



Phytogenic Synthesis of Ag Bionano-Antibiotics Against ESKAPE Drug Resistant Communities in Krasnoyarsk, Siberia

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Abstract

The present study reports synthesis of silver nano-antibiotics from aqueous extract of *H. dissectum*. The nano-antibiotics were characterized using UV-visible spectra which displayed maximum absorbance at 430 nm. The role of phytocomponents as reducing agent and stabilization of silver nano-antibiotics was depicted with Fourier-transform infrared spectroscopy which revealed presence of hydroxyl and carboxyl groups associated with silver nano-antibiotics. The crystalline nature was studied with X-ray diffraction which showed Bragg's intensities at 2θ angle which denoted (101), (111), (200), (220), (311) planes. The morphological characteristics were studied using Transmission Electron Microscopy to reveal the size ranging from 5 to 50 nm. The bactericidal activity of nano-antibiotics was studied via well diffusion and minimal inhibitory concentration assay against members of drug-resistant communities bearing resistant to more than ten standard antibiotics. Nano-antibiotics displayed highest activity against *Ps. aeruginosa* strain 55 and *Methicillin-resistant Staphylococcus aureus* with 16 mm zone of inhibition followed by *Kl. pneumoniae* strain 104 and *E. coli* strain 55. Moderate activity was observed against *Ac. baumannii* strains with 12 mm zone of inhibition. The obtained results envision the role of plant mediated nano-antibiotics as one of the best suited alternatives towards combating drug resistant pathogens.

Keywords *Heracleum dissectum* · Silver nano-antibiotics · ESKAPE · Antimicrobial-resistant · Krasnoyarsk · Siberia

Introduction

The emergence of antibiotic resistant era has resulted owing to the expansion of multi drug resistant pathogens [1]. The proliferation of antimicrobial resistance has tempered the global economy by influencing health and biomedical sectors [2]. According to the latest survey,

fatality ratio owing to drug-resistant pathogens is increasing especially in hospital-acquired infections [3, 4]. The recent studies report that 70% of hospital acquired infections are caused by pathogenic bacteria which are resistant to one or more antibiotics [5–7]. Especially, ESKAPE pathogens which includes *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter*

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