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Synthesis and Biological Significance of Pyrimidine Derivatives as New Anti-bacterial Agents

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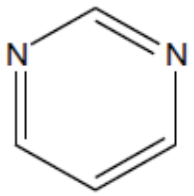
ABSTRACT:

A heterocyclic moiety has great biological and medicinal significance. The various pharmacological activities discussed here proves biological importance of pyrimidine moietyAmong the diverse biological activities of pyrimidine derivatives are antiviral, anticancer, antifungal, antimalarial, sedative, hypnotic, anticonvulsant, anthelmintic, and antithyroid properties. The present research aims to focus on account of important chemical moiety, various derivatives of pyrimidine and its as antimicrobial agents. In the current studies we synthesize pyrimidines derivatives derivatives and *in vitro* antimicrobial activities which can facilitate the development of more potent and effective antimicrobial agents.

Keywords: *Pyrimidines, antiviral, anticancer, antifungal, antimalarial, sedative, hypnotic, anticonvulsant, anthelmintic*

INTRODUCTION:

Pyrimidiine nucleus exhibited remarkable pharmacological activities. Literature indicates that compounds having pyrimidine nucleus have wide range of therapeutic uses that include anti-inflammatory, antibacterial, anticancer,antiviral, anti-HIV, antimalarial, antihypertensive, sedatives and hypnotics. In medicinal chemistry pyrimidine derivatives have been very well known for their therapeutic applications. The presence of a pyrimidine base in thymine, cytosine and uracil, which are the essential binding blocks of nucleic acids, DNA and RNA for their activity. [1-5]



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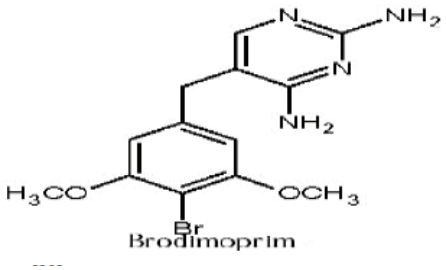
Pyrimidine is an aromatic heterocyclic organic compound similar to pyridine[6]**.** One of the three diazines (six-membered heterocyclics with two nitrogen atoms in the ring), it has the nitrogen atoms at positions 1 and 3 in the ring[7]**.** The other diazines are pyrazine (nitrogen atoms at the 1 and 4 positions) and pyridazine (nitrogen atoms at the 1 and 2 positions). In nucleic acids, three types of nucleobases are pyrimidine derivatives: cytosine (C), thymine (T), and uracil (U). Naturally occurring a Uracil [pyrimidine-2,4(1H, 3H)-dione].Uracilis a common and naturally occurring pyrimidine derivative. Originally discovered in 1900, it was isolated by hydrolysis of yeast nuclein that was found in bovine thymus and spleen, Herring sperm, and Wheat germ. It is a planar, unsaturated compound that has the ability to absorb light.[7-8]

REVIEW OF LITERATURE

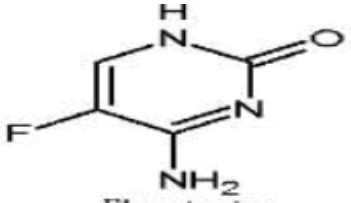
Kompis I and Co-workerssynthesizedBrodimoprim, and found it to be an effective antimicrobial compound.[9]



Brodimoprim

Polak A. and Co-workers proved that Pyrimidine also shows antifungal properties.

Flucytosine is a fluorinated pyrimidine used as nucleosidalanti fungal agent for the treatment of serious systemic infections caused by susceptible strains of candida and Cryptococcus.[10]



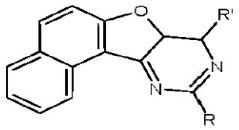
Flucytosine

Mishra A. and co-workers synthesized various derivatives of pyrimidines and reported their fungicidal activities against P .infestans and C. falcatum by the usual agar plate method.[11]

Padmashri B and Co-workers reported the synthesis 2- (2', 5' substituted

indolideneamino- 3'- yl) - 4, 6- diaryl pyrimidines (I) and 2 [2', 5'- substituted indole- 3'- yl)(phenyl azo) methylene imino]- 4, 6- Diaryl pyrimidine and screened them for their

antimicrobial activity against the gram negative Bacteria E. Coli and Gram-positive bacteria. S. Aureous by cup plate method and show antifungal activity against A. niger and A. flavus.[12]

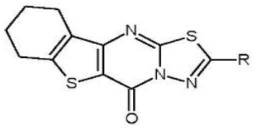


R= CH_3, C_6H_5; R'=OCH_3, OC_2H_5, NHC_2H_5,NHC_6H_5

Hitchings GH and Co-Workersin 1948, made an important observation that a large number of 2, 4-diamino pyrimidines and some 2- amino- 4 hydroxy pyrimidines are antagonists of folic acid.[13]

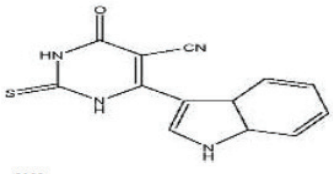
Futterman S. and Co-workers eventually proved that these pyrimidines were inhibitors of the enzyme dihydrofolate reductase (DHFR).[14]

Chang CC and Co-Workerssynthesized some 2 substituted (1, 3, 4) thiadiazole(2,3-b) tetrahydro-benzothieno [3, 2-e] pyrimidines and then screened them for anticancer,antibacterial and antifungal activities.[15]

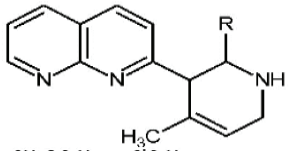


R= H, CH_3, $NHCH_3$, $(CH_2)_2CH_3$

Anjani S and Co-workers have synthesized a derivative of pyrimidine and screened it for its antibacterial activity.[16]



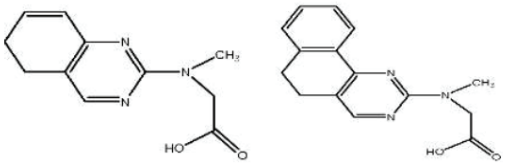
Mohammd A. and Co-workersreported 1, 8 Napthopyridine derivatives which were tested for their antibacterial activity in vitro against E. coli and B. subtilis using filter paper disc technique.[17]



R= C_6H_5, p-$CH_3C_6H_5$, $CH_3OC_6H_4$, o-ClC_6H_4, p-ClC_6H_4, p-OHC_6H_4

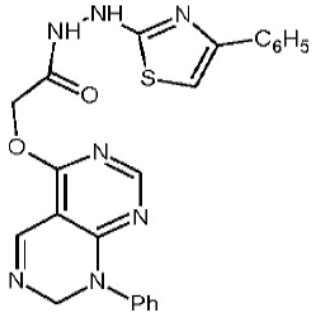
El Hossein KA and Co-workerssynthesized 2-[{2 (Morpholino)-3- pyridinyl- 5- thio} - 2 oxoethyloxadiazolyl]- amino- 4- (2, 4 dichloro- 5- fluorophenyl)- 6- (aryl) pyrimidines, which exhibit maximum zone of inhibition against E.coli, S. aureus, S.typhiiand B.subtilis.[18]

Naik TA. and Co-workers synthesized a series of N-methyl-N-pyrimidin-2-yl glycines,Like [N-methyl-N-(5,6-dihydroquinazolin-2-yl)glycine],[N-methyl-N-(5,6-dihydrobenzo[e]quinazolin -2-yl)glycine] etc. have been prepared and tested for anti-inflammatory activity.[19]



Olga BA, and Co-workerssynthsizedNaphtho [2, 1- b] furo [3, 2- d] pyrimidine.Carrageen induced rat paw edema method was employed for evaluating the anti-inflammatory activity. The compounds were given at a dose of 80 mg/kg body weight in albino rats weighing between 150 and 200 g. The edema was produced by injecting carrageenan solution at the left hind paw.[20]

Rathod A and Co-workerss ynthesized some new 2-[c]- phenyl- 1H- pyrazolo [3,4- d] pyrimidin- 4- yl) acetohydrazide derivative and screened them for their analgesic activity by acetic acid induced writhing test using standard drug diclofenac sodium.[21]



Fathalla OA, and Co-workerssynthesized a series of some new pyrimidine derivatives like 7-(2-methoxyphenyl)-3- methyl-5-thioxo-5, 6-dihydro [1, 2, 4]-triazolo[4, 3-c]pyrimidine-8-carbo-nitrile. All compounds were then screened for bacterial activity and anticancer activity.[22]

Development of pyrimidine analogues as potential antitubercular agents evolved from an early presumption that nucleic acids are involved in growth control.[23]Pyroll [2, 3-d] pyrimidines and sulfonamides have proved potent antitubercular activities. Capreomycin produced by streptomycescapreolus is a second- line bacteriostatic antituberculin drug containing pyrimidine Viomycin is more tuberculostatic than p-aminosalicyclic acid. It is effective in the treatment of experimental tuberculosis**.**[24-26]

EXPERIMENTAL:

Techniques used

- **Analytical:** The elemental chemical analysis for carbon, hydrogen and nitrogen were performed at SAIF, CIL Panjab University, Chandigarh using elemental analyser series- Flash 2000 Thermo Fischer Scientific (USA).
- **UV-VISIBLE spectroscopy:** The electronic spectra of the complexes were recorded at Chemistry Instrumental Lab, GZSCCET, BTI with GENSYS 10S UV-VIS [thermo scientific] spectrophotometer in DMSO as solvent.
- **FTIR spectroscopy:** FTIR spectra were recorded using Perkin – Elmer 400 spectrometer (Germany) at SAIF, CIL Panjab University, Chandigarh in range 4000-5000cm^{-1}.
- **NMR spectroscopy:** ^{1}H NMR spectra were recorded on a Bruker Avance II 400 NMR spectrometer at SAIF Panjab University, Chandigarh, using tetramethylsilane (TMS) as ineternal reference.
- **MASS spectroscopy:** LC-MS spectra were recorded in the range 0-1100m/z using WATERS, Q-TOF micromass LC-MS (UK) at SAIF, CIL Panjab University , Chandigarh.
- **Melting point apparatus:** Perfit India electrically heated apparatus is used to check the melting point by using dried samples in a capillary tube at Chemistry Instrumental Lab, GZSCCET, BTI.

General Procedure For the synthesis of Chalcones:

A mixture of various substituted aromatic aldehydes [0.01 mol] and substituted aryl acetophenone[0.01 mol] was stirred in 30 ml of ethanol at room temperature in the presence of 10 ml of 20% NaOH was added to the mixture. This mixture was stirred for 12hr and kept for overnight at room temperature and then it was poured into crushed ice and acidified with dilute hydrochloric acid to neutral. The chalcones derivatives are precipitates out as solid. Then it was filtered, dried and recrystallized from ethanol.

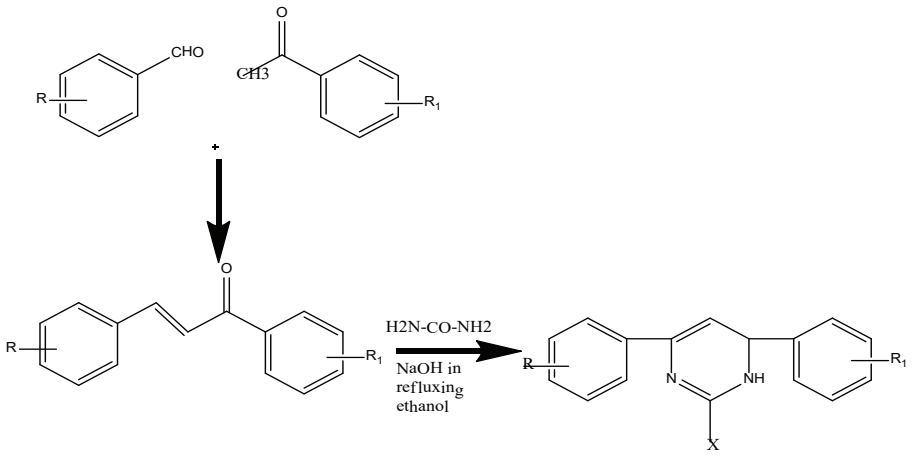
Procedure for the Synthesis of Pyrimidine Derivatives

Synthesis of 6-(-4 Chlorophenyl)-4-(4-methoxyphenyl) dihydropyrimidine-2-ol: A mixture of 2.44 g of chalcone (0.01M) with 0.6 g of urea (0.01) and urea were refluxed in 30 ml ethanol with 10 ml of 20% NaOH on water bath for 16 hours. Reacting mixture was cooled and poured into crushed ice, then the solid product was precipitate out. It was filtered, dried and recrystallized from ethanol. The reaction is monitored TLC. All the compounds are characterized by physical and spectral data.

Synthesis of 6-(-4-chlorophenyl)-4-(-4-fluorophenyl) dihydropyrimidine-2-ol: A mixture of 2.4 g chalcone (0.01M) with 0.6 g urea (0.01M) were refluxed in 30 ml ethanol with 10 ml of 20% NaOH on water bath for 16 hours. Reacting mixture was cooled and poured into crushed ice, then the solid product was precipitate out. It was filtered, dried and recrystallized from ethanol. The reaction is monitored by TLC. All the compounds are characterized by physical and spectral data .

Synthesis of 6-(-4-bromophenyl)-4-(-4-nitrophenyl) dihydropyrimidine-2-ol:A mixture of 2.52 g chalcone with 0.6 g of urea (0.01M) were refluxed in 30 ml ethanol with 10 ml of 20% NaOH on water bath for 16 hours. Reacting mixture was cooled and poured into crushed ice, then the solid product was precipitate out. It was filtered, dried and recrystallized from ethanol. The reaction is monitored by TLC. All the compounds are characterized by physical and spectral data **.**

Scheme 1.



R=OCH_3,NO_2,F R_1=Cl,Br X=-OH

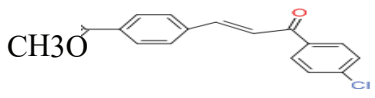
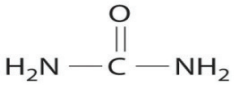
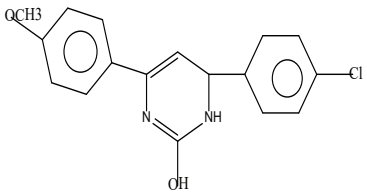
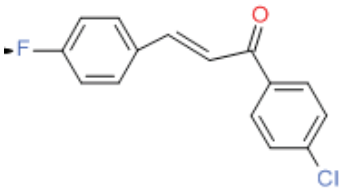
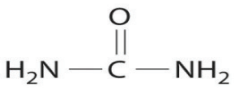
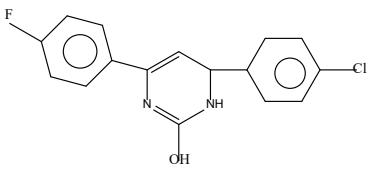
Table 1:-Properties of pyrimidines.

Sr. No	Complex	Melting Point	Molecular Formula	Solubility	Yield
1.	6-(4Chlorophenyl)-4-(4-methoxy phenyl)dihydro pyrimidine-2-ol	200℃	$C_{17}H_{13}N_2OCl$	$CDCl_3$, Ethanol	65%
2.	6-(-4-chlorophenyl) -4-(-4-fluorophenyl) dihydropyrimidine-2-ol	193℃	$C_{16}H_{10}N_2FCl$	$CDCl_3$, Ethanol	70%
3.	6-(-4-bromophenyl)-4-(-4-nitrophenyl) dihydropyrimidine-2-ol	205℃	$C_{16}H_{10}N_3O_3Br$	$CDCl_3$, Ethanol	69%

RESULTS:

1. Characterization of synthesized compounds by UV, NMR and IR
2. Studies of antimicrobial activity of pyrimidine derivatives.

Table-2: Detail of Synthesized compounds

Sr.No	Reactant	Reactant	Product
1.			
2.			

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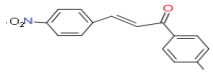
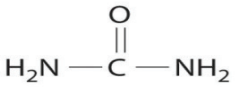
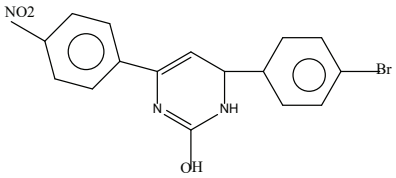






Br

Spectral studies of pyrimidine derivatives

UV Spectral analysis of pyrimidine

Two band one at 243 nm and the other at 298 nm are generally observed in the UV spectrum of pyrimidines. When an electron releasing substituent is present, a bathochromic shift of the second band (n-π*) usually occur while the electron withdrawing substituent produces an opposite effect. The more intense band at 243 nm is due to π-π* transition which undergoes a bathochromic shift by both type of substituents with an increase in intensity. Two bands, one in between 330-350 nm and the other in between 250-260 nm are usually observed in the case of 3, 5-diaryl pyrimidines**,** whereas 4,6-diarylpyrimidines exhibit characteristic UV maxima at 254 nm for π-π* transition and at 350 nm for n-π* transition.

IR Spectral analysis of pyridines

IR Spectra of 6-(4-Chlorophenyl)-4-(4-methoxyphenyl) dihydropyrimidine-2-ol: The IR spectra of compound 6-(4-Chlorophenyl)-4-(4-methoxyphenyl) pyrimidine-2-ol exhibits characteristics band at 3045 cm^{-1} attributing to Ar-H stretching vibrations. Band due to C=C stretching vibrations was observed in the range of 1435-1640 cm^{-1}. The band observed at 2928 cm^{-1} was characteristic of C-H stretching vibrations. The band due to stretching vibration of C=N group was observed at 1674 cm^{-1}. A broad band at 3372 cm^{-1} is observed due to O-H stretching vibrations. The band due to stretching vibration of N=CH group was observed at 1600 cm^{-1}.

IR Spectra of compound 6-(4-bromophenyl)-4-(4-nitrophenyl) dihydropyrimidine-2-ol: The IR spectra of compound 6-(4-nitrophenyl)-4-(4-bromoyphenyl) pyrimidine-2-ol exhibits characteristics band at 3082 cm^{-1} attributing to Ar-H stretching vibrations. Band due to C=C stretching vibrations was observed in the range of 1420-1620 cm^{-1}. The band observed at 2928 cm^{-1} was characteristic of C-H stretching vibrations. The band due to stretching vibration of C=N group was observed at 1674 cm^{-1}. A broad band at 3431 cm^{-1} is observed due to O-H stretching vibrations. The band due to stretching vibration of N=CH group was observed at 1610 cm^{-1}. Band due to C=C stretching vibrations was observed in the range of 1430-1640 cm^{-1}. Bands appear at 700 cm^{-1} for C-Br stretching.

IR spectra of compound 6-(4-Chlorophenyl)-4-(4-fluoroyphenyl)dihydropyrimidine-2-ol : The IR spectra of compound 6-(4-Chlorophenyl)-4-(4-fluoroyphenyl) pyrimidine-2-ol exhibits characteristics band at 3050 cm^{-1} attributing to Ar-H stretching vibrations. Band due to C=C stretching vibrations was observed in the range of 1420-1620 cm^{-1}. The band observed at 2932 cm^{-1} was characteristic of C-H stretching vibrations. The band due to stretching vibration of C=N group was observed at 1674 cm^{-1}. A broad band at 3443,3356 cm^{-1} is observed due to O-H stretching vibrations. The band due to stretching vibration of N=CH group was observed at 1600 cm^{-1}. Band due to C=C stretching vibrations was observed in the range of 1420-1620 cm^{-1}. The band due to stretching vibration of C-Cl bond was observed at 720 cm^{-1}. The band observed at 940 cm^{-1} was characteristic of C-F stretching vibrations.

NMR Spectral analysis

NMR Spectra of 6-(4-Chlorophenyl)-4-(4-methoxyphenyl) dihydropyrimidine-2-ol :

In the ^{1}H NMR spectrum of compound pyridine a complicated pattern was observed at δ 6.95-7.69 ppm for eight aromatic protons. A singlet at δ 3.4 ppm for three proton, which accounted for $–OCH_3$ group, other singlet at δ 8.94 ppm is appeared due to the presence of one proton of CH=N group. A singlet at δ 8.5 ppm for one protons, which accounted for phenolic–OH.This downfield shifting occur due to the resonance effect of aromatic pyrimidine ring.

NMR Spectra of 6-(-4-chlorophenyl)-4-(-4-fluorophenyl) dihydropyrimidine-2-ol:

In the ^{1}H NMR spectrum, a complicated pattern of compound pyridine was observed at δ 7.25-7.92 ppm for eight aromatic protons. A singlet at δ 3.6 ppm for three proton, which accounted for $–OCH_3$ group, other singlet at δ 8.94 ppm is appeared due to the presence of one proton of CH=N group. A singlet at δ 8.6 ppm for one protons, which accounted for phenolic–OH.This downfield shifting occur due to the resonance effect of aromatic pyrimidine ring.

Table- 3: NMR and IR spectral data:

Sr. No	Sample	IR(KBr)	^{1}H NMR ($CDCl_3$)
1.	6-(4-Chlorophenyl)-4-(4-methoxy phenyl) dihydropyrimidine-2-ol	3045cm^{-1}(Ar-H)) 1425-1640cm^{-1}(-C=C) 2928cm^{-1}(-C-H) 1624cm^{-1}(C=N) 1600cm^{-1}(N=CH)	6.95-7.69 ppm multiplet (8H), 3.4 singlet (3H) OCH_3, 8.3 ppm, singlet (1H, CH=N group), 8.5 ppm singlet (1H, phenolic –OH)
2.	6-(-4-chlorophenyl)-4-(-4-fluoro phenyl) dihydropyrimidine-2-ol	3082 cm^{-1}(Ar-H), 1420-1640cm^{-1}(-C=C-) 2928cm^{-1}(-C-H) 1674cm^{1}(C=N) 3430 cm^{-1}(-O-H) 1610cm^{-1}(N=CH) 532.2 cm^{-1}(-C-Br)	7.25-7.92 ppm ,multiplet (8H, Aromatic), 8.20 ppm singlet (1H,CH=N), 8.8 ppm singlet (1H, phenolic –OH)
3.	6-(-4-bromophenyl)-4-(-4-nitro phenyl) dihydropyrimidine-2-ol	3050cm^{-1}(Ar-H), 1440-1650cm^{1}(C=C) 2932cm^{-1}(-C-H), 1674cm^{-1}(C=N) 3010cm^{-1}(-O-H) 1600cm^{-1}(N=CH) 720cm^{-1}(-C-Cl) 940cm^{-1}(-C-F)	7.10 -7.90 ppm multiplet (8H, aromatic) 8.5 ppm singlet (1H, CH=N) 8.9 ppm, singlet (1H, phenolic –OH)

Antimicrobial studies of synthesized compounds

LB media: Lysogenybroth (LB), a nutritionally rich medium, is primarily used for the growth of bacteria. The initialism is also commonly, albeit incorrectly, taken to mean Luria broth, Lennox broth, or Luria-Bertani medium. According to its creator Giuseppe Bertani, the abbreviation LB was actually intended to stand for lysogeny broth**.** The formula of the LB medium was published in 1951 in the first paper of Bertani on lysogeny. In this article he described the modified single-burst experiment and the isolation of the phages P1, P2, and P3. He had developed the LB medium to optimize Shigella growth and plaque formation. LB media formulations have been an industry standard for the cultivation of Escherichia coli as far back as the 1950s**.** These media have been widely used in molecular microbiology applications for the preparation of plasmid DNA and recombinant proteins. It continues to be one of the most common media used for maintaining and cultivating laboratory recombinant strains of Escherichia coli. For physiological studies however, the use of LB medium is to be discouraged. There are several common formulations of LB. Although they are different, they generally share a somewhat similar composition of ingredients used to promote growth, including the following:

- Peptides and caseinpeptones
- Vitamins (including B vitamins)
- Trace elements (e.g. nitrogen, sulfur, magnesium)
- Minerals

Peptides and peptones are provided by tryptone. Vitamins and certain trace elements are provided by yeast extract. Sodium ions for transport and osmotic balance are provided by sodium chloride. Tryptone is used to provide essential amino acids to the growing bacteria, while the yeast extract is used to provide a plethora of organic compounds helpful for bacterial growth.

Agar medium: An **agar plate** is a Petri dish that contains a growth medium (typically agar plus nutrients) used to culture microorganisms or small plants like the moss Physcomitrella patens. Selective growth compounds may also be added to the media, such as antibiotics**.**[27] Individual microorganisms placed on the plate will grow into individual colonies, each a clone genetically identical to the individual ancestor organism (except for the low, unavoidable rate of mutation. Thus, the plate can be used either to estimate the concentration of organisms in a liquid culture or a suitable dilution of that culture using a colony counter, or to generate genetically pure cultures from a mixed culture of genetically different organisms, using a technique known as "streaking". In this technique, a drop of the culture on the end of a thin, sterile loop of wire, sometimes known as an inoculator, is streaked across the surface of the agar leaving organisms behind, a higher number at the beginning of the streak and a lower number at the end. At some point during a successful "streak", the number of organisms deposited will be such that distinct individual colonies will grow in that area which may be removed for further culturing, using another sterile loop.[28]

E. Coli

E. Coli culture in LB media protocol

E. Coli culture in LB Agar media protocol

E. coli antimicrobial activity

The synthesized pyrimidine derivatives were screened for the antibacterial activity against Gram-negative bacteria viz., Escherichia coli by using the cup plate method Benzylpenicillin was used as reference standard for comparing the results.[29]

Culture medium: Nutrient broth was used for the preparation of inoculums of the bacteria and nutrient agar was used for the screening method. The test organisms were subcultured using nutrient agar medium. The tubes containing sterilized medium were inoculated with the respective bacterial strain. After incubation at 37°C+-1°C for 18 hours, they were stored in a refrigerator. The nutrient agar medium was sterilized by autoclaving at 121°C for 15 min. The petriplates, tubes and flasks plugged with cotton were sterilized in hot-air oven at 160°C, for an hour. Into each sterilized petriplate, was poured about 125 ml of molten nutrient agar medium which was already inoculated with respective strain of bacteria aseptically. The plates were left at room temperature aseptically to allow the solidification. After solidification, the cups of each of 7 mm diameter were made by scooping out medium with a sterilized cork borer from a petridish and labeled accordingly. Each test compound (5 mg) was dissolved in dimethyl sulfoxide to give a concentration of 1000µg/ml. Benzyl penicillin solution was also prepared to give a concentration of 1000 µg/ml in sterilized distilled water. The pH of all the test solutions and control was maintained in between 2 to 3 by using concHCl. All the compounds were tested at dose levels of 50 µg and 100 µg and DMSO used as a control. The solutions of each test compound, control and reference standard were added separately in the cups and the plates were kept undisturbed for at least 2 hours in a refrigerator to allow diffusion of the solution properly into nutrient agar medium. Petri dishes were subsequently incubated at 37+_1 °C for 24 hours. After incubation, the diameter of zone of inhibition surrounding each of the cups was measured with the help of an antibiotic zone reader.[30-31]

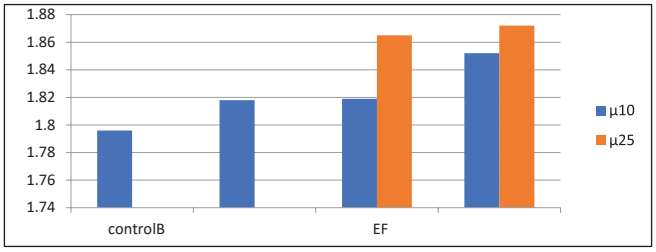
Table 4: Composition of Nutrient agar medium

Peptone	5.0 gm
Sodium chloride	5.0 gm
Beef extract	1.5 gm
Yeast extract	1.5 gm
Agar	15.0 gm
Distilled water(q.s)	1000 ml
Ph	7.4+-0.2

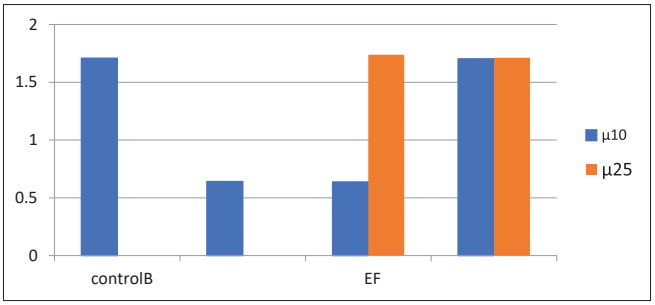
Table 5: Optical density of synthesized compounds

Sr. No	Sample	O.D readings after 5 hours	O.D readings after 24 hours
1	**Control**	1.796	1.709
B	**6-(-4 Chlorophenyl)-4-(4-methoxyphenyl) dihydropyrimidine-2-ol**	B10=1.818	B10=0.641
E	**6-(-4-chlorophenyl)-4-(-4 -fluorophenyl) dihydropyrimidine-2-ol**	E10=1.819, E25=1.865	E10=0.637 ,E25=1.738
F	**6-(-4-bromophenyl)-4-(-4 -nitrophenyl) dihydropyrimidine-2-ol**	F10=1.852 ,F25=1.872	F10=1.702 ,F25=1.712

Graph: 1. Reading after 5 hours:



Graph 2: Reading after 24 hours:



DISCUSSION:

Antimicrobial activity in sample after 5 hours:

Above graph shows that from the obtained results, it is evident that most of compounds like 6-(-4-bromophenyl)-4-(-4-nitrophenyl)dihydropyrimidine-2-ol (µ10,µ25) [F] possess very good activity against bacterial strains like E. coli. And compound like 6-(-4-chlorophenyl)-4-(-4-fluorophenyl)dihydropyrimidine-2-ol (µ10,µ25)[E] possess a moderate activity while 6-(-4 Chlorophenyl)-4-(4-methoxyphenyl) dihydropyrimidine-2-ol (µ10) [B] possess least activity against all the bacteria.

Antimicrobial activity in sample after 24 hours:

Above graph shows that from the obtained results. It is evident that most of compounds like 6-(-4-chlorophenyl)-4-(-4 -fluorophenyl) dihydropyrimidine-2-ol (µ25)[E] possess very good activity while 6-(-4-chlorophenyl)-4-(-4

-fluorophenyl) dihydropyrimidine-2-ol (μ10)[E] shows moderate activity against bacterial strains like E.coli. And compound like 6-(-4-bromophenyl)-4-(-4-nitrophenyl) dihydropyrimidine-2-ol (μ10,μ25)[F] possess a moderate activity while 6-(-4Chlorophenyl)-4-(4-methoxyphenyl) dihydropyrimidine-2-ol (μ10)[B] possess least activity against selected bacterial strain.

CONCLUSION:

Pyrimidines occupy a distinct and unique place in our life because it is an essential constituent of all living cells.. So it can be seen from the literature review that pyrmidine ring containing heterocyclic system has wide medicinal applications. A large array of pyrimidine drugs possesses a variety of medicinal properties. A vast literature has been accumulated over the years and chemistry of pyrimidines continues to be a blossoming field. The biological profiles of this new generation of pyrimidines represent much progress with regard to the older compounds. We hope that in the future many new biological profiles will be added to it and more investigations must be carried out to evaluate more activities of pyrmidine for many diseases whose treatment are challenging in the field of medical sciences. The versatile synthetic applicability and biological activity of these heterocycles will help the medicinal chemists to plan, organize and implement new approaches towards discovery of novel drugs.

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Declaration: *We also declare that all ethical guidelines have been followed during this work and there is no conflict of interest among authors.*

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