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ANTIMICROBIAL ACTIVITY OF NIKEL II COORDINATED COMPOUNDS

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ABSTRACT
It was planned to investigate that Nickel II coordinated compounds exhibit so many applications in the field of agriculture and medicines. So it is required to antimicrobial screening against pathogenic and non pathogenic organism. In the present study antimicrobial screening was carried out against *Escherichia coli, Staphylococcus aureus*. *Bacillus subtilis, Sacchromycese cereviseae Rhodotorula minuta, and Candida albicans.* The suspension was made up in DMSO and acetone and compared with antibiotic (ciprofloxacin) and anti fungal (fluconazole) . The minimum inhibitory conc. was also finding out with the dilution of nickel II coordinated compound as 20%, 40%, 60%, 80%. Acetone and DMSO also used as a control. The test organism were taken from IMTECH Chandigarh and maintained subculture in college laboratory and compared with isolates

KEY WORDS: Antibacterial, Nickel II coordinated compounds.

INTRODUCTION

To overcome the alarming problem of microbial resistance to antibiotics, the discovery of novel active compounds against new targets is a matter of urgency. Many of the crude drugs, which are sources of medicinal preparations, still originate from wild-growing material. However, plant-based drugs have shortened the life span of the source of material. The study of coordination compounds has received much attention in recent years. This interest was generated by the discovery of the anti-bacterial, -fungal and -cancer activities of several coordination compounds. As a result, studies have been carried out on the structure and chemical behavior of several metal complexes (Chohan *et al*., 2006). Various *in-vivo* studies have shown that biologically active compounds become more bacteriostatic and carcinostatic upon chelation (Husseiny *et al*., 2008). Amino acids, which are also components of proteins, offer excellent ligands for binding to metal ions (Kostova, 2006). The properties of coordination compounds are influenced to a considerable extent by the nature and the oxidation state of the central metal atom. A method of studying this influence is by comparing the compounds formed by a series of metal atoms in a given oxidation state with a particular ligand. (Komiyama *et al*., 2008). So, it is important to find out safer, more effective and inexpensive chemotherapeutic agents. An extensive literature has developed in recent years in the field of chelate compounds with special reference to their antimicrobial activities. Nickle II coordination complexes have been widely studied for their antimicrobial (Kamalakannan *et al*., 2002) and anticancer properties. (Treshchalina *et al*., 1979). Although coordination compounds of amino acids, such as histidine (Nomiya *et al*., 2000), arginine, glutamic acid (Legler *et al*., 2001) have been synthesized and their antimicrobial properties studied, little attention has been focused on Nickel II coordinated compounds and hydrophobic amino acids, such as phenylalanine. Chelation of bulky ligands to metal cations reduces the polarity of the ion. Due to the glycolipophilic nature of the cell wall, an increase in the lipophilicity of a coordination compound enhances its ability to penetrate bacterial cell membrane. The N bonding model (suggesting deprotonation of nitrogen of the hydroxamic group) was first observed by Brown and Roche (1982) in nickel (II) complexes with glycine hydroxamic acids and since then only a few examples have been reported. Aminohydroxamic acid, coordinating through N, also occurred in polynuclear complexes with bridging hydroxamic function.

Other examples are complexes of Ni (ll) and Cu(ll) with (hydroxyimino) propanohydroxamic acid exhibiting N bonding mode have been sited, thus providing a new example of .the adjacent donor function facilitating this bonding mode. The interaction of hydroxamic acids with nickel (II) is ofimportance since they act as potent and specific inhibitors of the nickelloenzyme, urease (Hase and Bobashi, 1967). It was planned to investigate that nickel II coordinated compounds exhibit so many applications in the field of agriculture and medicines. So it is required to antimicrobial screening against pathogenic and non pathogenic organism . In the present study antimicrobial screening was carried out against *Escherichia coli, Staphylococcus aureus*. *Bacillus subtilis, Sacchromycese cereviseae, Rhodotorula minuta , and Candida albicans.* The suspension was made up in DMSO and acetone and compared with antibiotic (ciprofloxacin) and anti fungal (fluconazole) . The minimum inhibitory conc was also find out with the dilution of nickel II coordinated compound as 40%, 60%, 80%. The antimicrobial screening of nickel II compound carried out by three replicates to avoid the technical

error. Acetone and DMSO also used as a control. The test organisms were taken from IMTECH Chandigarh and maintained subculture in college laboratory and compared with isolates.

METERIAL & METHOD

Preparation of [Ni (C_6H_5COO-) NH_2CONH_2]SO_4

Benzoic acid (5g, 0.0206moles) was dissolved in 50ml of 2M NaOH and stirred with a magnetic stirrer 2.712g(0.0103moles) of NiSO4 dissolved in 10ml of water was added to the solution While stirring. The solution changed from colorless to light green on addition of the dissolved NiSO4 and the mixture was stirred for the next 30minutes.The precipitate formed was filtered through suction and washed with water and acetone. The compound was diluted in equal amount of DMSO (Dimethylsulfoxide). The sensitivity test was used to test the effects of the Nikel II coordinated compounds on three bacterial strain *Escherichia coli, Staphylococcus aureus*. *Bacillus subtilis,* and fungicidal activity tested against three fungal strain *Sacchromycese cereviseae, Rhodotorula minuta ,* and *Candida albicans.* using paper discs diffusion method. The test organisms were taken from IMTEC Chandigarh and maintained subculture in college laboratory and compared with isolates. The sterilized nutrient agar and PDA was inoculated with the test organism and poured in the petriplates. Plates were kept for solidification. After solidification place the filter disc dipped in plant extract in center position and places the control on the top and distilled water disc on bottom position. Plates were left for the diffusion for half hour .They was allowed for 24 hrs incubation to allow the growth of microorganisms. After 24 hours the zones of inhibition of plant extract were measured.

RESULT & DISCUSSION

The pure extract of Ni II compound gave zone of inhibition 14mm, 13mm ,15mm against *Bacillus subtilis* and effective zone of inhibition were measured 9mm ,8mm 10mm. Antibiotic (ciprofloxacin) gave zone of 25mm and the effective zone was 20mm. (table no 4) . In first test20% dilution of the sample gave no zone. While 40%, 60%, 80% of dilution gave the zones of inhibition 9mm, 10mm 12mm.respectively against *Bacillus subtilis*. Effective zone was calculated by subtracting the observed zone from the actual diameter of disc i.e.5mm. Effective zones of inhibition for 20%, 40%, 60%, 80% dilutions were nil. 4mm, 5mm, 7mm.The pure extract of Ni II compound gave zone of inhibition 15mm ,14mm ,16mm against*E coli,* and effective zone of inhibition were measured 10mm,9mm ,11mm . Antibiotic (ciprofloxacin) gave zone of 27mm and the effective zone was 22mm. (table no 6) . In first test20% dilution of the sample gaveno zone. While 40%, 60%, 80% of dilution gave the zones of inhibition 10mm, 12mm 14mm. respectively against *E coli,* Effective zone was calculated by subtracting the observed zone from the actual diameter of disc i.e.5mm. Effective zones of inhibition for 20%, 40%, 60%, 80% dilutions were nil.5mm, 7mm, 9mm. The pure extract of Ni II compound gave zone of inhibition 17mm, 15mm ,16mm , against *Staphylococcus aureus* and effective zone of inhibition were measured 11mm ,10mm ,11mm .Antibiotic (Ciprofloxacin) gave zone of 23mm and the effective zone was 18mm(table no 1)20% dilution of the sample gave no zone. While 40%, 60%, 80% of dilution gave the zones of inhibition 11mm, 12mm, 15mm respectively against *Staphylococcus aureus*. Effective zone was calculated by subtracting the observed zone from the actual diameter of disc i.e.5mm. Effective zones of inhibition for 20%, 40%, 60%, 80% dilutions were nil.6mm,7mm,10mm. The pure extract of Ni II compound gave zone of inhibition 17mm , 16mm,17mm against *Candida albicans,,* and effective zone of inhibition were measured 12mm, 11mm ,12mm . Antifungal(fluconazole) gave zone of 26mm and the effective zone was 21mm. (table no 8) . In first test20% and 40 % dilution of the sample gave no zones. While 60%, 80% of dilution gave the zones of inhibition 11mm 13mm. respectively against *Candida albicans,* Effective zone was calculated by subtracting the observed zone from the actual diameter of disc i.e.5mm. Effective zones of inhibition for 20%, 40%, 60%, 80% dilutions were nil, 6mm, 8mm.

TABLE 1: Antibacterial effect of Ni II compound

Test organism	Diluted Compound in mm			Control water	Effective Zone of Inhibition			Ciprofloxacin
	80%	60%	40%		80%	60%	40%	
Bacillus subtilis	12	10	9	5mm	7	5	4	20
Escherichia coli	14	12	10	5mm	9	7	5	22
Staphylococcus aureus	15	12	11	5mm	10	7	6	18
	Undiluted DMSO extract Replicates				Control DMSO	Control water	Effective Zone of Inhibition	
	1	2	3	Mean				
Bacillus subtilis	15	14	13	14	5.0	Nil	13	
Escherichia coli	14	15	16	15	5.0	Nil	14	
Staphylococcus aureus	17	15	16	16	5.0	Nil	10	

TABLE 2: Antifungal effect of Ni II compound

Test organism	Diluted Compound in mm			Control water	Effective Zone of Inhibition			Ciprofloxacin
	80%	60%	40%		80%	60%	40%	
Candida albicans	13	11	Nil	5mm	8	6	Nil	21
Rhodotorulla. minuta	16	14	12	5mm	11	9	7	22
S.cerevesiae,	12	10	9	5mm	7	5	4	20
	Undiluted DMSO extract Replicates				Control DMSO	Control water	Effective Zone of Inhibition	
	1	2	3	Mean				
Candida albicans	17	16	17	16.6	5.0	Nil	11.6	
Rhodotorulla. minuta	18	19	19	18.6	5.0	Nil	13.6	
S.cerevesiae,	16	15	16	15.6	5.0	Nil	10.6	

The pure extract of Ni II compound gave zone of inhibition 18mm, 19mm, 19mm against *Rhodotorulla minuta,* and effective zone of inhibition were measured 13mm ,14mm 12mm ,14mm . Antifungal (fluconozole) gave zone of 27mm and the effective zone was 22mm. (table no 11) . In first test 20% , 40%, 60%, 80% of dilution gave the zones of inhibition 12mm 14mm, 16mm. respectively against *Rhodotorulla. minuta.* Effective zone was calculated by subtracting the observed zone from the actual diameter of disc i.e.5mm. Effective zones of inhibition for 20%, 40%, 60%, 80% dilutions were 4mm, 7mm, 9mm, 11mm.

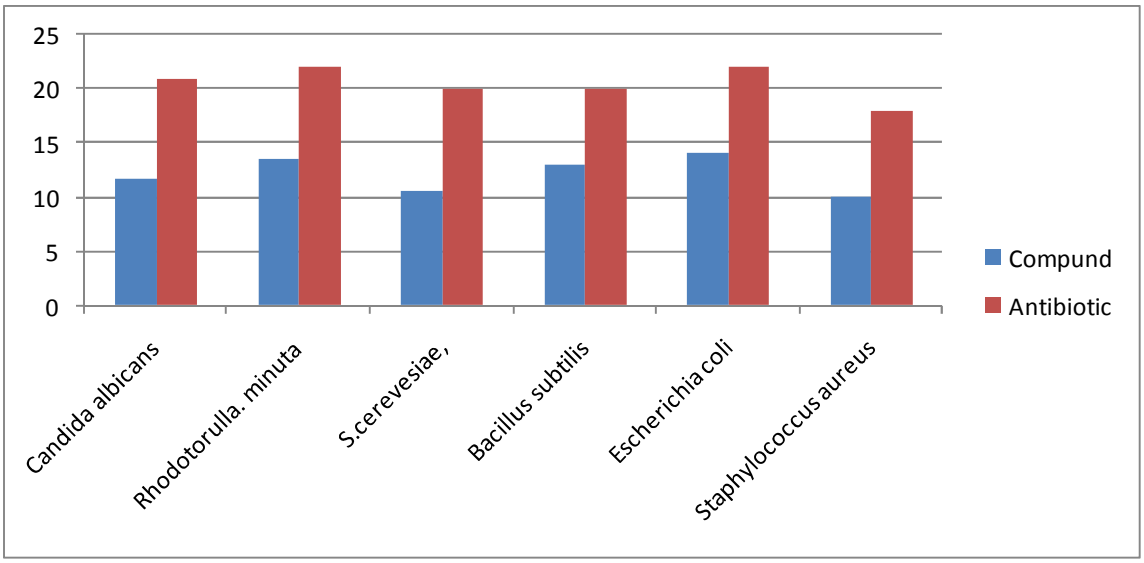

FIGURE 1: Antimicrobial effect of Ni II compound and compared with Antibiotic

The pure extract of Ni II compound gave zone of inhibition 16mm, 15mm,, 16mm against *Sacchromycese cerevesiae,* and effective zone of inhibition were measured 11mm,10mm,11mm . Antifungal (fluconozole) gave zone of 25mm and the effective zone was 20mm. (table no 10) . In first test20% dilution of the sample gave no zone. While 40%, 60%, and 80% of dilution gavethe zones of inhibition 9mm, 10mm 12 mm. respectively against *Sacchromycese cerevesiae.* Effective zone was calculated by subtracting the observed zone from the actual diameter of disc i.e.5mm. Effective zones of inhibition for 20%, 40%, 60%, 80% dilutions were nil.4mm, 5mm, 7mm.

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