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SYNTHESIS AND ANTI- BACTERIAL ACTIVITY OF NOVEL ISONIAZIDYL SCHIFF BASE DERIVATIVES

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ABSTRACT

Synthesis of novel derivatives of N^1-Benzylidene benzohydrazide Schiff bases (Isoniazidyl Schiff bases) has been done by using hydrolysis reaction which involves one step synthesis. Schiff bases are Synthesized by using Isoniazid and different aldehydes like vanillin, anisaldehyde, benzaldehyde. The aqueous solution of isoniazid is added to a warm solution of aldehydes in water, after 15 min, by hydrolysis reaction the Schiff bases will form in the mixture. The yield is good for the products. Recrystallization was done to obtain pure crystals. The newly synthesized compounds were characterized by melting point, TLC, and IR spectra. The synthesized compounds were evaluated for antibacterial activity by agar diffusion method. All the compounds were screened for their antibacterial activity against Staphylococcus aureus (Gram positive bacteria) and E.coli (Gram-negative bacteria).Compounds showed significant anti-bacterial activity against both gram +ve and gram-ve, but less effective than the standard, amoxicillin.

Keywords: Isoniazid, aldehydes, Schiff bases, anti-bacterial activity.

INTRODUCTION

Isoniazid is also known as isonicotinyl hydrazide (INH), is an antibiotic used as a first-line agent for the prevention and treatment of both latent and active tuberculosis [1-4]. It can be synthesized from an aliphatic or aromatic amine and a carbonyl compound by nucleophilic addition .A Schiff base is a nitrogen analog of an aldehyde or ketone in which the C=O group is replaced by C=N-R group [5-8]. It is usually formed by condensation of an aldehyde or ketone with a primary amine. Microbiology explores how microbes work and how to control them. It seeks way to use that knowledge to prevent and treat the diseases microbes cause [9-10]. The discovery of antibiotics is one of the greatest events in the history of medicine, which has a profound effect on human life and society as a whole synthesize and evaluate the antibacterial activity of novel Schiff bases obtained from isoniazid [11-13].

BIOLOGICAL EVALUATION

Antibacterial activity

The in-vivo Antibacterial activity was performed by Agar diffusion method. The novel compounds were evaluated for *in vitro* antibacterial activity against Gram-positive bacteria like streptococcus aureus, and Gram Negative bacteria like E.coli, using Amoxicillin as a reference standard.

MATERIALS AND METHODS

All the chemicals used were of analytical grade and purchased from SD Fine chemicals. Melting points of all the synthesized compounds were determined by open capillary tube method. The purity of all compounds was checked by TLC technique and spots were visualized using UV chamber.

PROCEDURE

Antibacterial activity

The lyophilized forms of different strains of microorganisms like Escherichia coli [NCIM-2256], Staphylococcus aureus [NCIM-2074] were obtained from

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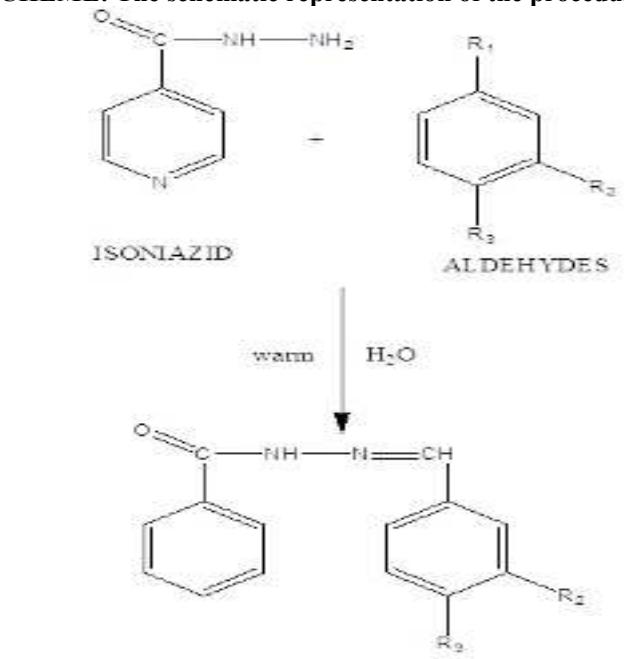
the National Collection of Industrial Microorganisms (NCIM), Pune, India by using Agar Well Assay Method

Determination of zone of inhibition

In this Method, 20 ml nutrient agar medium was poured in sterilized Petri plates. After incubation, at 37 ºC for 24hrs and the diameter of the zone of inhibition were measured in cm. Similar procedure was adopted for the pure Amoxicillin and noted.

SCHEME: The schematic representation of the procedure is as follows:



	R_1	R_2	R_3
Compound 1: IVS	CHO	OCH_3	OH
Compound 2: IAS	CHO	H	OCH_3
Compound 3: IBS	CHO	H	H

RESULTS AND DISCUSSION

Table 1. Compounds Data

S.No	Compound Code	M.P °C	% Yield	Mol. Formula	M. Wt	Calculated %			
						C	H	N	O
1	IVS	100	85	$C_{14}H_{13}N_3O_3$	271	61.99	4.79	15.498	17.71
2	IAS	89	78	$C_{14}H_{13}N_3O_2$	255	65.86	5.09	16.47	12.54
3	IBS	94	66	$C_{13}H_{11}N_3O$	225	69.33	4.88	18.66	7.11

Table 2. Results of antibacterial activity by agar diffusion method

S.No	Compound Code	Concentration(µg/ml)	Bacterial Strain	Zone of Inhibition (cm)
1	Amoxicillin	10	*Escherichia coli*	2.8±0.13
2	IVS	10		2.2±0.04
3	IAS	10		1.8±0.02
4	IBS	10		2.0±0.02
5	Amoxicillin	10	*Staphylococcus aureus*	3.2±0.12
6	IVS	10		2.5±0.02
7	IAS	10		2.0±0.02
8	IBS	10		2.3±0.01

E.coli –Zone of inhibition	Staphylococcus aureus- zone of inhibition
	

DISCUSSION

The titled compounds were synthesized by using reactant as isoniazid and reacted with different aldehydes like vanillin, benzaldehyde and anisaldehyde to form final Schiff bases using one step synthesis. A total of three derivatives were synthesized. The synthesized compounds were identified by melting point, thin layer chromatography and characterized by IR spectroscopy. All the analytical details show satisfactory results. The titled compounds were screened for antibacterial activity against Escherichia coli and Staphylococcus aureus by agar diffusion method using 10 µg/ml. Amoxicillin was used as a standard. Our studies revealed that the IVS, IAS and IBS showed significant antibacterial activity. Among the three derivatives IVS showed better activity than the other two derivatives. All compounds showed mild to moderate antibacterial activity when compared to standard amoxicillin.

CONCLUSION AND FUTURE SCOPE OF RESEARCH

N-Benzylidene Benzohydrazide Schiff base derivatives were synthesized by appropriate synthetic route, the yields of synthetic compounds were found to be good. The compounds were identified by physical parameters like melting point; TLC; characterized by IR spectroscopy and screened for their antibacterial activity respectively. The compounds might be favorable for antibacterial activity, but slightly less than the standard, Amoxicillin. The future work involves complete characterization by NMR and Mass spectroscopy. The scope of present work for its future by modifying various functional groups of the titled compounds we may get more potent antibacterial activity than existing one.

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CONFLICT OF INTEREST

Authors declare no conflict of interest

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