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A REVIEW ON "VARIOUS PHARMACOLOGICAL ACTIVITIES OF NOVEL ISOXAZOLES DERIVATIVES"

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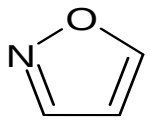
ABSTRACT

Isoxazole-containing compounds have garnered significant attention due to their versatile pharmacological profiles and favourable physicochemical characteristics. This review emphasizes current research on novel isoxazoles, and their therapeutic applications across a broad spectrum of biological targets. Particular focus is given to their anti-inflammatory, antioxidant, antimicrobial, antibacterial, and anticancer properties, supported by both in vivo and in vitro evaluations. By integrating the isoxazole core into drug like scaffolds, researchers have advanced the development of agents with improved target specificity, metabolic stability, and minimal toxicity. This comprehensive analysis underscores the strategic value of isoxazoles in modern medicinal chemistry and highlights promising avenues for future drug design and therapeutic innovation.

KEYWORDS: Isoxazoles, anti-inflammatory activity, antioxidant activity, antimicrobial activity, antibacterial activity, and anticancer activity.

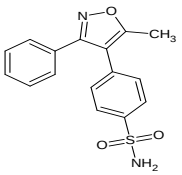
INTRODUCTION

Isoxazoles, comprising a five-membered ring with adjacent nitrogen and oxygen atoms at the 1 and 2 positions, are notable for their electronic structure and their interactions with biological systems, making them attractive frameworks in pharmaceutical chemistry. Chalcones, recognized as open-chain flavonoids with an α, β-unsaturated ketone group, function as flexible precursors in the synthesis of a wide range of heterocyclic compounds, including isoxazoles. The isoxazole ring has garnered considerable interest in recent years as a privileged scaffold in medicinal chemistry, owing to its favourable physicochemical attributes and structural adaptability. This five-membered heterocycle features prominently in a diverse array of bioactive compounds, where its incorporation often enhances solubility, metabolic stability, and target specificity. The current review explores the multifaceted therapeutic potential of isoxazole derivatives, highlighting their efficacy against various disease classes including cancer, microbial infections, oxidation and inflammatory disorders. By integrating the isoxazole core into novel molecular frameworks, this compilation aims to underscore the strategic value of isoxazole moieties in modern drug discovery, while also offering insights into future directions for their development across multiple pharmacological landscapes. The incorporation of the isoxazole ring aims to develop new molecules that are potent, minimally toxic, and free from common side effects such as gastrointestinal discomfort, cardiovascular complications, or bleeding tendencies.[1][9]

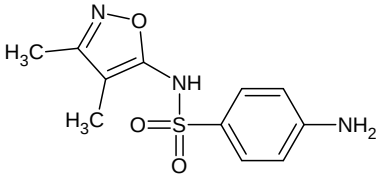


Isoxazole

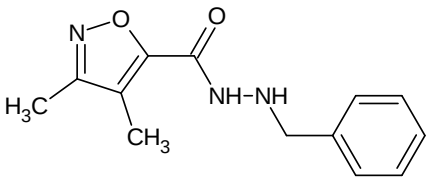
Approved drugs



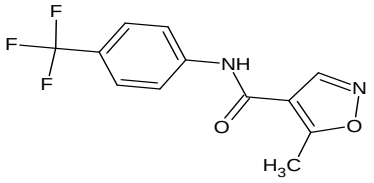
Valdecoxib



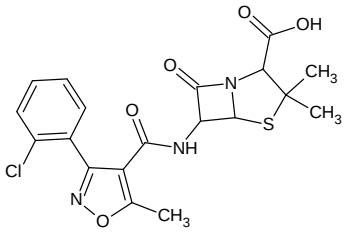
Sulfafurazole



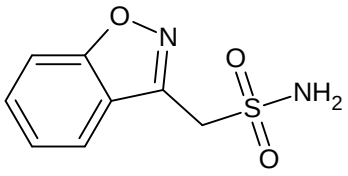
Isocarboxazid



Leflunomide



Cloxacillin

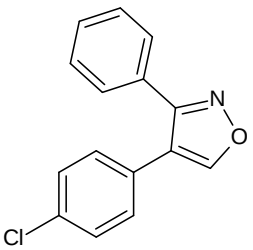


Zonisamide

Pharmacological activities

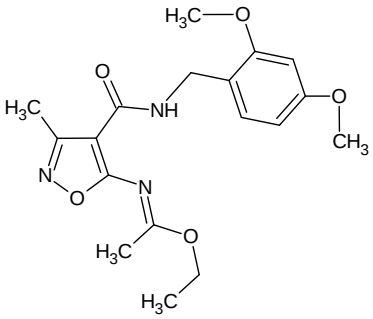
1. Anti-inflammatory activity

a. Kamal et al., 2024 reported a novel series of isoxazole derivative were synthesized, conducted molecular docking studies and characterised through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and mass spectrometry. All the prepared new isoxazole derivatives such as, 4-Diphenyl-isoxazole, 3-(4-Chloro-phenyl)-4-phenyl-isoxazole, 4-(4-Phenyl-isoxazol-3-yl)-phenol, 3-(4-Phenyl-isoxazol-3-yl)-phenol, 3-(3-Nitro-phenyl)-4-phenyl-isoxazole, 3-(4-Nitro-phenyl)-4-phenyl-isoxazole, 3-(3-Bromo-phenyl)-4-phenyl-isoxazole, 3-(4-Bromo-phenyl)-4-phenyl-isoxazole, 3-(3-Chloro-phenyl)-4-phenyl-isoxazole, 3-(4-Fluoro-phenyl)-4-phenyl-isoxazole, 3-(2-Methoxy-phenyl)-4-phenyl-isoxazole, 3-(3-Methoxy-phenyl)-4-phenyl-isoxazole, 3-(4-Methoxy-phenyl)-4-phenyl-isoxazole were screened for in vivo anti-inflammatory activity by Carrageenan-induced paw edema. Among these 3-(4-Chloro-phenyl)-4-phenyl-isoxazole showed good anti-inflammatory activity over the activity of Diclofenac which used as standard.[1]



3-(4-Chloro-phenyl)-4-phenyl-isoxazole

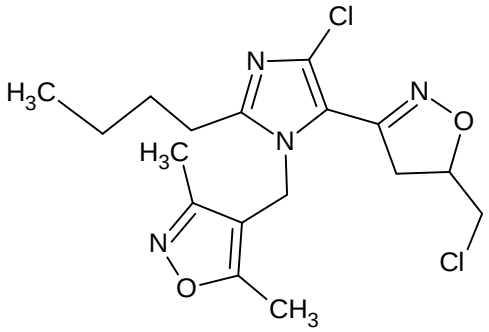
b. Mączynski M *et al*., 2016 stated that a novel series of isoxazole derivatives were synthesized. All the prepared new isoxazole derivatives such as 3,6-Dimethyl-5-(4-methylbenzyl)isoxazolo[5,4-d]pyrimidin-4(5H)-one,3,6-Dimethyl-5-(4-chlorobenzyl) isoxazolo[5,4-d]pyrimidin-4(5H)-one,3,6-Dimethyl-5-(4-methoxybenzyl)isoxazolo [5,4-d]pyrimidin-4(5H)-one, 3,6-Dimethyl-5-[4-(trifluoromethyl)benzyl]isoxazolo [5,4-d]pyrimidin-4(5H)-one, EthylN-{4-[(4-methoxybenzyl) carbamoyl]-3-methylisoxazol-5-yl}acetimidate,EthylN-{4-[(2,4-dimethoxybenzyl)carbamoyl]-3methylisoxazol-5-yl} acetimidate, EthylN-{4-[(2,4-dichlorobenzyl) carbamoyl] -3-methylisoxazol-5-yl}acetimidate,3-Methyl- 5-(4-methylbenzyl)isoxazolo[5,4-d][1,2,3] triazin-4(5H)-one were screened for in vivo anti-inflammatory activity by carrageenan induced paw edema method. Among these Ethyl N-[4-[(2,4-dimethoxybenzyl) carbamoyl]-3 methylisoxazol-5-yl] showed good anti-inflammatory activity when Dexamethasone used as reference.[2]



Ethyl N-[4-[(2,4-dimethoxybenzyl) carbamoyl]-3 methylisoxazol-5-yl] acetamidine

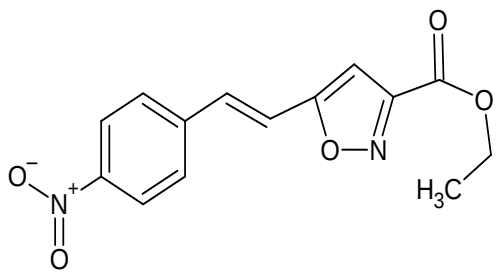
c. Sreenivasa S *et al*., 2014 filed that a novel series of isoxazole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and elemental analysis, and evaluated for analgesic and anti-inflammatory properties. All the prepared new isoxazole derivatives such as, 3-(2-butyl-4-chloro-1-((3,5-dimethylisoxazol-4-yl) methyl)-1H-imidazol-5-yl)-4,5-dihydroisoxazole-5- carbonitrile, 2-butyl-4-chloro-5-(4,5-dihydro-5-phenylisoxazol-3-yl)-1-((3,5-dimethylisoxazol-4-yl)methyl)-1H-imidazole, 2-butyl-4-chloro-5-(4,5-dihydro-5- methyl-5-phenylisoxazol-3-yl)-1- ((3,5-dimethylisoxazol-4-yl)methyl)-1H-imidazole, 3-(2-butyl-4-chloro-1-((3,5-dimethylisoxazol-4-yl)methyl)- 1H-imidazol-5-yl)-4,5-dihydroisoxazol-5-yl acetate, 2-butyl-4-chloro-5-(5-(chloromethyl)-4,5- dihydroisoxazol-3-yl)-1-((3,5-dimethylisoxazol -4-yl)methyl)-1H-imidazole, 5-(5-(bromomethyl) -4,5-dihydroisoxazol-3-yl)-2-butyl-4-

chloro-1- ((3,5-dimethylisoxazol-4-yl)methyl)-1H-imidazole, Methyl3-(2-butyl-4-chloro-1-((3,5-dimethylisoxazol-4-yl) methyl)-1H-imidazol-5-yl)-4,5-dihydroisoxazole-5-carboxylate, Methyl-3-(2-butyl-4-chloro-1-((3,5-dimethylisoxazol-4-yl) methyl)-1H-imidazol-5-yl)-4,5-dihydro-5 -methylisoxazole-5-carboxylate were screened for in vivo anti-inflammatory activity by carrageenan induced paw edema method. Among these 2-butyl-4-chloro-5-(5-(chloromethyl)-4,5-dihydroisoxazol-3-yl)-1-((3,5-dimethylisoxazol-4-yl) methyl)-1H-imidazole showed good anti-inflammatory activity when Ibuprofen used as standard.[3]



2-butyl-4-chloro-5-(5-(chloromethyl)- 4,5-dihydroisoxazol-3-yl)-1-((3,5-dimethylisoxazol-4-yl) methyl)-1H-imidazole.

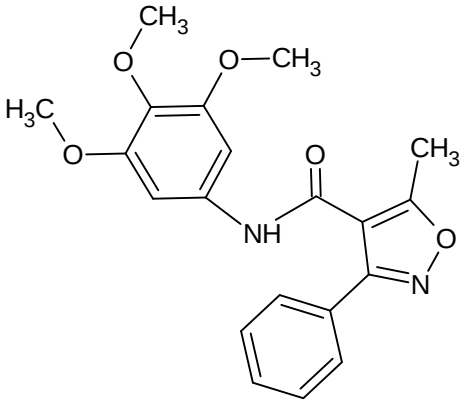
d. Omar FA *et al.*, 2004 noted that a novel series of isoxazole derivatives has been synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, thin layer chromatography (TLC). All the prepared new isoxazole derivatives such as, 5-(p-Substituted styryl)-isoxazole-3 carboxylic acid (4a-g), hydroxamic acid (5a-h), carboxylic acid ethyl ester (3b,e-g) and carboxylic acid amide (22, 24, 25) derivatives were screened for in vivo anti-inflammatory activity by carrageenan induced paw edema method. Among this ethyl 5-[2-(4-nitrophenyl) ethen-1-yl]-1,2-oxazole-3-carboxylate[3e] showed good anti-inflammatory activity when Indomethacin used as standard.[4]



ethyl 5-[2-(4-nitrophenyl) ethen-1-yl]-1,2-oxazole-3-carboxylate

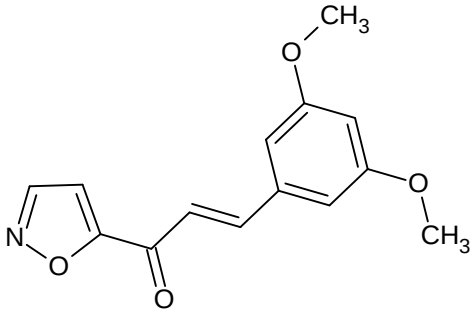
2. Anti-oxidant activity

a. Hawash M et al., 2021 reported that a novel series of isoxazole derivatives were synthesized characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy. All the prepared new isoxazole derivatives such as, N-(4-tert-Butylphenyl)-5-methyl-3 phenyl-1,2-isoxazole-4 carboxamide, N-(3,4-Dimethoxyphenyl)-5-methyl-3 phenyl-1,2-isoxazole-4 carboxamide, N-(3,5-Dimethoxyphenyl)-5-methyl-3 phenyl-1,2-isoxazole-4 carboxamide, 5-Methyl-3-phenyl-N-(3,4,5 trimethoxy phenyl)-1,2-isoxazole-4 carboxamide, 5-Methyl-N,3-diphenyl-1,2-isoxazole-4 carboxamide were screened for invitro antioxidant activity by DPPH (2,2-diphenyl-1-picrylhydrazyl) assay. Among these 5-Methyl-3-phenyl-N-(3,4,5 trimethoxy phenyl)-1,2-isoxazole-4 carboxamide showed good antioxidant activity when Trolox used as reference.[5]



5-Methyl-3-phenyl-N-(3,4,5 trimethoxy phenyl)-1,2-isoxazole-4 carboxamide

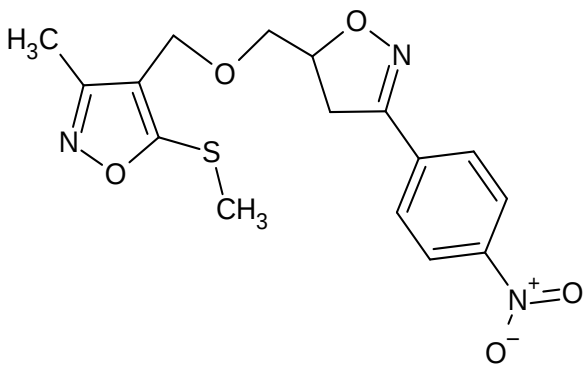
b. Shaik A *et al.*, 2020 stated that a novel series of isoxazole derivatives were synthesized. All the prepared new isoxazole derivatives such as, chalcones (17–31) and dihydropyrazoles (32–46) were screened for antioxidant activity by 1,1-diphenyl-2-picrylhydrazine (DPPH) free radical scavenging assay. Among these 3-(3,5-dimethoxyphenyl)-1-(1,2-oxazol-5-yl) prop-2-en-1-one [25] showed good antioxidant activity when Gallic acid used as reference.[6]



(2*E*)-3-(3,5-dimethoxyphenyl)-1-(1,2-oxazol-5-yl) prop-2-en-1-one

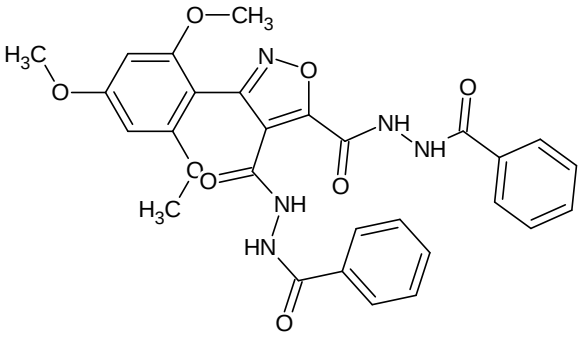
c. Saleh EA *et al.*, 2022 filed that a novel series of isoxazole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and elemental analysis. All the

prepared new isoxazole derivatives such as, 3-Methyl-5-(methyl Thio)-4-(((3-(p-tolyl)-4,5 dihydroisoxazol-5-yl)methoxy)methyl)isoxazole, 3-Methyl-5-(methyl Thio)-4-(((3-(3,4,5-trimethoxy phenyl)-4,5-dihydroisoxazol-5-yl)methoxy)methyl) isoxazole, 3-Methyl-5-(methyl Thio)-4-(((3-(4-nitrophenyl) 4,5-dihydroisoxazol-5-yl)methoxy)methyl)isoxazole, 3-Methyl-5-(methyl Thio)-4-(((3-(3-nitrophenyl) 4,5-dihydroisoxazol-5-yl)methoxy)methyl)isoxazole, 4-(((3-(4-Chlorophenyl)-4,5-dihydroisoxazol-5-yl) methoxy)methyl)-3-methyl-5-(methyl Thio)isoxazole, 4-(((3-(2,4-Dichlorophenyl)-4,5-dihydroisoxazol 5-yl)methoxy)methyl)-3-methyl-5-(methyl Thio)isoxazole, 5-(((3-Methyl-5-(methyl Thio)-1H-pyrazol-4-yl) methoxy)methyl)-3-(p-tolyl)-4,5-dihydroisoxazole, 5-(((3-Methyl-5-(methyl Thio)-1H-pyrazol-4-yl) methoxy)methyl)-3-(3,4,5-trimethoxyphenyl)-4,5 dihydrooxazine, 5-(((3-Methyl-5-(methyl Thio)-1H-pyrazol-4-yl) methoxy)methyl)-3-(4-nitrophenyl)-4,5-dihydroisox azole, 5-(((3-Methyl-5-(methyl Thio)-1H-pyrazol-4-yl) methoxy)methyl)-3-(3-nitrophenyl)-4,5-dihydroisox azole, 3-(4-Chlorophenyl)-5-(((3-methyl-5-(methyl Thio) 1H-pyrazol-4-yl)methoxy)methyl)-4,5-dihydroisoxazole, 3-(2,4-Dichlorophenyl)-5-(((3-methyl-5-(methylthio)-1H-pyrazol-4-yl)methoxy)methyl)-4,5-dihydroisoxazole were screened for antioxidant activity by 2,2-diphenyl-1-picryl-hydrazyl (DPPH) free radical scavenging assay. Among these 3-Methyl-5-(methylthio)-4-(((3-(4-nitrophenyl)4,5-dihydroisoxazol-5-yl) methoxy) methyl) isoxazole showed good antioxidant activity when Ascorbic acid used as reference.[7]



3-Methyl-5-(methylthio)-4-(((3-(4-nitrophenyl)4,5-dihydroisoxazol-5-yl)methoxy) methyl)isoxazole

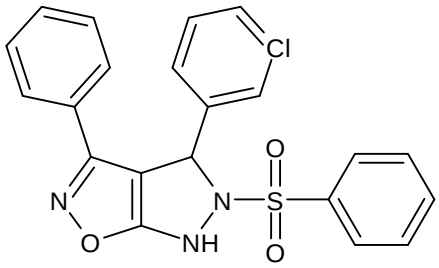
d. Alshamari AK *et al.*, 2022 noted that a novel series of isoxazole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and mass spectrometry. All the prepared new isoxazole derivatives such as, 3-(2,4,6-trimethoxyphenyl) isoxazole-4,5-bis(phenyl-carbohydrazide), 3-(2,4,6-trimethoxyphenyl) isoxazole-4,5-bis(phenyl-carbohydrazide), 3-(2,4,6-trimethoxyphenyl) isoxazole-4,5-bis(phenyl-carbohydrazide), 3-(2,4,6-trimethoxyphenyl) isoxazole-4,5-bis(phenyl-carbohydrazide) were screened for invitro antioxidant activity by 2,2-diphenyl-1-picryl-hydrazyl (DPPH) free radical scavenging assay. These compounds showed good activity when ascorbic acid and α-Tocopherol used as reference. Among the above-mentioned compounds one's structure is depicted below.[8]



3-(2,4,6-trimethoxyphenyl) isoxazole-4,5-bis(phenyl-carbohydrazide)

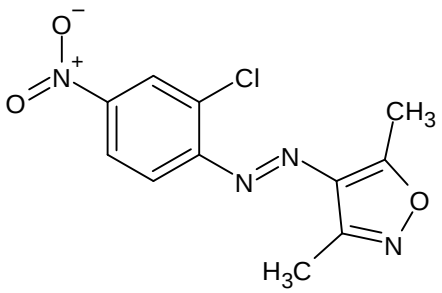
3. Anti-Bacterial activity

a. Badrey MG et al., 2014 reported that a novel series of isoxazole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, and mass spectrometry. All the synthesized new isoxazole derivatives were screened for invitro antibacterial activity by Agar diffusion well method (S. aureus etc..). The synthesized new isoxazole derivatives are 4-(4-Chlorophenyl)-3-phenyl-5,6-dihydro-4H-pyrazolo[4,3 d]isoxazole, 4-(4-Chlorophenyl)-3,5-diphenyl-5,6-dihydro-4H-pyrazolo[4,3 d]isoxazole, 4-(4-Chlorophenyl)-5-(2,6-dichloro-4 (trifluoromethyl)phenyl)-3-phenyl-5,6-dihydro-4H pyrazolo[4,3-d]isoxazole, 2-(4-(4-Chlorophenyl)-3-phenyl-4H-pyrazolo[4,3-d]isoxazole 5(6H)-yl)-4,4-diphenyl-1H-imidazol-5(4H)-one, 4-(4-Chlorophenyl)-5-(5,6-diphenyl-1,2,4-triazin-3-yl)-3 phenyl-5,6-dihydro-4H-pyrazolo [4,3-d]isoxazole, 4-(4-Chlorophenyl)-3-phenyl-4,6-dihydroisoxazolo[5,4 c]isoxazole, (4-(4-Chlorophenyl)-3-phenyl-4H-pyrazolo[4,3-d]isoxazole 5(6H)-yl)(phenyl)methanone, 4-(4-Chlorophenyl)-3-phenyl-5-(phenylsulfonyl)-5,6-dihydro 4H-pyrazolo[4,3-d]isoxazole, 1,4-Phenylenebis((4-(4-chlorophenyl)-3-phenyl-4H pyrazolo[4,3-d]isoxazol-5(6H)-yl) methanone) among these 4-(4-Chlorophenyl)-3-phenyl-5-(phenylsulfonyl)-5,6-dihydro 4H-pyrazolo[4,3-d]isoxazole showed good antibacterial activity when Streptomycin is used as reference.[10]



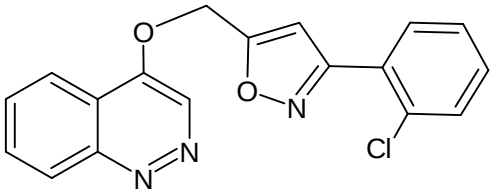
4-(4-Chlorophenyl)-3-phenyl-5-(phenylsulfonyl)-5,6-dihydro 4H-pyrazolo[4,3-d] isoxazole

b. Ketan vashisht et al., 2024 stated that a novel series of isoxazole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and mass spectrometry. All the synthesized new isoxazole derivatives were screened for invitro antibacterial activity by Agar-well diffusion method (B. subtilis etc.). The synthesized new isoxazole derivatives are 3,5-Diamino-4-(4'-bromophenylazo) isoxazole, 3,5-Diamino-4-(3'-chlorophenylazo) isoxazole, 3,5-Diamino-4-(4'-fluorophenylazo) isoxazole, 3,5-Diamino-4-(2'-bromophenylazo) isoxazole, 3,5-Diamino-4-(2'-chlorophenylazo) isoxazole, 3,5-Dimethyl-4-(2'-chloro-4'-nitrophenylazo) isoxazole, 3,5-Dimethyl-4-(3'-nitrophenylazo) isoxazole, 3,5-Dimethyl-4-(2'-fluoro-4'-methylphenylazo) isoxazole, 3,5-Dimethyl-4-(2'-fluoro-3'-chlorophenylazo) isoxazole, 3,5-Dimethyl-4-(3'-chloro-4'-fluorophenylazo) isoxazole, among these 3,5-Dimethyl-4-(2'-chloro-4'-nitrophenylazo) isoxazole showed good antibacterial activity when Bacitracin and Chloramphenicol are used as reference.[11]



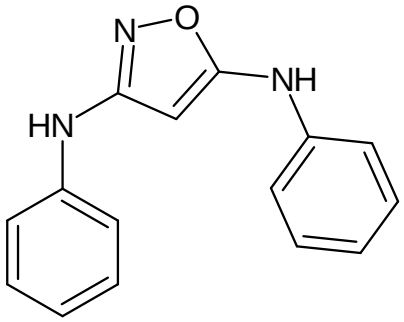
3,5-Dimethyl-4-(2'-chloro-4'-nitrophenylazo) isoxazole

c. Bommagani MB et al., 2021 filed that a novel series of isoxazole derivatives were synthesized. All the synthesized new isoxazole derivatives were screened for invitro antibacterial activity by Disk diffusion technique (P. aerogenosa etc.). The synthesized new isoxazole derivatives are 5-((cinnolin-4-yloxy)methyl)-3-phenylisoxazole, 5-((Cinnolin-4-yloxy)methyl)-3-(o-tolyl)isoxazole, 5-((Cinnolin-4-yloxy)methyl)-3-(2-methoxyphenyl)isoxazole, 5-((Cinnolin-4-yloxy)methyl)-3-(4-methoxyphenyl)isoxazole, 5-((Cinnolin-4-yloxy)methyl)-3-(4-fluorophenyl)isoxazole, 3-(2-Chlorophenyl)-5-((cinnolin-4-yloxy)methyl)isoxazole, 3-(3-Chlorophenyl)-5-((cinnolin-4-yloxy)methyl)isoxazole, 3-(4-Chlorophenyl)-5-((cinnolin-4-yloxy)methyl)isoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-phenylisoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-phenylisoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-(2-methoxyphenyl)isoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-(4-methoxyphenyl)isoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-(4-fluorophenyl)isoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-(2-chlorophenyl)isoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-(3-chlorophenyl)isoxazole, 5-(((6-Bromocinnolin-4-yl)oxy)methyl)-3-(4-chlorophenyl)isoxazole, among these 3-(2-Chlorophenyl)-5-((cinnolin-4-yloxy)methyl)isoxazole showed good antibacterial activity when Norfloxacin is used as reference.[12]



3-(2-Chlorophenyl)-5-((cinnolin-4-yloxy) methyl)isoxazole

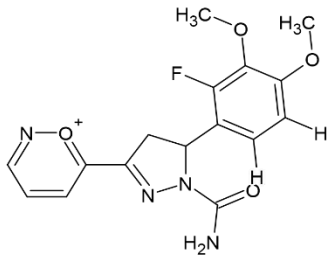
d. Riddhisiddhi P et al., 2024 noted that a novel series of isoxazole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and mass spectrometry. All the synthesized new isoxazole derivatives were screened for invitro antibacterial activity by Mueller Hinton broth turbidimetric method (E. coli, S. aureus). The synthesized new isoxazole derivatives are N3,N5-diphenylisoxazole-3,5-diamine, N3, N5-di-p-tolylisoxazole-3,5-diamine, N3,N5-di-p-methoxyisoxazole-3,5-diamine, N3,N5-bis(2,4-di-methyphenyl)lisoxazole-3,5-diamine, N3,N5-bis(p-fluorophenyl)lisoxazole-3,5-diamine, N3,N5-di-p-chloroisoxazole-3,5-diamine, among these N3,N5-diphenylisoxazole-3,5-diamine showed good antibacterial activity when Cloxacillin is used as reference.[13]



N3, N5-diphenylisoxazole-3,5-diamine

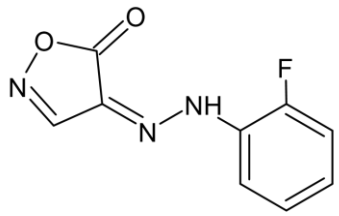
4. Anti-microbial activity

a. Afzal Shaik *et al.*, (2020), reported a novel isoxazole ring containing chalcone and dihydropyrazole derivatives were synthesized, characterised and evaluated for invitro antimicrobial activity by serial tube dilution method against Gram-positive *Staphylococcus aureus* and Gram-negative *Pseudomonas aeruginosa*, whereas the fungal strains employed were *Aspergillus Niger* and *Candida Tropicalia*. The compound 6-[1-carbamoyl-5-(2-fluoro-3,4-dimethoxyphenyl)-4,5-dihydro-1*H*-pyrazol-3-yl]-1,2-oxazin-1-ium showed potent antibacterial activity when compared with ciprofloxacin and fluconazole as a Standard.[14]



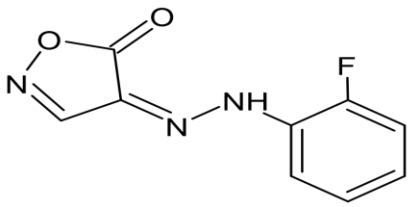
6-[1-carbamoyl-5-(2-fluoro-3,4-dimethoxyphenyl)-4,5-dihydro-1*H*-pyrazol-3-yl]-1,2-oxazin-1-ium

b. Anita R. Banpurkar *et al., (*2018), stated a novel series isoxazole derivatives of antimicrobial activity of 4-(substituted phenyl azo)-3-methyl-4HIsoxazol-5-one azo dyes. synthesized, characterised by Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and mass spectrometry, and evaluated for antimicrobial activity by broth dilution method against a staphylococcus aureus. Against Escherichia coli, pseudomonas aeruginosa, staphylococcus aureus, Staphylococcus pyrogens and Candida Albinus, Aspergillus Niger. the compound (4*Z*)-4-[2-(2fluorophenyl) hydrazinylidene]-1,2-oxazol-5(4*H*)-one showed antifungal activity when compared with candida albinos. Griseofulvin as a standard.[15]



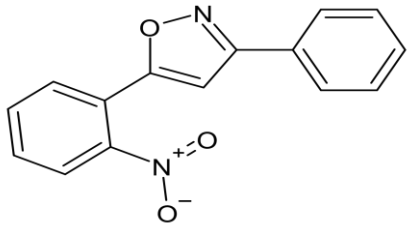
(4*Z*)-4-[2-(2-fluorophenyl)hydrazinylidene]-1,2-oxazol-5(4*H*)-one

c. S K Sahul *et al*, (2008) filed a novel isoxazole derivative of (1a-t). Novel series of 4`-(5`-substituted-aryl-4,5-dihydroisooxazole-3-yl-amino) phenol have been synthesized by treating substituted aryl-N-cholchonyl amino phenol with hydroxylamine hydrochloride. Characterised through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, and evaluated for invitro antimicrobial activity were tested for their antimicrobial activity by serial agar diffusion cup plate method. The fungal strains candida albicans and Aspergillus Niger. The compound 4-[(4,5-dihydro-1,2-oxazol-3-yl) amino] phenol showed potent antibacterial activity when compared with Ciprofloxacin and Clotrimazole as a standard.[16]



(4*Z*)-4-[2-(2-fluorophenyl)hydrazinylidene]-1,2-oxazol-5(4*H*)-one

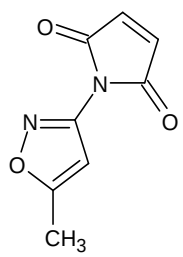
d. Biswa Mohan Sahoo *et al*., (2017), noted a novel isoxazoles derivatives of 5(substituted phenyl)-3-phenylisoxozole (4a-f) were synthesized characterised through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, and thin layer chromatography (TLC) and evaluated. The synthesized compounds were evaluated for antimicrobial against staphylococcus aureus, Escherichia coli, staphylococcus epidermidis, pseudomonas aeruginosa using cup plate method. similarly anti-fungal activity was carried out against various fungal strains such as candida albicans and Aspergillus Niger. The compound 5-(2nitrophenyl)-3-phenyl-1,2-oxazole showed a good antibacterial activity. Where Ampicillin and ketoconazole as a standard.[17]



5-(2-nitrophenyl)-3-phenyl-1,2-oxazole

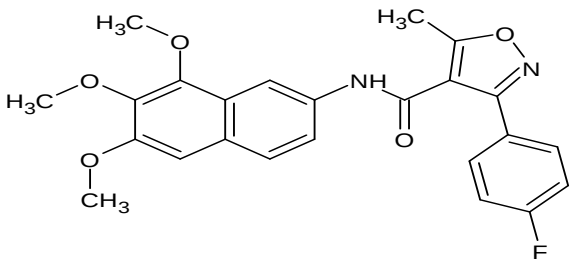
5. Anti-cancer activity

a. Sharifa m Abu baker *et al*.,**2025**, reported a novel isoxazole ring containing chalcone and thizolidin-4-one derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and mass spectrometry, and evaluated by in-vitro anticancer activity by cytotoxicity method against human pancreatic carcinoma (panc-1) and human epithelial colorectal adenocarcinoma (Caco2). Among that 1-(-methyl-1,2-oxazol-3-yl)-1h-pyrrole-2,5-dione compound show anticancer potency when compared to the standard drug doxorubin.[18]



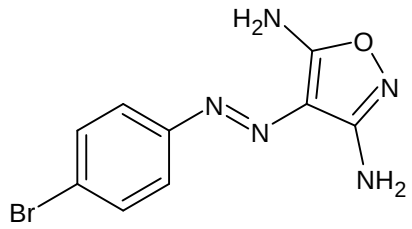
1-(5-methyl-1,2-oxazol-3-yl)-1*H*-pyrrole-2,5-dione

b. Johnny amer *et al*, **2021** stated a novel isoxazole ring containing dairy lispoxozole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and evaluated by in-vitro anticancer activity by comet assay method against androgen receptor (AR-) acetylated lysine (kac-). Among that compound 2-(5-methoxy-1-nitroso-1H-benzo[d]imidozole-2-carbonothioyl)-3,5-dimethylpyridin-4(1H)-one, showed anticancer potency when compared to the standard drug cyclophosphamide.[19]



2-(5-methoxy-1-nitroso-1H-benzo [d]imidazole-2-carbonothioyl)-3,5-dimethylpyridin-4(1H)-one

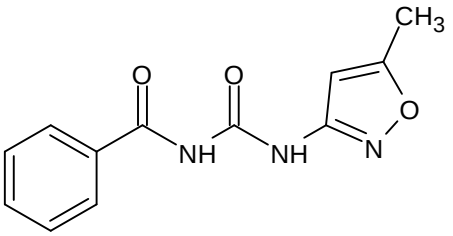
c. Ketan Vashisht *et, al*.,***2024*** filed a novel isoxazole ring containing isoxazole derivatives were synthesized, characterized through Fourier transform infrared spectroscopy (FT-IR), proton nuclear magnetic resonance (1HNMR) spectroscopy, carbon-13 nuclear magnetic resonance (13CNMR) spectroscopy, and mass spectrometry. and evaluated by in vitro anticancer activity by one-pot condensation method against prostate cancer [pc3] and normal cell lines. Among that 3,5-diamino-4-(4'bromophenylazo) isoxazole compound showed anticancer activity when compared to standard drug Escherichia coli.[20]



3,5-diamino-4-(4'bromophenylazo) isoxazole

d. Fahid M. sroor, *et al*.**, 2019,** noted a novel isoxazole ring containing thiazolyl urea derivatives were synthesised, studied Structural Activity

Relationship(SAR), conducted molecular modelling and evaluated by in vitro anticancer activity by MTT colorimetric assay method against lung cancer cell lines (A549) Among that *N*-[(5-methyl-1,2-oxazol-3-yl) carbamoyl] benzamide compound showed anticancer activity.[21]



N-[(5-methyl-1,2-oxazol-3-yl) carbamoyl] benzamide

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