Abstract

Traditional plants are in broad consumption, due to their higher biological impact, minimal side effects, and comparatively low cost. In this study, two plantsMentha spicata (Mint) and Allium sativum (Garlic) were used for the green synthesis ofsilver nanoparticles. The emergence of antibacterial resistance forces us to reconsider the herbal remedies which provides us suitable and acceptable solutions. This current study aimed to investigate the comparative analysis of antibacterial activity of Mentha spicata and Allium sativum conjugated silver nanoparticles (M-AgNPs and G-AgNPs)against Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Klebsiella pneumoniae, Pseudomonoas aeruginosa and Aeromonas veronii by agar well diffusion method at 2 mg/ml, 4 mg/ml and 8 mg/ml concentrations. They demonstrated theexcellent antibacterial activity and the significant zone of growth inhibition (23±0.2mm) was observed at 8 mg/ml against S. aureus and the less significant zone of growthinhibition (4.0±0.2 mm) was observed at 2 mg/ml against A. veronii. The stability ofM-AgNPs and G-AgNPs was analyzed at various pH values (4, 7 and 11). WithMentha spicata conjugated silver nanoparticles (M-AgNPs), the significant zones ofgrowth inhibition (11.3±0.3 mm, 8.3±0.3 mm, 14.3±0.3 mm, and 7.6±0.2 mm) wereobserved at pH 11 against S. aureus, B. subtilis, E. coli, and K. pneumoniae,respectively. With Allium sativum conjugated silver nanoparticles (G-AgNPs), thehighly significant zones of growth inhibition (10.0±0.8 mm, 11.0±0.2 mm, and 13.0±0.5 mm) were observed against B. subtilis, E. coli, and P. aeruginosa,respectively at pH 11. The M-AgNPs and G-AgNPs were synthesized at different temperatures including 25oC, 4oC, 37oC, 75oC and their analyzed their antibacterialactivity. The significant zones of growth inhibition (14.0±0.5 mm and 13.0±0.5 mm) were observed against B. subtilis and S. aureus at 25oC when bacterial strains were exposed to Mentha spicata (Mint) conjugated silver nanoparticles while Staphylococcus aureus, and A. veronii gave maximum zones of growth inhibition (10.0±0.5 mm and 9.0±0.5 mm) at 75oC when exposed with Allium sativum (Garlic)conjugated silver nanoparticles.The antioxidant potential of Mentha spicata and Allium sativum conjugatedsilver nanoparticles was assessed at 2 mg/ml and 4 mg/ml by DPPH. assay. Weobserved the highest free radical scavenging activity of Mentha spicata and AlliumDepartment of Zoology, GCU Lahore.sativum at 4 mg/ml (38.66±0.2%) and (25.6±0.5%), respectively. It is concluded thatconjugated silver nanoparticles have the ability to fight against bacterial infections andto combat the effects of free radicals in DPPH. However, Mentha spicata has higherantibacterial effects and antioxidant potential than Allium sativum.