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Photobiomodulation with LED Does Not Alter Antibiotic Sensitivity in ATCC and Burn-Patient Bacteria

ABSTRACT

Photobiomodulation (FBM) has been used in different specialties in the health field, with an emphasis on the interaction of light with microbiology in recent years. Represented by Laser and LED (Light Emitting Diode), research in the context of inhibiting bacterial growth has been explored, since they are bacterial species that commonly colonize the skin, and can generate occurrences. For the treatment of infections, the therapeutic use of antibiotics is recommended, which, over the years, has made the population resistant to many of them. On the other hand, the use of FBM in the treatment of skin lesions has increased, and little is investigated about the effects on the interaction of FBM by LED with the use of antibiotics in bacterial cultures. Thus, this study aims to verify bacterial inhibition and the profile of sensitivity to antibiotics with the use of LEDs at different wavelengths (465 and 630 nm) and doses (30, 40 and 50 J/cm²) in *Staphylococcus aureus* and *Pseudomonas aeruginosa*, ATCC type and bacteria collected from burn patients. 300 µl of saline with bacterial suspension in concentrations between 0.5-0.63 were irradiated with LEDs using the McFarland scale, after five serial dilutions, and distributed in transparent flat-bottomed microtubes. Before and after irradiation, pH and temperature variables were controlled. The cultures were placed in an oven at 37°C for 24 hours for later counting of colony forming units (CFU). To check the sensitivity profile, a qualitative method (Disc diffusion) were adopted. To quantify oxidative stress, assessments were performed using Malondialdehyde (MDA) and antioxidant action using glutathione (GSH). All data were discovered using the Shapiro-Wilk normality test and comparisons between groups using the single-factor ANOVA test, with Tukey's post hoc with a 95% confidence interval. Differences between the irradiated groups were found, however, without statistical significance or representing a change in the sensitivity profile of the bacteria investigated. The highest production of oxidative stress was at 465 nm (30 J/cm²), and no glutathione production was detected. LED irradiation was found to be safe for application to bacterial colonies, as it did not modify their antibiotic susceptibility profile, despite inducing oxidative stress.

Keywords: Photobiomodulation, Light Emitting Diode, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, Drug Resistance, Bacterial.