Volume : 5 | Issue : 1 | JANUARY 2016 • ISSN No 2277 - 8179

Research Paper

Synthesis, Spectral and Comparative Antimicrobial Study of Substituted Schiff Bases.

Chemistry

KEYWORDS : Synthesis, Imines, Investigation, Antibacterial activity

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ABSTRACT

Some substituted schiff bases have been synthesized by microwave assisted technique . The compounds were synthesized by the reaction of amino compounds and substituted aldehydes in ethanol. Such compounds were characterized by different physico-chemical techniques like, melting point, elemental analysis, IR technique. The substituted schiff bases have been screened for their in vitro biological activities against bacteria and fungi.

INTRODUCTION :

Schiff bases such as are a class of important compounds in medicinal and pharmaceutical field. The Schiff bases bearing aryl groups or heterocyclic residue posses excellent biological activities which has attracted attention of many researchers. [1-3] Because of the relativeeasiness of preparation, synthetic flexibility, and the special property of C=N group, Schiff bases are generally excellent chelating agents,[4-10] especially when a functional group like –OH or –SH is present close to the azomethine group so as to form a five or six membered ring with the metal ion.

In azomethine derivatives, the C=N linkage is essential for biological activity, several azomethines were reported to possess remarkable antibacterial, antifungal, anticancer and diuretic activities [11] Schiff bases have wide applications in food industry, dye industry, analytical chemistry, catalysis, fungicidal, agrochemical and biological activities[12] Schiff bases have number of applications viz., preparative use, identification, detection and determination of aldehydes or ketones, purification of carbonyl or amino compounds, or protection of these groups during complex or sensitive reactions. Several Schiff bases possess anti–inflammatory, allergic inhibitors reducing activity radical scavenging, analgesic and anti-oxidative action.

In this paper we have synthesized some substituted schiff bases by microwave irradiation technique .The synthesized compounds are characterized by IR ,NMR spectra. Further their antibacterial activities are screened.

EXPERIMENTAL:

Melting points were determined in open capillaries and are uncorrected. IR spectra were recorded in KBr on Perkin-Elmer 883 spectrometer. All the compounds gave satisfactory analysis. Benzaldehyde, 4-methylbenzaldehyde, 4-hydroxybenzaldehyde, 4nitrobenzaldehyde were obtained from Sigma- Aldrich Ltd and used without further purification. All the compounds were tested for their antibacterial activity against negative bacteria *E.coli* at concentration of 10 and 50 µg/disc using cup-plate method

2. METHOD AND MATERIAL:

2.1 Typical experimental procedure:-

3,4,5trihydroxy-benzohydrazide:

3, 4,5-trihyydroxy benzohydrazide was synthesized by refluxing propyl gallete (0.01mol) and hydrazine hydrate in presence of 25 cm3ethanol for about 6 hrs. While refluxing 2-3 drops of conc. H_2SO_4 was added .After refluxing the crude compound was filtered and washed with distilled water .It was then recrystallized from ethanol. This compound is further used for the synthesis of substituted Schiff bases.

1. 3,4,5trihydroxy benzoamido-4-methylimine.

0.01 mol.3,4,5 trihydroxy benzohydrazide was mixed with equimolar amount of p-methyl benzaldehyde. In this reaction mixture Dimethyl sulphoxide was added as solvent .It was then irradiated to microwave. After completion of reaction ,the crude product was washed with distilled water ,and recrystallized from ethanol.

IR:(ν max) cm^{-1}: 3420(OH), 1617.72(C=N), 1563,1484.13 (C=C Aromatic),1400(-CH3)

Yield :82%,time required for completion of reaction:40 sec.

2. 3,4,5trihydroxy benzoamido-4-nitroimine.

0.01 mol.3,4,5 trihydroxy benzohydrazide was mixed with equimolar amount of p-nitro benzaldehyde. In this reaction mixture Dimethyl sulphoxide was added as solvent .It was then irradiated to microwave. After completion of reaction ,the crude product was washed with distilled water ,and recrystallized from ethanol.

IR:(ν max) cm-1: 3420(OH), 1596.19(C=N), 1522, (C=C Aromatic),1289.7(NO2),842.5(p sub)

Yield :67%,time required for completion of reaction:51 sec.

3. 3,4,5trihydroxy benzoamido-4-hydroxyimine

0.01 mol.3,4,5 trihydroxy benzohydrazide was mixed with equimolar amount of p-hydroxy benzaldehyde. In this reaction mixture Dimethyl sulphoxide was added as solvent .It was then irradiated to microwave. After completion of reaction ,the crude product was washed with distilled water ,and recrystallized from ethanol.

IR:(ν max) cm-1: 3190(OH), 1605(C=N), 1585, 1560, 1525 (C=C Aromatic), 1H

. Yield :78%,time required for completion of reaction:44 sec.

3.BIOLOGICAL ACTIVITY:

3.1. ANTIBACTERIAL ACTIVITY

Procedure:

The antibacterial activity was measured by agar cup method. The bacterial cultures selected were, two gram negative cultures viz. *Escherichia coli; Salmonella typhi and* two Gram positive cultures viz. *Staphylococcus aureus, Bacillus subtilis.* This seeded preparation was then poured in sterile Petri plate under aseptic condition and allowed it to solidify. Cups of 10mm diameter were borered in the agar plate with sterile cork borrer. 100. ~I ·of compound solution prepared in Dimethyl Sulphoxide (1%) was added in the cup under aseptic condition with the help of micropipette. 100 ul of DMSO was also placed in one of the cup as blank (negative control). A standard antibiotic disk impregnated

Volume : 5 | Issue : 1 | JANUARY 2016 • ISSN No 2277 - 8179

with 10 units of Penicillin was also placed on the seeded nutrient agar surface as standard reference antibiotic (positive control). Plates were incubated at 37°C for 24 hours. After incubation the average zone of inhibition was recorded in mm.

3.2 ANTIFUNGAL ACTIVITY

Procedure:

Antifungal activity was performed by Poison plate method. The "medium used was Potato Dextrose Agar (Himedia). The medium was prepared and sterilized at 10 Psi in autoclave for 15 minutes. Then the compound to be tested is added to the sterile medium in aseptic condition so as to get final concentration as 1%. A plate with DMSO was prepared as blank (negative control) similarly a plate with 1% Gresiofulvin was prepared as standard reference plate (positive control). *Aspergillus niger, Penicillium chrysogenum, Fusarium moneliforme, Aspergillus flavus* were selected as test fungal cultures. They were allowed to grow on slant for 48 hours so as to get profuse sporulation. The fungal suspension was spot inoculated on the plates prepared using. Compound with the help of nicrome wire loop. The plates were incubated at room temperature for 48 hours. After incubation. plates were observed for the growth of inoculated fungi.

RESULT AND DISCUSSION:-

The inhibition zones were measured in mm and results are shown in following table . The results of antimicrobial screening, indicate that substituted Schiff bases show significant activity against Staphylococcus aureus, Escherichia coli, Bacillus subtilis and salmonella typhi. When we increase concentration, area of inhibited growth also increased.

The antibacterial results are shown in table 1

Table no.1

Sr.no.	Compound	Escherichia coli	*Salmonella* typhi	*Staphylococcus aureus,*	*Bacillus* subtilis
1	1a	32	27	22	18
2	2b	28	22	20	17
3	3c	30	22	19	17
4	DMSO	-ve	-ve	-ve	-ve
5	Penicilin	24	19	34	18

Legends- - ve No Antibacterial Activity

Zone of inhibition -- mm

Antifungal activity

From the results obtained by the antifungal activity it is found that the compounds e,f and g

active against all tested fungi .

The greater activity of these compounds is probably due to the presence of methyl group.. Compound b does not show activity against any tested fungi as compared to standard drug.. The antifungal activity results are shown in Table 2.

Table 2

Sr. no.	Compound	Aspergillus niger	Penicillium chrysogenum	Fusarium moneliforme	Aspergillus flavus
1	1a	+ve	+ve	+ve	+ve
2	2b	-ve	-ve	-ve	-ve
3	3c	-ve	-ve	-ve	+ve
4	+ve control	+ve	+ve	+ve	+ve
5	-ve control	-ve	-ve	-ve	-ve

Legends- +ve - Growth (No Antifungal Activity)

-ve - No Growth (Antifungal Activity Observed)

CONCLUSION:

Schiff bases of substituted aldehydes were synthesized and characterized by analytical and spectral techniques. These compounds exhibited significant activity against all the tested microorganisms.

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