THE EFFECT OF LASER HARDENING AND EMBEDDING NANOPARTICLES ON TOOTH RESISTANCE AGAINST CARIES

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ABSTRACT

Tooth caries begin when acids formed by bacteria in the plaque penetrate the dentin and dissolve its minerals. Lasers illumination can improve dental enamel properties against demineralization. Tooth resistance to mineral loss can be improved by combining the effect of laser with re-mineralizing nanoparticles. Thirty two extracted teeth in good dental health were used in this study. Q-switched Nd: YAG laser was utilized to illuminate the sectioned teeth samples; immersed in nano-colloidal silver solution. Each sample was treated by the same laser energy fluence but with different number of laser pulses. Vickers Micro-hardness tester, Atomic Force Microscope AFM, scanning electron microscope SEM, and Energy dispersive X-ray spectrometer were employed to characterize the treated samples. The samples treated with laser alone showed moderate increased hardness, but a higher hardness value was demonstrated when treated with combined laser and silver-nanoparticles. The treated samples revealed significant changes in the topography and granularity distribution; with a notable increase in enamel surface roughness due to laser induced-crystallographic changes. The enamel grain size and structure showed significant changes after treatment. The demineralized samples of the laser treated samples demonstrated higher Ca/P ratios than the demineralized control samples; which meant better acid resistance.


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