ISSN 0976-7126

INTERNATIONAL JOURNAL OF PHARMACY & LIFE SCIENCES

Synthesis and antibacterial activity of new schiff's bases

Ahmed Syed Shakeel [1]*, Kalyane N.V. [2], Karjgi S.R. [2] and Ahmed Md.Liyakat [1]
1, Department of Pharmachemistry, Luqman College of Pharmacy, Gulbarga-585 102, Karnataka
2, Department of Pharmachemistry, B.L.D.E.A's College of Pharmacy, Bijapur-586103, Karnataka

Abstract

Five novel schiff bases have been prepared from 2-Amino-4-(4-acetanilido) thiazole and substituted aromatic aldehyde to form a number of potentially biologically active Schiff bases (SA_1-SA_5). The structure of all these compounds have been established on the bases of analytical and spectral data compounds SA_1-SA_5 are comparable with standard drug ampicillin against s. aureus and E.coli. Compounds SA_2, and SA_5 shows good activity as compared to standard drug.

Keywords: Schiff bases, Antibacterial activity, Aminothiazole, Ampicillin.

Introduction

Schiff bases are used as substrates in the preparation of a number of industrial and biological active compounds via ring closure, cycloaddition, and replacement reactions. More ever Schiff bases are also known to have biological activities such as bacteriostatics, antimicrobial[1-2], antifungal[3] antitumor[4], and CNS regulants of high selling diuretics[5-7]. All these facts were driving forces to developed novel Schiff bases with wide structural variation. Thus Schiff bases plays pivotal role in medicinal chemistry.

In the present study, various Schiff bases were synthesized and screened for their antibacterial[8-10] activity. Starting compound p-acetamidoacetophenone was obtained by treating p-aminoactophenone with acetic anhydride, the required Schiff bases was obtained according to the reported method[11-12] aminothiazole was treated with various aromatic aldehydes in alcohol to get to different substituted schiff's bases (SA_1 - SA_5).

Material and methods

Melting points were determined in precision melting point apparatus and in open capillaries and are uncorrected. Physical characterization data of all the compounds are given in table 1. The IR spectra were run on a "SHIMADZU FT-IR 8400S FTIR spectrometer in KBr pellets. ^{1}H NMR was recorded using BRUCKER 400 MHz NMR spectrometer in DMSO-d6 Using TMS as internal standard. Mass spectra were recorded on SHIMADZU GC-MS QP-5050 mass spectrometer. All the chemicals used were of analytical grade.

Synthesis of P-Acetamidoacetophenone (II)

P-Aminoacetophenone (30 gm, 0.22 M) and acetic anhydride (90 ml) was taken in beaker. The reaction mixture was heated on a steam-bath for 45 min and allowed to stand for 2 hrs. The solid obtain was filtered, dried and purified by recrystallization from ethanol to get pure 25 gm (83.33%) of the compound II obtained as white crystals.

*** Corresponding Author:**
Mobile: +919945569685; +919663667452
E-mail: atiyashakeel@yahoo.co.in, mlapharm@rediffmail.com, santosh.karajgi@gmail.com

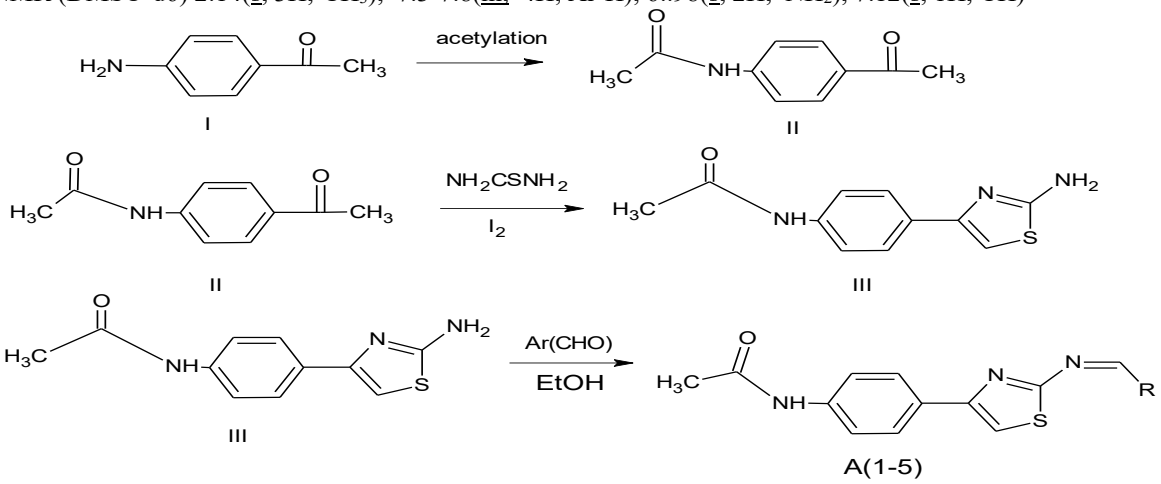
ISSN 0976-7126

Synthesis of 2-Amino-4-(4-acetanilido) thiazole (III)

Thiourea (30.4g, 0.4) mole and iodine (50.8 g, 0.2 moles) ware triturated and mixed with p-acetamidoacetophenone (24g, 0.2 moles). The reaction mixture was heated on a water bath with occasional stirring for 8 hours. The solid obtained was triturated with diethyl ether to remove any unreacted p-acetamidoacetophenone, after which it was washed with sodium thiosulphate to remove any unreacted iodine finally, it was washed with water and the residue filtered dried and dissolved in hot water, heated until most of the solid had gone in to the solution and filtered when hot. The filtrate was cooled and made alkaline with a strong solution of ammonia, Filtered and purified by recrystallisation from water to get pure 15.3 gm (62.5%) of the compound III obtained as light brown crystals.

IR(KBr): 3306(N-H), 1670(C=0), 2965(Ar-CH), 3403(NH_2)

^{1}H NMR (DMSO-d6) 2.14(s, 3H,-CH_3), 7.3-7.8(m, 4H, Ar-H), 6..98(s, 2H, NH_2), 7.12(s, 1H, CH)



SA_1, Ar = phenyl, **SA_2**, Ar = 4-nitrophenyl, **SA_3**, Ar = 2-methylphenyl, **SA_4**, Ar = 3-methylphenyl, **SA_5**, Ar = 2-bromophenyl

Synthesis of Schiff's bases (SA_1 - SA_5).

A mixture containing 2-Amino-4-(4-acetanilido) thiazole (0.01mole) and substituted aromatic aldehyde (0.01mole) in 40 ml of ethanol along with glacial-acetic acid (2-3 drops) was reflux for 3 hrs. The reaction is monitored by TLC. The reaction mixture was cooled to room temperature. Solid obtained was filtered washed with Ethanol, dried and purified by recrystalisation in DMF: Water (1:1) mixture. To get pure compound Schiff Bases (**SA_1-SA_5**)

SA_1 IR (KBr): 3300(N-H), 1670(C=0), 2965(Ar-CH), 1590(N=CH)

^{1}H NMR (DMSO-d_6) 2.04(s, 3H, CH_3), 7.5-7.9(m, 8H, Ar-H), 8.35(s, 1H, N=CH) 8.14(s, 1H, CH).12(s, 1H, CH) 10.02(s, 1H, NH); MS: m/z 321(M^+), 251.

SA_2 IR (KBr): 3340(N-H), 1630(C=0), 1533(NO_2), 1599(N=CH)

^{1}H NMR (DMSO-d_6) 2.32(s, 3H, CH_3), 7.5-7.9(m, 8H, Ar-H), 8.35(s, 1H, N=CH)

MS : m/z 365(M^+), 280, 217.

SA_5 IR (KBr): 3309(N-H), 1680(C=0), 675(BR_2), 1598(N=CH)

^{1}H NMR (DMSO-d_6) 2.10(s, 3H, CH_3), 6.9-7.5(m, 8H, Ar-H), 8.35(s, 1H, N=CH)

MS: m/z 399(M^+), 312, 280

Antibacterial screening

All the synthesized compounds were tested for their antibacterial activity against Gram +ve (s.aureus) and the Gram –ve (E.coi) bacteria at a concentration of 500 µg/ml. using disc-diffusion method[13]. Ampicillin was used as a reference standard at a concentration of 500 µg/ml.

Compounds **SA_2**, and **SA_5** showed good activity as compared to standard drug.

ISSN 0976-7126

Results and discussion

The structures of all the compounds have been established on the basis of spectral data analysis. The appearance of primary amino group band at 3405 cm^{-1} in the IR spectrum, the NMR signal for thiazole proton at δ 7.55, the molecular ion peak at m/z 231 and the fragmentation pattern peaks at m/z 189,159 and 79 confirmed the formation of compound III the compounds A_1-A_5 showed –N=CH-band in IR between 1530-1600 cm^{-1}
The NMR spectra of the compounds **SA_1**– **SA_5** exhibited absence of amino group signal of thiazole at δ 9.46 and the appearance of sharp signal 0f - N=CH- between δ 8.3 -9.1 which indicated the formation of **Schiff bases**. And the compound **SA_1**, **SA_2**, **SA_5**, showed the molecular ion peak at m/z 321, 365, 399 respectively.

Table 1: Characterization data of newly synthesized Schiff Bases SA (1-5)

Compound No	Molecular formula	R	Molecular Weight	M.P.(^{0}C)	Percentage yield %
SA_1	$C_{18}H_{15}N_3OS$	phenyl	320	192-194 ^{0}C	73.48
SA_2	$C_{18}H_{14}N_4OS$	4-nitrophenyl	366	187-189 ^{0}C	61.48
SA_3	$C_{19}H_{17}N_3OS$	2-methylphenyl	335	207-208 ^{0}C	63.53
SA_4	$C_{19}H_{17}N_3OS$	3-methylphenyl	335	179-180 ^{0}C	69.34
SA_5	$C_{18}H_{14}N_2O_1SBr$	2-bromophenyl	400	212-214 ^{0}C	75.48

Table 2: Anti-bacterial activity of newly synthesized aminothiazole derivatives

Sr. no.	Compound	Zone of inhibition (in mm)	
		E.coli	S.aureus
1	SA_1	5.4	8
	SA_2	**7.9**	**13**
	SA_3	5.9	8
	SA_4	6.1	7
	SA_5	**7.2**	**12**
2	**S**	**10.8**	**18**
3	**B**	**0**	**0**

S-Standard (Ampicillin), B-Blank (DMSO)

Acknowledgement

The authors wish to thanks to management & Principal of B.L.D.E.A'S College of Pharmacy for providing laboratory facilities

References

1. Baser M. A., Jadhav V. D., Phule R. M., Archana Y. V. and Vibhute Y. B. (2000). Synthesis and antimicrobial activity of some Schiff bases, *Orient. J. Chem*.. **16**: 553-556.
2. More P. G., Bhalvankar R. B. and Patter S. C. (2001). Synthesis and biological activities of Schiff bases of aminothiazoles. *J. Indian Chem. Soc.*,**78**: 474-475.
3. Singh W. M. and Dash B. C. (1988). Synthesis of some new Schiff bases containing thiazole and oxazole nuclei and their fungicidal activity, *Pesticide,* **22**: 33-37.
4. Hodnett E. M. and Dunn W. J. (1970). Structure-antitumor activity correlation of some Schiff bases, *J. Med. Chem.,* **13**: 768-770.
5. Coppola K. (2001). PTC *Int. appl*. wo, 01 10 8523.
6. Patil S. and Bhagaval G. (1994). *J. int. char.soc*., **71**: 205.
7. Patel K. H. and Mehta A. G. (2006). Synthesis and antifungal activity of azetidinone and thiazoloilidinone derivatives of 2-amino-6(-2 naphthalenyl)thiazole[3,2-d]thiazole *E-Journal of chemistry,* **3(13)**: 267-273.
8. Mahajanshetti C. S., Acharya S. P. and Nargund K. S. (1962). *J .Ind Chem.Soc.,* **39(6)**: 427.

ISSN 0976-7126

9. Anjali M. R. (1999). *Asian J.Chem*., **11(4)**: 427.
10. Mahpatra G. N.(1956). *J*.of *Ind.chem.soc*., **33(7)**: 527.
11. Hui-Ling Liu (2000). Synthesis and Fungicidal Activity of 2-Imino-3-(4-arylthiazol-2-yl)-thiazolidin-4-ones and Their 5-Arylidene Derivatives. *Molecules*, **5**:1055-1061.
12. Sutaria B. and Raziya S. K. (2007). Synthesis of substituted aminothiazoles and its antibacterial activity. *Ind.Journal. Chem.*, **46**: 884-887.
13. Pharmacopoeia of India 19961996). Volume 11, 104-107.
14. Hamid L.S. and Amjad I. (2006). Synthesis and spectroscopic studies of new Schiff bases. *Molecule*, **11**, 206-211.
15. Patrik C., Kearney, Monica Fernandez and John A. Flygare. (2001). *Solid Phase Organic Syntheses:* A Wiley –Interscience Publications (1st edn)., 15-22.