

## Abstract

The current research investigates the synthesis, elucidation and biological applications of Schiff base coordination-metal complexes, which have garnered substantial attention for their prospective roles in the medical field, specifically in antifungal, antibacterial and antioxidant activities. The Schiff base was synthesized via a condensation reaction between p-nitroaniline and salicylaldehyde. Subsequently, the ligand was utilized to form Schiff base metal complexes with cadmium (Cd), zinc (Zn), Nickel (Ni) and chromium (Cr) metal salts under controlled reaction conditions. The synthesized products were comprehensively analysed using infrared (FTIR), UV-visible and photoluminescence spectroscopy, which confirmed the successful formation of desired products. Photoluminescence Spectroscopy provided valuable information regarding the luminescent properties of synthesized compounds. Additionally, the antibacterial activity was tested against bacterial and fungal cultures. Antibacterial activity tests were performed against both gram-positive bacteria (*Enterococcus nanganensis*, *Styphilococcus aureus* and *Bacillus subtilis*) and gram-negative (*Escherichia coli*) bacterial strains, highlighting the effectiveness as antibacterial agents. Antifungal activity was evaluated against *Aspergillus niger* strains. The antioxidant assessment was also performed by using DPPH assay providing significant efficacy as potential antioxidant agent. Furthermore, the antioxidant assessment carried out using the DPPH assay, demonstrated significant efficacy, suggesting the potential as antioxidant agents.