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Research Article

SYNTHESIS AND ANTIMICROBIAL STUDY OF SOME NEW SCHIFF BASES OF SULPHONAMIDES DERIVATIVES

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ABSTRACT

Objective: The purpose of research was to synthesize the better antimicrobial compounds using Different substituted aromatic aldehydes / acetophenone are chosen as the starting material for the synthesis of Schiff Bases with sulphonamide helps to formation of Schiff bases in presences of alcohol and acidic reagent. **Material and methods**: Melting points of the synthesized compounds were determined by open capillary and are uncorrected. The purity of the compounds was checked using precoated TLC plates (MERCK,60F) using Benzene: acetone (3:1) solvent system. The developed chromatographic plates were visualized under UV at 254nm. IR spectra were recorded using KBr on Shimadzu FTIR model 8400 spectrophotometer, 1H NMR spectra in DMSO on a BRUKER FT-NMR instrument using TMS as internal standard. **Results:** All the synthesized compounds (S-1,S-2,SN-1,SN-2,SN-3) were purified by successive recrystallization using ethanol. The purity of the synthesized compounds was checked by performing TLC. The structures of the synthesized compounds were determined on the basis of their FTIR and1H NMR data. In accordance with the data obtained from antimicrobial activity, all the synthesized Schiff bases of sulphacetamide have shown good activity against the tested microbes. **Conclusion:** Antibacterial activity of the synthesized derivatives was done in comparison with ampicillin as standard to reveal the potency of synthesized derivatives. All the 2 selected strains of bacteria Gram positive (Staphylococcus aureus) and Gram negative (Escherichia coli) showed sensitivity to all derivatives at higher concentration (50µg/ml, 100µg/ml) and no sensitivity at lower concentration.

Keywords: Synthesis, Schiff bases, Antimicrobial activity, Sulphonamide.

1. INTRODUCTION

Sulphonamides having functional group (R-SO2-NH2) called sulphonamide group are compounds having potential of antimicrobial activity. They have their familiarity as amide derivatives of sulphuric acid because they are synthesized by introduction of amino group in sulphuric acid after replacing its hydroxyl group[1] The structure-activity study on the sulphonamide azo dyes was performed and the reductive cleavage of azo linkage to release the active antibacterial product, sulphonamide, was concluded.[2] Schiff bases are the important compound owing to their wide range of biological activities. They have been found to posses the pharmacological activities such as antimalarial, anticancer, anti-inflammatory, antibacterial, antifungal, antitubercular, antimicrobial, and antiviral.[3] Resistance is most likely a result of a compensatory increase in the biosynthesis of p-amino benzoic acid (PABA) by bacteria although other mechanisms may play a role.[4] Resistance of *E Coli* strains to sulphonamide has been shown due to their containing sulphonamide- resistant dihydropteroate Syntheses.[5] The lipophilicity of the N1 group has the largest effect on protein binding, and generally, the more lipids soluble a sulphonamide is the more of it will be protein bound[6]. The aniline (N4) amino group is very important for activity because any modification of it other than to make prodrugs results in a loss of activity[7]. Moreover sulphonamides are also inactive if *p*-amino group is acylated, benzene is substituted, sulphonamide group not attached directly to benzene ring. More advanced studies revealed that modified

sulphonamides showing high to moderate antibacterial activity[8]. Aliphatic sulphonamides have highest powerful antibacterial activity for Gram (-) bacteria than Gram (+) and antibacterial activity decreases as the length of the carbon chain increases. Also, novel macrocyclicbis-sulphonamides showed antimicrobial activities[9].

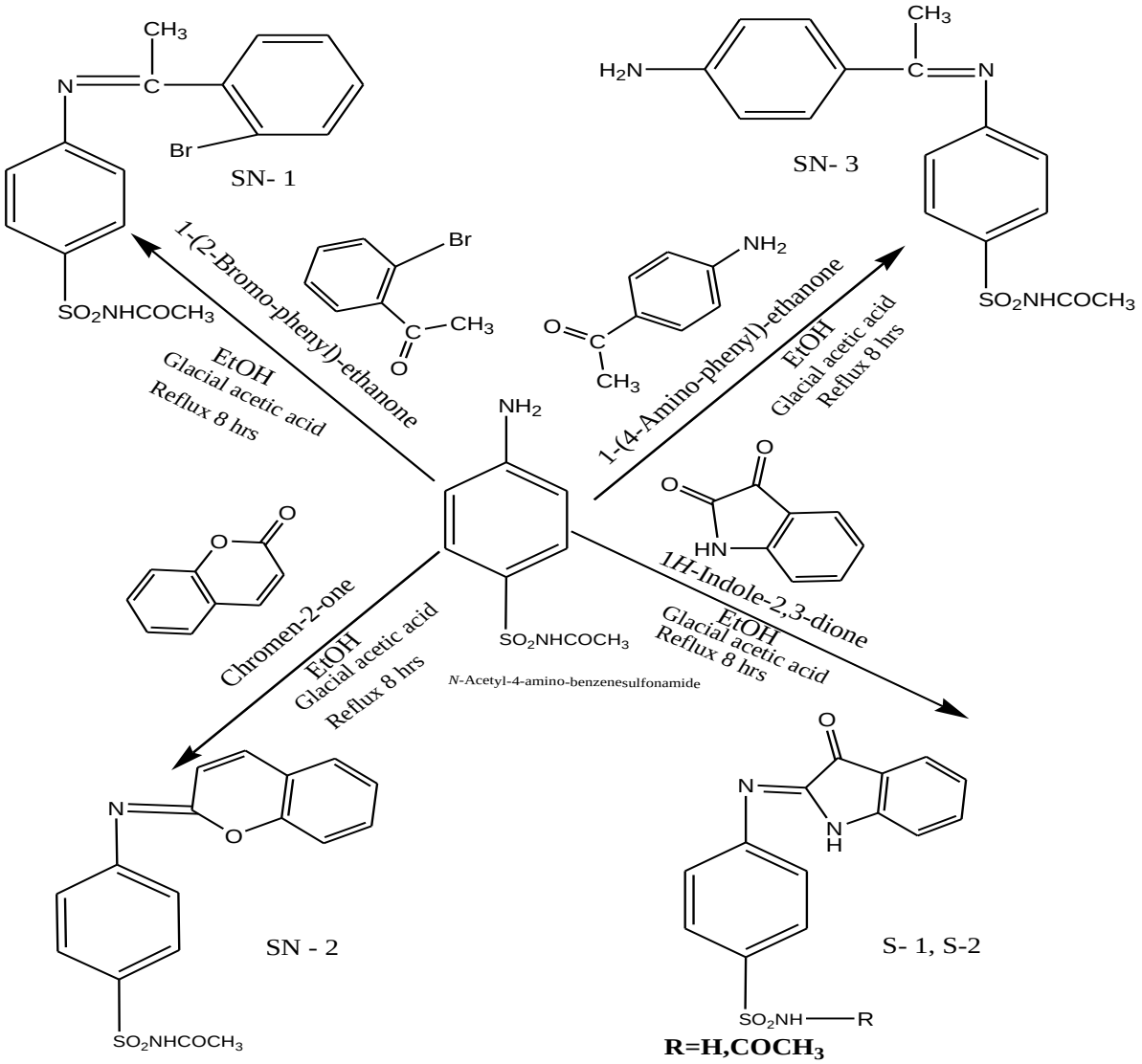
2. MATERIALS AND METHODS

Experimental

Melting points of the synthesized compounds were determined by open capillary and are uncorrected. The purity of the compounds was checked using precoated TLC plates (MERCK,60F) using Benzene: acetone (3:1) solvent system. The developed chromatographic plates were visualized under UV at 254nm. IR spectra were recorded using KBr on Shimadzu FTIR model 8400 spectrophotometer, 1H NMR spectra in DMSO on a BRUKER FT-NMR instrument using TMS as internal standard.

General procedure for the synthesis of some new Schiff bases of sulphonamide (S-1, S-2, SN-1, SN-2, SN-3)

The Schiff base was prepared by reaction of equimole of 4-amino benzene sulphonamide and substituted aromatic aldehydes / acetophenone. Each reactant was dissolved in a minimum amount of ethanol, then mixed together and followed by addition of 2ml glacial acetic acid. The solution was refluxed for 8h then cools to room temperature and poured in to ice cold water. The solid product was collected through filtration and then dried using drying oven at 80 ºC. The product was redissolved in ethanol for recrystallization and then dried to give a product.



Scheme.1: Synthesis of Some new Schiff Bases sulfonamide derivatives

4-(2-Oxo-1,2-dihydro-indol-3-yli deneamino)- benzenesulfonamide from isatine (S-1)
M.P.215-217, Rf.0.70, yield%, 54.22IR (KBr cm-1): 1677.51 (HC=N), 3296.96 (N-H str), 1154.28(S=Ostr).1H NMR (DMSO, 500 MHz, δ in ppm) 10.21(s, 1H, NH), 7.23-7.63(m, 8H, Ar-H), 4.32(s,2H NH_2) MS (m/z+) [M+1] 302.59.

N-acetyl–4-(2-Oxo-1,2-dihydro-indol-3-ylideneamino)-benzenesulfonamide from isatine (S-2) M.P.201-203, Rf.0.56, yield%, 54.22IR (KBr, cm-1, υ): 1672.40 (HC=N), 3294.92 (N-H str), 1167.97(S=Ostr). 1H NMR (DMSO, 500 MHz, δ in ppm) 10.22(s, 1H, NH), 7.32-7.92(m, 9H, Ar-H), 3.21(s,3H Ali-H,-$COCH_3$), MS (m/z+) [M+1] 344.70.

N-acetyl -4- [1-(2-bromo-phenyl)-ethylideneamino]-benzene sulfonamide (SN-1)
M.P.203-205, Rf.0.42, yield%, 62.52IR (KBr, cm-1, υ): 1616.40 (HC=N), 3296.96 (N-H str), 1151.54(S=Ostr).1677.80 (>C=O); 1353.72(-SO2-); 1H NMR (DMSO, 500 MHz, δ in ppm) 10.40(s, 1H, NH), 7.16-7.70(m, 8H, Ar-H), 1.10(s,3H,Ali-H),2.04(s,3H Ali-H,-$COCH_3$), MS (m/z+) [M+1] 395.61.

N- acetyl – 4- (chromen-2 -ylideneamino]-benzensulfonamidefrom coumarin (SN-2)
M.P.223-225, Rf.0.54, yield%, 72.66 IR (KBr, cm-1, υ): 1616.40 (HC=N), 3108.09 (N-H str), 1159.56(S=Ostr). 1H NMR (DMSO, 500 MHz, δ in ppm) 10.14(s, 1H, NH), 7.12-7.64(m, 10H, Ar-H),2.96(s,3H Ali-H,-$COCH_3$), MS (m/z+) [M+1] 343.75.

N-Acety -4- [1-(4-amino-phenyl)-ethylideneamino]-benzenesulfonamide (SN-3)
M.P.208-210, Rf.0.46, yield%, 50.68,IR (KBr, cm-1, υ):1677.51 (HC=N), 3296.96 (N-H str), 1151.54(S=Ostr). 1675.80 (>C=O). 1H NMR (DMSO, 500 MHz, δ in ppm); 10.50(s 1H,NH), 6.47-7.70(m, 8H, Ar-H), 4.03 (s 2H,NH_2),1.10(s, 3H, Ali-H), 2.04(s,3H,Ali-H,-$COCH_3$) MS (m/z+) [M+1] 332.11.

Table 1: Physical constants data of synthesized compounds

Compound	Molecular formula	Molecular weight	Melting point (°C)	R_f value (cm)	% yield
S-1	C14H11N3O3S	301.32	215-217	0.70	54.22
S-2	C16H13N3O4S	343.36	201-203	0.56	56.40
SN-1	C16H15BrN2O3S	395.27	203-205	0.42	62.52
SN-2	C17H14N2O4S	342.37	223-225	0.54	72.66
SN-3	C16H17N3O3S	332.12	208-210	0.46	50.68

3. RESULTS AND DISCUSSION

All the synthesized compounds (S-1,S-2,SN-1,SN-2,SN-3) were purified by successive recrystallization using ethanol. The purity of the synthesized compounds was checked by performing TLC. The structures of the synthesized compounds were determined on the basis of their FTIR and 1HNMR data.
The IR spectra of the synthesized compounds showed the presence of C=N stretching bands at 1690-1600cm-1 and NH stretching frequencies at 3300-2900 cm-1 corresponding to azomethine compounds .In1HNMR spectra of the synthesized compounds ,the protons of azomethine compounds have given δ.

Antimicrobial activity
The antimicrobial activity of all the synthesized compounds (S-1,S-2,SN-1,SN-2) were examined against different Gram-positive (*Staphylococcus aureus)* and Gram-negative (*Escherichia coli*) and organisms by measuring zone of inhibition. The antimicrobial activity was performed by Agar diffusion method at the concentration level of 50µg/ml, 100µg/ml. Ampicillin as standard drug at a concentration of 50µg/ml, 100µg/ml. Nutrient agar was used as culture media for antibacterial activity and Sabouraud dextrose agar was used a ppm 8.16-8.20. In accordance with the data obtained from antimicrobial activity, all the synthesized Schiff bases of sulphonamide have shown good activity against the tested microbes.

Table 2: Antimicrobial screening by Cup-plate method Zone of inhibition in millimetre

Compounds	Zone of inhibition (mm)			
	MTCC-1688 (gram+ve)		MTCC-521(gram-ve)	
	50µg/ml	100µg/ml	50µg/ml	100µg/ml
SN-1	07	09	06	18
SN-2	06	08	07	08
S-1	08	20	09	21
S-2	06	07	07	08
Ampicillin	23	27	02	25
Control.	-	-	-	-

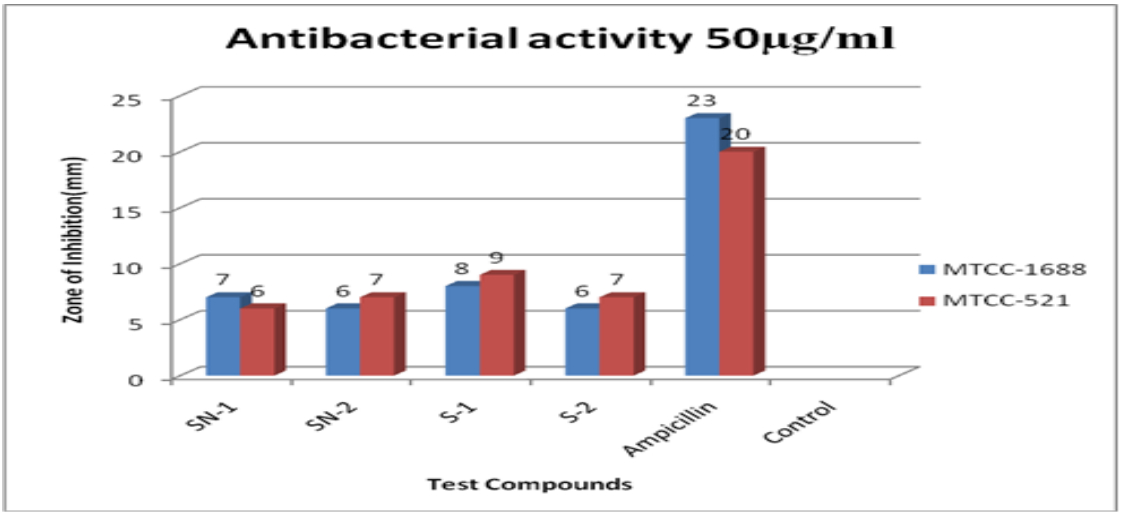


Fig.1: Antibacterial activity (50 µg/ml)

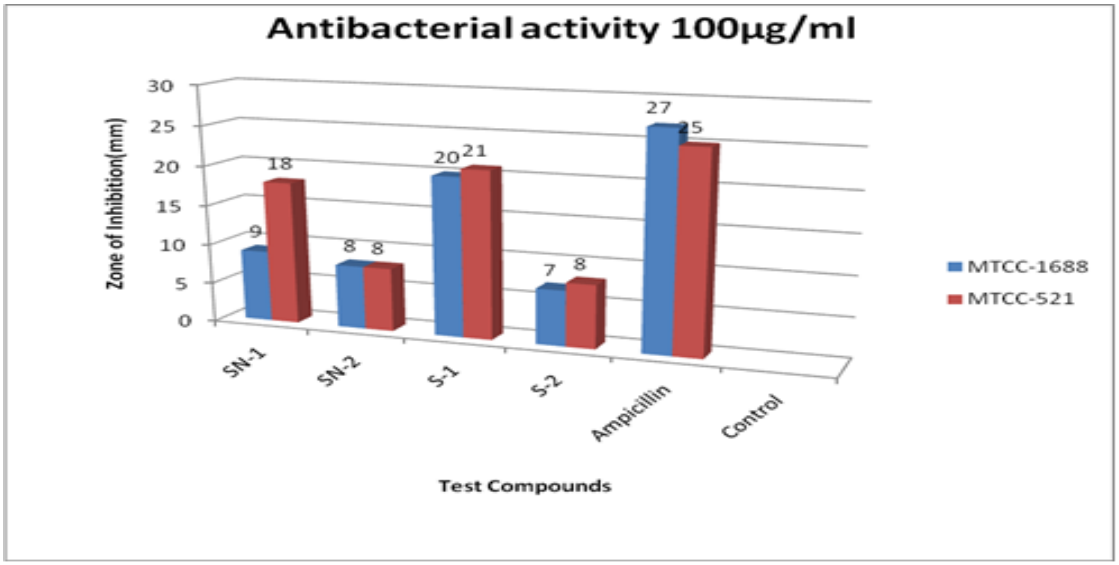


Fig. 2: Antibacterial activity (100 µg/ml)

4. CONCLUSION

Antibacterial activity of the synthesized derivatives (SN-1,SN-2,S-1,S-2) was done in comparison with Ampicillin as standard to reveal the potency of synthesized derivatives. All the 2 selected strains of bacteria Gram positive (Staphylococcus aureus) and Gram-negative (Escherichia coli) showed sensitivity to all derivatives at higher concentration (50µg/ml, 100µg/ml) and no sensitivity at lower concentration. Among these Schiff bases of sulphonamide, compound has shown good activity against all the tested bacteria.

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