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Investigation of the antibacterial effect of laser irradiation and chemical agent on human oral biofilms contaminated titanium discs

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Introduction: A main challenge in treatment of peri-implant disease is the effective decontamination of the implant surface. This challenge has always been a problem, associated with the treatment of these diseases with regard to the difficulty in removing and eliminating bacterial biofilm from the surface of dental implants, especially rough surfaces.

Aim: The aim of this in-vivo study was to evaluate the effect of five different antimicrobial methods in reducing bacteria adhering to titanium surfaces.

Materials & Methods: In the present in-vivo study, the contaminated discs, except for the negative control group, randomly under went one of five treatments: Erbium:Yttrium Aluminum Garnet (Er-YAG) laser; plastic curette; 0.12% chlorhexidine; a PDT; and 810 nm diode laser. A spectrophotometer was used to measure optical density (OD) in case of aerobic microorganisms. Colony forming units (CFUs) were used for an aerobic bacteria. Then, all the analyses were carried out at a significance level of $\alpha=0.05$ through SPSS software. One-way analysis of variance (ANOVA) of aerobic bacteria showed a significant difference among six groups in terms of OD variations during a 0-24 h time interval ($P<0.001$).

Results: The results of Kruskal-Wallis test were used to investigate the effect of study methods on anaerobic bacteria after 48 h, and the results showed a significant difference among six groups in terms of CFUs ($P<0.001$). The results of the present study showed that all five mechanicals (plastic curette), chemical (CHX), laser (810 nm diode and Er:YAG), and a PDT methods could reduce oral biofilms from roughed surfaces of titanium discs. Er:YAG laser and plastic curette had the highest and the lowest effects respectively.