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Review on Antimicrobial Activity of Quinoline



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ABSTRACT

Quinoline is a heterocycle containing nitrogen in a conjugated ring structure. The molecular formula of the Quinoline is C₉H₇N. Quinoline nucleus also has a biological presence in natural compounds like alkaloids. Quinoline has shown profound biological activity. Quinoline nucleus is known for anti-cancer, anti-inflammatory, antioxidant and antimicrobial potential. In this work, we have reviewed the antimicrobial potential of Quinoline.



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INTRODUCTION

Quinoline is a heterocycle containing nitrogen in a conjugated ring structure. The molecular formula of the Quinoline is C_9H_7N . Quinoline is a benzo[b]pyridine in which the six membered benzene ring is conjugated with nitrogen-containing pyridine. Quinoline nucleus also shown profound biological activity and has a biological presence in natural compounds like alkaloids. Quinoline nucleus is known for anti-cancer, anti-inflammatory, antioxidant and antimicrobial potential. Many therapeutic agents were found to contain Quinoline nucleus like Bedaquiline, Chloroquine, Ciprofloxacin as shown in figure no 1.

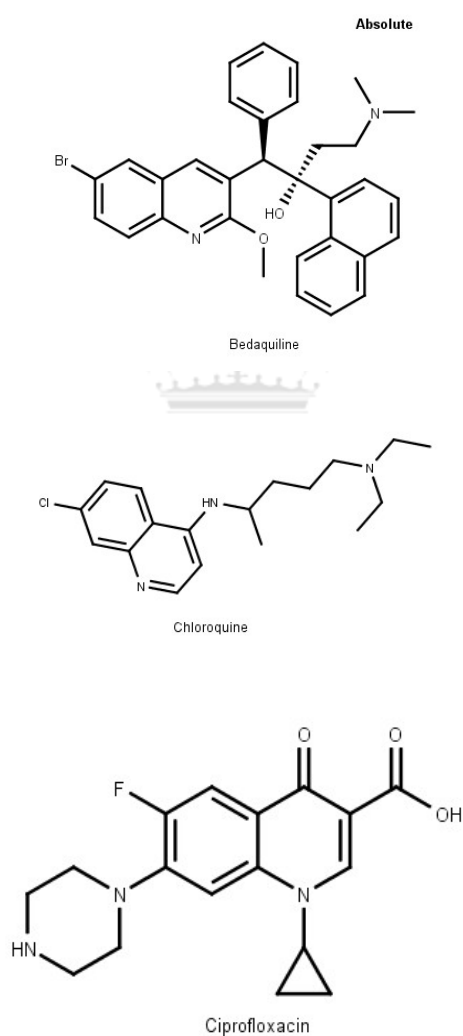
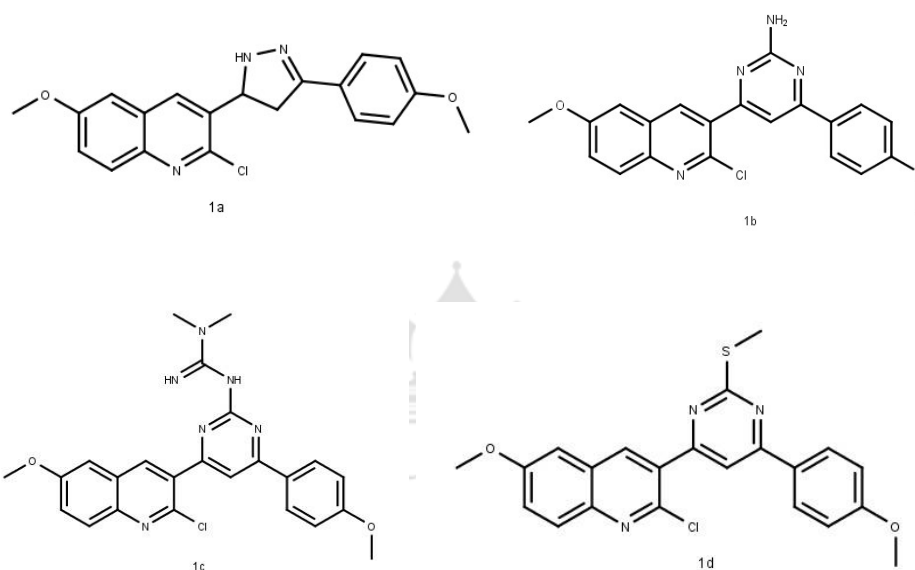


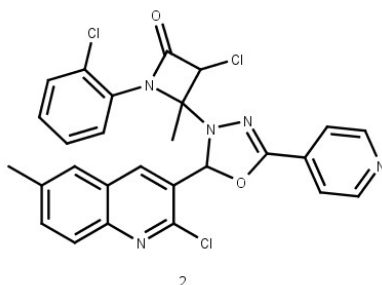
Figure no 1: Quinoline nucleus containing therapeutic agents

The number of Quinoline derivatives with potent antimicrobial activity has been reported. In this work, we have reviewed the antimicrobial potential of Quinoline derivatives.

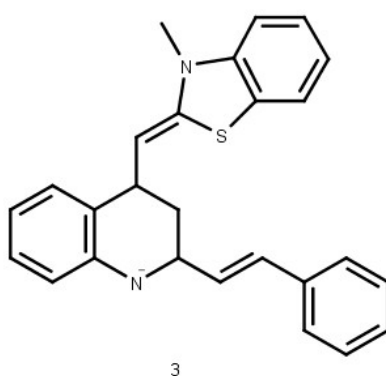
Abulkhair et. al. (2016) reported the antimicrobial of quinoline derivatives bearing different heterocyclic moieties. 2-Chloro-6-methoxy-3-[3-(4-methoxyphenyl)-4,5-dihydro-1H-pyrazol-5-yl]quinoline (1a) and 4-(2-Chloro-6-methoxyquinolin-3-yl)-6-(4-methoxyphenyl)pyrimidin-2-amine (1b), 3-[4-(2-Chloro-6-methoxyquinolin-3-yl)-6-(4-methoxyphenyl)pyrimidin-2-yl]-1,1-dimethylguanidine (1c) and 2-Chloro-6-methoxy-3-(6-(4-methoxyphenyl)-2-(methylthio)pyrimidin-4-yl)quinoline (1d) are potent compounds observed in the series.



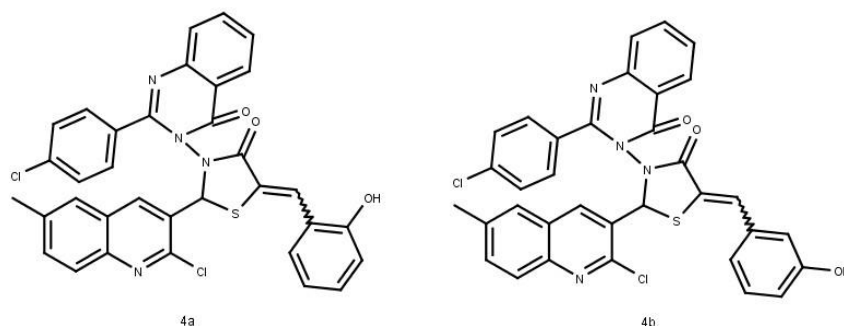
Desai et. al. (2014) reported the synthesis and antimicrobial screening of a new quinoline nucleus containing 1, 3,4-oxadiazole and 2-azetidinone. 3-Chloro-1-(2-chlorophenyl)-4-(2-(2-chloro-6-methylquinolin-3-yl)-5-(pyridin-4-yl)-1,3,4-oxadiazol-3(2H)-yl)-4-methylazetidin-2-one (2) is one of the potent compound observed in the series.



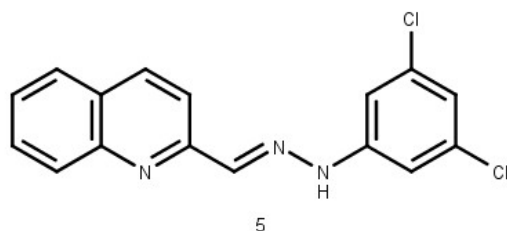
Yao et. al. (2018) reported the development of quinoline-based FtsZ inhibitor (3) and reported its antimicrobial activity and synergistic effects with β -lactam antibiotics.



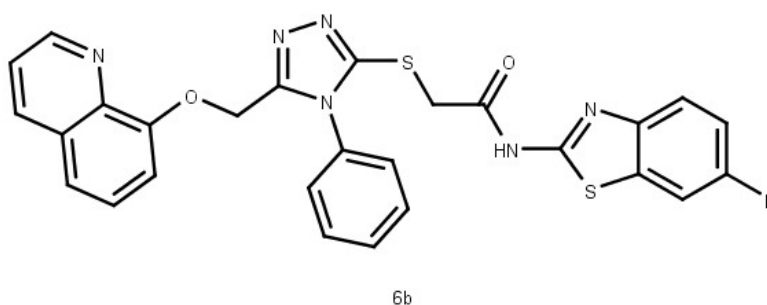
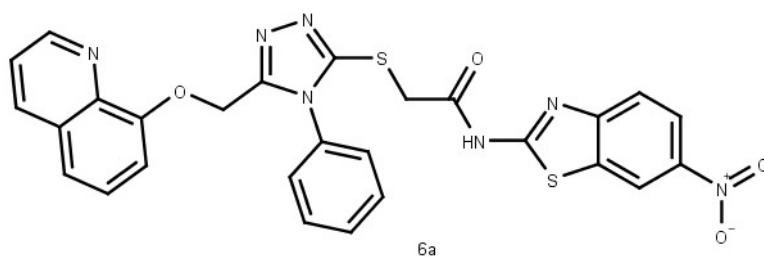
Desai et. al. (2014) reported the synthesis and antimicrobial screening of quinoline based quinazolinone-4-thiazolidinone heterocycles. 2-(2-Chloro-6-methyl(3-quinoly))-3-[2-(4-chlorophenyl)-4-oxo-(3-hydroquinazolin-3-yl)]-5-[(2-hydroxyphenyl)-methylene]-1,3-thiazolidin-4-one (4a) and 2-(2-Chloro-6-methyl(3-quinoly))-3-[2-(4-chlorophenyl)-4-oxo-(3-hydroquinazolin-3-yl)]-5-[(3-hydroxyphenyl)-methylene]-1,3-thiazolidin-4-one (4b) are two potent compounds observed in the series.



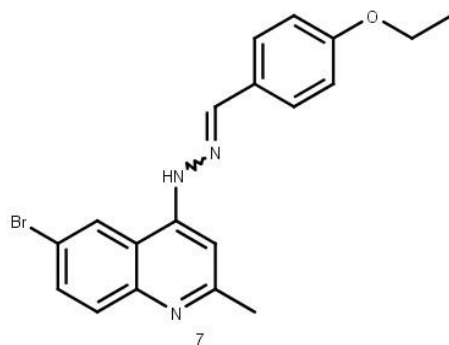
Erol et. al.(2020) reported the development of Quinoline-2-carbaldehyde hydrazone derivatives as antimicrobials, 2-[(1E)-[2-(3,5-dichlorophenyl)hydrazin-1-ylidene]methyl]quinoline (5) is the promising antimicrobial agent.



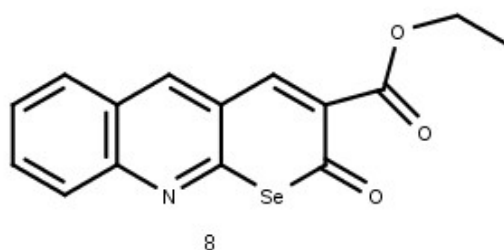
Yurttas,et. al. (2020) reported the development of the 3, 4, 5-trisubstituted triazole derivatives bearing Quinolone ring as antimicrobial agents. N-(6-nitrobenzothiazol-2-yl)-2-[[4-phenyl-5-((quinolin-8-yloxy)methyl)-4H-1,2,4-triazol-3-yl]thio]acetamide (6a) and N-(6-fluorobenzothiazol-2-yl)-2-[[4-phenyl-5-((quinolin-8-yloxy)methyl)-4H-1,2,4-triazol-3-yl]thio]acetamide (6b) are two potent molecules.



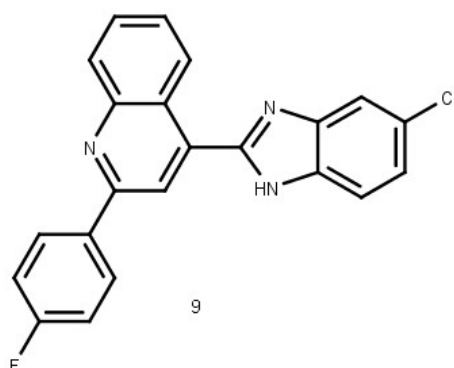
Katariya et. al. (2019) reported the development of Quinoline based hydrazone analogues (7) as antimicrobial agents.



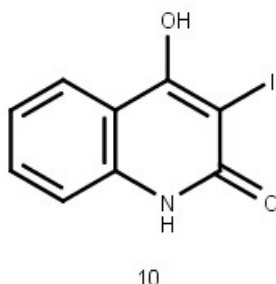
Nandeshwarappa et. al. (2020) reported the development of 2-oxo-2H-selenopyrano[2,3-b]quinoline-3-carboxylates (8) analogues as antimicrobial agents. Ethyl 7-chloro-2-oxo-2H-selenopyrano[2,3-b]quinoline-3-carboxylate and Ethyl 7-nitro-2-oxo-2H-selenopyrano[2,3-b]quinoline-3-carboxylate are two active compounds of the series.



Isloor et. al. (2012) reported the development of new quinoline incorporated benzimidazole derivatives (9) as antimicrobial agents.



Smyth et. al. (2010) reported the development of new quinoline incorporated benzimidazole derivatives as antimicrobial agents. 4-hydroxy-3-iodo-quinol-2-one (10) is one of the potent compounds observed.



SUMMARY:

Quinoline is a heterocycle containing nitrogen in a conjugated ring structure. The molecular formula of the Quinoline is C₉H₇N. Quinoline is a benzo[b]pyridine in which the six membered benzene ring is conjugated with nitrogen-containing pyridine. The molecules with the Quinoline nucleus will be potent antimicrobial agents with good binding affinities.

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