Abstract

Bacterial strains resistant to antibiotics are increasingly becoming a threat to public health resulting in major economic and environmental damage. The current study has been designed to synthesize tailored nanoparticles (NPs) with various sizes and shapes capable of enhanced bactericidal efficacy. Silver nanoparticles (AgNPs) and silver nanoprisms (AgNPrs) were synthesized via chemical reduction method and conjugated with azithromycin; one surface plasmon resonance peak was recorded at 434 nm for nanospheres and three prominent peaks at 258, 341 and 516 nm for nanoprisms. Transmission electron microscope (TEM) micrographs confirmed spherical and prismatic shapes of nanomaterials Scanning electron microscope (SEM) results also strengthen TEM findings. Stability, size and crystal morphology was assessed by zeta potential, particle size analyzer, and XRD respectively. These newly synthesized silver nanomaterials were evaluated for their antibacterial activity against *Staphylococcus aureus* (gram-positive) and *Escherichia coli* (gram-negative) bacterial strains in free and conjugated state with azithromycin. Silver nanoparticles, conjugated silver nanoparticles, silver nanoprisms and their conjugates antibacterial activity were recorded, 9.8-12.1 mm, 12.1-13.8 mm, 12.5-16 mm and 17-18.5 mm (Zone of inhibition) respectively. Azithromycin conjugated silver nanoprisms (AgNPrs) showed enhanced antibacterial activity as compared to silver nanoprisms (AgNPrs) antibacterial activity.

Keywords: Silver nanoparticles; silver nanoconjugates; azithromycin; antibacterial activity; silver nanoprisms;