Antibacterial Studies of Copper Complex Derived From Isoniazid Schiff Bases

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Abstract - The heterocyclic hydrazones constitute an important class of biologically active drug molecules which have attracted the attention of medicinal chemists due to their wide-ranging pharmacological properties including iron scavenging and anti-tubercular activities. Isoniazid, also known as isonicotinylhydrazide (INH), is an antibiotic used for the treatment of tuberculosis. In the present study a few mixed ligand copper complexes of isoniazid Schiff base have been synthesized. The synthesized compounds are characterized by elemental analysis, magnetic susceptibility, magnetic moment, UV and FT IR spectroscopic methods. PASS prediction analysis shows that the synthesized ligand posseses higher antituberculosis activity than the free isoniazid. All the synthesized compounds are screened for antimicrobial activity.

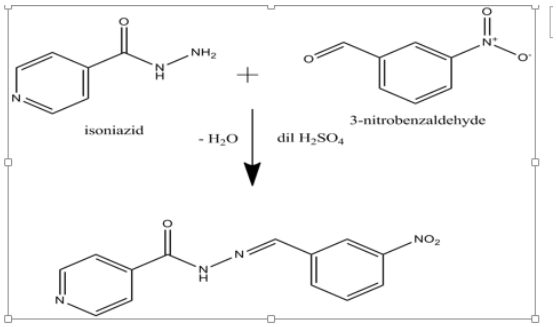
Keywords: Hydrazones; Isoniazid; Metal complex; Anti-microbial activity.

1. INTRODUCTION

Schiff base compounds and their metal complexes have been extensively investigated due to their wide range of applications including catalysts, medicine, crystal engineering, anti-corrosion agent[1]. Isoniazid is one of the primary drugs used in combination with ethambutol, rifampin, streptomycin and pyrazinamide to treat tuberculosis[2]. Common side effect of isoniazid includes increased blood levels of liver enzymes and numbness in the hands and feet. Serious side effects may include liver inflammation. It is unclear if use during pregnancy is safe for the baby and use during breastfeeding is likely okay. Pyridoxine may be given to reduce the risk of side effects. It has been reported that, its side effects can be reduced after forming Schiff base (due to the deactivation of NH_2 group)[3,4]. Mixed ligand complexes can be a synthetic challenge to tune the properties of the transition metal complexes[5]. Most active mixed ligand metal complexes of 1,10-phenanthroline derivatives that have been reported to prove considerable pharmacological activity. Transition metal complexes of 1,10-phenanthroline or their modified variants have been extensively employed in DNA studies due to their applicability in several areas of research, including bioinorganic and biomedicinal chemistry[6]. *In silico* analysis using cheminformatics techniques can actually reduce the risks of developing a drug. Such techniques as virtual screening, library design, and docking figure into the analysis. By keeping all these facts, this work emphasizes the synthesis of copper complex from isonazid Schiff base. The synthesized compounds are characterized by elemental analysis, magnetic susceptibility, magnetic moment, UV and FT IR spectroscopic methods. Biological activity of the synthesized ligand can be predicted by PASS online software. The antibacterial activity of these compounds is examined by well diffusion method.

2. EXPERIMENTAL SECTION

2.1. Synthesis of Isoniazid - Schiff's base ligand



N'-(3-nitrobenzylidene)isonicotinohydrazide

Scheme: 1 Schematic diagram for the synthesis of isoniazid Schiff Base

1 mmol of isoniazid and 3-nitrobenzaldehyde was dissolved in 10 mL of ethanol and it was heated in a mantle for *ca* 3 h in RB flask by adding 3 drops of dilute sulphuric acid. A yellow coloured precipitate was