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A convenient synthesis and antibacterial evaluation of some novel 4-oxo-thiazolidines

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ABSTRACT

A new series of 4-oxo-thiazolidines (3a-e) have been prepared by cycloconndensation of hydrazones (2a-e) and mercapto acetic acid. Hydrazones (2a-e) have been synthesized by reaction between 5-bromofuran-2-carbohydrazide (1) with different aromatic aldehydes. The constitutions of newly synthesized compounds have been established on the basis of elemental analysis, IR and ^{1}H NMR spectral data. All the synthesized compounds have been evaluated for their antibacterial activity.

Key words: Hydrazones, 4-oxo-thiazolidines, mercapto acetic acid, spectral data, antibacterial activity.

INTRODUCTION

The chemsitry of 4-oxo-thiazolidines was reviewed[1-2] in depth. Literature survey revels that various 4-oxo-thiazolidines[3] attracted considerable attention as they endowed with wide rang of pharmacological activities. They are found to be effective as antiviral[4], anthelmintic[5], anticonvulsant[6], antitubecular[7] and anti-HIV[8] agents. 5-Bromofuran-2-carbohydrazide(1) reacts with different aromatic aldehydes to give hydrazones (2a-e). This on cyclocondensation with mercapto acetic acid yielded 4-oxo-thiazolidines (3a-e) (Scheme 1). The characterizations of the all the synthesized compounds were assigned on the basis of elemental analysis, IR and ^{1}H NMR spectral data. The compounds were evaluated for their antibacterial activity against *S. aureus* (MTCC 96), *B. subtilis* (MTCC 441) (*Gram-positive* bacteria) and *E. coli* (MTCC 443) *S. paratyphi* B. (MTCC 733) (*Gram-negative* bacteria).

EXPERIMENTAL

All the melting points were determined in an open capillary and are uncorrected. The IR spectra were recorded on Perkin-Elmer 237 spectrophotometer. ^{1}H NMR spectra on a Bruker Avance DPX 300 MHz spectrometer with $CDCl_3$ as a solvent and TMS as internal reference. Purity of the compounds was checked on TLC was using silica gel-G.

Preparation of N-(substituted benzylidene)-5-bromofuran-2-carbonylhydrazones (2a)

5-bromofuran-2-carbonylhydrazones (1) (0.01mol) and 3,4,5-trimethoxy benzaldehyde (0.01mole) in dry toluene (50ml) was refluxed on water bath using Dean-Stark water separator for 4-5 hours. Excess of toluene was then distilled off and the product separated out was recrystallised from alcohol to give (2a). Yield 65% m.p. 240°C: IR (KBr); 1659 (>C=O,-CONH), 1578(-N=CH), 1240 (C-O-C), 630 (C-Br); ^{1}H NMR (DMSO); 3.80 (s, 6H, m-COH_3), 3.86 (s, 3H, p-OCH_3), 6.30-7.81 (m, 4H, Ar-H and -CG of furan ring), 8.16 (s, 1H, N=CH). Similarly other compounds of these series (2b-e) and their physical data are given in (Table 1).

Preparation of 2-(substituted phenyl)-3-(5'-bromofuran-2'-carboxamido)-thiazolidine-4-ones(3a)

A mixture of (2a) (0.01 mol) and mercapto acetic acid (0.01mol) in dry toluene (60ml) was

refluxed water bath using Dean-Stark water separator for 10-12 hours. Excess of toluene was then distilled off and the resulting viscous liquid was treated with saturated $NaHCO_3$ solution to remove unreacted mercapto acetic acid, The resulting product separated was washed with water, dried and recrystallized from alcohol to give (3a). Yield 64% m.p. 93°C: IR (KBr); 1670 (>C=O,-CONH), 1688 (>C=O, thiazolidine ring), 1245 (C-O-C), 704 (C-S-C), 628 (C-Br), ^{1}H NMR ($CDCl_3$), 3.84 (s, 6H, m-OCH_3), 3.90 (s, 3H, p-OCH_3), 6.0 (s, ^{1}H, -CH-Ar), 6.40-7.62 (m, 4H Ar-H and -CH furan ring), 8.14 (s, 1H, -CONH). Similarly other compounds of these series (2b-e) and their physical data are given in (Table 1).

RESULTS AND DISCUSSION

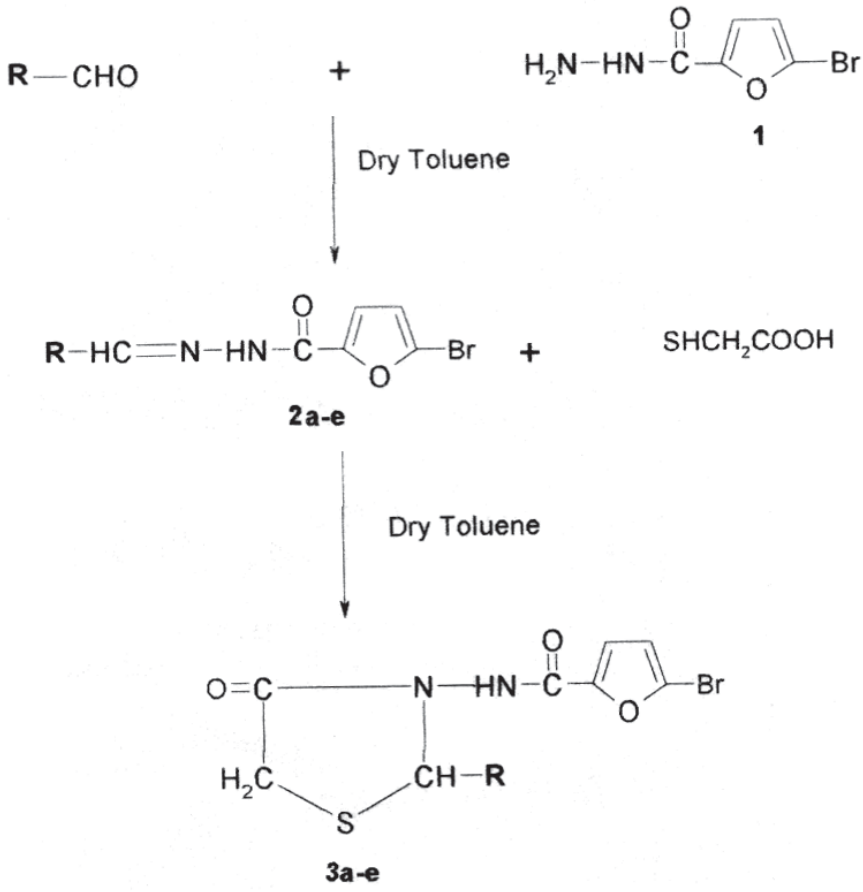
Antibacterial acitivity all the synthesised compounds have been assayed against *S. aureus* (MTCC 96), *B. subtilis* (MTCC 441) (*Gram-positive* bacteria), and *E. coli* (MTCC 443) *S. paratyphi* B. (MTCC 733) (*Gram-negative* bacteria) by using agar diffusion method of A L Barry[9]. Known antibiotic like ciprofloxacin used for comparison (Table 2). Antibacterial activity data of the tested compounds revealed that compounds (2d), (3a), (3c) and (3e) were found to be moderately active against *S. aureus* (MTCC 96). Compounds (2a) and (2b) were found to be less against *S. aureus* (MTCC 96). Compounds (2c), (2e), (3b) and (3d) were found to be inactive against *S. aureus* (MTCC 96). Compounds (3d) found to be active against *B. subtils* (MTCC 441), where as (2a), (2c), (3c) and (3e) found to be moderately active against *B. subtils* (MTCC 441). Compounds (2b), (2d), (2e) and (3e) were found be less against *B. subtils* (MTCC 441). Compounds (2c), (2e), (3b) and (3b) were found to be medorately active against *E. coli* (MTCC 443), where as compound (3d) was found to be

Table 1: Characterization data of compounds (2a-e) and (3a-e)

compound	R	m.p. °C	Yield (%)	Mol formula	Elemental Analyses %C Found (Calcd.)	%N Found (Calcd.)	%H Found (Calcd.)
2a	3,4,5-Trimetho-xyphenyl	240	65	$C_{15}H_{15}BrN_2O_5$	46.97 (46.99)	3.37 (3.39)	7.33 (7.31)
2b	2-Nitrophenyl	200	63	$C_{12}H_8BrN_3O_4$	42.64 (42.60)	2.33 (2.36)	12.40 (12.42)
2c	3-Bromophenyl	136	70	$C_{12}H_8BrN_2O_2$	38.68 (38.70)	2.13 (2.15)	7.50 (7.52)
2d	2,3-Dichlorophenyl	190	73	$C_{12}H_7BrCl_2N_2O_2$	39.74 (39.77)	1.90 (1.93)	7.75 (7.73)
2e	3,4,5-Dichlorophenyl	172	72	$C_{12}H_7BrCl_2N_2O_2$	39.73 (39.77)	1.91 (1.93)	7.71 (7.73)
2a	3,4,5-Trimetho-xyphenyl	93	61	$C_{17}H_{17}BrN_2O_6S$	44.65 (44.63)	3.69 (3.71)	6.10 (6.13)
2b	2-Nitrophenyl	120	64	$C_{14}H_{10}BrN_3O_5S$	40.74 (40.77)	2.39 (2.42)	10.17 (10.19)
2c	3-Bromophenyl	93	64	$C_{14}H_{10}Br_2N2O_3S$	37.64 (37.66)	2.21 (2.24)	6.25 (6.27)
2d	2,3-Dichlorophenyl	170	67	$C_{14}H_9BrCl_2N_2O_3S$	38.50 (38.53)	2.08 (2.06)	6.44 (6.40)
2e	3,4,5-Dichlorophenyl	165	65	$C_{14}H_9BrCl_2N_2O_3S$	38.55 (38.53)	2.04 (2.06)	6.40 (6.42)

Table 2: Antibacterial activity data of compound 2a-e and 3a-e

S. No	R	Antibacterial Activity Diameter of zone of inhibition (in mm)			
		S. aureus **MTCC 96**	***B. subtilis*** **MTCC 441**	***E.coli.*** **MTCC 443**	***S.parathyphi-B*** **MTCC 773**
2a	3,4,5-Trimetho- xyphenyl	13	13	13	16
2b	2-Nitrophenyl	12	-	12	12
2c	3-Bromophenyl	-	13	15	-
2d	2,3-Dichlorophenyl	15	-	-	17
2e	3,4,5-Dichlorophenyl	-	-	16	-
2a	3,4,5-Trimetho-xyphenyl	15	16	12	14
2b	2-Nitrophenyl	-	-	16	15
2c	3-Bromophenyl	14	13	11	16
2d	2,3-Dichlorophenyl	-	17	17	17
2e	3,4,5-Dichlorophenyl	15	13	10	15
	Ciprofloxacin(Standard Drug)	22	24	27	28



Scheme 1:

inactive against *E. coli* (MTCC 443). Compounds (2a), (2d), (3b), (3c), (3d) and (3e) were found to be moderately active against *S. paratyphi-B* (MTCC 733). Compounds (2b) and (3a) were found to be less active against *S. paratyphi-B* (MTCC 733), where as compounds (2c) and (2e) were found to be inactive against *S. paratyphi-B* (MTCC 733).

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REFERENCES

1. Brown, F.C., *Chem. Rev.,* **61**: 463 (1961).
2. Danila, G., *Rev Chim (Burchares),* **29**: 820 (1978), *Chem. Abstr.,* **90**: 72086o (1979).
3. Grasso, S., Chimirri, A., Monforte, P., Frenech, G., Zappalar, M. and Monforte, A.M., *Framaco Ed Sci.,* **43**: 851 (1988), *Chem. Abstr.,* **110**: 50734c (1989).
4. Schauer, P., Kabavcic., A., Tisler, M. and Likar M., *Experientia.,* **22**: 304 (1966).
5. Brody, G. and Elward T.E., *J. Parastiol.,* **57**: 1068 (1971).
6. Singh, S.P., Auyong, T.K. and Parmar S.S., *J. Pharm Sci.,* **63**: 960 (1974).
7. Solankee, A., and Kapadia, K., *Orient J Chem.,* **10**(2): 173 (1994), *Chem Abstr.,* **125**: 221678d (1996).
8. Abdel Rehman, R.M., *Boll Chim Farma.,* **146**(6): 401 (2001), *Chem. Abstr.,* **137**: 352919d (2002).
9. Barru Arthur L., *The Antimicrobic susceptibility test: Principles and practices,* Illus Lea and Febiger, *Philadephia, Pa.,* USA, 180 (1976), *Bio. Abstr.,* **64**(5), 25183 (1977).