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Synthesis, Characterization and Biological Activity of 3,7-substituted-1[(5-aryl-1,3,4-oxadiazol-2-yl)methyl]pyrazin-2-(1H)-one and quinoxalin-2-(1H)-one Derivatives

S. S. Dhok[1*], S. E. Bhandarkar[2], S. S. Mamidwar[3]

[1, 2] *Government Vidarbha Institute of Science and Humanities, Amravati- 444604, (M.S.), INDIA*
[3]*Saraswati College of Engineering, Kharghar,Navi Mumbai,(MS), INDIA*

[*] *Correspondence: E-mail: sarikadhok07@gmail.com*

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ABSTRACT: 3,7-Substituted-1[(5-aryl-1,3,4-oxadiazol-2-yl)methyl]-pyrazin-2-(1H)-one and quinoxalin-2-(1H)-one derivatives were synthesized from ethyl(3,7-substituted-2-oxo-pyrazin-1(2H)-yl)-acetohydrazide and quinoxalin-1-(2H)-yl)-acetohydrazide with substituted aromatic carboxylic acid &phosphorous oxychloride ,which was refluxed for 8 hr. The product was then poured to ice cold water, neutralized with sodium bicarbonate. The compounds thus synthesized have been characterized by chemical, physical and spectral data. All of these titled synthesized compounds have been examined for antimicrobial study and are found to possess very good antimicrobial activities.

Keywords: Biological evaluation; Characterization; Pyrazine; Quinoxaline and Synthesis.

INTRODUCTION: The pyrazine nucleus is a part of polycyclic compounds of biological significance.. Uncountable efforts made to synthesis various heterocyclic compounds and their derivatives in the last decade & were found to posses excellent biological activities.[1-7]

Pyrazine ring is six membered heterocyclic compounds but it curioused by Scientists because of the many biological activities not only pyrazine but different substituted derivatives as well. The biological activities likeantidepressant[8] antimicrobial [9]anti-tuberculosis[10-11] anti-inflammatory[12], antiprotiferative[13], antifungal[14] antifilarial agents[15] vitro anticancer activity[16], antihypertensive agent.[17]

Synthesis characterization and biological activity of pyrazine derivatives becomes most important field for many investigators. Hence, Considering the scope of pyrazine derivatives we synthesized novel3,7-substituted-1[(5-sulfanyl-1,3,4-oxadiazol-2-yl)methyl]-pyrazin-2-(1H)-one and quinoxalin-2-(1H)-one one compounds and find their biological activities.

MATERIALS AND METHOD: The melting points (ºC) were measured by open capillary method. IR spectra (υ max in cm-1) were observed on a Shimadzu FTIR 8300 spectrophotometer using KBr pellets. The 1H NMR spectra were observed on DRX-300 (300 MHZ) instrument using $CDCl_3$ as solvent (chemical shift in δppm) and TMS as internal standard. Thin Layer Chromatography on silica gel-G, was used to find the purity of the compounds.

RESULT AND DISCUSSION:

Synthesis of 3,7-substituted-1[(5-aryl-1,3,4-oxadiazol-2-yl)methyl]pyrazin-2-(1H)-one and quinoxalin-2-(1H)-one derivatives : 3,7-Substituted-1[(5-aryl-1,3,4-oxadiazol-2-yl)methyl]-pyrazin-2-(1H)-one and quinoxalin-2-(1H)-one derivatives are synthesised from ethyl(3,7-substituted-2-oxo-pyrazin-1(2H)-yl)-acetohydrazide and quinoxalin-1-(2H)-yl)-acetohydrazide with substituted aromatic carboxylic acid &phosphorous oxychloride ,which is refluxed for 8 hr. The product was then poured to ice cold water, neutralised with sodium bicarbonate.

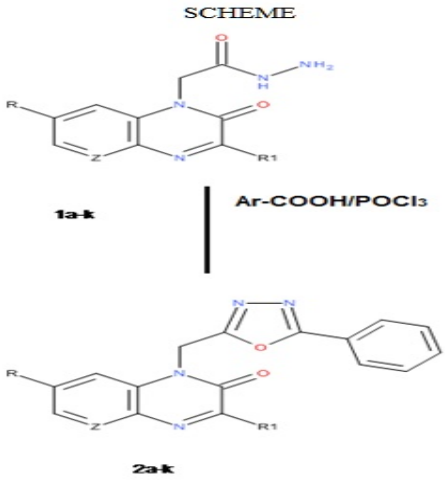

Table 1: Physical Properties.

Comp. No.	Z	R	R_1	Molecular formula
2a	N	Cl	C_6H_5	$C_{22}H_{16}ClN_5O_2$
2b	N	Cl	CH_3	$C_{17}H_{12}ClN_5O_2$
2c	N	Cl	C_2H_5	$C_{18}H_{14}ClN_5O_2$
2d	N	Cl	Cl	$C_{16}H_9Cl_2N_5O_2$
2e	N	CH_3	Cl	$C_{17}H_{12}ClN_5O_2$
2f	N	CH_3	CH_3	$C_{18}H_{15}N_5O_2$
2g	C	Cl	C_6H_5	$C_{23}H_{15}ClN_4O_2$
2h	C	Cl	C_2H_5	$C_{19}H_{15}ClN_4O_2$
2i	C	Cl	Cl	$C_{17}H_{10}Cl_2N_4O_2$
2j	C	CH_3	C_6H_5	$C_{24}H_{18}N_4O_2$
2k	C	CH_3	C_2H_5	$C_{20}H_{18}N_4O_2$

Spectral Analysis of compound number 8:

IR (ν_{max}) (cm^{-1}) : 3090(Ar-H),2967(C-H, str),1705 (C=O, str), 1668(C=N,str) , 1317(C-N-C,str) ,1157(C-O, str),C-O-C (1170& 1055 str),740(C-Cl ,str) ,

NMR: 7.65(m,7H,Ar-H) 5.49(s,2H,CH_2) 2.39 (t,2H,CH_2) 1.74(d,3H,CH_3)

Antimicrobial Studies: Above synthesized 3,7-substituted-1[(5-sulfanyl-1,3,4-oxadiazol-2-yl) methyl] pyrazin-2-(1H)-one and quinoxalin-2-(1H)-one derivatives have been studied for their antimicrobial activity against *staphylococcus aureas*, *pseudomonas aeruginos*, *escherichia coli*, *proteus mirabilis*.. Incubated the culture of each species at 37^0C and measured the zone of inhibition after 24 hr. Most of these compounds found to be active.

Table 2: Antimicrobial Study.

Comp. No.	Antimicrobial activity			
	E-coli	***P. mirabilis***	***S. aureas***	***P. aeruginosa***
2a	15	14	16	14
2b	14	16	14	14
2c	17	14	18	18
2d	15	14	15	17
2e	16	17	16	14
2f	12	13	07	11
2g	15	16	11	14
2h	14	16	14	18
2i	17	15	18	18
2j	14	14	13	16
2k	11	09	13	10

Strongly active, range 14-18 Weakly active, range 7-10 mm Moderately active, range 1

CONCLUSION: Thus from above results it was observed that these heterocyclic compounds like Cl atoms were found more active against *staphylococcus aureas, pseudomonas aeruginosa escherichia coli, proteus mirabilis.* So those compounds can be easily be used for the cure of diseases caused by test pathogens, only when they does not have toxic and other side effects.

REFERENCES:

1. Dhok S. S. and Bhandarkar S. E. A Review on pyrazin-2(1H)-one derivatives possessing biological activity. International Journal of Research in Pharmacy & Chemistry 2015, 5(2), 312-316.
2. Sherekar V. M., Bhandarkar SE. Synthesis and biological evaluation of 3-(4-chloro-1-hydroxynaphthalen-2-yl)-5-aryl-1-substituted-pyrazoles Der Pharma Chemica International Journal of Current Pharmaceutical Research, vol. 7 issue 2, 2015, 10-1.
3. S. W. Schneller and J. K. Luo, "Composition antiviral activity of substituted Organic azaindoleoxoacetic piperazine derivative," Journal of Chemistry, vol. 45, no. 20, pp. 4045–4048, 1980.
4. Bhandarkar S. E. Synthesis and characterization of 3-(1-hydroxy naphthalene-2-yl)-5-(furane 2-yl)-1-substituted pyrazoline. Orient J Chem 2014; 30(1): 361-363
5. Bhandarkar S. E., Khobragade B. Synthesis and Biological study of 2-(5-aryl-4,5-dihydro-1-Substituted pyrazole-3-yl)-substituted naphthalene 1-ol. Advanced Materials Research,Trans Tech Publications Volume 1110; 2015; 306-310.
6. Vaijayanthi. S. P. & Mathiyalagan. N, Synthesis and characterization of a new oxidant, Nchloropyrazinamide, International Journal of Research in Organic Chemistry 2012; 2(3):13-15.
7. Dhok S. S. and Bhandarkar S. E. Synthesis, Characterisation & biological evaluation of 9,10-bicyclo-3-substituted- pyrazine-2-(1H)-one.Am.J. Pharm Tech Res., 2017; 7(2), 176-180.
8. P.A.Bonnet,A.Michel,F.Laurentetal.,"Synthesisand antibronchospastic activity of 8alkoxy-and 8(alkylamino)imidazo[1,2-a]pyrazines," Journal of Medicinal Chemistry, vol.35, no. 18, pp. 3353–3358, 1992.
9. Miralinaghi. P., Salimi. M, Mohammadli. S. S. and Amini. M., Synthesis aCytotoxicityEvaluation of Diarylpyrazine and Dihydropyrazine Derivatives, InternationaJournal of Pharma and Bio Sciences, 2011; 2(3): 60-64.
10. Janduorek.O., Dolezal. M, Klementova.M., Kralova K,Pesko. M., Microwave assisted synthesis of new pyrazinamide analogus & their biological evaluation, Universitas Comeniana Bratislavensis,MCMXIX, facultas Rerum Naturalium,1-12.
11. Spaia S, Magoula I, Tsapas G, Vayonas G (2000) "Effect of pyrazinamide and probenecid on peritoneal urate transport kinetics during continuous ambulatory peritoneal dialysis", PeritDial Int, 20 (1): 47–52.
12. O. Vitse, P. Bonnet, J. Bompart et al., "Nitration in the imidazo[1,2-a]pyrazine series.Experimental and

computa- tional results," Journal of Heterocyclic Chemistry, vol.34,no.3,pp. 701–707, 1997.

13. F. Azam, I. A. Ibn-Rajab, and A. A. Alruiad, "Adenosine A2A receptor antagonists asnovel anti-Parkinsonian agents: a review of structure-activity relationships,"Pharmazie,vol. 64,no. 12, pp.771–795,2009.

14. Abd El-Wahab. A. H. F, Bedair. A. H, Eid. F. A, El-Haddad. A. F, Adawy El-Deeb. A. M and El-Sherbiny. G. M, Pyrazine-2-substituted carboxamide derivatives: synthesis,antimicrobial and *Leuconostoc mesenteroides* growth inhibition activity, J. Serb. Chem.Soc. 2006; 71 (5): 471–481.

15. Singh B. K., Mishra M., Saxenaa N., Yadav G.P., Maulik P. R., Sahoo M. K., Gaur R. L., Murthy P. K., Tripathi R. P. Synthesis of 2-sulfanyl-6-methyl-1,4-dihydropyrimidines as a new class of antifilarial agents. Eur J Med Chem. 2008; 43: 2717–2723

16. Sosnicki J. G., Struk L., Kurzawski M., Peruzynska M., Maciejewska G., Dro zdzik M.Regioselective synthesis of novel 4,5-diaryl functionalized 3,4-dihydropyrimidine-2(1H)-thiones via a non-Biginelli-type approach and evaluation of their in vitroanticancer activity. Org Biomol Chem., 2014, 12, 3427–40

17. Rovnyak G. C., Atwal K. S., Hedberg A., Kimball S. D., Moreland S., Gougoutas J. Z., O'Reilly B. C., Schwartz J., Malley M. F. Basic 3-substituted-4-aryl-1,4-dihydropyrimidine-5carboxylic acidesters. Potent antihypertensive agents. J Med Chem.