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Review Article

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IMPORTANCE OF PYRIDINE DERIVATIVES IN BIOLOGICAL ACTIVITIES

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ABSTRACT

Pyridine is a six member ring of heterocyclic compound in which 5 carbons and one nitrogen atom present in ring. Pyridine is very important part of heterocycles and some natural products. Defferent type of mediums are available in the market that contain pyridine ring like omeprazole, Netupitant, Abomaciclib, Lorlatinib, Apalutamide and Lvosidenib which are used treatment of cancer. Pyridine derivatives have various pharmacological applications such as antibacterial, antifungal, anticonvulsant, anticancer agents. In this review article we have summarized the pharmacological application of various pyridine derivatives.

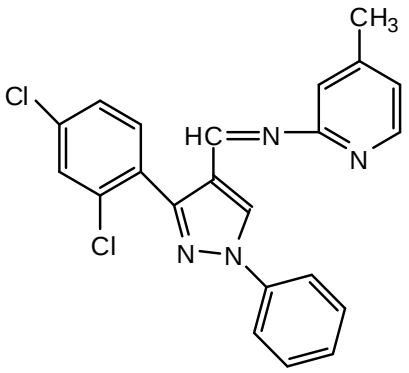
KEYWORDS: Pyridines, antibacterial, antifungal, anti-inflammatory activity.

INTRODUCTION

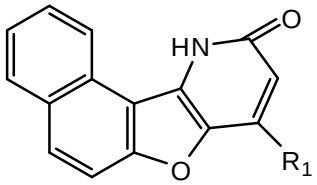
Most of the heterocyclic compounds containing nitrogen atom, are pharmacologically active. The structure of heterocyclic derivatives molecule due to their structure and chemical diversity, they are utilized in many various biochemical processes like antimicrobial[1-8], anti-inflammatory[9-10], antibacterial[11-15], antifungal[16], antitumor[17] activities etc. From the above aspects different scientists have observed that pyridines showed pharmacological activities. This article focused on the work done by different researchers and scientists in the field of chemistry and biological activity of pyridine derivatives.

BIOLOGICAL IMPORTANCE OF PYRIDINES

Ali et al[18] have synthesized pyridine derivatives and evaluation of their antimicrobial activity against different bacteria b. subtilis, staphylococcus aureus, Escherichia coli, pseudomonas aerugenasa, and different fungi candida albicans aspergillus niger.

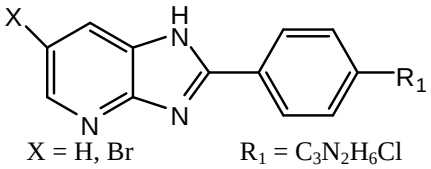


Ramesh et al[19] have prepared pyridines and screened antimicrobial activities. They selected various bacteria and fungi like s. aureus, s. pyrogens, and c. albicans, a. flavus respectivily. They apply cup plate method and found that compounds 4a, 5b, and 6a were more active against c. albicans.



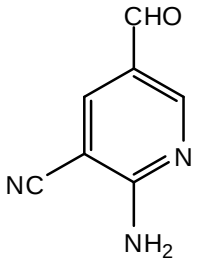
R_1 = CH_3, C_6H_5, OH

Biological activity of amidino substituted imidazo[4,5-b]pyridine have been synthesized by Pavlinac et al.[20] and tested for antibacterial, antiviral activity.

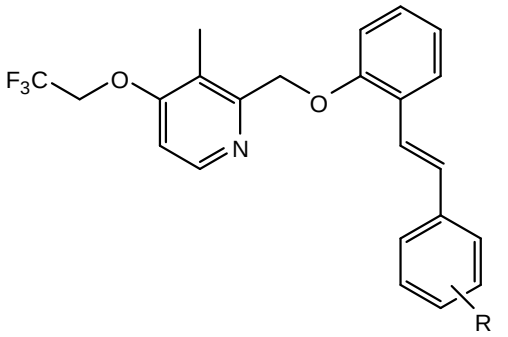


X = H, Br R_1 = $C_3N_2H_6Cl$

Jemmezi et al.[21] have synthesized pyridines evaluated antimicrobial activities by using disc diffusion method. They have taken different bacteria and fungi like vibrio alginoliticus, vibrio cholera, vibrio parahaemolyticus, vibrio vulnificus and candida parapsiloses, candida krusei, candida glabrata, candida albicans and then compared with standard drugs tetracycline and amphoterecin respectively.

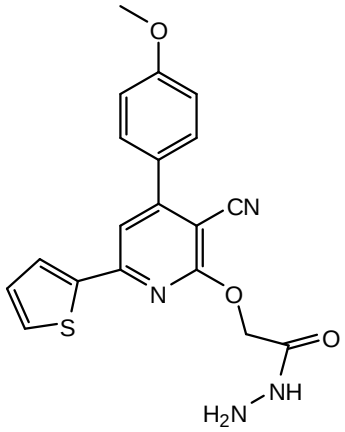


Rathod et al.[22] have reported antimicrobial activity of pyridine derivatives. This activity was tested against different bacteria such as s. pneumonia MTCC 1936, b. subtilis MTCC 441, e. coli MTCC 443, v. cholera MTCC 3906 and compared with standard drug ampicilin and kanamycin. They found that compounds 9a,9c,9e, 9h were showed good potency against gram positive bacteria and 9c, 9h, 9i showed good activity against gram negative bacteria. Antifungal activity was tested against different fungi such as a. fumigates MTCC 3008, c. albicans MTCC 227 and compared with standard drugs chloramphenical. Compounds 9c, 9i showed good antifungal activity against c. albicans and 9a, 9h against a. fumigates.

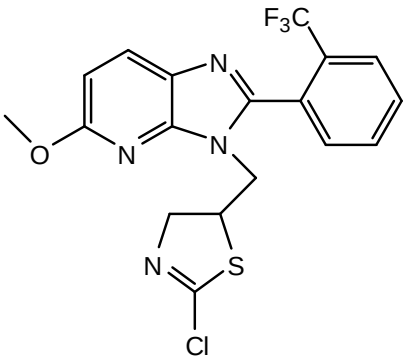


R = 4-OCH_3, 4-CH_3, 4-Cl, 4-NO_2, 4-Br, 2&4-Cl, 4-F, 4-OH, 4-CN

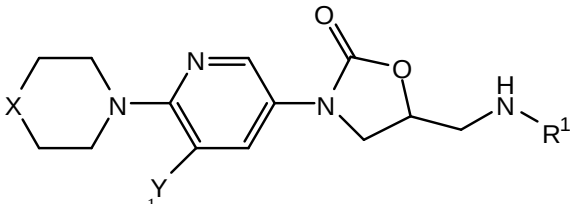
Saeed et al[23] have prepared pyridine acetohydrazide derivatives and screened for their antibacterial and anti fungal activity against Escherichia coli, staphylococcus aureus and candida albicans, aspergillus flavus respectively.



Novel imidazo[4,5-b] pyridine derivatives have synthesized by Wu et al[24] and tested antifungal activity.

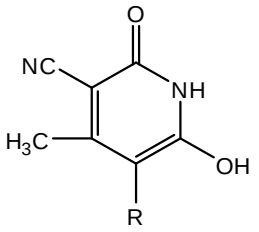


Pyridine derivative with oxazolidinone have been synthesized by Jin et al[25] and explained antibacterial activity against different bacteria.

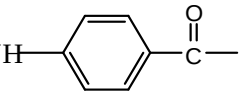


X = O Y = H R^1 = Aromatic acyl, fatty acyl, sulfuryl (or) aminoacyl

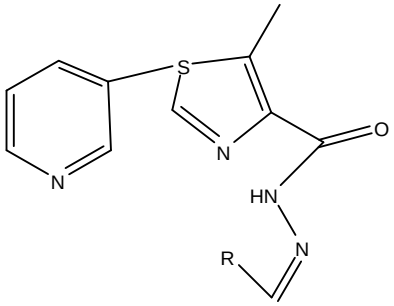
El-Sayed[26] reported new pyridines then evaluated antibacterial activity against Escherichia coli, bacillus coli, staphylococcus aureus and antifungal activity against aspergillus flavus, candida albicans, penicillium etalicum.



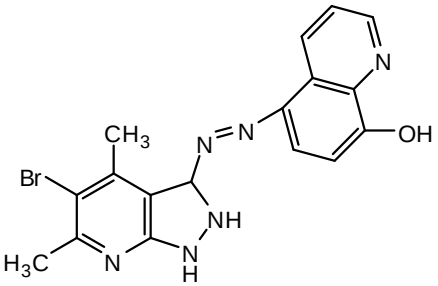
R= $CH_3(CH_2)_{16}$-CONH



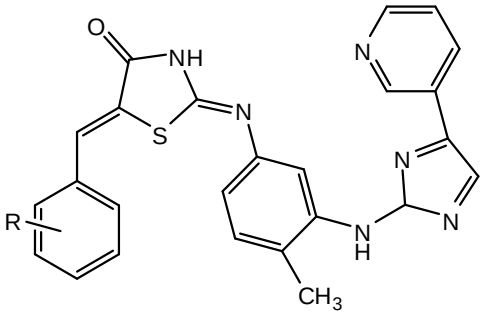
Pyridine derivatives with thiazole and hydrazides have prepared by Kamat et al.[27] and observed anti-inflammatory and antimicrobial ctivity.



Salem and Ali[28] have reported novel pyrazolo[3,4-b]pyridine derivatives then investigated antimicrobial activity.

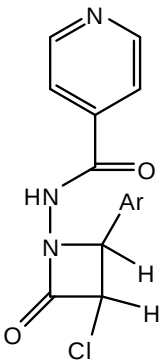


Pyridine derivatives with thiazolidinone moiety have been synthesized by Poszczenko et al[29] and observed anticancer activity.



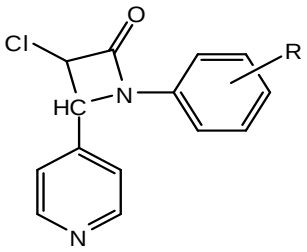
R = 2-F, 4-CF_3, 4-OCH_3

Thomas et al[30] have synthesized pyridines with azetidinone derivative then screened antidepressant activity.

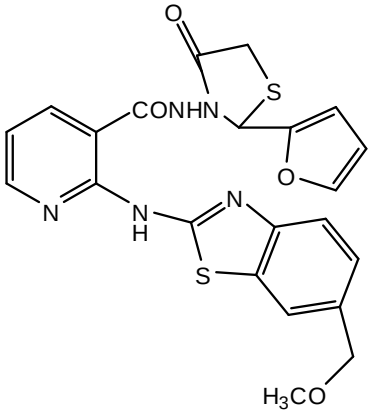


Ar = 2-OHC_6H_4, 4-OHC_6H_4, 4-ClC_6H_4, 4-$NO_2C_6H_4$, 2-$NO_2C_6H_4$, 4-FC_6H_4, 4-$OCH_3C_6H_4$, 4-OH&3-$OCH_3C_6H_3$, 4-$(CH_3)_2NC_6H_4$, 2,5$(OCH_3)_2C_6H_3$

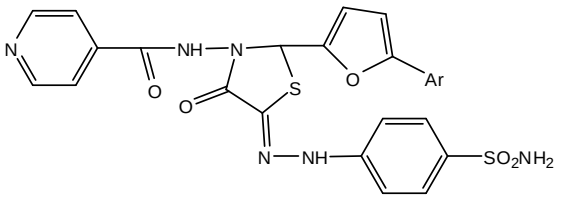
Some novel pyridine derivatives containing azetidinones have been reported by Pramod and Mayuri[31] and explained antitubercular activity.



Patel and Shaikh[32] have prepared pyridines containing 2-amino-6-methoxy benzothiazole and showed antimicrobial activity.

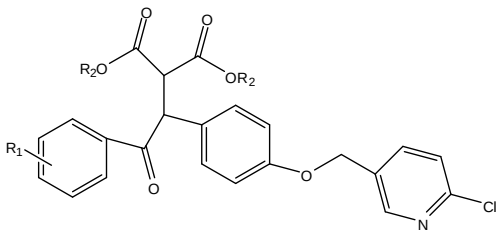


Gujjar et al[33] have synthesized pyridine derivatives then screened antibacterial and antifungal activity against s. aureus, b. subtilis, e. coli, k. promioe and nigrospora, s. niger, r. nigricum, f. oxyporium respectively.



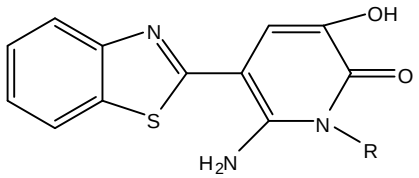
Ar = C_6H_5, 4-$CH_3C_6H_4$, 4-ClC_6H_4, 4-$NO_2C_6H_4$, 2&4-$Cl_2C_6H_3$

Pyridine derivatives have been prepared by De et al[34] and screened biological activity.



R_1 = H, 2-Cl, 3-Cl, 4-Cl, 2&4-diCl R_2 = CH_3, C_2H_5

Metwally et al[35] have synthesized pyridines with benzothiazolyl moiety then explained anti-virus activity.



R = 4-$OMeC_6H_4$, 2&4$(OMe)_2C_6H_3$, 2-Me&4-ClC_6H_3, 2&4$(Cl)_2C_6H_3$, 4-BrC_6H_4, 4-FC_6H_4, 2&3$(F)_2C_6H_3$, 3-$CF_3C_6H_4$

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