SYNTHESIS, CHARACTERIZATION, AND ANTIBACTERIAL ACTIVITY OF Cu(II) AND Ni(II) TRANSITION METAL COMPLEXES OF NOS TRIDENTATE SCHIFF BASE DERIVED FROM *S*-2-FLUOROBENZYLDITHIOCARBAZATE WITH 5-CHLOROISATIN

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ABSTRACT

SYNTHESIS, CHARACTERIZATION, AND ANTIBACTERIAL ACTIVITY OF Cu(II) AND Ni(II) TRANSITION METAL COMPLEXES OF NOS TRIDENTATE SCHIFF BASE DERIVED FROM *S*-2-FLUOROBENZYLDITHIOCARBAZATE WITH 5-CHLOROISATIN

A Schiff base ligand, *S*-2-fluorobenzyl 2-(5-chloro-2-oxoindolin-3-ylidene)hydrazinecarbodithioate was synthesized *via* the condensation reaction between *S*-2-fluorobenzyldithiocarbazate and 5-chloroisatin. The Schiff base was reacted with Cu(II) and Ni(II) metal salts to produce metal complexes. The Schiff base and its metal complexes were characterized by elemental analysis and various physico-chemical techniques. The ligand was capable of being a versatile chelating ligand. It acted as a uninegatively charged bidentate ligand when it was bonded to Cu(II) ion via the azomethine nitrogen and thiolate sulfur. In the Ni(II) complex, it acted as a uninegatively charged tridentate ligand when it was bonded to the metal ion through carbonylic oxygen. Square planar geometry was assigned to the Cu(II) complex and Ni(II) complex exhibit the tetrahedral geometry. Antibacterial screening was done on the Schiff base ligand and its metal complexes. Cu(II) complex showed that it was moderately active against the Gram positive bacteria strain and Cu(II) complex also showed lower activity against the Gram negative bacteria strain. Both Schiff base ligand and Ni(II) complex showed no activity against the Gram negative bacterial strain.

CHAPTER 1

INTRODUCTION

1.1 Schiff bases

Schiff bases are compounds that contain azomethine group (-C=N-) in their structures. They can form stable complexes with transition metals and they can act as bi- or tri-dentate ligands. Schiff base ligands can be formed from the condensation reaction between different types of amines and carbonyl compounds (aldehyde or ketone) (Imran *et al.*, 2006).

Basically, ligands are anions or neutral molecules possessing lone pair(s) of electrons and can act as Lewis bases. The formation of a complex ion involves the donation of a pair of electrons from the ligand to the empty orbitals of the central metal atom or ion. Many ligands are described as monodentate or one-toothed as they 'bite' the metal at one place. There are also numbers of ligands described as tetradentate, hexadentate, and polydentate (Rajavel *et al.*, 2008).

Transition metal complexes having oxygen and nitrogen donor Schiff base posses unusual configuration, structural liability and sensitive toward molecular environment. The environment around the metal centre ''as coordination geometry, number of coordinated ligands and their donor group'' are the key factors for metalloproteins to carry out specific physiological functions (Golcu *et al.*, 2005).