Heterocyclic compounds have drawn special attention in organic chemistry because of their abundance in natural products and their diverse biological properties. Pyrimidine and its derivatives have been recognized as important heterocyclic compounds due to their variety of chemical and biological significance to medicinal chemistry.

Pyrimidines have a long and distinguished history extending from the days of their discovery as important constituents of nucleic acids to their current use in the chemotherapy of ‘acquired Immuno Deficiency syndrome’ (AIDS). The pyrimidine nucleus is embedded in a large number of alkaloids, drugs, antibiotics, agrochemicals and antimicrobial agents.

In the past decades, a broad range of biological effects, including antiviral, antitumor, antibacterial and anti-inflammatory activities, has been ascribed to partly reduced pyrimidine (DHPM) derivatives.

More recently, appropriately functionalized DHPMs have emerged as eg. Orally active antihypertensive agents. M. D. Gavilan et al reported the synthesis of (tetrahydro-4-,1-benoxazepine-3-yl) pyrimidines and evaluated for anticancer activity, these compound showed significant antitumor activity (IC50=1.25-6.75µM on MCF-7 cell.)

Some other researchers also prepared pyrimidine derivatives and tested their antitumor and anticancer activities. As a result of remarkable pharmacological activity of pyrimidine derivatives, in continuous of our earlier work, we have synthesized 1,2,3,4-tetrahydro pyrimidine derivatives and studied their antimicrobial activity.

1,2,3,4 Pyrimidine antagonists belong to the group of antimetabolite anti-cancer drugs and show structural resemblance with naturally occurring nucleotides. Their action is accomplished through incorporation as false precursor in DNA or RNA or through inhibition of proteins involved in nucleotide metabolism.
Chapter 1

General introduction

Chapter 1 reveals the importance of Heterocycles in drug discovery. This chapter is related to introduction of Heterocyclic chemistry. Biological and medicinal significance of pyrimidines and related heterocycles are discussed.

Also discussed about challenge of increasing productivity, reactivity, innovation, and decreasing costs of research.

Pyrimidines occupy a distinct and unique place in our life. This heterocyclic moiety has great biological and medicinal significance. A large array of pyrimidine drugs possesses a variety of medicinal properties. These properties include anticancer, antibacterial, antiprotozoal, antimicrobial, antiviral, antihypertensive, antihistaminic, anti-inflammatory, analgesic, and Central nervous system (CNS)-active to metabolic adjuvant.

Keeping in mind various biomedical applications and with a view to further assess the pharmacological profile of bi/tricyclic aromatic heterocycles related to pyrimidines, three different heterocyclic scaffolds related to pyrimidines (1,2,3,4-tetrahydropyrimidines have been synthesized in the work of this doctoral thesis. Objectives of research are mentioned in this chapter.

Chapter 2

Synthesis of 1,2,3,4-tetrahydro pyrimidines derivatives (AB-101 to AB-145)

Chapter 2 reveals Introduction of synthesis strategies, e.g. The Biginelli dihydropyrimidine synthesis & Mechanistic Studies, Atwal alternative synthetic route, Pharmacological Profile, Biological importance, Mechanism of Biginelli reaction, Improved Reaction Conditions and Alternative synthetic strategies.
In section-I keeping in mind various biomedical applications and with a view to further assess the pharmacological profile of these class of compounds, three novel series of 1,2,3,4-tetrahydro-N-(substitutedphenyl)-6-methyl-2-oxo-4-(4-(phenoxy)methyl) phenyl)pyrimidine-5-carboxamide (AB-101 to 145) are synthesized.

The synthesis of (AB- 101 to 145) was achieved by acid catalysed cyclocondensation of N-(substituted)-3-oxobutanamide, substituted urea derivatives and 4-(phenoxy)methyl) benaldehyde.

The products were characterized by FT-IR, mass spectra, $^1$H NMR and elemental analyses. The newly synthesized compounds were subjected to various biological activities viz., antimicrobial.

Chapter 3

Synthesis of 1,2,3,4-tetrahydro pyrimidines derivatives (AB-146 to AB-190)

Chapter 3 reveals Mechanism of reaction, Plausible Reaction Mechanism, Materials and Methods for (AB- 146 to 190).

In section-II keeping in mind various biomedical applications and with a view to further assess the pharmacological profile of these class of compounds, three novel series of 1,2,3,4-tetrahydro-6-isopropyl-N-(substitutedphenyl)-2-oxo-4-(4-(phenoxy)methyl)phenyl)pyrimidine-5-carboxamide (AB- 146 to 190) are synthesized. The synthesis of (AB- 146 to 190) was achieved by acid catalysed cyclocondensation of N-(substitutedphenyl)-4-methyl-3-oxopentanamide, substituted urea and 4-(phenoxy)methyl)benaldehyde. The products were characterized by FT-IR, mass spectra, $^1$H NMR and elemental analyses. The newly synthesized compounds were subjected to various biological activities viz., antimicrobial.
Chapter 4

Spectral discussion (AB-101 to AB-190)

Chapter 4 reveals the detail study of mass spectra, FT-IR, $^1$H NMR and elemental analyses for all series i.e (AB- 101 to 190).

Chapter 5

Biological evaluation

Chapter 4 reveals biological evaluation of all series. All of the synthesized compounds (AB- 101 to 190) were tested for their antibacterial and antifungal activity (MIC) in vitro by broth dilution method with two Gram-positive bacteria Staphylococcus aureus MTCC-96, Streptococcus pyogenes MTCC 443, two Gram-negative bacteria Escherichia coli MTCC 442, Pseudomonas aeruginosa MTCC 441 and three fungal strains Candida albicans MTCC 227, Aspergillus niger MTCC 282, Aspergillus clavatus MTCC 1323 taking gentamycin, ampicillin, chloramphenicol, ciprofloxacin, norfloxacin, nystatin and griseofulvin as standard drugs. The standard strains were procured from the Microbial Type Culture Collection (MTCC), Institute of Microbial Technology, Chandigarh, India. primary and secondary screening are carried out and achieved the results shown in tables and graphical presentation.