Short Note
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ANTIMICROBIAL STUDY *(INVITRO)* OF AZOMETHINES OF ARYL OXAZOLES

Niraimathi V*, Jerad Suresh A, Lata Sriram, Latha T
Department of Pharmaceutical Chemistry, College of Pharmacy, Madras Medical College, Chennai - 600 003. India.

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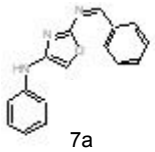
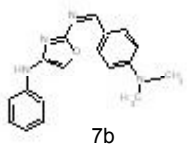
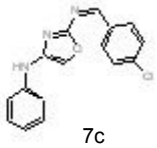
ABSTRACT
A novel series of azomethines of aryl oxazoles were synthesised and investigated for their antimicrobial activity against Gram positive and Gram negative bacteria using antibiotic diffusion method. The recorded data of zone of inhibition showed significant broad activity when compared with standard. The sensitivity of the Gram positive bacteria to the tested compounds was higher than that of Gram negative bacteria. The synthesised compounds were also screened for antifungal activity and observed that they had an inhibitory effect against the pathogenic fungi.

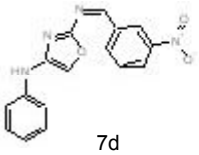
Keywords: *Oxazoles; azomethines; antibacterial activity; antifungal activity.*

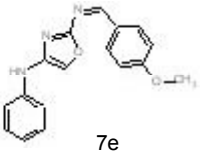
INTRODUCTION
Heterocyclic analogues of oxazole scaffolds represent an broad spectrum of diversified biological activities such as antibacterial[1,2],antifungal[3,4],antitubercular[5], antihyperglycemic[6],anti-inflammatory[7,8],anti-proliferate[9]and antihypertensive activity. Five novel aryl oxazoles (7a-7e) were synthesised and characterised[10]. The experimental data and its spectral data of the said derivatives had already been sent for publication. The synthesis and characterization has been accepted for publication in the Asian Journal of Chemistry in volume 23(2011). All the synthesised compounds were screened for antibacterial and antifungal activity. The structures of the synthesised compounds are as follows:


7a


7b


7c


7d


7e

Where;
7a *- N^4-phenyl-N^2-[(Z)-phenylmethylidene]-1,3-oxazole-2,4-diamine,*

7b *- N^2-{(Z)-[4-(dimethylamino)phenyl]methylidene}-N^4-phenyl-1, 3- oxazole-2,4-diamine*

7c- *N^2-[(Z)-(4-chlorophenyl)methylidene]-N^4-phenyl-1,3-oxazole-2, 4 diamine*

7d-*N^2-[(Z)-(3-nitrophenyl)methylidene]-N^4-phenyl-1,3-oxazole-2, 4- diamine,*

7e *- N^2-[(Z)-(4-methoxyphenyl)methylidene]-N^4-phenyl-1,3-oxazole-2, 4-diamine.*

Experimental
Antibacterial Activity [11]
All the five synthesised compounds were evaluated for their antimicrobial activity. The various organisms used for *invitro* study include Gram negative organism such as Escherichia *coli*, Klebsiella *Spp, Pseudomonas aeruginosa, Salmonella typhi, Vibrio cholerae, Staphylococcus coagulase negative*, and *Serratia*. Gram positive organisms include *Enterococci and Staphylococcus aureus.* MIC values of the test compounds were determined by dilution technique. The organism was subcultured on Muller Hinton Agar medium. DMF was used as negative control and ciprofloxacin (5μg/mL) as standard. Four different concentrations (133.33μg/ML, 200μg/mL, 333.33μg/mL, and 400μg/mL) were used to determine the MIC. Zone of inhibition of the individual compounds were studied by antibiotic diffusion method. Diameters of the zone of inhibition in mm for the test compounds at 400μgm/mL were measured and compared with that produced by the standard drug. The results of the study are presented in Table 1 and Table 2.

Table 1: *Minimum Inhibitory concentration of azomethines of aryl oxazoles*

Sl. No	Name of the organism	Minimum inhibitory concentration in (μgm/mL)																			
		7a				7b				7c				7d				7e			
		133.33	200.00	333.33	400.00	133.33	200.00	333.33	400.00	133.33	200.00	333.33	400.00	133.33	200.00	333.33	400.00	133.33	200.00	333.33	400.00
1.	*Enterococci*	+	+	+	-	+	+	+	-	+	+	-	-	+	+	-	-	+	+	+	-
2.	*Staphylococcus coagulase negative*	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	-	-
3.	*Staphylococcus aureus*	+	+	+	+	+	+	+	+	+	+	-	-	+	+	-	-	+	+	+	-
4.	*Salmonellatyphi*	+	+	+	-	+	+	+	-	+	+	-	-	+	+	-	-	+	+	-	-
5.	*Escherichia coli*	+	+	+	-	+	+	+	-	+	+	-	-	+	+	+	+	+	-	-	-
6.	*Klebsiella Spp*	+	+	+	-	+	+	+	-	+	+	-	-	+	+	-	-	+	+	+	-
7.	*Pseudomonas aeruginosa*	+	+	+	-	+	+	+	-	+	+	-	-	+	+	-	-	+	+	+	-
8.	*Vibrio cholerae*	+	+	+	-	+	+	+	-	+	+	-	-	+	+	-	-	+	+	+	-
9.	*Serratia*	+	+	+	-	+	+	+	+	+	+	-	-	+	+	-	-	+	+	+	-

Note: (+) indicates growth
(-) indicates no growth

***Correspondence :** vnm_anr@yahoo.co.in

Table 2: *Zone of inhibition of azomethines of aryl oxazoles*

S.no	Name of the organism	Zone of inhibition in mm					
		ciprofloxacin	7a	7b	7c	7d	7e
1	*Enterococci*	33	33	24	35	34	35
2	*Staphylococcus coagulase negative*	40	38	33	38	39	40
3	*Staphylococcus aureus*	45	42	42	38	40	40
4	*Salmonella typhi*	44	40	43	35	39	39
5	*Escherichia coli*	15	20	10	13	20	12
6	*Klebsiella Spp*	26	18	15	17	18	15
7	*Pseudomonas aeruginosa*	49	45	51	41	47	32
8	*Vibrio cholerae*	36	34	31	32	31	34
9	*Serratia*	41	30	48	40	36	29

Antifungal activity

The antifungal activities of tested compounds were studied against the pathogenic fungi *Candida albicans, Aspergillus niger, Aspergillus flavous, and Mucor* at 133.33μg/mL, 200.00μg/mL, 400.00μg/mL concentrations. The fungi were subcultured in Sabaroud dextrose agar medium. The susceptibility of the fungi was done by comparing the growth of the pathogenic control of the test compound with the authentic standard. The fungal study related data are given in Table 3.

Table 3 : *Antifungal activity*

Compound Concentration (μg/mL)		*Candida albicans*	*Aspergillus niger*	*Aspergillus flavous*	*Mucor*
Control		+	+	+	+
7a	133.00	+	+	+	+
	200.00	+	+	-	+
	400.00	-	-	-	-
7b	133.00	+	+	+	+
	200.00	-	+	+	+
	400.00	-	-	-	-
7c	133.33	+	+	+	+
	200.00	+	+	+	+
	400.00	-	-	-	-
7d	133.33	+	+	+	+
	200.00	+	+	-	-
	400.00	-	-	-	-
7e	133.33	+	+	+	+
	200.00	+	+	+	+
	400.00	-	-	-	-

Note: *(+) indicates growth*
(-) indicates no growth

RESULT AND DISCUSSION

Despite the progress in the medical science we are in need of new drugs, because the role of opportunistic pathogens is so prevalent that they cause newer disease. Almost all the tested compounds were found to exhibit moderate to good *invitro* antimicrobial activity against Gram positive and Gram negative and antifungal activity. A comparative study on the zone of inhibition by the antibiotic diffusion technique indicated that all the compounds had antibacterial activity. Compound **7a** were found to be very effective against *Escherichia coli, Staphylococcus coagulase negative and Staphylococcus aureus*. Compound **7b** were found to possess more potent activity against *Pseudomonas, Salmonella typhi, Staphylococcus aureus and Serratia*. Compound **7c** found to be very sensitive against *Enterococci*. Compound **7d** were found to have higher antibacterial activity against *Escherichia coli, Pseudomonas, Staphylococcus coagulase negative, and Enterococci.* Compound **7e** were found to be effective against *Staphylococcus coagulase negative and Enterococci.* Compound 7a**, 7d, and 7e** were found to exhibit moderate activity against *Kliebseilla and Vibrio cholerae.*

The results of the antifungal activity indicate that compound **7a,** showed moderate activity to all except against *Candida albicans,* and compound **7a** and **7d** exhibited very potent activity against *Aspergillus flavous* and *Mucor* and were effective against the concentration of 200μgm/ml.Compounds **7a-7e** was found to possess moderate activity against *Aspergillus niger.*

CONCLUSION

All the synthesised compounds were found to exhibit antibacterial and antifungal activity which creates an interest for the future scope of our study. Among the tested compounds**, 7b** and **7d** exhibited higher antibacterial activity and all the compounds were found to possess moderate antifungal activity against four pathogenic strains of fungi.

Acknowledgement

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