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RESEARCH ARTICLE

Synthesis, Characterization, Antimicrobial Evaluation of 2-Amino pyrimidine Schiff base derivative

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ABSTRACT:
Schiff base or imine is an analogue of a ketone or aldehyde in which the carbonyl group has been replaced by an imine or azomethine group. Schiff bases exhibits a broad range of biological activities, including antifungal, antibacterial, antimalarial, antiproliferative, anti-inflammatory, antiviral, and antipyretic properties Imine or azomethine groups are present in various natural, natural-derived and non-natural compounds. The imine group present in such compounds has been shown to be critical to their biological activities A new compound (Z)-N_(4-dimethylamino) benzylidene) pyrimidine-2-aminewas synthesized by the reaction of 2-aminopyrimidine, 4-(dimethylamino) benzaldehyde and a drop of acetic acid in the presence of ethanol respectively. The chemical structures of the synthesized compounds were characterised by using Fourier Transform Infra Red Spectroscopy (FTIR), Proton Nuclear Magnetic Resonace Spectroscopy technique (1HNMR). The synthesized compound showed mild antibacterial activity against Staphylococcus aureus and Escherichia coli.

KEYWORDS: Antibacterial, Aromatic aldehyde, 2-amino pyrimdine, SchiffBase, Imine.

1. INTRODUCTION:
Schiff bases are products formed by reacting primary amines and carbonyl compounds and it was discovered by a German chemist, Nobel Prize winner, Hugo Schiff in 1864[1].

Structurally, Schiff base or imine is an analogue of a ketone or aldehyde in which the carbonyl group has been replaced by an imine or azomethine group[2].

Schiff bases exhibits a broad range of biological activities, including antifungal, antibacterial, antimalarial, antiproliferative, anti-inflammatory, antiviral, and antipyretic properties[3,4]. Imine or azomethine groups are present in various natural, natural-derived and non-natural compounds. The imine group present in such compounds has been shown to be critical to their biological activities[5,6,7,8]

In this present study Schiff bases was synthesised by reacting 2-aminopyrinidine, 4-(dimethylamino) benzaldehyde and a drop of acetic acid in the presence of ethanol respectively The chemical structures of the synthesized compounds were confirmed by means of FTIR, 1H-NMR. The synthesized compounds were screened for antibacterial activity against *Staphylococcus aureus, Escherichia coli.*

2. CHEMISTRY:
The melting points were taken in open capillary tube and are uncorrected. The IR spectra of the compounds were recorded on IR Spectrophotometer using KBr Pellets 1H-NMR spectra was recorded on 500 MHz NMR using DMSO-d6 as solvent Facility at SRM University. The chemical shifts are reported as parts per million downfield from tetramethylsilane (Me4Si). The purity of the compounds was checked by TLC on pre-coated aluminium sheets (Silica gel 60 F254) using benzene and alcohol as mobile phase and visualized by iodine vapors.

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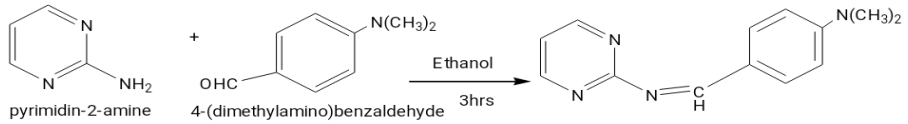
Synthetic scheme for Schiff Bases:



(*Z*)-*N*-(4-(dimethylamino)benzylidene)pyrimidin-2-amine
(Compound P1)

3. GENERAL METHODS OF SYNTHESIS OF SCHIFF BASE[9, 10,11]:

Compound P1 2-aminopyrimidine (0.01mol), 4-(dimethylamino) benzaldehyde (0.01mol) and a drop of acetic acid was dissolved in ethanol (25ml) and heated on a steam bath for 45-60 min or on a water bath for 3-4 hrs. The reaction mixture was allowed to stand at room temperature for 24hrs. The mixture was cooled properly. The product was formed. It was filtered, dried under vacuum and recrystallized using warm ethanol
This study was based on Ramachandran.S[9]*etal.*

1H-NMR:
(DMSO-d6): 1H-NMR

7.63-7.66, 9.6(m, 2H; CH Pyrimidine), 6.5-6.6(m, 2H; benzene) 8.1(s, 1H; CH-benzylidene), 2.97 (s, 3H dimethyl)

IR (KBr) cm^{-1}:1987(C=N), 1362(C-N), 939(CH-Ph), 1362(N-methyl), 1474(CH3)

601(m), 716(m), 814(m), 939(s), 995(m), 1067(m), 1159(m), 1230(m), 1362(m), 1474(m), 1683(m), 1987(s), 2093(m) 2174(m), 2260(w), 2345(w), 2475(w), 2540(w), 2713(w), 2954(w)

4. ANTIMICROBIAL ACTIVITY:

The antibacterial activity[12] of the synthesised compound were tested against gram(+) bacteria (*Staphylococcus aureus* and gram(-) bacteria (*Escherichia coli* using Nutrient agar medium.

4.1 Cup Plate method[13,14]:

Add the suspension to the medium at a temperature between 40 to 50^{o}. Immediately pour the inoculated medium into petri dishes to give a depth of 3-4mm thickness. Ensure that the layers of medium are uniform in thickness.

The prepared dishes are stored properly. Ensure that no significant growth or death of the test organism occurs before the dishes are used. The surface of the agar layer is to be dry at the time of use. The cavities in the agar plates are prepared be using a metal borer. The cavities formed must be uniform throughout the dish. Add the solutions to the surface of the solid medium in sterile cavities prepared in the agar medium. The volume of solution added to each cavity must be uniform and sufficient to fill the bored holes. Leave the dishes standing for 1-4 hrs at room temperature or at 4^{o}C. Then the plates are incubated at 37±1^{o}C for 24 hrs and observed for antibacterial activity. The diameter of the zone of inhibition was measured for the plates in which the zone of inhibition was observed. The average area of inhibition in millimetre (mm)was calculated and compared with that of the standards as shown in the Table 1 below.

Table 1: Zone of Inhibition in mm

S. No	Compound	Antibacterial activity	
		***Staphylococcus aureus* (Gram+ve)**	***Escherichia coli* (Gram -ve)**
		Zone of Inhibition in mm	Zone of Inhibition in mm
1	Standard 50 µg/ml	40mm	36mm
2	Sample P1 100 µg/ml	17mm	22mm
2	Sample P1 200 µg/ml	19mm	25mm

The antibacterial activity of the Synthesised compound P1 was performed using ciprofloxacin as standard. The concentration of ciprofloxacin used was 50 µg/ml and the concentration of synthesises P1 used was 100 µg/ml and 200 µg/ml respectively. The antibacterial activity was done against *Staphylococcus aureus* (Gram +ve) and *Escherichia coli* (Gram –ve). The compound P1 showed mild activity against both the organisms.

5. SUMMARY AND CONCLUSION:

The present work describes the synthesis of Schiff bases along with their antibacterial activities.

The Schiff bases were prepared by the method of Ramachandran. S *et al*. The reaction completion was confirmed by TLC and the synthesised compounds were purified by recrystallisation.

The structures of the synthesised compounds were assigned on the basis of the spectral data. The infra red, nuclear magnetic resonance spectra of these Schiff bases compounds showed the expected frequencies and signals.

The antimicrobial activity of the Schiff bases was screened by the cup plate method with the standard drug ciprofloxacin, control (solvent DMSO) and the sample (Compound S1).

It showed that the compound had mild activity towards both gram +ve and gram –ve organism. The standard used was ciprofloxacin (50 µg/ml).

As only one methodology was used to determine the antimicrobial activity of the synthesised compounds, there is a need for testing the synthesised compounds against various other microbes and observing their inhibitory activity of the growth of the microorganism. This would give rise to an idea about the mechanism of activity of the antimicrobial compound. Many activities such as antifungal, analgesic, anti-inflammatory, ulcerogenic are also to be performed further.

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