TITLE: ASSESMENT OF ANTIBACTERIAL ACTIVITY OF ZINC OXIDE NANOPARTICLES AGAINST CLINICALLY SIGNIFICANT BACTERIA

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ABSTRACT

Cases of morbidity and mortality related to different microbial groups acquired in hospitals constitute a public health problem. The hospital is considered the highest risk environment for the acquisition of resistant microorganisms. The possibility of using Zinc Oxide nanoparticles (ZnO-NP) in hospital structures, such as coatings for surgery rooms, is an alternative that can contribute to the reduction in nosocomial infections. Currently, the ZnO-NP has attracted interest as an antimicrobial agent due to its chemical stability and safety. This study aimed to evaluate the antibacterial activity of ZnO-NP against clinically significant bacteria. This evaluation was performed by the broth microdilution technique for determining the Minimum Inhibitory Concentration (MIC) against the strains *Staphylococcus aureus* (INCQS 25922), *Pseudomonas aeruginosa* (INCQS 00026) and *Escherichia coli* (INCQS 00182). For that purpose, the ZnO-NP was synthesized with hydrated Zinc Sulfate ($ZnSO_4$)$7H_2O$, Sodium Lauryl Sulfate and a solution of Sodium Hydroxide (NaOH) at a ratio of 1:0.4:4M. The action of the ZnO-NP was evaluated in different concentrations (2500 ug/mL to 1.22 ug/mL). Assays were carried out following the adapted methodology recommended by the CLSI M7-A9 protocol, used 96 well microplates. After 24 hours and revelation performed with resazurin, it was possible to observe MIC of 78.12 µg/mL against the *Staphylococcus aureus* and MIC of 1250 ug/mL against the *Escherichia coli* and *Pseudomonas aeruginosa*. Literature reports different biological activities related to the ZnO-NP. These preliminary results indicate a great potential in the development of new materials for hospital environmental coatings with an intrinsic antimicrobial activity, contributing to reduce the occurrence of contamination.

Keywords: Zinc oxide; nanoparticles; antibacterial activity; MIC.