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Review of Antimicrobial Activity of Oxazole

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ABSTRACT

Oxazole is a heterocycle containing nitrogen and oxygen in the five-member ring structure. The Oxazole derivatives can interact with a variety of biological targets including enzymes and proteins. Oxazole and oxazole-based compounds like isoxazole, oxazoline, and oxadiazole have shown profound biological activity. Oxazole nucleus is known for anti-cancer, anti-inflammatory, antioxidant, and antimicrobial potential. In this work, we have reviewed the antimicrobial potential of oxazole.

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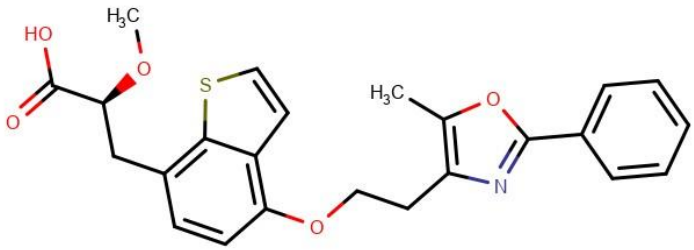
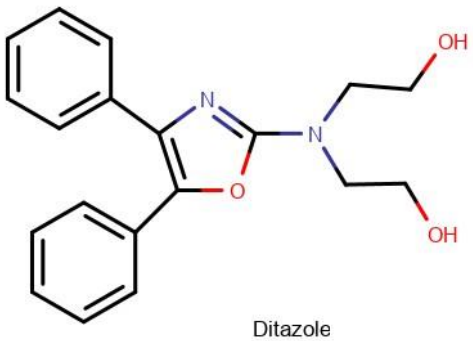
INTRODUCTION

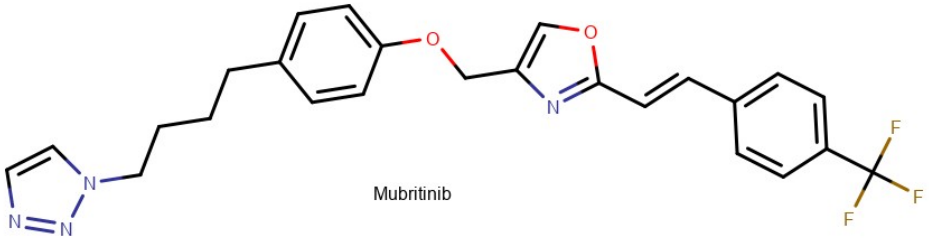
Oxazole is a heterocycle containing nitrogen and oxygen in the five-member ring structure. The Oxazole derivatives can interact with a variety of biological targets including enzymes and proteins. Oxazole and oxazole-based compounds like isoxazole, oxazoline, and oxadiazole have to show profound biological activity. Oxazole nucleus is known for anti-cancer, anti-inflammatory, antioxidant, and antimicrobial potential. Oxadiazole is found to possess many pharmacological properties like antiviral, anticancer, anti-inflammatory, and many more. Many therapeutic agents were found to contain oxazole nucleus like Aleglitazar (antidiabetic), Ditazole (platelets aggregation inhibitor), Mubritinib (tyrosine kinase inhibitor), and Oxaprozin (COX-2 inhibitor) as shown in figure no 1.



Aleglitazar



Ditazole



Mubritinib

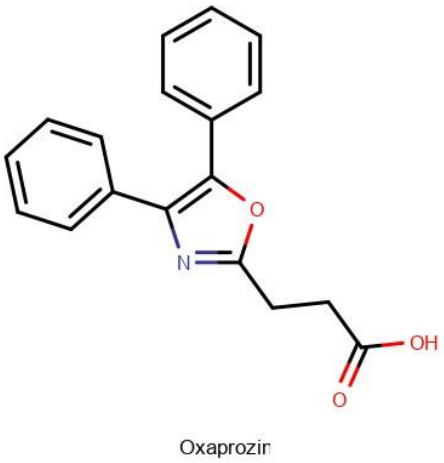
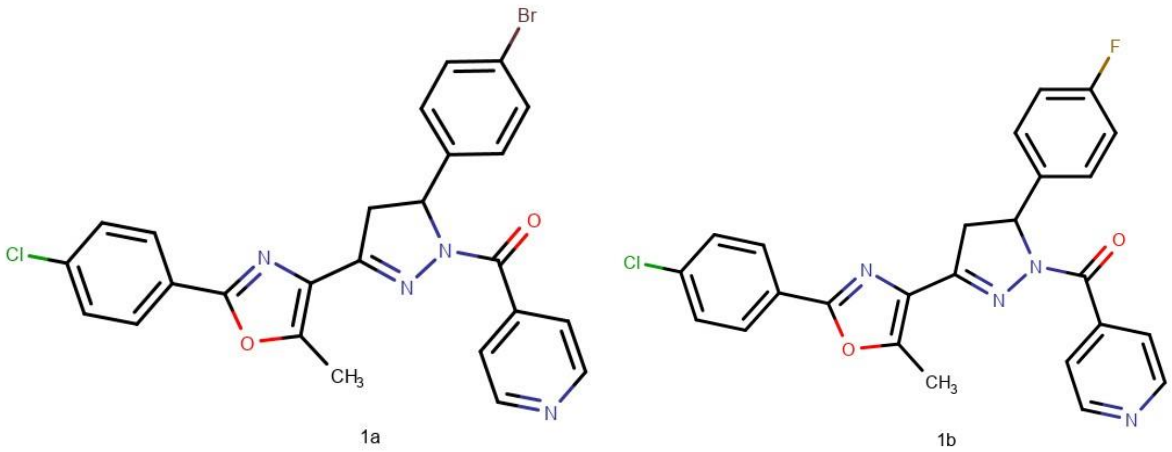


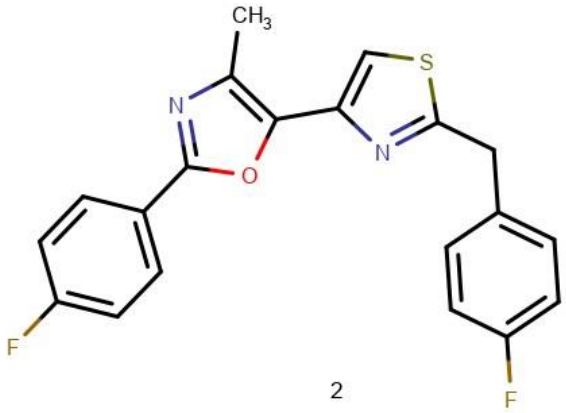
Figure no 1: Oxazole nucleus containing therapeutic agents

Several oxazole derivatives with potent antimicrobial activity have been reported. Here we have summarized some antimicrobial applications of the oxazole.

Katariya et. al. (2021) reported the antimicrobial activity and molecular docking of novel 1,3-oxazole clubbed pyridyl-pyrazolines. [(5-(4-Bromophenyl)-3-{(2-(4-chlorophenyl)-5-methyl-1,3- oxazol-4-yl)}-4,5-dihydro-1H-pyrazol-1-yl)](pyridin-4-yl) methanone (1a) and [(3-{(2-(4-Chlorophenyl)-5-methyl-1,3-oxazol-4-yl)}-5-(4- fluorophenyl)-4,5-dihydro-1H-pyrazol-1-yl)](pyridin-4-yl)methanone (1b) are two potent compounds observed in the series.

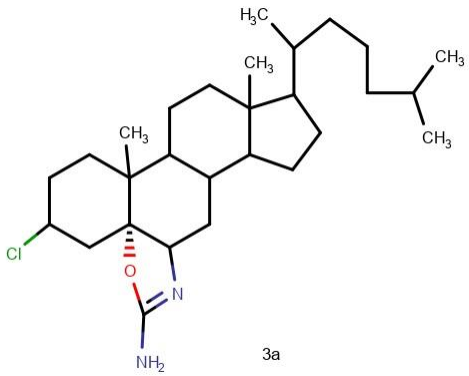


Mhaske et. al. (2017) reported the synthesis antimycobacterial screening of new thiazolyl-oxazole derivatives. 5-(2-(4-fluorobenzyl)thiazol-4-yl)-2-(4-fluorophenyl)-4-methyloxazole (2) is the potent compound observed in the series.

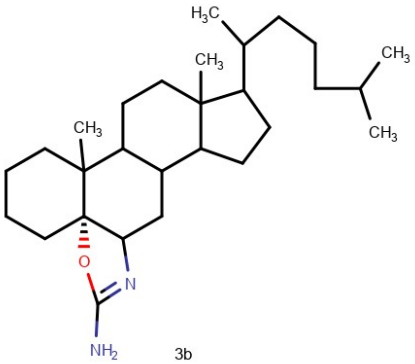


2

Shamsuzzaman et. al. (2011) reported antimicrobial activity of 6,5 fused steroidal oxazoles and (7R)-5-chloro-2,18-dimethyl-17-(6-methylheptan-2-yl)-8-oxa-10-azapentacyclo[11.7.0.0^{2},^{7}.0^{7},^{11}.0^{14},^{18}]icos-9-en-9-amine (3a) and (7R)-2,18-dimethyl-17-(6-methylheptan-2-yl)-8-oxa-10-azapentacyclo[11.7.0.0^{2},^{7}.0^{7},^{11}.0^{14},^{18}]icos-9-en-9-amine (3b) are potent derivatives generated from the synthesized series.

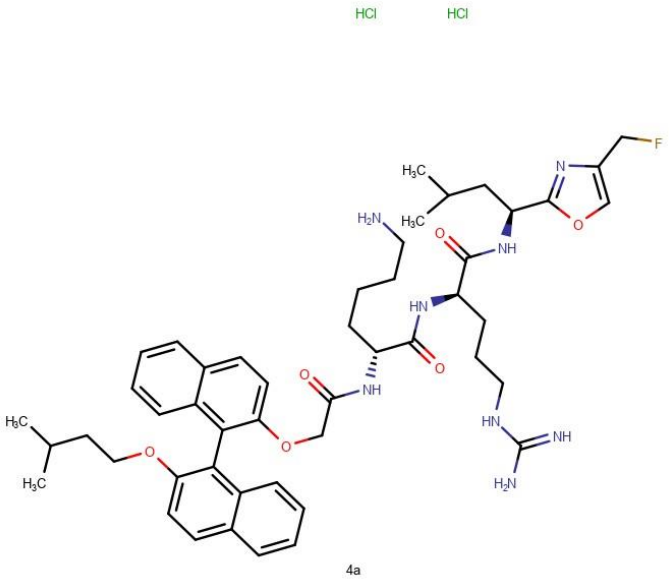


3a

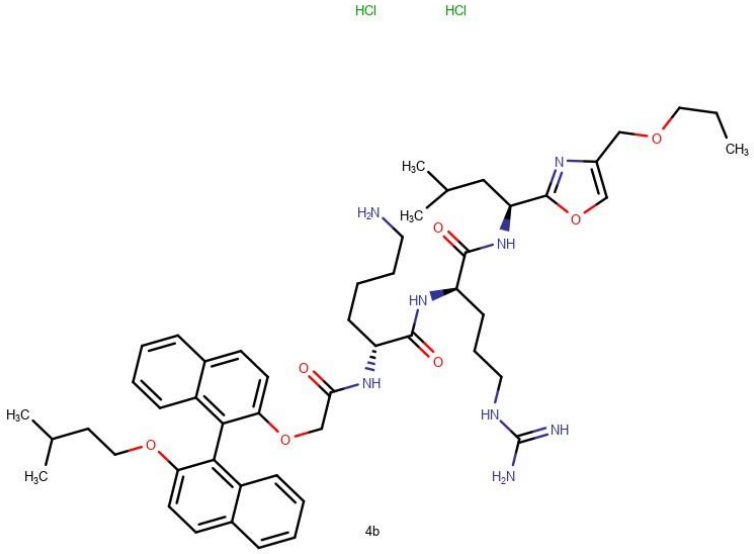


3b

Binaphthyl-Based, Functionalized Oxazole and Thiazole Peptidomimetics as antimicrobial agents have been developed by Keller et. al. (2019). (2R)-6-amino-N-[(1R)-4-carbamimidamido-1-{[(1S)-1-[4-(fluoromethyl)-1,3-oxazol-2-yl]-3-methylbutyl]carbamoyl}butyl]-2-(2-{[2'-(3-methylbutoxy)-[1,1'-binaphthalen]-2-yl]oxy}acetamido)hexanamide dihydrochloride (4a), (2R)-6-amino-N-[(1R)-4-carbamimidamido-1-{[(1S)-3-methyl-1-[4-(propoxymethyl)-1,3-oxazol-2-l]butyl]carbamoyl}butyl]-2-(2-{[2'-(3-methylbutoxy)-[1,1'-binaphthalen]-2-yl]oxy}acetamido)hexanamide dihydrochloride was found to be active compounds.

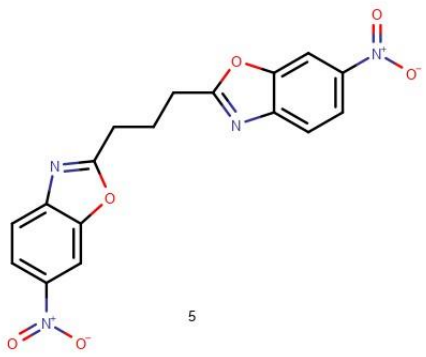


4a



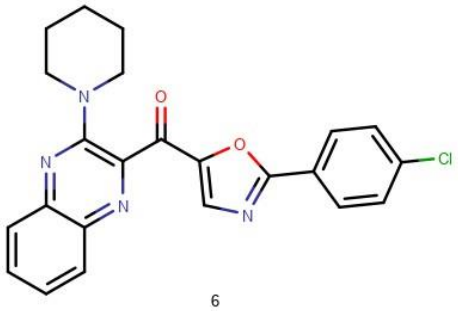
4b

Haj Ersan et. al.(2020) reported the development of Bisbenzoxazole derivatives as antimicrobial, 1,3-Bis(6-nitrobenzo[d]oxazol-2-yl)propane (5) is the promising antimicrobial agent.



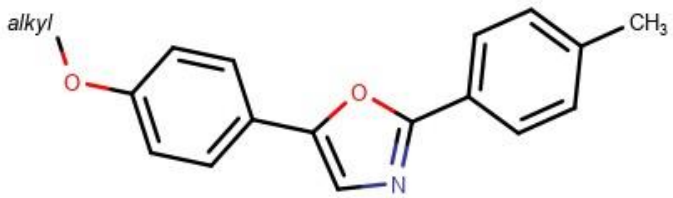
5

Keivanloo et. al. (2020) reported the development of the 1,3-Oxazole-Quinoxaline amine hybrids (6) as antimicrobial agents.



6

Tomi et. al. (2018) reported the development of heterocyclic compounds containing oxazole and benzothiazole moieties (7) as antimicrobial agents.



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SUMMARY:

Oxazole is an attractive option for the development of potent antimicrobial agents as several Oxazole derivatives with profound antimicrobial potential have been reported. The molecules with oxazole nucleus will be potent antimicrobial agents with good binding affinities.

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