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Nilesh B. Chauhan
**List of Abbreviations**

DMF : $N,N$-Dimethyl formamide  
DMSO : Dimethylsulfoxide  
MeOH : Methanol  
DCM : Dichloromethane  
EtOH : Ethanol  
EtOAc : Ethylacetate  
CAN : Cerric Ammonium Nitrate  
TMS : Tetramethylsilane  
DMSO-$d_6$ : Deutero dimethylsulfoxide  
CDCl$_3$ : Deutero chloroform  
Comp : Compound  
Equiv : Equivalent  
mmol : mili mole  
mL : mili Liter  
M.F. : Molecular Formula  
Calcd : Calculated  
h : Hour  
min : Minute  
gm : Gram  
m.p. : Melting point  
TLC : Thin layer chromatography  
str : Stretching  
bend : Bending  
s : Singlet  
t : Triplet  
d : Doublet  
qu : Quartet  
m : Multiplet  
MIC : Minimal Inhibitory Concentration  
MTCC : Microbial Type Culture Collection  
*E. coli* : *Escherichia coli*  
*P. aeruginosa* : *Pseudomonas aeruginosa*  
*S. aureus* : *Staphylococcus aureus*
<table>
<thead>
<tr>
<th>Organism</th>
<th>Description</th>
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<tbody>
<tr>
<td>S. pyogenes</td>
<td><em>Streptococcus pyogenes</em></td>
</tr>
<tr>
<td>C. albicans</td>
<td><em>Candida albicans</em></td>
</tr>
<tr>
<td>A. niger</td>
<td><em>Aspergillus niger</em></td>
</tr>
<tr>
<td>A. clavatus</td>
<td><em>Aspergillus clavatus</em></td>
</tr>
<tr>
<td>M. tuberculosis</td>
<td><em>Mycobacterium tuberculosis</em></td>
</tr>
<tr>
<td>DPPH</td>
<td>2, 2-Diethyl-1-picrylhydrazyl</td>
</tr>
<tr>
<td>ABTS</td>
<td>2, 2'-Azinobis (3-ethylbenzthiazoline-6-sulfonate)</td>
</tr>
<tr>
<td>THF</td>
<td>Tetra Hydro Furan</td>
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3.3 Characterization of synthesized compounds

3.4 Biological studies

3.5 Results and Discussion

3.6 References

Chapter IV

4.1 Introduction

4.2 Experimental

4.2.1 Series-VII: 4-Methyl-6-nitro-2-oxo-2H-chromen-7-yl-(5-cyano-3-methyl-4-phenyl-1,4-dihydropyrano[2,3-c]pyrazol-6-yl) glycinate (7a-j)

4.2.2 Series-VIII: 4-Methyl-6-nitro-2-oxo-2H-chromen-7-yl-(5-cyano-1-(2,4-dinitrophenyl)-3-methyl-4-phenyl-1,4-dihydropyrano[2,3-c]pyrazol-6-yl) glycinate (8a-j)

4.3 Characterization of synthesized compounds

4.4 Biological studies

4.5 Results and Discussion

4.6 References

Conference/Seminar/Workshop

Publications
Preface

Chemistry is necessarily an experimental science: its conclusions are drawn from data, and its principles supported by evidence from facts.

-Michael Faraday

The analogous-based-drug design is the most important perception in medicinal chemistry to design new drug contender. Amongst different heterocyclic systems; compounds containing hetero atoms such as oxygen and/or sulfur along with nitrogen i.e. coumarin, thiazine, oxazine, thiazole, pyridine, pyrimidine, pyrano-pyrazole etc. have impart preferential biological responses. On looking of the studies on biological activities it was decided to club the nitrocoumarin derivatives with above mentioned heterocycles to develop newer and more potential analogous. Many works showed that coumarin-containing analogs exhibited a wide range of pharmacological activities. The coumarin nucleus is present in numerous natural products is extremely important in the biological activities which have found applications in treatment of various pathogens. The increased incidence of opportunistic microbial infections, associated with superior resistance to the antimicrobial drugs currently in use has highlighted the need for new solutions. So development of potent, fast-acting, new classes of agents which are likely to be unaffected by existing resistance mechanisms is demanding need of current scenario. We focused to introduce chemical varieties in single structure which are pharmacologically interesting compounds.

Present thesis consists of Four Chapters;

Chapter I contains general introduction, scope of present work and literature review of coumarins, pyridine, pyrazole thiazine, oxazine, thiazole and pyrimidine with their analogs.

Chapter II contains experimental protocol, characterization, biological studies, results and discussion of three series of thiazines, oxazines and thiazoles clubbed coumarin;

Chapter III contains experimental protocol, characterization, biological studies, results and discussion of three series of pyridines and pyrimidine clubbed coumarin;

Chapter IV consist of experimental protocol, characterization, biological studies of the compounds two series of pyrano-pyrazoles clubbed coumarin;
Biological activity studies of final compounds (anti microbial, anti mycobacterial and anti oxidant) showed that compounds 1c, 1h and 2c showed very good activity against *E. coli* compared to chloramphenicol and ciprofloxacin whereas, 2c, 6c, 8f and 8g showed good activity against *P. aeruginosa* compared to chloramphenicol and ciprofloxacin. Compounds 1a, 1b, 1d, 2i, 3j, 4c, 5f, 7b and 8c displayed encouraging activity against *C. albicans* compared to griseofulvin. Compounds 1b, 1h, 3h, 4c, 4h and 7b showed comparable activities against *M. tuberculosis* *H*$_{37}$*Rv*. Compounds 1b and 1h bearing Cl and -C$_{3}$H$_{7}$ respectively were appeared to have high radical scavenging efficacies as 33.99 ± 0.301 and 35.35 ± 0.470 µg/mL ± SD of IC$_{50}$ values in DPPH and ABTS bioassay, respectively and can be comparable to that of control ascorbic acid while other compounds have moderate to poor antioxidant power against scavenging DPPH and ABTS From above, it was concluded that the compounds bearing halogens, -C$_{3}$H$_{7}$, -OCH$_{3}$, -CH$_{3}$ or -OH showed good activity compared to other compounds.

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