Oriental Journal of Chemistry Vol. **25**(2), 409-412 (2009)

Studies on synthesis and antibacterial activity of some new 3-(2-Hydroxyphenyl)-4-benzoyl-5-phenylisoxazolines

MADHURI P. BHISE*, V.M. RAUT, R.P. PAWAR, D.P. GULWADE and N.A. JUNGHARE

Department of Chemsitry, Government Vidarbha Institute of Science and Humanities, Amravati (India).
*MCT's Rajiv Gandhi Institute of Technology, Andheri (W) Mumbai (India).

(Received: March 20, 2009; Accepted: April 29, 2009)

ABSTRACT

3-Aroyl flavanones (1a-j) were allowed to react with NH_2 OH- HCl in dioxane containing piperidine to give the corresponding 3-(2-hydroxyphenyl)-4-aroyl-5-arylisoxazolines (2a-j). There structural assignment are based on the elemental analysis, spectra data (IR, UV & NMR) and chemical properties. All these compounds were tested in vitro for their antibacterial activity by disk-diffusion method against *Gram positive* and *Gram negative* bacterials. In some of the compounds the results are found to be encouraging.

Key words: 3-(2-Hydroxyphenyl)-4-royl-5-arylixosazoline, antibacterial activity.

INTRODUCTION

Literature on Isoxazolines[1-8] revealed that these compounds are not only used in textile and cinematographic[9] films but also show widely differing antinnflammatory, antibacterial[10], herbicidal[11] activity. Some 3,5-diarylisoxazolines have been synthesised from flavanones on treatment with $NH_2OH.HCl$ in pyridine. Gamil Aziz *et al.*[13] have prepared the isoxazolines by the action $NH_2OH.HCl$ on furochalcones in basic medium. Recently Borul[14] and co-workers have reported the synthesis of substituted ioxazolines by action of hydroxylamine hydrochloride and sodium acetate on chalcones in ethanol.

Keeping these facts in view, the title compounds have been synthesized and were screened for their antibacterial activity against some Gram positive and Gram negative bacterials like *Escherichia coli, Klebisella pneumoniae, Pseudomonas aeruginosa, Staphylococcus aureus, Staphylococcus albus, Salmonella typhymurium, Vibrio chloreare* and *Shigella dysentery*.

EXPERIMENTAL

Synthesis of 3-(2-Hydroxyphenyl)-4-benzoyl-5-phenyl arylioxazolines (2a-j)

A mixture of flavanone (1a-j) (0.01 mol) and $NH_2OH.HCl$ (0.02 mol) was reluxed in dioxine (30ml) containing piperidine (0.5ml) for 3-4 hours. The reaction mixture was poured in water and acidified with 1:1 HCl and the semisolid obtained was triturated with and crystalised from ethanol to get the products (2a-j) (Table 1). These compounds gave dark green colouration with ethanolic $FeCl_3$ and were soluble in NaOH indicating thereby the presene of free phenolic OH group.

Spectral Analsyis

Their IR spectra showed absorption bands

at 1600 (C=N of isoxazolines; probably overlapping the COPh group), 1450 (CH_2) and 940 cm^{-1} (C=N-O). Their UV spectra showed λmax at 270 and 370 nm which indicates carbonyl function, and pmr spectra in $CDCl_3$ showed δ2.32 (3H, s, $ArCH_3$), 3.75 (3H, s, $ArOCH_3$), 5.1 (2H, d, ^HB), 5.9 (1H, d, ^HA), 6.8, 9.8, 7.25-7.8 (H, H, 10H, d, d, m, aromatic protons).

M.Ps. reported are uncorrected and were recorded on 'Tempo' melting point apparatus. The purity of the compounds synthesized was tested by TLC on microscopic slides with silica gel-G layers.

The Infra red spectra were recorded on "Perkin-Elmer 577" specstrophotometer. The ultraviolet visibel spectra were recorded on "Perkin-Elmer 202" spectrophotometer. The PMR spectra were recorded on Perkin-Elmer R-32" in $CDCl_3$ using TMS a reference from the chemical properties analytical results and spectral analysis, the compound (2a) was assigned the structure 3-(2-hydroxyphenyl)-4-aoyl-5-arylisoxazoline.

Antimicrobial activity

The compound (2a-j) are 3-Hydroxyphenyl-4-benzoyl-5-phenylisoxazolines. All these compounds were tested in for their antibacterial activity by disk-diffusion method[15,16] in dimethyl formamide (DMF) solvent at a concentration of 100 µg/ml using gram positive bacteria, *Staphylococcus aureus, Staphylococcus albus* and gram negative bacteria[17] *Escherichia coli, Klebisella pneumoniae, Pseudomonas aeruginosa, Salmonella typhi, vibrio chloreare* and *shigella dysentery*.

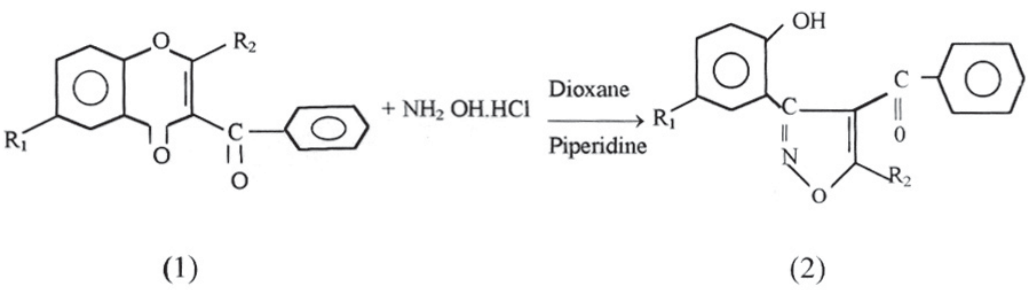
RESULTS AND DISCUSSION

Most of the compounds showed significant antibacterial activty as stated in (Table 2). However, the antibacterial activity was highest against

Table 1: Physical data of 3-(2-hydroxyphenyl)-4-aroyl-5-arylisoxazolines (2a-j)

Compound	R1	R2	Yield (%)	m.p. (°C)	% found (Calc)
2a	CH_3	$-C_6H_5$	55	153	4.04 (3.92)
2b	CH_3	$-4'-CH_3O-C_6H_4$	85	170-171	3.70 (3.62)
2c	CH_3	$-3',4'-O-CH_2-O-C_6H_3$	55	150	3.56 (3.49)
2d	CH_3	$-2'-OH-C_6H_4$	75	167	3.80 (3.75)
2e	CH_3	-2' Furyl	70	148	4.13 (4.03)
2f	H	$-C_6H_5$	60	150	4.20 (4.08)
2g	H	$-4'-CH_3O-C_6H_4$	70	134	3.82 (3.75)
2h	H	$-3',4'-O-CH_2-O-C_6H_3$	55	151	3.75 (3.62)
2i	H	$-2'-OH-C_6H_4$	50	174	3.49 (3.40)
2j	H	-2' Furyl	60	160	4.31 (4.20)

Statisfactory analysis for C and H were also obtained



(1) (2)

Scheme 1

Table 2: Antibacterial activity data of 3-(2-hydroxyphenyl)-4-benzoyl-5-phenyl arylisoxazolines (2a-j)

Compound	Substituents		Antibacterial activity zone of inhibtion (nm)							
	R1	R2	*E. coli*	*Ki Pneumoniae*	*Pseu. areuginosa*	*Staph. aureus*	*Staph. albus*	*Salm. typhi*	Vibrio cholerare	Shigella dysentery
2a	CH_3	$-C_6H_5$	13	10	-	16	-	13	13	13
2b	CH_3	$-4'-CH_3O-C_6H_4$	13	12	-	14	-	14	17	16
2c	CH_3	$-3',4'-O-CH_2-O-C_6H_3$	14	12	10	13	9	13	15	13
2d	CH_3	$-2'-OH-C_6H_4$	12	10	-	13	-	11	10	10
2e	CH_3	-2' Furyl	18	18	13	13	10	13	14	13
2f	H	$-C_6H_5$	10	9	-	13	-	8	8	9
2g	H	$-4'-CH_3O-C_6H_4$	13	12	-	14	-	13	14	14
2h	H	$-3',4'-O-CH_2-O-C_6H_3$	13	11	-	14	-	13	13	14
2i	H	$-2'-OH-C_6H_4$	11	10	12	18	12	14	16	15
2j	H	-2' Furyl	18	16	13	16	10	13	14	14

Staphylococcus aureus, Escherichia coli, Salmonella typhi, Vibrio, Shigella dysenterica, moderate activity agaisnt *Klebsiella pneumoniae* while *Pseudomonas aeruginosa* and *Staphylococcus albus* showed lesser activity of found inactive.

It has been interesting to note that the antibacterial activity invariably increased with the presence of methoxy and furyl groups.

ACKNOWLEDGEMENTS

The authors express their sincere thanks to Dr. P.R. Bhise, Prof. and Head, Department of Microbiology, PDMMC, Amravati (India) for providing antimicrobial data of the compounds and alos to UGC for financial support.

REFERENCES

1. G.F. Duffin and J.D. Kendall, *J. Chem. Soc.,* 408 (1954).
2. M. Stanper and B.F. Ayerk, *J. Am. Chem. Soc.*, **76**: 2786 (1954).
3. A.M. Oman, K.M. Hasan and M.A. El-Mghiwang, *Ind. J. Chem*. **14**: 282 (1946).
4. Z.H. Halil and A.S. Yanni, *J. Ind. Chem. Soc.*, **58**: 168 (1981).
5. J.M. Roushdi, I.A. El-Sehai and N.S. Habib, *Chem. Abstr.*, **89**: 163490j (1981).
6. J. Karl, Kramer, Mcgegor and E. Harrison, *Chem. Abstr*. **90**: 82064u (1979).
7. N.K. Mandal, R. Sinha and K.P. Banarjee, *Chem. Abstr.*, **104**: 34034v (1986).
8. M.D. Ankhiwala and K.B. Naik, *Chem. Abstr.,* **112**: 55611n (1990).
9. B. Shivkumar, Nargund, *India J. Heterocyct. Chem*. **8**(1): 27-30 (1998).
10. Kuchero V.F.J. Gen. Chem., USSR **21**: 1145 (1951); *Chem. Abstr*. **46**: 5043 (1952).
11. V.R. Naik, *Asian J. Chem* **12**(4) 1358-13609 (2000), *Chem. Abstr* **16**: 222650m, 134 (2001).
12. K.T. Borkhade and M.G. Marathey *Indian J. Chem*. **8**: 796 (1970).
13. G. Aziz, M.H. Nossoir, N.L. Doss and A.S. Rizk, *Indian J. Chem*. **14**(B): 286 (1976).
14. Borul *et al.*, *Orient. J. Chem*. **24**(2): 775-776 (2008).
15. Robert Cruickshank, J.P. Duguid, B.P. Marimon, R.H.A. Swain, Medical Microbilogy, Twelfth Edition Vol II, 1982, Churchill Livign Stone, Edingurgh, London, New York (1982).
16. Mani Mohan Banerjee, Essential of Medical Microbilogy, 1-2 (1999).
17. R. Ananthnarayan and C.K. Jayaram Panikar, Text Book of Microbiology, 5th Edn., Orient Longman, (2002).