



Synthesis of a novel series of Schiff's bases from PABA and Phenyl Hydrazine and Evaluation of their Antibacterial Activity

Sashmitha Samuel.B*and Praharsha. Y.

Assistant Professor, Department of Pharmaceutical Chemistry, MLR Institute of Pharmacy, Hyderabad, India.

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*Corresponding author:
sashmitha_sam@yahoo.com

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Abstract

Over the past decade, the synthesis of Schiff's bases has become one of the main areas of interest in synthetic chemistry. These compounds have gained much attention, owing to their potential role as anti-inflammatory, anthelmintic, analgesic, antibacterial and antifungal agents. Thus in view of the significance and diverse therapeutic activities of Schiff's bases we have aimed at a simple and efficient procedure for their synthesis by the reaction of various aldehydes with PABA and phenyl hydrazine and also evaluation of their antibacterial activities. We have been successful in synthesizing various Schiff's bases and also these compounds have been proved to be effective antibacterial agents.

Keywords: Schiff's bases, PABA, Phenyl hydrazine, Aldehydes, Dioxan, Antibacterial agents, Cup plate method.

INTRODUCTION

Schiff's bases are one of the important classes of synthetic compounds that have gained much attention due to their wide scope of therapeutic activity. These are already proved to be efficient anti-inflammatory, anthelmintic, analgesic, antibacterial and antifungal agents.

Hence, we aimed at the synthesis of a novel series of Schiff's bases by the reaction of PABA and Phenyl hydrazine with various aldehydes. We also planned to evaluate the antibacterial properties of the synthesized Schiff's bases.

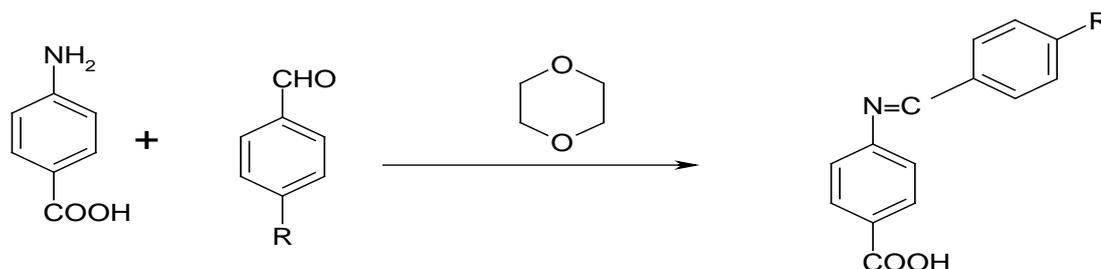
MATERIALS AND METHODS

All chemicals used in this work were of laboratory grade procured from Hi-Media, E-Merck, and Loba chemicals etc. The percentage yield was based upon the products obtained after purification and recrystallization. The melting points of the compounds were determined in one-end open capillary tubes and are uncorrected. Porous silica gel plates activated at 110°C for 30 min. were used for thin layer chromatography (TLC) and were developed with iodine vapours. I.R spectra were recorded on Perkin Elmer Model 283B using potassium bromide (KBr) pellet and the wave numbers were given in cm^{-1}

Methodology:

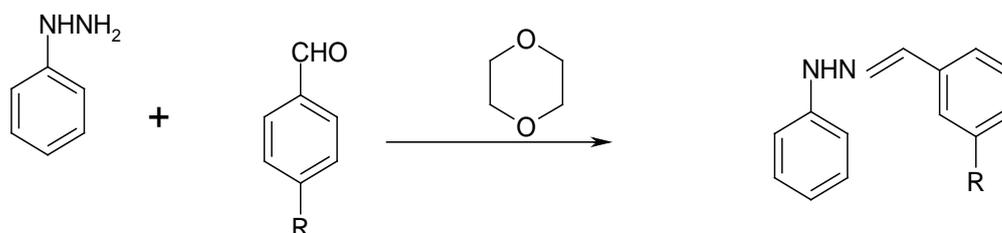
Two schemes were employed for the synthesis of Schiff's bases.

Scheme-1: The scheme mentioned below was employed for the synthesis of Schiff bases 1(a-d)



0.1M Aldehydes had been coupled with 0.1M of PABA using 1, 4-Dioxan as solvent and was refluxed on heating mantle for an hour. After refluxing; the excess of the solvent was removed. The solid mass that separated out was filtered and recrystallized from 95% methanol. The whole process of reaction was monitored by TLC method.

Scheme-2: The scheme mentioned below was employed for the synthesis of Schiff bases 2(a-d)



0.1M Phenyl hydrazine had been coupled with 0.1M of Aldehydes using 1, 4-Dioxan as solvent and was refluxed on heating mantle for an hour. After refluxing, the excess of the solvent was

removed. The solid mass that separated out was filtered and recrystallized from 95% methanol. The whole process of reaction was monitored by TLC method.

RESULTS

The compounds that were synthesized using these schemes are as follows:

Table-1: List of compounds synthesized.

S.NO.	R	COMPOUND	
1	Benzaldehyde	1a	2a
2	Anisaldehyde	1b	2b
3	Salicylaldehyde	1c	2c
4	Para dimethyl amino benzaldehyde	1d	2d

Antibacterial activity

The antibacterial activity of various Schiff's bases 1(a-d) and 2(a-d) was tested by agar diffusion method (cup-plate method) taking drug at a concentration of 100µg/ml against four strains of bacteria (S.aureus, E. faecalis, E. coli, P.mirabilis). The area of zone of inhibition (ZOI) was taken as a parameter for antibacterial activity. The ZOI of the test compound is compared to that of the standard drug i.e. Ciprofloxacin.

Table 2: Results of antibacterial activity

ZONE OF INHIBITION				
Compound	Gram positive organisms		Gram negative organisms	
	S.aureus	E.faecalis	E.coli	P.mirabilis
1a	8	12	10	10
1b	6	13	15	6
1c	6	12	14	7
1d	18	15	17	12
2a	9	10	8	12
2b	5	7	10	4
2c	8	13	10	5
2d	7	10	10	8
Ciprofloxacin	20	23	22	25

DISCUSSION

The Schiff's bases which have been synthesized were screened for anti-bacterial activity against two strains of gram positive bacteria and two strains of gram negative bacteria by agar well diffusion method. The minimum inhibitory concentration (MIC) was taken as a parameter of antibacterial activity. The MIC of the test compounds is compared to that of Ciprofloxacin (standard drug). Almost all the compounds showed MIC at 25µg/ml against all strains of bacteria except compound 1b which showed activity at 50µg/ml against P.mirabilis, compound 2a which showed activity at 50µg/ml against E.coli and compound 2b which showed activity at 50µg/ml against S.aureus.

CONCLUSION

Among the compounds screened the zone of inhibition was observed to be maximum for compound 1d against all strains of bacteria. However all the compounds have shown satisfactory zone of inhibition.

REFERENCES

1. Pandeya SN, Sriram D. Synthesis and screening for antibacterial activity of Schiff's and Mannich bases of Isatin and its derivatives. *Acta Pharm Turc* 1998;40:33-38
2. Pandeya SN, Sriram D, Nath G, De Clercq E. Synthesis, characterization and evaluation of antibacterial, antifungal and anti HIV activity of Schiff's and Mannich bases of isatin with N-[6-Chlorobenz thiazole-2-yl]thiosemicarbazide. *Indian J Pharm Sci* 1999;61:358-61
3. Varma, M.; Pandeya, S, N.; Singh, K. N.; Stables, J. P. Anticonvulsant activity of Schiff bases of isatin derivatives. *Acta Pharm.* 2004, 54, 49-56.
4. Z Guo et al., Antifungal properties of Schiff bases of chitosan, N-substituted chitosan and quaternised chitosan. *Carbohydr Res*, 342(10), 2007, 1329-1332.
5. Rajaram Prakash Chinnasamy, Synthesis, characterization and analgesic activity of novel Schiff bases of isatin derivatives, *JAPTR*, 2010, Vol.1, Issue 3, 342-347.
6. Lamani.K.S.S, Synthesis, characterization and antimicrobial properties of Schiff bases derived from condensation of 8-formyl-7-hydroxy-4-methyl coumarin and substituted triazole derivatives, *E-journal of chemistry*, 2009, 6, S239-246.
7. Aliasaghar, Synthesis, antibacterial, antifungal and antiviral activity evaluation of some new bis-schiff bases of isatin and their derivatives, *Molecules*, 2007, 12, 1720-1730.