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R E V I E W A R T I C L E

Mannich Bases and Their Biological Activity

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A B S T R A C T

Mannich bases are the important pharmacophores for the development of various new and potent drugs with high pharmacological value. The mannich base is also known as β-amino carbonyl compound, is obtained by the amino alkylation of acidic proton next to a carbonyl functional group by formaldehyde and a primary amine/secondary amine or ammonia. Mannich bases are highly reactive and can be easily converted into other products. Mannich bases have various pharmacological actions such as analgesic, anti-convulsant, anti-bacterial, anti-fungal, anti-filarial, anti-inflammatory, anthelmintic, anti-tubercular and anti-cancer properties.

Keywords: Amines,Carbonyl functional group, Mannich base, Pharmacological activity.

A R T I C L E I N F O

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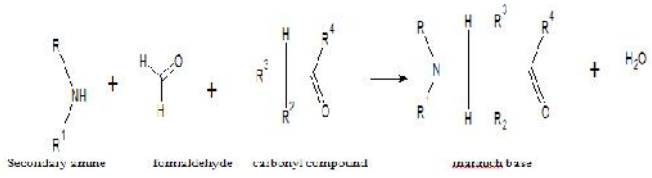
C O N T E N T S

1. Introduction

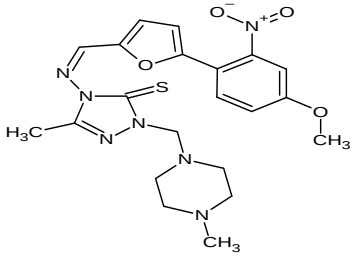
Mannich bases are very reactive and can be transformed into other compounds easily. The mannich bases represent the easily available intermediates for the synthesis of other compounds such as heterocycles, amino alcohols etc. Mannich reaction is an example of nucleophilic addition of an amine to a carbonyl group followed by dehydration to the Schiff base. It is the aminoalkylation of an acidic proton placed next to a carbonyl functional group by formaldehyde and a primary or secondary amine or ammonia. The final product is a β-amino-carbonyl compound also known as the mannich base that act as an important pharmacophore for the development of various new drug molecules. A general scheme for the synthesis of mannich bases are given below.



2. Activities of Mannich bases

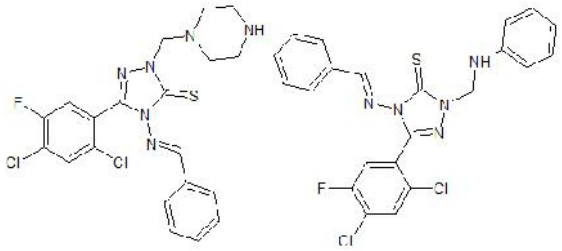
Anticancer Activity:

Shivarama Hollaet al prepared the mannich bases by the reaction of Schiff bases of 3-substituted-4-amino-5-mercapto-1, 2, 4-triazoles with secondary amines morpholin and N-methyl piperazine in presence of formaldehyde in ethanol medium. The compounds were found to possess significant anticancer activity against lung cancer, breast cancer, by one dose anticancer assay [1].

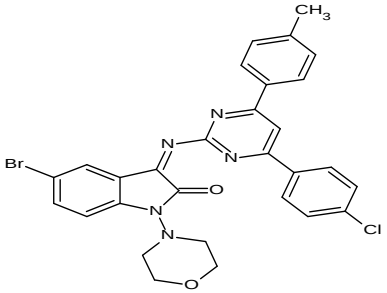


Anti-Bacterial Activity:

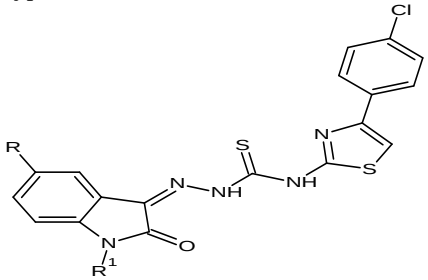
Mari SithambaramKarthikeyan et al prepared the mannich bases of 4-amino-3-(2, 4-dichloro-5-fluorophenyl)-5-mercapto-1, 2, 4-triazole by reacting its Schiff base with formaldehyde, secondary and substituted aromatic amines. The compounds showed good antibacterial activity against various strains of bacteria such as Escherichia coli, S.aureus, P.aeroginosa, and K.pneumoniaeby disc diffusion method [2].



S.N.Pandeya et al synthesized the mannich bases from the reaction of tetrahydrofuran and piperidine with Schiff bases derived from 4-chlorobenzaldehyde and 4-chloroacetophenone in presence of 37% formalin. By agar dilution method, it was found that the compound is active against various species of bacteria such as S.typhimurium, S.aureus, K.pneumoniae, Enterococcus facalis, P.aeruginosa, B.subtilis, and S.albus [3].

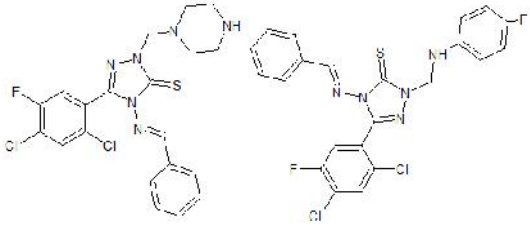


S.N.Pandeya et al prepared the mannich bases from the isatin-3-{1'-[4''-(p-chlorophenyl)thiazol-2"-yl] thiosemicarbazone} with various secondary amines like morpholine. The resultant compound showed mild to moderate activity against pathogens such as Enterococcus faecalis,S.typhi, B.subtilis, and V.cholerae [4].

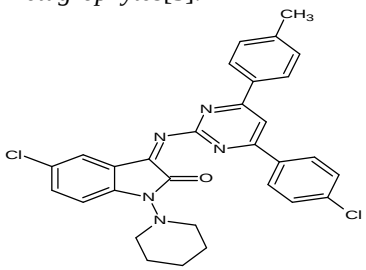


Antifungal Activity:

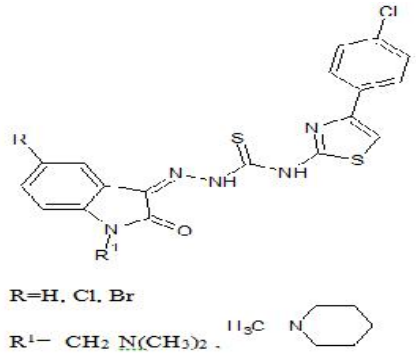
Mari SithambaramKarthikeyan et al prepared the mannich bases of 4-amino-3-(2,4-dichloro-5-fluorophenyl)-5-mercapto-1,2,4-triazole by reacting its Schiff base with formaldehyde,secondary and substituted aromatic amines. The prepared compounds exhibited significant anti-fungal activity against *Aspergillusniger, A.fumigatus, Penicilliummarneffei, Trichophytonmentagrophytes* by serial plate dilution method[2].



S.N.Pandeya et al synthesized the mannich bases from the reaction of tetrahydrofuran and piperidine with Schiff bases derived from 4-chlorobenzaldehyde and 4-chloroacetophenone in presence of 37% formalin. The compounds showed significant antifungal activity against *Microsporumaudouini, M.gypseum, Trichophytonmetagrophytes*[3].



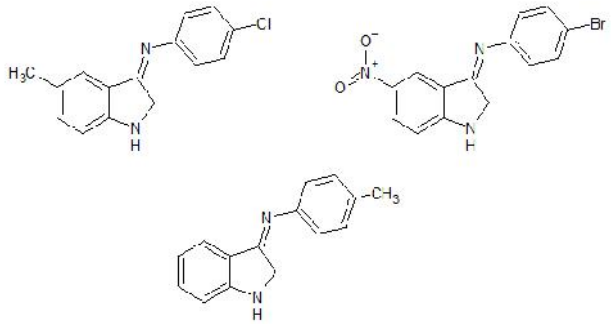
S.N.Pandeyaet al prepared the mannich bases from the isatin-3-{1'-[4''-(p-chlorophenyl)thiazol-2yl] thiosemicarbazone} with various secondary amines like morpholine. The compounds showed good antifungal activity[4]



R=H, Cl, Br

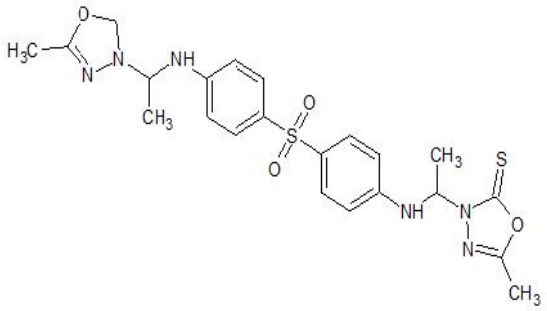
R1= $CH_2N(CH_3)_2$,

Anti Consultant Activity:



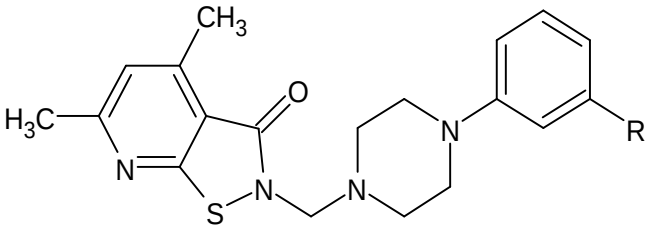
Anti-Mycobacterial Activity:

Mohamed Ashraf Ali et al made mannich bases by condensation of oxadiazole with appropriate aromatic aldehyde and dapsone in methanolic solution. The compounds were found to be active against both drug-sensitive and drug-resistant strains of Mycobacterium tuberculosis[6].



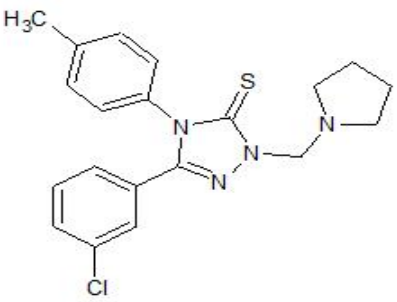
Analgesic Activity:

Malinika et al prepared the mannich bases of isothiazolopyridine by the condensation of isothiazolopyridine with aryl piperazino derivatives. The compounds showed significant analgesic activity in the writhing test[7].



Anti-Microbial Activity:

Tomazplech et al synthesized the mannich bases of thiosemicarbazide, s-triazole bearing 3-chlorophenyl moiety by the reaction of 4,5-disubstituted derivatives of 1,2,4-triazolo-3-thione with pyrrolidine and formaldehyde in ethanol environment. The compounds showed promising antimicrobial activity especially against gram positive bacteria and are found to be 4 fold more effective against Bacillus species, Staphylococcus epidermidis, Escherichia coli, Proteus microbilis, S.aureus, K.pneumoniaewhen compared with ampicillin[8].



R= F, Cl, I, Br

3. Conclusion

Mannich bases have various pharmacological actions such as analgesic, anti-convulsant, anti-bacterial, anti fungal, anti-filarial, anti-inflammatory, anthelmintic, anti-tubercular and anti-cancer properties.

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