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ANTIBACTERIAL SCREENING OF 1(4-CHLORO PHENYL)-2(P-TOLYLTHIOCARB - AMIDO)-1-ETHANOL

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Abstract: Present work deals with anti-bacterial screening of 1(4-Chlorophenyl)-2(p-Tolyl thiocarbamido)-1-ethanol against Gram-positive bacteria (*Staphylococcus aureus*, *Enterococcus faecalis*, *Streptococcus pyogenes*, *Bacillus cereus*) and Gram-negative bacteria (*Escherichia coli*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Proteus vulgaris*, *Enterobacter aerogenes*) at 0.001M and 0.01M concentrations by disc diffusion method. The effect of the structure of the investigated compounds on the antimicrobial activity is discussed. This compound showed remarkable result against *Escherichia coli and Staphylococcus aureus at 0.01 M rather than 0.001M rather than others*.

Keywords*: 1(4-chlorophenyl)-2-(p-Tolylthiocarbamido)-1-Ethanol, Gram Positive bacteria, gram negative bacteria, antibacterial activities*

I. INTRODUCTION

The escalating prevalence of antibiotic-resistant bacterial strains poses a significant threat to global public health, necessitating the development of novel antimicrobial agents with enhanced efficacy and broader spectra of activity. In this context, heterocyclic and sulfur-containing compounds have emerged as promising scaffolds in medicinal chemistry due to their diverse biological properties and structural adaptability [1-7]. Thiocarbamido derivatives**,** characterized by the presence of the thiocarbamoyl functional group, represent a versatile class of compounds known for their pharmacological potential. The incorporation of various substituents onto the thiocarbamido backbone has been shown to modulate their phys-icochemical properties and biological activity, particularly in the realm of antibacterial efficacy [8-12]. These derivatives are believed to exert their antimicrobial effects through multiple mechanisms, including disruption of bacterial cell wall synthesis, inhibition of enzymatic pathways, and interference with nucleic acid function. Recent studies have highlighted the significance of structural modifications such as the introduction of aromatic rings, electron-donating or withdrawing groups, and heteroatoms in enhancing the antibacterial potency of thiocarbamido compounds [13-17]. Such substitutions not only influence lipophilicity and membrane permeability but also improve target specificity and reduce toxicity. many researchers evaluated antibacterial activity of substituted thiocarbamido derivatives [18-25].

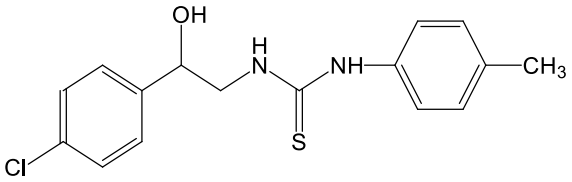
This research aims to synthesize of 1(4-chlorophenyl)-2-(p-Tolylthiocarbamido)-1-Ethanol and evaluate for their antibacterial activity against selected Gram-positive and Gram-negative bacterial strains by disc diffusion method. By exploring the structure-activity relationships (SAR) within this compound, the study seeks to identify potent candidates that could serve as leads for the development of new antimicrobial agents in the fight against resistant pathogens.

II. RESEARCH METHODOLOGY

All AR grade chemicals were used throughout experiment.

2.1 Synthesis

1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol was synthesized by refluxing 4-(2-amino-1-hydroxyehtyl) chlorobenzene and p-tolylisothiocyanate in acetone medium for 2 hours. After completion of reaction, to isolated 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol from solvent. After distillation of acetone the product is isolated which is recrystalized from ethanol to get white colour crystalline solid flakes with m.p. 82^0C.



1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol

2.2 Antibacterial activity

The antibacterial activities of 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol were tested to evaluate their efficiencies against gram positive and gram negative pathogenic bacteria's. All the chemical and media were purchased from M/s. Hi-Media Pvt. Ltd., Mumbai, India. The organisms used were taken for studies are Gram-positive bacteria (two different standard strains of *Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus faecalis, Streptococcus pyogenes, Bacillus cereus*) and Gram-negative bacteria (*Esherichia coli, Pseudomonas aeruginosa, Enterobacter cloacae, Proteus vulgaris, Enterobacter aerogenes*). For the evaluation of in-vitro antimicrobial activity.

In the present study, we used agar disc diffusion method to find out the activity of newly synthesized 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol against the microbes. Then the minimum inhibitory concentrations were measured by serial dilution method for those compounds only which were found to be active.

2.3 Preparation of sample solution

To study antimicrobial activity of synthesized molecule dissolve and prepared their solution in ethanol medium. Thus, ethanol was taken and tested as control. To check the potency of compounds, the solutions were prepared with 50 alpha gm/ml concentration. 1 ml of this solution was added to 5 ml of nutrient broth solution containing organism to be tested. Tubes with organism and medium with solvent were used as controls. These tubes were kept for incubation at 37°C for 24 hrs. Most of the compounds under study exhibited total inhibition of the test cultures within 24 hours of incubation. The tube containing compounds showing inhibition (antimicrobial activity) was clear and the tube which was kept as control where no compound was added showed growth. Therefore, for all the antibacterial screenings, the concentrations of 0.001 M and 0.01M of 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol used, which is in the range of the substance to be used as antibiotic.

2.4 Disc diffusion method

Every time fresh sterile nutrient agar medium was prepared. The proceedings were carried out aseptically. In each sterile Petridis 15-20 ml of molten medium was added. Simultaneously 0.05-0.1 ml (approx. 2-3 drops) of 24 hours fresh diluted culture of organism under study was added to each Petri plate. The nutrient broth culture and nutrient agar media were mixed thoroughly by rotatory motion of agar plate on a plane surface. It was allowed to solidify at room temperature. Then sterilized Whitman filter paper No. 1 discs (6 mm diameter) thoroughly moistened with the same concentration of each of the compound were placed on the surface of the plate. Disc moistened with ethanol was used as control. They were allowed to diffuse in the media and then the plates were incubated at 37°C for 24 hrs. The diameter of the zones of inhibition was observed.

III. RESULTS AND DISCUSSION

Newly synthesized 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol molecule was studied for their antimicrobial activities. All the pathogens tested during analysis are human pathogens. The activities of compounds were tested against all the pathogens by disc diffusion method. Anti-bacterial activity of 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol against gram positive and gram negative pathogens respectively shown in Table-1 and Table-2.

Table-1: Zone of Inhibition of 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol in mm for Gram-positive bacteria's

Conc. M	***Staphylococcus aureus,***	***Staphylococcus epidermidis***	***Streptococcus pyogenes***	***Bacillus cereus***
0.001	14	08	--	08
0.01	17	10	--	11

Table-2: Zone of Inhibition of 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol in mm for Gram-Negative bacteria's

Conc. M	***Escherichia coli***	***Pseudomonas aeruginosa***	***Proteus vulgaris,***	***Enterobacter aerogenes***
0.001	16	--	07	06
0.01	18	--	09	08

All the organisms studied are human pathogens; from the resultant data reveals that the synthesized compound showed remarkable and considerable antimicrobial activities. From above Table**s,** 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol shows high zone of inhibition against *Staphylococcus aureus* and *Escherichia coli* while no zone of inhibition against *Streptococcus pyogenes and Pseudomonas aeruginosa* and weak zone of inhibition found against *Staphylococcus epidermidis, Bacillus cereus, Proteus vulgaris and Enterobacter aerogenes.* During present work observed that 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol act strongly in 0.01 M concentration than 0.001 M of its concentration. *It shows highest* Zone of Inhibition against gram negative bacteria than gram positive bacteria.

IV. CONCLUSION

In present work found investigated about antimicrobial activity against various pathogenic bacteria at 0.001M and 0.01M concentration. presently 1(4-Chlorophenyl)-2(p-Tolylthiocarbamido)-1-ethanol reveals that remarkable and considerable antibacterial activity. Specially it shows remarkable antibacrerial activity against *Escherichia coli* (causes diarrhea) and *Staphylococcus aureus* (causes pus formation) rather than other gram positive and gram negative bacteria's. so these molecules can be used as alternative for the treatment of diseases caused by the above mentioned pathogens only if they do not have toxic and other side effects after the details study. The potency of the drug is increased due to substitution.

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