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Invitro Cell viability and Antibacterial activity of novel Bismuth (V) complex

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Abstract : Bismuth (V) was incorporated in chloramphenicol and streptomycin keeping in view of finding new antibiotics. Formed complex was evaluated for their antibacterial and cell viability activity in mice. Murine peritoneal macrophage cell lines RAW 264.7 were used for *in vitro* antibacterial and cytotoxicty studies of various synthesized compounds. Bactericidal activity was assessed by Minimum inhibitory concentrations (MIC) of various compounds against different bacterial strains. Antibacterial activity of T-IV was found highest among all treatments given followed by T-III. Metal-ligand administered group showed comparatively higher *in vitro* cell viability than standard drug streptomycin. It was concluded that metal drug complex may have better antibiotic activity than parent antibiotics alone.

Key words: Chloramphenicol, Streptomycin, Bismuth (V)-ligand complex, antibiotics.

Introduction

Streptomycin, tetracycline and chloramphenicol are well known antibiotics. They have potential donor atoms to coordinate with metal ions and to cause their impact with a larger extent. Streptomycin is an aminoglycosidic antibiotic with three components: streptidine, streptose and N-methyl-L-glucosamine (Figure1). It is used to treat infections caused by Gram-negative bacteria and in the therapy of tuberculosis [1-4]. Serious toxicity is a major limitation of its usefulness, most notable is its ototoxicity, and causing deafness is severe cases. It has been proposed that the mechanism of action of this antibiotic could be related to an enhancement of the biological availability of metal ligand attached to it [5-6]. Some preliminary studies about the interaction in solution of some metal ions with streptomycin have been reported [7-9] but detailed characterization of the complexes is unavailable except for a neutral Cu (II) complex where Cu-O bonds with streptomycin are suggested [10-11]. Furthermore, literature on streptomycin as a ligand reveals that there is clear disagreement about the metal – ligand binding sites in complexes of this ligand [12].Therefore, in order to ascertain metal binding sites in streptomycin metal chelates, the synthesis and spectroscopic characterization of complexes of streptomycin with these transition/non-transition metal ions is attempted in this investigation.

Chloramphenicol (Chloromycetin, D-(7)-threo-di-choloacetamide-1-p-nitrophenyl propane-1-1, 3-diol, CAP) is an antibiotic that finds applications in combating a wide range of infections caused by Gram-negative and some Gram-positive organisms. It is currently the first choice antibiotic in developing countries and is still widely used in industrialized countries for the treatment of serious bacterial infections. The adverse effect to the eye of chloramphenicol appears to result from the interaction of the drug with metals ions. Chloramphenicol is still widely used in topical preparations (ointment and eye drops) for the treatment of bacterial conjunctivitis.

In view of the rapid development and also challenging demands, it has become necessary to synthesize newer compounds, which may show potential antimicrobial activity. In naturally occurring chloramphenicol, the amino nitrogen and deprotonated alcoholic oxygen may be involved in the binding with streptomycin in presence of aqueous alcoholic medium. This paper describes the synthesis of novel ligands and their complexing ability with bismuth metal ions. These synthesized compounds were assed for their potential antioxidant activities and hepatoprotective effects in rat (Communicated data). They were found to be a potent antioxidant agent and their activity was hepatoprotective. In further assessment of their biological activity synthesized compounds were evaluated for their anti-inflammatory and cell viability studies.