TITLE: ANTIMICROBIAL ACTIVITY OF THE RUTHENIUM (II) POLYPYRIDINE COMPLEXES IRRATIATED WITH BLUE LED ON CLINICALLY RELEVANT BACTERIA

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ABSTRACT:

Bacterial resistance to antimicrobial drugs is a significant threat to humans, being needed to discover new classes of antimicrobials to overcome the antibiotic resistance problems. Currently, there has been a widespread interest in the study of Ruthenium(II) complexes as alternatives for microbial control. In fact, some studies have shown the potential antimicrobial of ruthenium (II) complexes. Thus, the aim of this study was evaluated the antibacterial effect of the $[Ru(bpy)2dppz]^{2+}$ with and without blue LED irradiation against *Staphylococcus aureus* ATCC 25923, *Staphylococcus epidermidis* ATCC 12228, *Pseudomonas aeruginosa* ATCC 10145 and *Escherichia coli* ATCC 11303. To determine the antibacterial activity, the compound was diluted in ultrapure sterile water in concentrations ranging from 3.9 to 500 µg/mL and dispensed into 96-well plates with each bacterial suspension (1×10^6 cfu/mL) in TSB. The plates were submitted to irradiation with blue LED for 1 hour or dark, and then incubated overnight at 37˚C. The susceptibility of the bacteria to ruthenium complexes were evaluated by minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC). $[Ru(bpy)2dppz]^{2+}$ irradiated with blue LED showed MIC and MBC values of 7.8 µg/mL against *S. aureus* and 31.25 µg/mL against *S. epidermidis*. Interestingly, $[Ru(bpy)2dppz]^{2+}$ without irradiation with blue LED did not show activity on both bacteria. Moreover, the complexes ruthenium not showed antimicrobial activity against Gram-negative bacteria (with and without irradiation). Studies it has shown that photodynamic therapy combined with ruthenium complexes to induce damage to microbial pathogens caused by photogeneration of reactive oxygen species (ROS) and DNA damage. In conclusion, $[Ru(bpy)2dppz]^{2+}$ showed activity against Gram-positive bacteria, mainly when irradiated with blue LED. These findings are fundamental for the deployment of new therapies aimed at preventing of bacterial infections.

Keywords: Ruthenium complexes, irradiation, bacteria

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