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Synthesis, characterization and investigation of antimicrobial activity of monomeric ni(ii) and co(ii) complexes of a schiff-base ligand synthesized from 2, 4-dinitrophenylhydrazine and acetyl acetone

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The chemistry of Schiff-base transition metal complexes has attracted the interest of both inorganic and bioinorganic chemists in recent years mainly due to their catalytic and microbiological activities. Therefore, the present study was focused on the antimicrobial activity of a Schiff-base ligand (L) and its Ni(II) and Co(II) complexes as the chemistry of these metal complexes can be monitored easily using spectroscopic techniques. L was prepared by refluxing ethanolic solutions of 2, 4-dinitrophenylhydrazine and acetyl acetone in 2:1 molar ratio. Ni(II) and Co(II) complexes were synthesized according to the template synthesis method. All the complexes were characterized by FTIR, H^1-NMR and UV-Vis spectroscopic techniques. According to the FTIR spectra, both bands at 1635 cm^{-1} and 3441 cm^{-1} corresponding to the C=N imine and N-H vibrations respectively, have shifted to lower frequency (1330-1615 cm^{-1}) due to the complex formation. Metal-L bond formation is confirmed due to the presence of a band around 530-550 cm^{-1} corresponding to the ν (M–N) vibrational mode. The UV-Visible spectra of L exhibits intense absorption peaks at 217 and 345 nm. L incorporation to the metal is evident due to the presence of highly intense bands around 215-300 nm and 305-360 nm in both Co(II) and Ni(II) complexes. The main peaks of ^1H NMR of L and the Ni(II) complex in $CDCl_3$ are similar; the aromatic, CH_3, CH_2 and N-H protons appear in the range 7.2-8.9, 2.1-2.2, 3.3 and 4.0 ppm, respectively. Antibacterial activity of the synthesized L and the complexes were determined using thin-layer chromatography with direct bioautography for *Escherichia coli* sp. Antifungal activity was studied using well diffusion method for *Cladosporium* sp. According to the results, both free ligand and its Co(II) and Ni(II) complexes show antibacterial activity. Antibacterial activity of metal complexes is higher than that of the free ligand. In contrast, antifungal activity was higher for the free ligand than the metal complexes. Overall results of this study reveal that the L, Ni(II) and Co(II) complexes can be used as antifungal and antibacterial agents.