

15823 POSTER DISPLAY BASIC RESEARCH

Antimicrobial photodynamic therapy and light-activated disinfection efficacy in decontaminating titanium implant surfaces- In vitro study

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Background: As dental implants are becoming a common dental treatment option, there is also an increase in the frequency of peri-implantitis. The main cause of peri-implantitis is considered to be the microorganisms living on the implant surface. The goal of treating peri-implantitis is to stop the inflammatory process and the bone loss that occurred as a result of the disease.

Aim/Hypothesis: The aim of this study was to evaluate and compare the effect of antimicrobial photodynamic therapy and light-activated disinfection on contaminated titanium dental implants. In addition Scanning Electron Microscopy analysis was done to evaluate possible surface alterations on the implant surfaces.

Material and Methods: The study was conducted on 72 titanium dental implants contaminated with a bacterial suspension prepared from three different bacterial species and were incubated in anaerobic conditions for 72 hours. The implants were randomly divided into four experimental groups and two control groups ($n = 12$ each), according to the following treatment protocols- Group 1 (PDT1)- PDT with toluidine blue; Group 2 (PDT2)- PDT with phenothiazine chloride dye; Group 3 (LAD)- light emitting diode (LED) with toluidine blue; Group 4 (TB)- treatment with only toluidine blue. In the positive control (PC) group, the implants were treated with a 0.2% chlorhexidine-based solution, and in the negative control (NC) group, no treatment was used. After microbiologic analysis, one random implant was chosen from each of the treatment groups, and one sterile nontreated implant was chosen for scanning electron microscopy (SEM).

Results: The highest bacterial reduction was recorded in the PDT1 (98.3%) and PDT2 (97.8%) groups both having statistically significant reduction compared to NC group (<0.05). LAD was less effective than PDT1 and PDT2, without statistically significant difference compared with NC or any other treatment group. TB was the least effective treatment in terms of both the total bacterial count and the individual count for each bacterial species. There were no surface alterations after the use of PDT or LAD on the implant surfaces.

Conclusion and Clinical Implications: Antimicrobial photodynamic therapy can be a successful alternative option for decontaminating titanium dental implants. An effective treatment protocol for decontaminating implant surfaces should be established and the potential use of PDT and LAD should be further investigated in clinical studies.

