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ANTIMICROBIAL ACTIVITY OF COBALT(II) COMPLEX WITH 2-AMINOBENZOXAZOLE

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ABSTRACT
In view of the fact that a large number of derivatives of benzoxazole have been found to exhibit a wide variety of antimicrobial activities. Heterocyclic compounds play an important role in medicinal chemistry and exhibit wide range of biological activities. Cobalt(II) chloride reacts with 2-aminobenzoxazole to give complex of the formula $[CoL_2Cl_2]$, where L=2-aminobenzoxazole. The antimicrobial activity of the complex against E.coli ATCC25922,Salmonella abony ATCC6017, Pseudomonas aeruginosa ATCC27853, Staphylococcous aureus ATCC25923, Bacillus subtilis ATCC11774. Benzoxazole derivative have been reported antibacterial activity. The minimum inhibitory concentration (MIC) was determined for the complex . It was found that tested compounds were more active against gram-positive slightly active to gram-negative bacteria.

KEYWORDS: 2-amino Benzoxazole , Antibacterial activity , Co(II).

INTRODUCTION

The approach to the study and design of medicinal agents has centered primarily on the gross chemical structure of natural and synthetic compounds having established biological action. Benzoxazole and its derivative 2-aminobenzoxazole are interesting heterocycles because of their antimicrobial activity. It has been found that they possess antibacterial, antifungal, antihistaminic, cytostatic, local analgesic, hypotensive and anti-inflammatory activity (I-III). It was confirmed to have a moderate in vitro anti-HIV activity (IV). In recent years, transition metal complexes have attracted particular interest because of their potential use in several biological processes. However, in the recent time, possible therapeutic properties of the metal complexes have been examined. It was found that the complex of transition metal with 2-aminobenzoxazole showed a higher antimicrobial activitiy(V). Following our studies of the reactivity of 2-aminobenzoxazole with metallic chloride(VI), we evaluated the antimicrobial activity of this type of complex in this study. We report in vitro antimicrobial activities of 2-aminobenzoxazole and their cobalt(II) complex against three gram-positive and two gram-negative bacteria(VII). Modifications of the basic structure are obtained by chemical synthesis and the effect of these change in biological response are used to compile structure activity relationship. These relationships are intended to serve as a guide in the interpretation of the structural feature essential for a given type of drug activity and also in the design

of new agents of similar biological activity. A currently promising approach is the attempt to relate certain physiochemical properties of drugs to their mode of action which leads to an understanding of drug action or result in the development of more effective drug(VIII-XII).

MATERIAL AND METHODS

The present investigating studies includes the chemistry and application of highly interesting and significantly useful oxygen and nitrogen molecules.

Reagents

All chemicals used to prepare the ligands and complexes were of analytical reagent grade, commercially available from different sources. The ligands were synthesized as described in the literature (XIII-XVII).

Preparation of complex

The complex was prepared by refluxing for two hours, the respective metal chiloride with ligand in 1:2 molar ratio in ethanolic medium on concentrating, the complex so formed was suctioned, filtered, washed with alcohol and dried in vacuum over $CaCl_2$..on the basis of analytical data the complex was found to possess molecular formulae ml_2x_2 where m=Co(II),l_2=2-aminobenzoxazole and x_2=cl.

Antimicrobial investigations

Disc-diffusion technique

Antimicrobial activity of the synthesized compound was tested by the disc-diffusion technique.

Disc-diffusion technique- It is type of quantitative analysis and is done by using Kirby-Bauer method to determined the antimicrobial activity of a compound at a fixed concentration.

Media

The media employed in bacteriological studies were prepared dissolving the required amount of component of the subjective media .media for bacteria is Nutrient Broth and Nutrient Agar.

Test

For the growth of microorganism pour plate method was used. In this method 1ml of defined density of microbial pure culture suspension was poured into 90 mm glass Petri plates (Borosil,India) and spread by L-spreader after that add autoclaved media poured, and left to solidify under laminar air flow. After solidification of media was the sterile filter paper discs, impregnated with fixed dose viz.10mg/ml,1mg/ml,100µg/ml,10µg/ml,1µg/ml. Of the compound were placed on the plate keeping equal distance between them with the help of sterilized forceps.The plates were incubated for 24hr at 37^{o}c for the bacterial strains.

Measurement zone of inhibition

The diameter of the clearing zone appeared encircling the discs were measured as zone of inhibition in mm. The diameter of zone of inhibition is directly proportional to the degree of sensitivity of the bacterial strains and concentration of compound under test. The data of antibacterial activity reveals that, with the increase in concentration of drug, increase in zone of inhibition occur in petridish.

RESULTS AND DISCUSSION

The antimicrobial activity of the Co (II) complex of 2-aminobenzoxazole was tested first by the agar disc-diffusion method against gram-positive and gram-negative bacteria . The results of these studies are summarized in Table.

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10 mg/ml solution in DMSO, serially diluted, used 50 µl for test						
Test Bacteria	10 mg/ml	1 mg/ml	100 µg/ml	10 µg/ml	1 µg/ml	NC
Co Compound	**Zone of inhibition in mm**					
E.coli ATCC25922	16	13	12	10	8	0
Salmonella abony ATCC6017	12	10	10	8	6	0
Pseudomonas aeruginosa ATCC27853	16	13	10	8	8	0
Staphylococcous aureus ATCC25923	18	15	13	11	10	0
Bacillus subtilis ATCC11774	21	18	14	10	8	0

From the data given in Table, it is clear that the tested compounds were more active against gram-positive bacteria than against gram-negative Pseudomonas aeruginosa. It may be concluded that the antimicrobial activity of the compounds is related to cell wall structure of the bacteria. Considering of the structural formula of the compounds that exhibited antimicrobial activity, it can be concluded that cobalt (II) complex of 2-aminobenzoxazole may play a role in the antimicrobial activity.

CONCLUSIONS

Cobalt(II) chloride reacts with 2-aminobenzoxazole to give complex of the formula $[CoL_2Cl_2]$, where the cobalt(II) complexes were evaluated for their in vitro antimicrobial activity against E.coli ATCC25922, Salmonella abony ATCC6017, Pseudomonas aeruginosa ATCC27853, Staphylococcous aureus ATCC25923, Bacillus subtilis ATCC11774. It was found that the tested compounds were more active against grampositive than gram-negative bacteria. cobalt (II) complex of 2-aminobenzoxazole are play important role in antimircrobial activity in the different type of bacteria. This compound shown that it is highly active against bacillus subtilis than other on the 10mg/ml concentration , at the same concentration E.coli and Pseudomonas aeruginosa , are similarly active. On considering the structural formula of the compound that exhibited antimicrobial activity, it can be concluded that cobalt (II) complex of 2-aminobenzoxazole may play a role in the antimicrobial activity.

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