JOURNAL OF PHARMACEUTICAL SCIENCE AND BIOSCIENTIFIC RESEARCH (JPSBR)

(An International Peer Reviewed Pharmaceutical Journal that Encourages Innovation and Creativities)

Synthesis of Novel Chalcones and their Antibacterial Activity

Sandeep Mekde*, K.S.Nimavat[2], R. A. Shah[3], K.B. Vyas[3]

1 Pacific Academy of Higher Education And Research University Udaipur.
2 Department of Chemistry, Government Science Collage– Gandhinagar.
3 Department of Chemistry, Sheth .L.H. Science Collage– Mansa-382 845

ABSTRACT:

4-(4-chlorophenoxy)-1,2-dimethylbenzene react with 1-(4-hydroxyphenyl)ethanone in presence of copper metal as a catalyst gives 1-(4-(4-(3,4-dimethylphenoxy) -phenoxy)phenyl)ethanone ,this derivatives react with various substituted aldehyde to give corresponding substituted chalcone derivatives .Now these derivatives on condensation with thourea gives the vast rang of Thioxo Tetrahydro Pyrimidine derivatives. Structure elucidation of synthesized compound had been made on the basis of element analysis, 1H NMR Spectra studies.

KEY WORDS: Synthesis, heterocyclic substituted chalcone derivatives, Pyrimidine derivatives, Chalcones

Article history:

Received 10 Jan 2016
Revised 14 Jan 2016
Accepted 16 Feb 2016
Available online 01 May 2016

Citation:

Mekde S., Nimavat K.S., Shah R. and Vyas K.B. Synthesis of Novel Chalcones and their Antibacterial Activity. J Pharm Sci Bioscientific Res. 2016. 6(3):478-482

For Correspondence:
Sandeep Mekde

Pacific Academy of Higher Education and Research University Udaipur, Rajasthan, India.

(www.jpsbr.org)

INTRODUCTION:

Chalcone (1) are the compounds were aromatic substitutes are introduced in to the terminal position of system C═C-C═, So chalcone are characterized by their position of a Ar(A)-CO-CH ═ CH-Ar(B) Structure in which two aromatic ring are linked by an aliphatic three carbon chain, thus chalcones are phenyl-styryl ketones containing reactive ketoethylenic group –C-CO═CH- .

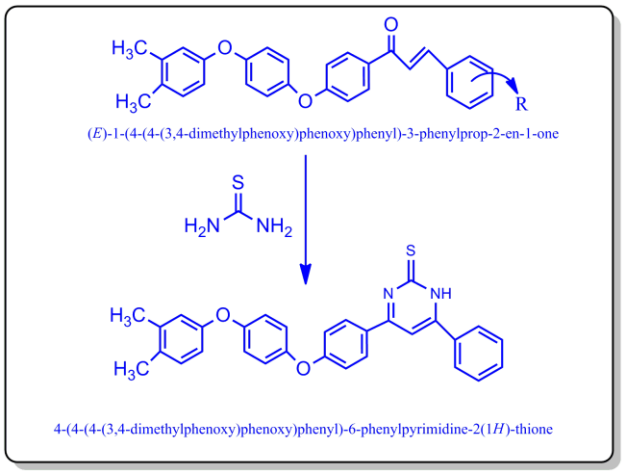
Pyrimidines (2) have chemical and biological importance, as the pyrimidine ring system has associated with the valuable pharmacological activity. The simple pyrimidine compounds were prepared by the. cyclization of aliphatic raw materials, Polysubstituted Pyrimidines compound were synthesized from acyclic compounds in a similar manner to.Chemistry of the benzenoid (3). The NH2CSNH2 groups act as an antithyroid. Compound, with the same actions and uses as thiouracil. Numerous derivative of NH2CSNH2 are valuable in the treatment of leprosy (4-5).

Mostly NH2CSNH2 derivatives show cytotoxic activity along with antithyroid activity. NH2CSNH2 also shows some.anti-inflammatory, antimicrobial and antifungal activities (6-7). The diverse medicinal uses and biological activities of pyrimidine are reported earlier (8-10).

Here a series of thioxo tetrahydro pyrimidine derivatives are synthesized to evaluate their antibacterial and antifungal activities

All effort are done in the research is to synthesized a novel compound that can be used for formulation of anticancer drugs.

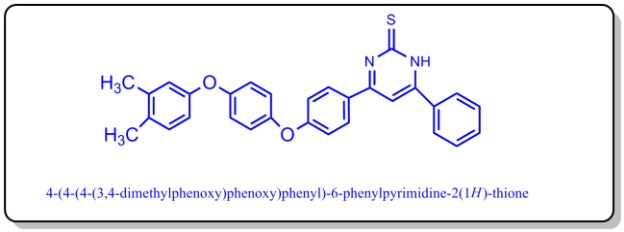
REACTION SCHEME



Reaction Scheme: I

EXPERIMENTAL:

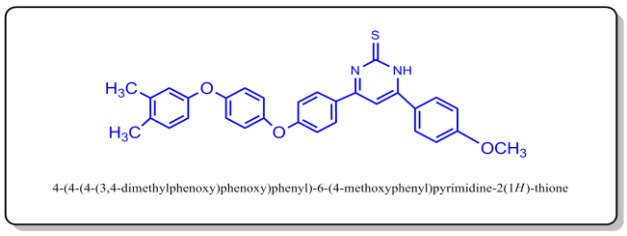
(3a) 4-(4-(4-(3,4-dimethylphenoxy)phenoxy)phenyl)-6-phenylpyrimidine-2(1H)-thione:



Comound 3a from Scheme:I

A mixture of (E)-1-(4-(4-(3,4-dimethylphenoxy)phenoxy)phenyl)-3-phenylprop -2-en-1-one (0.45 g, 0.002 mol) and NH_2CSNH_2 (0.09 gm, 0.002 mol) in the presence of DMSO (40 ml) and con. HCl (25 ml) was reflux for approximately 2.5 hours. The raw synthesized compound was filtered when it was warm, allows the reaction to cool down and neutralized by using NaOH. Wash the solid with water and consequently follow crystallization by ethanol.

(3b) 4-(4-(4-(3,4-dimethylphenoxy)phenoxy)phenyl)-6-(4-methoxyphenyl)pyrimidine-2(1H)- thione:



Comound 3b from Scheme:I

A mixture of (E)-1-(4-(4-(3,4-dimethylphenoxy)phenoxy)phenyl)-3-(4-methoxy -phenyl)-prop-2-en-1-one (0.45 g, 0.002 mol) and NH_2CSNH_2 (0.09 gm, 0.002 mol) in the presence of DMSO (40 ml) and con. HCl (25 ml) was reflux for approximately 2.5 hours .The raw synthesized compound was filtered when it was warm, allow the reaction to cool down and neutralized by using NaOH. Wash the solid with water and consequently follow crystallization by ethano

RESULTS AND DISCUSSIONS

Melting points

All melting points were determined in open capillaries in a liquid paraffin bath and are uncorrected (11-14). The IR spectra were recorded with KBr pellets on Perkin - Elmer - 783 spectrophotometer and 1H NMR spectra were recorded on a Varian Geminy 200 MHz spectrophotometer with CDC_{l3} / $DMSOd_6$ as a solvent using tetramethylsilane (T.M.S.) as an internal standard; the chemical shift values are in d ppm. The purity of the compounds was checked by thin layer chromatography (T.L.C.) on silica gel coated glass plates. The elemental analysis (i.e. C, H and N analysis) has been done on Carlo - Erba - 1108 analyzer and the values are within the permissible limits (i.e. + 0.5) of their calculated values.

Antimicrobial activity

Antimicrobial activity of newly synthesized compounds was studied against gram-positive bacteria *Staphylococcus aureus* and gram-negative bacteria *Escherichia coli* (for antibacterial activity) and against the culture "Candela albicans" (for antifungal activity)(15-16). The antimicrobial screening was carried out by cup - plate method10 at a concentration of 50 $mg.mL^{-1}$ in solvent Dimethyl formamide. The zone of inhibition was measured in mm (17). The antimicrobial activity of the synthesized compounds was compared with standard drugs Ampicillin, Penicillin and Tetracycline at the same concentration.

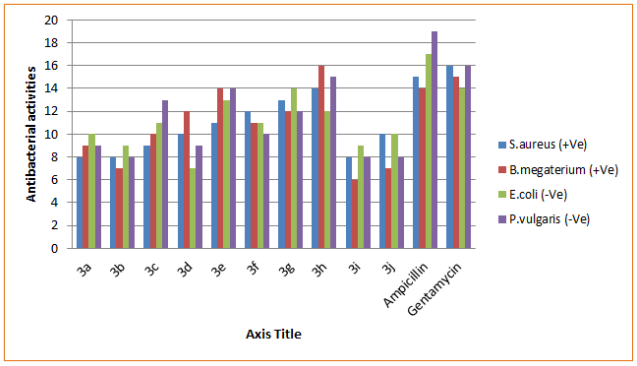
ANALYSIS DATA

Table: I

No.	Code No.	R	Molecular Formula	Molecular Weight (g/m)	Yield (%)	M.P. °C	C %	H %	N %
							Found		
1	3a	H	$C_{30}H_{24}N_2O_5S$	476.16	65	190	75.60	5.08	5.88
2	3b	4-OCH_3	$C_{31}H_{26}N_2O_3S$	506.17	73	168	73.49	5.17	5.53
3	3c	2-OCH_3	$C_{31}H_{26}N_2O_3S$	506.17	70	172	73.49	5.17	5.53
4	3d	2-OH	$C_{30}H_{24}N_2O_3S$	492.15	68	182	73.15	4.91	5.69
5	3e	2-Cl	$C_{30}H_{23}ClN_2O_2S$	510.12	69	185	70.51	4.54	5.48
6	3f	4-Cl	$C_{30}H_{23}ClN_2O_2S$	510.12	74	188	70.51	4.54	5.48
7	3g	2-NO_2	$C_{30}H_{23}N_3O_4S$	521.14	70	192	69.08	4.44	8.06
8	3h	3-Br	$C_{30}H_{23}BrN_2O_2S$	554.07	76	161	64.87	4.17	5.04
9	3i	3,4-$(OCH_3)_2$	$C_{32}H_{28}N_2O_4S$	536.18	75	167	71.62	5.26	5.22
10	3j	3,4,5-$(OCH_3)_2$	$C_{33}H_{30}N_2O_5S$	566.19	77	175	69.94	5.34	4.94

ANTIBACTERIAL ACTIVITY

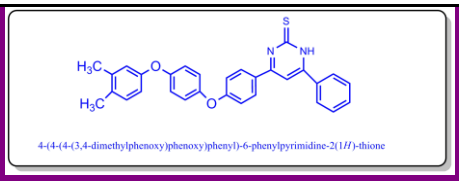
Chart-I



Results: (Comparison of Thioxo Tetrahydro Pyrimidine Derivatives against standard Drugs)

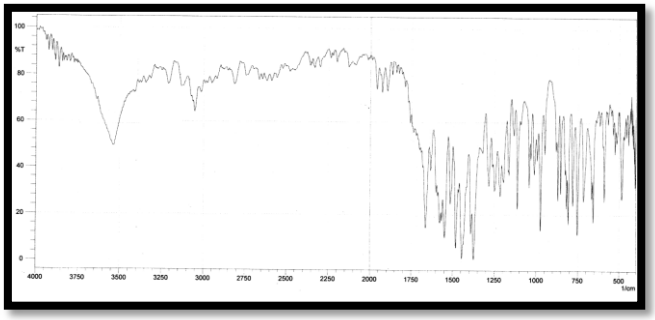
Table: II

Organisms	Compounds	Ampicillin	Gentamycin
S.aureus	3-Br	✓	-
B. megaterium	3-Br and 2-Cl	✓	✓
E.coli	2-NO_2	-	✓
P. vulgaris	3-Br	-	✓

Compound code: 3a	 4-(4-(4-(3,4-dimethylphenoxy)phenoxy)phenyl)-6-phenylpyrimidine-2(1*H*)-thione
Molecular formula: $C_{30}H_{24}N_2O_5S$	
^{1}H NMR (400 MHz, $CDCl_3$) δ ppm:	1.66-1.91 (2H, dd), 2.34 (3H, s), 4.9 (1H, s), 6.86-7.40 (17H, Ar-H, m), 8 (1H, s).
^{13}C NMR (100 MHz, $CDCl_3$) δ ppm:	20.5, 39.2, 52.6, 117.5, 118.8, 120.9, 121.2, 127.5, 128.1, 129.3, 130.1, 131.4, 131.9, 143.6, 151.8, 153.6, 155.1, 151.8, 162.6
IR cm-1 (KBr):	3545, 3049, 1644, 1614, 1592, 1569, 744
Mass (M+1):	476.59

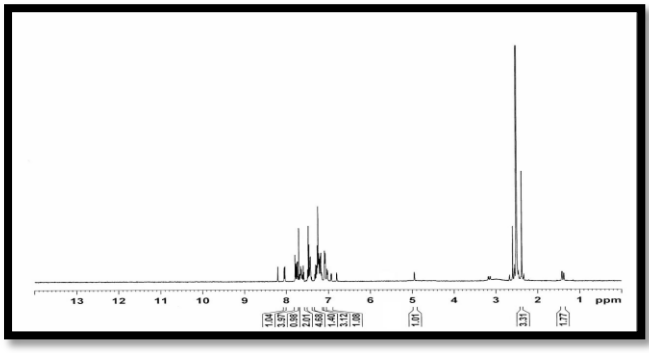
IR Spectral Studies

I.R. (cm-1) (KBr) spectral data of compound:-

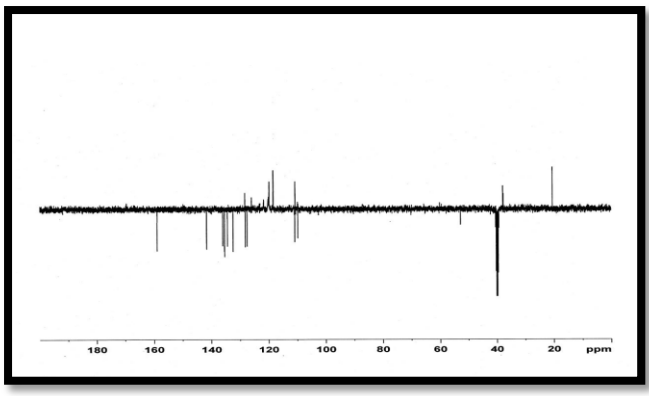


IR of compound 3a

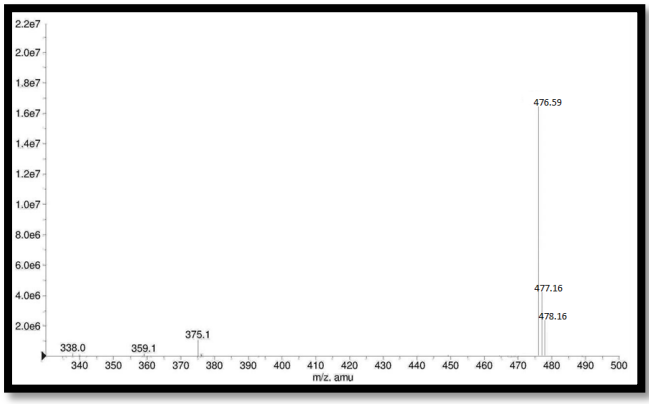
1H N.M.R. Spectral Studies:



^{13}C NMR of compound 3a



M/z of compound 3a



CONCLUSION

The screening results revealed that the compounds (i) showed significant antimicrobial activity. In particular compounds (h) and (j) showed moderate to considerable antibacterial and antifungal activities against all the organisms employed at a conc. of 1000 _g/mL (0.1ml dose level) Comparable to that of standard drugs Ampicillin and Gentamycin.

ACKNOWLEDGEMENTS

The authors are thankful to Dr.Rajarshi N. Patel for providing research facilities. They are also grateful to and the Department of Biosciences, Sardar Patel University, Vallabh Vidyanagar, for screening the newly synthesized compounds for their antimicrobial activities, for scanning the IR spectra and 1H NMR spectra of newly synthesized compounds.

REFERENCES

1. R.N. Patel1, K.S.Nimavat & K. B.Vyas,Study on synthesis of Chalcone & Pyrimidine Heterocyclic compound & their Antimicrobial Activity, *Asian Journal of Biochemical and Pharmaceutical Research,* Issue 4 (Vol. 1) **2011.**
2. Rajarshi N. Patel, K. S. Nimavat, K. B. Vyas And Piyush V. Patel, Synthesis on Study of 2-Methyl-5-Nitro-N-(4-(3-(2-Aryl-2,3-Dihydrobenzo[B][1,4]Thiazepin-4-Yl)Phenoxy)Phenyl) Benzene sulfonamide And Their Antimicrobial Activity, *J. Chem. Pharm. Res*., **2011**, 3(6):409-415.
3. Rajarshi N. Patel, K. S. Nimavat, K. B. Vyas And Piyush V. Patel, Synthesis on Study of 2-Methyl-5-Nitro-N-(4-(3-(5-Substituted-4,5- Dihydroisoxazol-3-Yl)Phenoxy)Phenyl)Benzene sulfonamide And Their Antimicrobial Activity, *Der Pharma Chemica*, **2011**, 3 (6):334-340.
4. Rajarshi N. Patel, P.V.Patel, K.R. Desai, P.Y. Purohit, K.S. Nimavat And K.B. Vyas, Synthesis of New Heterocyclic Schiff Base, Thiazolidinone And Azetidinone Compounds And Their Antibacterial Activity And Anti HIV Activities, *Heteroletters*, 2: (1), **2012**, 99-105.
5. Rajarshi N. Patel, P.V.Patel, K.R. Desai, K.S. Nimavat And K.B. Vyas, Study And Synthesis of Some Organic Spiro Derivatives Using Schiff Base Reaction, *Heteroletters*, 2: (3), **2012**, 327-332.
6. Rajarshi N. Patel1, K.S. Nimavat, K.B. Vyas And Piyush V. Patel, Synthesis on Study of 2-Methyl-5-Nitro-N-(4-(3-(2-Oxo-6-Phenyl-1,2,5,6-Tetra-hydro-pyrimidin-4-Yl)Phenoxy)Phenyl)Benzene -sulfonamide And Their Antimicrobial Activity, *Elixir org. Chem.* 53 (**2012**) 11718-11721.
7. Rajarshi N. Patel1 and Piyush V. Patel, Synthesis on study of novel chalcone derivatives and their antimicrobial activity, *European Journal of Experimental Biology*, **2012**, 2 (5):1492-1496.

8. Rajarshi N. Patel, K.S.Patel, R.B.Patel, Biological activity of newly synthesized M (II) heterochelates of coumarin derivative and Enrofloxacin, *Heteroletters*, 3: (4), **2013,** 493-504.
9. Rajarshi N. Patel, K.S.Patel, R.B.Patel, D.S.Patel, A novel and industrial approach for the synthesis of Valsartan, *Heteroletters*, 3: (4), **2013**, 513-518.
10. Rajarshi N. Patel and K.B.Vyas, Synthesis on study Pyrazol derivatives and their antimicrobial activity, *World Journal of Science*, 1: (1), **2013**, 1-7.
11. Rajarshi N. Patel, K.B. Vyas, Piysh V Patel And Dinesh S. Patel, synthesis of 2-methyl-5-nitro-n-(4-(3-((3-phenylquinoxalin-2-yl) methyl) phenoxy) phenyl) benzene sulfonamide and their antimicrobial activity, *Heteroletters*,**2013**,Vol. 3: (3), 341-347.
12. Rajarshi N. Patel and K.B.Vyas Synthesis on study Pyrazol derivatives and their antimicrobial activity, , *World Journal of Medicine*, 1: (2), **2013**, 1-7.
13. R. B. Patel, K. S. Patel, R. N. Patel, Thermal and mechanical properties of Adipic Acid modified unsaturated polyester resin and jute composite, *International Journal for Pharmaceutical Research Scholars (IJPRS)*, **2013**, V-2,I-4.
14. Rajarshi N. Patel, Hitesh Dave, K. S. Nimavat, K. B. Vyas and P. V. Patel, Study on synthesis of 6-phenyl-4-(4-(4-(p-tolyloxy) phenoxy) phenyl)-5, 6-dihydro -pyrimidin -2(1H)-one and their antimicrobial activity, *Archives of Applied Science Research, 5*: (1), **2013**, 40-44.
15. R. B. Patel, K. S. Patel, R. N. Patel and K. D. Patel, Thermal and mechanical properties of modified polyester resin and jute composite, *Der Chemica Sinica*, **2014**, 5(1),47-54
16. Ketan S. Patel, Rajarshi N. Patel, Synthesis, thermal behavior and biological evaluation of dicoumarol cu(ii) complexes based on ciprofloxacin, *Heteroletters*, **2014**, vol. 4: (1), 23-33
17. Ketan S. Patel, Rajarshi N Patel, Synthesis of some novel pyrimidinone and pyrimidine derivatives and their antimicrobial activity, *Heteroletters*, 4: (1), **2014**, 119-124.
18. Patel KS, Patel RN, Chhasatiya MR, Baser, Patel DS, Study on synthesis of novel chalcone their antimicrobial activity, *Journal Club for Pharmaceutical Sciences* (JCPS), **2015**, V – 2, I – 1.

Journal of Pharnaceutical Science and Bioscientific Research Publication
www.jpsbr.org, www.jpsbr.com
jpsbronline@rediffmail.com, publish@jpsbr.com