyze the remineralization potential of experimental nano hydroxyapatite (nHAP) paste on artificial caries lesions using scanning electron microscope (SEM) with energy dispersive X-ray analysis (EDX).

Methodology

A total of 65 enamel specimens were randomly divided into 4 test groups (n=15) and a control group (n=5); Group I - Aclaim[®]; Group II - 1% experimental nHAP paste; Group III - 10% experimental nHAP paste; Group IV – casein phosphopeptide amorphous calcium phosphate (CPP ACP) paste; Group V – control (no treatment). Baseline quantitative measurement of mineral contents (calcium and phosphorus weight percentage) in enamel specimens were done by EDX analysis. Artificial carious lesion was induced in all the enamel specimens, according to the demineralization regimen by Tencate and Duijsters. All the enamel specimens were evaluated for loss in mineral content using EDX analysis. The specimens in Groups I, II, III and IV were treated with respective paste twice daily for 14 days. Specimens were rubbed with respective paste with the help of a cotton applicator for 3 minutes, washed with deionized water and then placed in artificial saliva and maintained at ambient temperature. In the control group, specimens were only washed once with deionized water and placed in artificial saliva. After the remineralization cycle, all the enamel specimens were again subjected to EDX

analysis to evaluate the change in mineral content. The data were collected and subjected to statistical analysis. SEM analysis was done for Group III, IV and control group to analyze the surface topographical changes after remineralization.

Results

All the test groups showed significant change in calcium and phosphorus weight percentage after remineralization. 10% nHAP showed higher mean value of calcium and phosphorus weight percentage followed by Aclaim[®], 1% nHAP and CPP ACP. Both 10% nHAP and CPP ACP showed favorable surface changes in enamel after remineralization in SEM analysis.

Conclusion

Commercially available and experimental nHAP have the potential to remineralize artificially induced carious lesions.

Keywords

Remineralizing agents, Nano hydroxyapatite, CPP ACP, SEM EDX analysis