



# Study of the Cytotoxicity Effect of Cu (II), Co (II), Ni (II) and Zn (II) Complexes Incorporating Indole Derived N, O Bi-dentate Ligand on Cancer Cell Lines MCF-7, Hep G2 and NHDF

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**Abstract** - A series of Cu(II), Co(II), Ni(II) and Zn(II) metal complexes with indole derived ligand were prepared and characterized by elemental analysis, molar conductance, magnetic susceptibility, UV-Vis, FT IR and proton NMR spectral studies. These analytical and spectral studies reveal that the complexes adopt a square planar arrangement around the central metal ion. The synthesized compounds were attempted for their cytotoxicity activity. Cytotoxicity of the tested compounds were investigated by MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] assay in normal NHDF and cancerous MCF-7 and HepG2 fibroblasts. Both compounds showed cytotoxicity activity as a dose-dependent manner. Moreover, the complexes exhibit a limited cytotoxicity effect on normal cell line NHDF. The effect of cytotoxicity of synthesized metal complexes is judge against standard drug of cisplatin.

**Keywords:** Indole derivatives; Tryptophan; Cytotoxicity; Metal complexes; Schiff base

## 1. INTRODUCTION

Chemotherapy is still one of the central courses of treatments employed in the clinic for various cancer diseases, and thus immense amount of research is conducted worldwide with the aim to develop new and improved anticancer drugs. Many studies start at the chemical level, with the design and synthesis of compounds, followed by biological evaluation of the cytotoxic properties *via in vitro*. Various types of organic and inorganic compounds involve in a variety of biological processes which are very important to the life process. Mainly, the metal ions play a decisive role in biological functions such as Cytochrome c oxidase, vitamin B-12, nickel-tetrapyrrole coenzyme and cofactor F430 and carboxypeptidase. Moreover, the metal atoms coordinate with oxygen or nitrogen - terminals from proteins in diver's model that play an essential role in the conformation and function of biological molecules [1, 2]. Recent research illustrates that most of the metal complexes

have potential biological activities like anti-bacterial, anti-fungal, anti-viral, anti-inflammatory and anti-cancer agents and so on [3, 4]. Among the important liable pharmacophores for biological activities, the biologically active amino acid derived ligands and their metal based compounds have selective drug actives in many pharmacological areas because of the functional groups of  $-NH_2$  and  $-COOH$  coordinate to the metal ion which develops the new therapeutic targets. Moreover, among the various amino acids L-tryptophan is considered as one of the essential amino acid for human nutrition which is necessary for normal growth in infants and for nitrogen balance in adults and even its helps the body makes proteins and certain brain- signaling chemicals. Then, it has one indole ring system. This heterocyclic ring system encompasses considerable pharmacological activities [5] such as anti-vascular, anti-malarial, anti-inflammatory, anticonvulsant, chronic diabetes, HIV inhibitors and particularly in the treatment of cancer etc.

Based on the above, herein we investigate the cytotoxicity activity of our previously reported Schiff base metal complexes of Cu(II), Co(II), Ni(II) and Zn(II) obtained by the condensation reaction of 4-chloro-3-nitrobenzaldehyde and L-tryptophan. Evaluation of the anticancer activity of these metal complexes can be attained by the MTT assay. The MTT assay is usually common in cytotoxicity studies due to its accuracy, rapidity and relative simplicity.