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SYNTHESIS, CHARACTERIZATION AND ANTI-MICROBIAL ACTIVITY OF 3-{4-[3-CHLORO-2-(SUBSTITUTEDPHENYL)-4-OXOAZETIDIN-1YL] PHENYL}-6-BROMO-2-PHENYLQUINAZOLINE-4-ONE

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ABSTRACT

Heterocyclic compounds have so far been synthesized mainly due to the wide range of biological activities. Azetidine plays an important role in biological field. From these reviews we synthesized a new series of 3-{4-[3-chloro-2-(substituted phenyl)-4-oxoazetidin-1yl] phenyl}-6-bromo-2-phenylquinazoline-4-one derived from the refluxes method of Schiff base in presence of tri-ethyl amine with chloro acetyl chloride is developed. The title compounds were characterized by element analysis, IR, NMR and spectral data. All the compounds were tested for their antibacterial and antifungal activities by Cup Borer method.

Key words: Azetidinones, IR, NMR, Cup borer method.

INTRODUCTION

2-Azetidinone or β-lactums are well known class of heterocyclic compounds among organic and medicinal chemistry[1]. They are most prescribed antibiotic in medicine. Besides their antibiotic, activity azetidinones are also known to exhibit some other types of biological activities, such as antibacterial[2,3], antimicrobial[4], antitubercular[5], local anesthetic[6], anti-inflammatory[7], anthelmintic[8], anticonvulsant[9], hypoglycemic agent[10]. They also function as enzyme inhibitors and are effective on central nervous system[11]. β-Lactum also serve as synthon for various biologically important classes of organic compounds[12].

EXPERIMENTAL

Melting points were taken in open capillary tube and were uncorrected. IR spectra were recorded on I.R. Spectrophotometer of Buck Scientific Model No. 500 and instrument used for NMR Spectroscopy was Bruker Advance II 400 and DMSO used as internal standard. Solvent used were DMSO. Purity of the compounds was checked by TLC on Silica-G plates. Anti-microbial activities were tested by Cup-Borer method.

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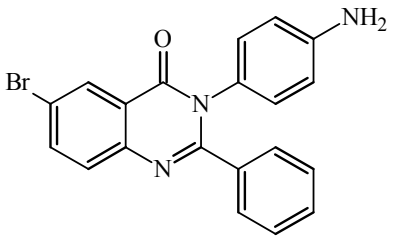
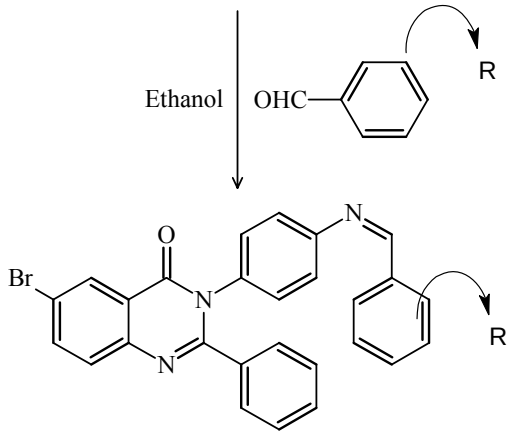
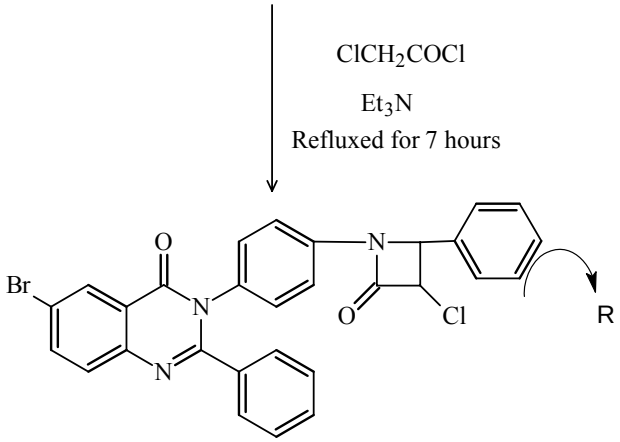


3-(4-aminophenyl)-6-bromo-2-phenylquinazolin-4-one



1 (a-j)

3-(4-{[(substitutedphenyl)methylene]amino}phenyl)-6-bromo-2-phenylquinazolin-4-one



2-(a-j)

3-{4-[3-chloro-2-(substitutedphenyl)-4-oxoazetidin-1-yl]phenyl}-6-bromo-2-phenylquinazolin-4-one

Scheme 1

Procedure of 3-(4-{[(substitutedphenyl)methylene]amino}phenyl)-6-bromo-2-phenyl quinazolin-4-one [1-(a-j)]

To a solution of 3-(4-aminophenyl)-6-bromo-2-phenylquinazolin-4-one (0.01 M) in absolute ethanol (60 mL), substituted aldehydes (0.01 M) and a few drops of glacial aceticacid were added and the mixture refluxed for 10 h. It was then cooled, concentrated and poured into crushed ice and filtered. The product thus obtained was purified by recrystallization from methanol to get compound 3-(4-{[(substitutedphenyl) methylene] amino}phenyl)-6-bromo-2-phenylquinazolin-4-one.

IR ; [1-e] (cm^{-1}) : 3288 (-OH), 3068 (=C-H, aromatic), 1674 (>C=O), 1620 (>C=N-), 1558 (>C=C<, aromatic ring), 1317 (C-N), 1261 (-C-O-), 561 (C-Br).

^{1}H NMR (DMSO); [1-h]: 2.8898, singlate (6H) (-N(CH_3)$_2$), 8.4797, singlate (1H) (-N=CH-Ar), 6.4880-8.8299, multiplate (16H) (Ar-H).

Procedure of 3-{4-[3-chloro-2-(substituted phenyl)-4-oxoazetidin-1-yl]phenyl}-6-bromo-2-phenylquinazolin-4-one [2-(a-j)]

In a 100 mL round bottom flask 3-(4-{[(substituted phenyl)methylene]amino} phenyl)-6-bromo-2-phenylquinazolin-4-one (0.01 M) in 70 mL benzene was taken. Chloro acetyl chloride (0.01 M) was added at room temperature with constant stirring and triethylamine 1ml was added and the reaction mixture was refluxed for 7 hours. After the completion of reaction, solvent was removed by vacuum distillation. The solid was filtered, dried and recrystallized from toluene.

IR (2j); (cm^{-1}): 3093 (=C-H), 1697 (>C=O stretch), 1651 (>C=N stretch), 1556 (>C=C<, aromatic), 1506 (-N=O), 1334 (C-N), 651 (C-Cl), 551 (C-Br).

^{1}H NMR (DMSO); (2a): 3.1224, Doublet (1H) (>CH-Cl), 5.8712, doublet (1H) (>CH-), 6.9937-8.3520, multiplate (16H) (Ar-H).

Table 1: Physical constant of 3-{4-[3-chloro-2-(substituted phenyl)-4-oxoazetidin-1-yl]phenyl}-6-bromo-2-phenylquinazolin-4-one

Sub. No.	R	Molecular formula	Mol. wt. (g/m)	Yield (%)	M.P. ^{o}C	Carbon (%)		Hydrogen (%)		Nitrogen (%)	
						Found	Required	Found	Required	Found	Required
2a	-2-Cl	$C_{29}H_{18}BrCl_2N_3O_2$	591.28	81	183	58.89	58.91	3.04	3.07	7.08	7.11
2b	-4-Cl	$C_{29}H_{18}BrCl_2N_3O_2$	591.28	79	160	58.88	58.91	3.03	3.07	7.07	7.11
2c	-3-OCH_3, -4-OCH_3	$C_{31}H_{23}BrClN_3O_4$	616.88	84	172	60.34	60.36	3.74	3.76	6.79	6.81
2d	-H	$C_{29}H_{19}BrClN_3O_2$	556.83	85	160	62.50	62.55	3.40	3.44	7.51	7.55
2e	-2-OH	$C_{29}H_{19}BrClN_3O_3$	572.83	86	180	60.75	60.80	3.30	3.34	7.30	7.34
2f	-3-OCH_3, -4-OH	$C_{30}H_{21}BrClN_3O_4$	602.86	77	165	59.71	59.77	3.47	3.51	6.92	6.97
2g	-4-OH	$C_{29}H_{19}BrClN_3O_3$	572.83	76	150	60.77	60.80	3.32	3.34	7.30	7.34
2h	-4-N(CH_3)$_2$	$C_{31}H_{24}BrClN_4O_2$	599.90	79	178	62.03	62.07	4.01	4.03	9.31	9.34
2i	4-OCH_3	$C_{30}H_{21}BrClN_3O_3$	586.86	81	170	61.37	61.40	3.59	3.61	7.14	7.16
2j	-3-NO_2	$C_{29}H_{18}BrClN_4O_4$	601.83	83	198	57.82	57.87	2.99	3.01	9.29	9.31

Table 2: Antimicrobial activities of 3-{4-[3-chloro-2-(substituted phenyl)-4-oxoazetidin-1-yl]phenyl}-6-bromo-2-phenylquinazolin-4-one

S. code	Microorganisms							Yeast
	E.coli **NCIM 2066**	***S.aureus*** **MTCC 737**	***B.spizinzenii*** **MTCC 441**	***P. aeruginosa*** **MTCC 1688**	***S.paratyphi*** **MTCC 735**	***B.pumillus*** **MTCC 1607**	***K.pneumoniae*** **MTCC 432**	***C.albicans*** **MTCC 227**
2a	17	22	23	14	21	20	19	22
2b	18	18	24	13	19	23	21	20
2c	19	17	21	14	17	21	Nl	23

Cont…

S. code	Microorganisms							Yeast
	E.coli **NCIM 2066**	***S.aureus*** **MTCC 737**	***B.spizinzenii*** **MTCC 441**	***P. aeruginosa*** **MTCC 1688**	***S.paratyphi*** **MTCC 735**	***B.pumillus*** **MTCC 1607**	***K.pneumoniae*** **MTCC 432**	***C.albicans*** **MTCC 227**
2d	17	16	Nl	11	17	16	14	18
2e	18	16	16	Nl	21	19	20	22
2f	15	22	19	14	17	Nl	18	21
2g	18	19	20	18	18	20	20	16
2h	22	19	17	16	20	18	18	19
2i	20	23	18	16	20	20	16	20
2j	Nl	20	20	15	21	22	16	22

Note: The digits in above cell is indicates diameter for the zone of inhibition in milimeter (mm)

CONCLUSION

The main focus of this research work was to synthesize, characterize and evaluate antimicrobial activities of the newly synthesized Azetidinones derivatives, structures of synthesized compounds were confirmed and characterized with the help of analytical data's such as IR and ^{1}H-NMR. In summary, we have described the synthesis and antimicrobial activity of novel 3-{4-[3-chloro-2-(substituted phenyl)-4-oxoazetidin-1-yl]phenyl}-6-bromo-2-phenylquinazolin-4-one has shown good activity against the bacterial strains.

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REFERENCES

1. G. S. Singh, Tetrahedron, **59**, 7631 (2003).
2. G. S. Singh, Rev. Mini. Med. Chem., **4**, 69 (2004).
3. G. S. Singh, Rev. Mini. Med. Chem., **4**, 93 (2004).
4. A. K. Khallafallah, M. A. Selim, R. M. A. El – Hamd, M. A. Maghraby-El, H. A. Soleimon and M. A. Raslan, Indian J. Chem., **34B**, 1066 (1995).
5. K. A. Parikh, P. S. Oza and A. R. Parikh, Indian J. Chem., **39B**, 716 (2000).
6. E. Costakes and G. Tastase, Chem. Abst., **90**, 203935q (1979).
7. D. Sreenivasa Rao, E. Jayachandran, G. M. Sreenivasa and B. Shivakumar, Orient. J. Chem., **21(1)**, 113 (2005).
8. G. M. Sreenivasa, B. Shivakumar and E. Jayachandran, Indian Drugs, **43**, 4 (2006).

9. A. E. H. Abdel Ghany and H. A. W. Mohammad, Acta Pharm., **53**, 127 (2003).
10. V. P. Chernykh and O. F. Sidorenko, Chem. Abstr., **98**, 89233 (1983).
11. B. S. Vashi, D. S. Mehta and V. H. Shah, Indian J. Chem., **34B**, 802 (1995).
12. L. J. Conte, Fluorine, Chem., **70**, 175 (1995).