Abstract

The utilization of plant extracts in the synthesis of silver nanoparticles has attracted considerable interest owing to its environmentally sustainable methodology. In this research work, *Silybum marianum* plant was used to create silver nanoparticles due to its abundance of phytochemicals and long history of medical applications. The characterization of silver nanoparticles was done using UV-Vis spectroscopy and FTIR analysis. Six bacterial strains were used for the antibacterial activity of *Silybum marianum* nanoparticles at the concentration of 8 mg/ml. The maximum zones of inhibition were against the *Bacillus fortis* (23.21±0.3 mm), *Streptococcus pneumonia* (20.31±0.3 mm), *Staphylococcus aureus* (17.6±0.3 mm), *Brodetella pertussis* (18.59±0.3 mm), *Pseudomonas fluorescens* (17.89±0.3 mm) and *Escherichia coli* (17.73±0.5 mm). The activity of nanoparticles was also evaluated at different temperatures where the maximum zone of inhibition was observed in *B. pertussis* of (18.19±0.5 mm) at 20°C. The minimum zone of inhibition was observed against *S. aureus* of (9.54±0.5 mm) at 10°C. The activity was illustrated at different pH values. The maximum zone of inhibition was against the *S. aureus* (17.18±0.5 mm), *Brodetella pertussis* (15.25±0.5 mm), *Streptococcus pneumonia* (14.50±0.8 mm), *Pseudomonas fluorescens* (15.68±0.5 mm), *E. coli* (15.33±0.5 mm) and *B. fortis* (15.08±0.5 mm) was at pH 7. This revealed that *Silybum marianum* conjugated silver nanoparticles were stable at different temperatures and pH values. Meanwhile, the free radical scavenging activity of *Silybum marianum* AgNPs was found at the 4 and 6 and 8 mg/ml concentration. *Silybum marianum* conjugated silver nanoparticles gave highest inhabiting percentage (79.0± 0.3%) at 8 mg/ml while the lowest inhabiting percentage (68.0±0.3%) shown at 4 mg/ml. The percentage inhibition of ascorbic acid was(83.0±0.4%). The percentage of free radical scavenging activity increased from 25% to 43.9% as the concentration increased from 4 to 8 mg/ml. The scavenging activity at these concentrations showed the statistically significant difference with the control. These findings revealed that *Silybum marianum* nanoparticles have huge number of applications, especially the development of environmentally friendly antibacterial agents.

Keywords. Silver nanoparticles, *Silybum marianum*, Phytochemical, Antibacterial activity