TITLE: HEMOLYTIC AND ANTIBACTERIAL ACTIVITY AGAINST MULTIRRESISTANT BACTERIA OF BIOGENIC SILVER NANOPARTICLES AND SILVER NITRATE

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ABSTRACT:

Multidrug resistant bacteria is a serious public health issue that challenges healthcare professionals. Infections caused by antibiotic-resistant microorganisms prolong hospitalization, cause hospital outbreaks, increase economic costs for health care and high mortality due to therapeutic failures. Therefore research and development of new antimicrobials are necessary. Silver-based compounds have been used due their antimicrobial properties, and today nanotechnology offers new possibilities for application of these compounds. The objective of this study was to evaluate hemolytic and antibacterial activities of biogenic silver nanoparticles (bioAgNP) and silver nitrate ($AgNO_3$). BioAgNP were synthesized using the fungus *Fusarium oxysporum* as reducing power, and diameter, morphology and silver concentration of nanoparticles were characterized. Silver nitrate was obtained commercially. Minimum inhibitory concentration (MIC) values (by broth microdilution technique) and minimal bactericidal activity (MBC) values (by quantification of viable cells) of each compound were determined against *Escherichia coli* and *Klebsiella pneumoniae*, including reference (ATCC) and carbapenemase-producing strains. The toxicity of compounds against human red cells was determined by colorimetric assay using spectrophotometer. The MIC and MBC values of bioAgNP and $AgNO_3$ ranged from 90 to 180 μM and from 125 to 250 μM, respectively. The cytotoxic concentrations (CC50) were 750 μM (bioAgNP) and >2000 μM ($AgNO_3$). Both compounds were non-toxic to human cells at their bactericidal concentrations. BioAgNP and $AgNO_3$ affected bacteria at different concentrations of silver, and this indicate that there was a specific nanoparticle effect. Bio-AgNP have potential application as antimicrobial in several sectors, including hospital environments, because they act against multidrug-resistant bacteria and preliminary tests showed no toxicity to human cells. Furthermore, such nanoparticles are ecologically friendly and may exhibit sustained release of silver due to nanometric characteristics.

Keywords: Enterobacteriaceae, *Fusarium oxysporum,* human hemocyte, KPC carbapenemase.

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