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Significant Antimicrobial Activity of some Schiff Bases

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Abstract

Development of new therapeutic compounds is the major necessity of the global world. The present study focus on recent advances in promising approaches of synthesizing new molecule of biological importance. Synthesis of new Heterocyclic compounds has develop a big arsenal of bioactive agent enabling to treat vast variety of diseases and lead to the discovery of new therapeutic drugs. Schiff Bases are the versatile category of Heterocyclic compounds exhibit several interesting biological properties.In this series various Benzaimidazole, Isatin, Sulphonamide,Thiosemicarbazone based Schiff bases are taken into consideration and their biological activity have been studied.

Key Words : Antimicrobial Activity, Gram positive bacteria, Gram Negative bacteria, Sulphonamide, Benzaimidazole

Introduction

Heterocyclic compounds forms a part of large number of pharmaceutical relevant molecule and have major biological significance. They have potential activity and serve as biomimetics and reactive pharmacophores. Schiff Bases are versatile bioactive compounds belongs to heterocyclic category and have significant contribution in medicinal field. Benzaimidazole,Isatin, Sulphonamide, Semicarbazide based Schiff base forms the prominent class of compound have versatile applications in medicinal field.

Schiff bases and their metal complexes are increasingly being used as catalysts in various biological processes as polymers , dyes and gives a broad range of biological properties anti bacterial anti fungal, antioxidant [1-3] it helps to understand of biomolecules and biological

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processes occurring in living organisms. They are involved in the treatment of cancer drug resistance, as antimalarial. Schiff base possess a wide range of biological Activity antimicrobial, antiviral, antioxidant,antifungal .The biological properties are characterized by the presence of imine group (–N=C-H). [4-8]

Hydrazide based Schiff base of 2-hydroxy-1-naphtahldehyde and hydrazine monohydrate found to show better results for antioxidant activity antibacterial and antifungal activity compounds showed good radical scavenging activity with IC50 value while phenol derivatives has good antioxidant activity as compared to standard (Ascorbic Acid) also they show potent Antibacterial activities and antifungal [9-11]

Hydrazone derivatives of schiff base are prepared and screened for anti fungal and anti microbial activity. In this series antimicrobial and anti fungal activity are evaluated against gram negative bacteria Escherichia coli , Pseudomonas Aeroginosa, S.Aureus, B..Substilus and fungi Candida Albicans. Nitro ,thiophene and Furan derivatives of Piperidine ethoxy Benzohydrazide shows good antibacterial activity ,found inactive against Candida Albicans. Thiophene , Nitrophenyl and Methoxy derivatives of Benzoimidazole Carbohydrazide are found to be more potent than other synthesized derivatives this lead to the conclusion that Nitro Thiophen nucleus exhibited highest antimicrobial activity dinitro derivative are more potent than ampicillin when tested against the strain of e coli.[12-14]

Among the versatile range of Schiff bases biological significance of Benzaimidazole , Isatin and Sulphonamide thiosemicarbazide based schiff bases are taken consideration.

Antimicrobial Activity of Sulphonamide based Schiff Bases

Sulphonamide based Schiff bases have excellent potential for antimicrobial activity.Mahmood Ahmed et al They are important class of active therapeutic reagent. Anti bacterial product is released due to cleavage of azo linkage of sulphonamide also stimulates the release of Para Amino Benzoic acid (PABA)which resists the growth of microorganism.[15] Sonu B Rabiya et al synthesized 4-Amino –N-(6 Methyl Benzothiozol 2-yl) Benzene sulphonamide and revealed that Methyl Pyrazole derivative exhibit prominent antimicrobial activity.[16]

Santosh Kumar et al examined antibacterial activity of Benzylidiene sulphonamide Benzamine and concluded that all the molecule shown good activity against tested microorganism , while Methoxy group , 1,3,5 trimethoxy and Furan derivatives have more potent activity.[17]

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Eizbiata Hejchman et al. synthesized salicylidene based Schiff base and the compounds were screened for antimicrobial activity He also concluded that chloro derivatives are most active against gram positive bacteria on contrary replacing Chloro group with Hydroxy and Methoxy group the antibacterial activity decreases. Sulphonyl salts of Schiff Bases show significant antifungal activity against C albicans. [18]

Antimicrobial Activity of Benzaimidazole Based Schiff Bases

Alam S.A M.F et al synthesized Benzaimidazole based Schiff bases concluded that Methyl and Bezylidine moity found to have most promising antibacterial activity Nitro, Chloro, Methoxy Hydroxy and Methhyl group attached to the ring enhanced the activity.[19]

Turgay Tung et al screened on bacterial activity of the compound and found that diphenyl substieunt of Methoxy Napthilidene and Amino Benzaimidazole shows maximum activity .He also concluded that Methoxy group attach to Phenyl ring increases the antimicrobial activity while further addition of more Phenyl rings will not affect the activity. [20]

Antimicrobial Activity of Isatin based Schiff Bases

1H Indole – 2,3 dione very well known for its potential biological activities. Ebrahim et al synthesized isatin Hydrazide derivatives and evaluated that molecules derived from hydantonin isoniazid found to have good anti bacterial agent exhibited highest activity on p aergnosa He also concluded that Chloro Fluoro Methyl thiourea based isatin derivatives of Schiff bases shown excellent activity against gram positive and gram negative bacteria. [21]

Matar et al revealed antimicrobial activity of diamine isatin based Schiff base the compound showed better result for gram positive bacteria than against gram negative bacteria .Molecules with Nitro group attach to para position found to be best bacteriostatic [22]

U.K. Singh et al reported the microbial activity of Schiff base of isatin and its derivative of carboxyimidoyl benzene Schiff base ,all the molecules show significant antimicrobial activities.[23]

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Ramachandran et.al reported that newly synthesized Schiff base have greator antibacterial activity than standard drug.[24] Seshaial Krishnan Sridhar synthesized Schiff bases of isatin derivatives where the dihydro and Nitro derivatives are most active among the series.[24]

Antimicrobial Activity of ThioSemicarbazole Based Schiff Bases

Ahmed A.Al Amiery et al investigated the microbial activity of Schiff bases of imidazoleidine hydrazine carbothimide and concluded that the group that increases the lipophillic character of the molecule favours its penetration through the lipid layer of bacterial membrane and responsible for potent biological activity. [25]

Conclusion

The research work oriented towards the biological significance of Schiff bases having Isatin, Semicarbazide, Sulphonamide, Benzaimidazole group .The compound assayed for antimicrobial activity. All the strains showed sensitivity at higher concentration. The literature reveals that Isatin based Schiff bases have diverse biological activity. The compounds containing electron withdrawing moity shows excellent activity Benzaimidazole based Schiff bases have highly potent range of antibacterial activity. Antimicrobial property of sulphonamide based Schiff bases are due to the cleavage of azo group present in it The study reveals that compounds containing electron donating substieunts like 1,3,5 trimethoxy attached to the ring ,furan group shows better results than the compounds having Chloro , Hydroxy moity attached. Thus it has been concluded that Schiff bases having Benzaimidazole group have remarkable activity, while in Schiff bases containing sulphonamides and semithiocarbazides electron donating group are more potent against microbes than the compounds with electron withdrawing group while in Isatin it is electron withdrawing group which increases the activity and shows excellent results against strain in comparison to electron donating moiety attached. This review article shows the antimicrobial activities of synthesized Benzaimidazole, Sulphonamide, Isatin and Thiosemicarbazide based Schiff bases.These Schiff bases shown a promising lead for the design of more efficient antimicrobial agents.

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