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Synthesis, Characterization and Study of Antimicrobial Activity of Phenyl Benzoate

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ABSTRACT-

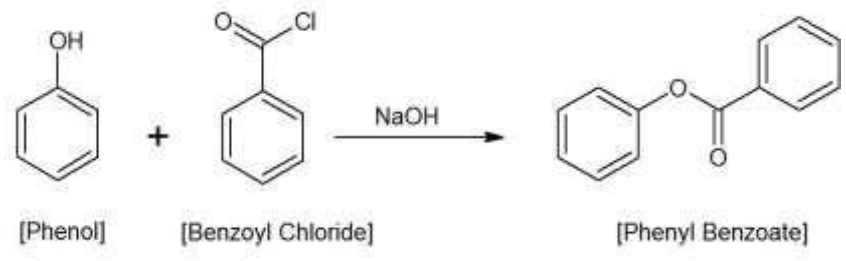
In this study the phenyl benzoate is synthesized by phenol and benzoyl chloride with the help of sodium hydroxide by Schotten- Baumann method of benzoylation. This phenyl benzoate compound was characterized by various qualitative and quantitative techniques. The given study includes the synthesis and antimicrobial activity, which was also determined by cup plate method. The products exhibited comparable Antimicrobial activity with Butanol and chloroform at same concentration against the E. coli and S. aureus. The phenyl benzoate has vasodilating and spasmolytic effects and also it is present in many asthmatic and whooping cough drugs.. Benzyl benzoate is also used as a topical scabicide, acaricide, as well as pediculicide in veterinary hospitals.

Keywords: Antimicrobial activity, phenyl benzoate, phenol and benzoyl chloride.

1. INTRODUCTION

An antimicrobial agent is defined as a natural or synthetic substance that kills or inhibits the growth of microorganisms such as bacteria, fungi and algae.[1] or the drug used to prevent the pathogenicity of microorganisms is called an antimicrobial agent. The Antimicrobial agent are large variety of chemical compounds and physical agents that are used to destroy microorganisms or to prevent their development. Antimicrobial susceptibility testing can be used for drug discovery, epidemiology as well as prediction of therapeutic effect. In this research, we focused on the synthesized and conclude the antimicrobial activity for the in vitro investigation of Phenyl benzoate drug. Infections and diseases may be caused by different types of organisms like bacteria, fungi, and viruses, etc., in humans and animals.[2] It is include gram positive and gram negative bacteria for the Antimicrobial activity against Escherichia coli, Staphylococcus aureus (S. Aurious, E.coli).

In the Schotten- Baumann method of benzoylation, phenols are reacted with benzoyl chloride in presence of aqueous sodium hydroxide and the reaction mixture is shaken vigorously. Benzoylation proceeds smoothly under these conditions and the solid benzoyl compound being insoluble in water separates out. Phenols when subjected to the Schotten- Baumann benzoylation, first dissolves in sodium hydroxide to give sodium phenoxide, which then undergoes benzoylation to give phenyl benzoate.[3,4] The phenyl benzoate is insoluble in water and soluble in organic solvent like chloroform ether and ethanol.[5]



2. MATERIALS

Synthesis Material: Phenol, sodium hydroxide, benzyl chloride, alcohol, etc

Solvents: chloroform, N- butanol

Nutrient Agar media- agar, peptone, Beef extract, Yeast extract, sodium chloride, activated carbon.

Micro-organisms: Gram positive and Gram negative (E. coli and S. aureus)

3. METHODS

Synthesis of phenyl benzoate:

Take 2ml phenol, add 10% NaOH 30ml solution in an iodine flask mixed well then add 4ml benzyl chloride and again mixed. Shake for 15-20 min, filter the preparation and separate the product. By using the alcohol recrystallized the product and dries it.[5]

Solubility Testing: In Ethanol, Butanol, Chloroform, water and Di-ethyl ether

Antimicrobial activity

Agar plate media was prepared by adding 28 g of a nutrient agar powder in 1 liter of distilled water, heat the mixture and dissolve all components .The dissolved mixture is put in autoclave at 121^0c for 15 min and allow to cool but not solidify. Then inoculated the selected microorganism in to nutrient agar medium and poured into plates and set till solidified. Then by using the cup-plate method/ agar well diffusion method, holes about 9 mm in diameter are cut in the medium with a sterile cork borer. The antimicrobial solution of phenyl benzoate directly placed in the holes. The plates are incubated.[6,7,8]

4. RESULT AND DISCUSSION

The synthesized product of phenyl benzoate was Characteristics by:

Nature: White crystalline powder.

PH: 8.6

Melting point: 68-70°c.

Fig. no 01 – Phenyl benzoate crystal

Solubility Testing: Freely soluble in ethanol and insoluble in water and slightly soluble in Di-ethyl ether, Butanol, chloroform.

Study of Antimicrobial Activity:

The synthesized compound of phenyl benzoate was tested for antimicrobial activity against the Gram positive and Gram negative micro-organism. The antimicrobial activity against human pathogens namely Escherichia coli, Staphylococcus aureus, by cup plate method and the diameters of the zone of inhibition (cm) against the are as shown in Table no 01 and Fig. no 02.

Table no 01- Antimicrobial activity of Phenyl benzoate

Sr. No.	Name of solution	Concentration (mg/ml)	Zone of Inhibition (cm)	
			S.aurius	E-coli
1	Phenyl benzoate in chloroform(C)	0.5	0.53	0.61
2	Phenyl benzoate in Butanol(B)	0.5	0.65	0.72

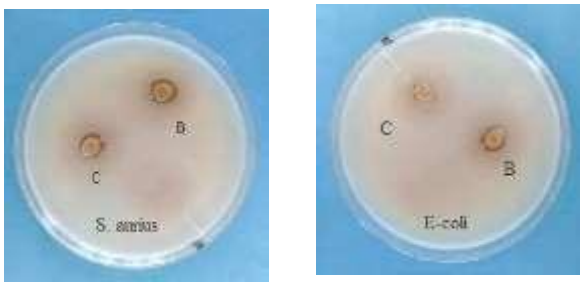


Fig. no 02: Antimicrobial activity of Phenyl benzoate

CONCLUSION:

Phenyl benzoate have been prepared and analyzed i.e conformed by some characters. The antimicrobial activity of the Phenyl benzoate compounds with Chloroform and butanol shows the effect against Gram Positive as well as Gram Negative bacteria.

The antimicrobial action of the compounds shows good effect against S.aurius than E.coli bacteria. Phenyl benzoate compounds have the capacity of inhibiting metabolic growth of pathogenic microorganism.

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