

Due to development of multi-drug resistance of microorganisms against available antibiotics there is a urgent need for the novel therapies to combat with resistant clinical pathogens.

Silver nanoparticles (AgNPs) are structures at nano level less than 100 nm which possess specific biological activity resulting from their chemical and physical properties and high surface area to volume ratio. Therefore, silver nanoparticles can be used in the field of medicine as antimicrobial agent.

Metal nanoparticles can be obtained by chemical, physical and biological methods. Biological systems such as bacteria, fungi and plants are easy, cheap and non-toxic to the environment. The presence of capping agent over the surface of small sized biogenic silver nanoparticles may affect on its antioxidant properties and low toxicity to human cells.

Therefore, the main aim of present research project is to apply actinobacteria as a biological system for synthesis of silver nanoparticles with special reference to antifungal, antibacterial, and antioxidant activity. Actinobacteria were chosen for synthesis of AgNPs as these microorganisms are known to be main producers of most natural bioactive compounds and those from extreme and unexplored habitats such as acidic, alkaline, halophilic, hyper irradiated or cold deep sea environments are still remaining as a rich source of novel biologically active compounds. Biosynthesized silver nanoparticles are less characterized therefore its application in the field of medicine is limited up-to-date.

Subsequently, the chemical and physical properties of synthesized nanoparticles, which affect on biological activity of AgNPs will be characterized by TEM (transmission electron microscopy), NTA (nanoparticle tracking analysis), FTIR (Fourier transform infrared spectroscopy), Zeta potential. The antifungal, antibacterial, antioxidant and toxicity against eukaryotic cells will be studied. Such full characterization allows to select nanoparticles with high potential in medical application and for future animal trials.