

MIDDLE EAST PHARMACY AND PHARMACEUTICAL CONFERENCE

September 24-25, 2018 Abu Dhabi, UAE

In vitro antimicrobial analysis of green matrix stabilized silver nanoparticles

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The use of antibiotics has reduced the incidence of infectious diseases. But their extensive use has led to drug-resistant bacteria, which is a major public health issue worldwide. The silver nanoparticles have been recognized as efficient broad spectrum antimicrobial agent but cause tissue oxidation. It uses mushroom glucans as reducing and capping agent to reduce its toxicity. In the current study Glucan coated silver Nanoparticles (Glucan-AgNPs) from four *Pleurotus* spp. were characterized for antimicrobial, biofilm inhibition, mutagenicity and carcinogenicity potential activities through *in vitro* analysis. The antimicrobial activity was performed by using well diffusion method and subsequently by minimum inhibitory concentration against bacterial strains *Escherichia coli* (ATCC 15597), *Staphylococcus aureus* (ATCC 25923) and *Bacillus subtilis* (ATCC 23857) collected from Department of Microbiology of the University. The anti-biofilm potentials of Glucan-AgNPs were performed by comparing positive and negative controls through phase contract microscopy. Carcinogenicity potentials analysis was determined by the spectrophotometric analysis of hemolytic activity. The mutagenicity analysis was performed by comparing Glucan-AgNPs with background micro titration plate against *Salmonella typhimurium* strains TA98 and TA100 in Ames test. By comparing the positive and negative controls the results have shown that Glucan-AgNPs exhibited excellent antimicrobial activity against bacterial strains. The results of biofilm inhibition analysis showed that Glucan-AgNPs were excellent agents to inhibit microbial biofilm. Carcinogenicity potentials analysis by hemolytic assay revealed that Glucan-AgNPs were non-hemolytic. The results of mutagenicity analysis showed Glucan-AgNPs were non-mutagenic against *Salmonella typhimurium* strains TA98 and TA100. From the present research it is concluded that the mushrooms glucans extracted from *Pleurotus* spp. possess strong reducing and capping property through which they get attached to AgNPs and enhance their *in vitro* biological activities. Glucan-AgNPs can be used as novel, naturally occurring, rapid acting broad spectrum nano-antibiotic. Furthermore, teamwork of biochemists and pharmacist is required to further improve its specificity and stability profile.

Biography

Asma Irshad has completed her PhD in Biochemistry from University of Agriculture Faisalabad, Pakistan and has performed research on biochemical characterization of glucans from mushrooms and their application as green matrix for nanoparticles. Her research has developed a novel, naturally occurring and rapid acting broad spectrum nano-antibiotic. She is currently working as In-charge of Outpatient Laboratory in Department of Pathology, Mayo Hospital/King Edward Medical University, Lahore, Pakistan.

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