

## ABSTRACT

This study explores the synthesis and characterization of silver nanoparticles (Ag-NPs) encapsulated within red cabbage extract and investigates their potential applications in antimicrobial activities. Various analytical techniques, including Ultraviolet Visible spectroscopy (UV-Vis), Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), and antimicrobial assays, were employed to assess the properties and bioactivity of these nanocomposites. SEM analysis revealed well-dispersed spherical Ag-NPs on the surface of red cabbage, and FTIR analysis confirmed the presence of biomolecules responsible for the reduction of silver ions. The antimicrobial assay demonstrated the effectiveness of Ag-NPs against both Gram-positive and Gram-negative bacteria. The results suggest that Ag-NPs encapsulated in red cabbage extract hold promise for various biomedical applications.