Comparative Study of Antimicrobial Photodynamic Therapy (aPDT) with and without Sodium Dodecyl Sulfate (SDS) for Biofilm Inactivation of Aggregatibacter actinomycetemcomitans

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Aggregatibacter actinomycetemcomitans is a facultative anaerobic Gram-negative bacterium that is associated with periodontal disease. As an adjunct intervention to mechanical periodontal treatment, antimicrobial photodynamic therapy (aPDT) aims to produce reactive oxygen species to decrease microbial infection. It has been shown that sodium dodecyl sulfate (SDS) can improve aPDT results by increasing the formation of methylene blue (MB) monomers. The aim of this study is to compare the behavior of aPDT mediated by methylene blue in phosphate buffered solution (PBS) and with sodium dodecyl sulfate (SDS) in bacterial killing of A. actinomycetemcomitans. The biofilm will be grown on bovine dental samples and aPDT will be performed on them. Microbiological evaluation, scanning electron microscopy, and verification of the formation of reactive oxygen species will be carried out.

For this, 2 groups will be created: PBS Group and SDS Group; and 6 subgroups: Control (not treated with laser or photosensitizer); FS (exposure to MB 100 μM photosensitizer for 1 min); Laser, irradiated for 5 min in the absence of FS; and three aPDT subgroups, with three exposure times of 1, 3 and 5 min of irradiation. A laser (Photon Lase III, DMC, São Carlos, Brazil) with a wavelength of 660 nm, output power of 0.1 W, well irradiation of 250 mW/cm2, energy of 6, 18 and 30 J will be used. corresponding to the time of 60, 180 and 300s and radiant exposure of 15, 45, 75 J/cm2. Subsequently, microaerophiles will be cultured, counted and converted into colony forming units per mL for analysis and comparison.

Keywords: Photodynamic antimicrobial chemotherapy (PACT), methylene blue, surfactant vehicle, *A. actinomycetemcomitans*, sodium dodecyl sulfate.

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