SUMMARY
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The thesis entitled “Synthesis and Biological Evaluation of Some New Oxygen, Nitrogen and Sulphur containing Heterocyclic Compounds” described the method of synthesis, purification and identification of some new substituted pyrazoles, pyrimidines, isoxazoles, pyridines, azetidinones and thiazolidinones bearing benzofuran moiety. These compounds were purified by chromatographic methods and identified by spectral studies. Since the compounds containing heteroatom such as oxygen, nitrogen and sulphur were reported to possess diverse biological and pharmacological activities, these compounds obtained were also screened for different activities based on literature reports. The thesis is divided into five chapters and the contents of each chapter are summarized below.

CHAPTER 1
Benzofuran - Introduction
An introduction to benzofuran and its chemistry was provided in the chapter. Mention also was made of different classes of naturally occurring benzofurans. The different general methods of synthesis of benzofurans were also described followed by the therapeutic potential of benzofurans. The literature incorporated in this chapter forms the basis for the work described in other chapters.
CHAPTER 2

Synthesis and biological evaluation of some new pyrazoles bearing benzofuran moiety

This chapter begins with an introduction to pyrazole, then a recent survey on the literature covering the general methods of synthesis, spectral characterization and therapeutic potential of various substituted pyrazoles. This is followed by the present work involving the synthesis, identification and biological evaluation of various pyrazoles bearing benzofuran moiety. All these compounds were checked for their purity on TLC. The identity was established by single spot on TLC, sharp melting point and by spectral characteristics.

The pyrazole derivatives obtained were screened for analgesic, anti-inflammatory, antitubercular, antibacterial and antifungal activities. Some of these compounds possessed significant analgesic and anti-inflammatory activities. Antitubercular activity was studied on *Mycobacterium tuberculosis* H37Rv in the media middle brook 7H9 broth. It was observed that many of these pyrazole bearing benzofuran moiety possessed better activity. Antibacterial and antifungal activity studies revealed that pyrazoles bearing benzofuran structure containing substituents such as 4-chlorophenyl, 4-methoxyphenyl, 4-aminophenyl and 4-nitrophenyl exhibited promising activity. The results of all these studies were presented at appropriate places in this chapter.
Scheme-1

1. \[ \text{Br-} \text{CCH-CHO} \] + \[ \text{ClCH}_2\text{COCH}_3 \]
   Anhydrous \( \text{K}_2\text{CO}_3 \) / Anhydrous Acetone

2. \[ \text{Br-} \text{C} \backslash \text{CCH-CHO} \]

3. \[ \text{EtOH} \]
   \[ \text{H}_2\text{N-NH}_2 \]

4. \[ \text{CH}_3 \]
   DMF / POCl\(_3\)

5a-e

6a-e

\[ \text{R-NH}_2 \] / Methanol

\[ \text{H}_3\text{C-O-R} \] / EtOH
Potential molecules identified for further optimization

Synthesis and biological evaluation of some new pyrimidines and isoxazoles bearing benzofuran moiety.

A general introduction to pyrimidines and isoxazoles, literature review on the general method of synthesis, spectral characteristics and their therapeutic potential was presented in this chapter.

The chalcones obtained from 5-bromo-2-acetylbenzofuran were converted into pyrimidines and isoxazoles by reaction with thiourea and hydroxylamine hydrochloride respectively. All the synthesized compounds were purified by crystallization then identified by physical and spectral data. Since pyrimidines and isoxazoles were reported to possess analgesic, anti-inflammatory, antitubercular, anticonvulsant, antibacterial and antifungal activities, all these pyrimidines and isoxazoles were evaluated for the above activities and the results are promising.
Interestingly pyrimidines and isoxazoles obtained from chalcones possessed much better analgesic and anti-inflammatory activities. Some of the pyrimidine and isoxazole derivatives bearing benzofuran moiety also showed significant antibacterial and antifungal activities. Some selected pyrimidines and isoxazoles were tested for anticonvulsants activity and the results, however, were not much encouraging.

Scheme-2
Potential molecules identified for further optimization:

CHAPTER 4

Synthesis and characterization of some new substituted pyridines bearing benzofuran moiety.

This chapter starts with an introduction to pyridines and then outlined the general methods of synthesis of cyanopyridines followed by therapeutic potential of cyanopyridines. The title compounds could be obtained in a single pot synthesis involving reaction between 5-bromo-2-acetylbenzofuran, aldehydes and ethylcyanoacetate / malononitrile. The synthesized compounds were then purified by crystallization and then identified by physical and spectral data. These cyanopyridines exhibited significant anti-inflammatory and antitubercular activities. They were also tested for antibacterial and antifungal activity based on literature reports and the results are presented in this chapter.
Scheme-3

Potential molecules identified for further optimization:

- 10b
- 10d
- 10e
- 11b
- 11d
- 11e
CHAPTER 5

Synthesis of some new substituted azetidinones and thiazolidinones bearing benzofuran moiety.

An introduction to azetidinones and thiazolidinones, covering their general methods of synthesis and therapeutic potential was given in this chapter. The title compounds were prepared from 1-(5-bromo-1-benzofuran-2-yl)ethanonehydrazone by the reaction with aldehydes to gave Schiff's bases which were then converted into azetidinones and thiazolidinones. The compounds obtained were purified by crystallization and then identified by physical and spectral data. The biological activity studies of these azetidinones and thiazolidinones revealed significant antitubercular activity. These compounds also displayed good anti-inflammatory, antibacterial and antifungal activities.

Scheme-4
Potential molecules identified for further optimization:

\[\begin{align*}
13b & & 13d & & 13e \\
14b & & 14d & & 14e
\end{align*}\]

At the end of each chapter references covering the literature was also provided. The work incorporated in this thesis has also been communicated for publication in different journals.