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PHARMACOLOGICAL PROFILE OF THIADIAZOLE DERIVATIVE: A REVIEW

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Abstract
It has long been a fascinating area of research to examine the chemistry of heterocyclic molecules. An essential group of substances for the creation of novel drugs is heterocyclic nucleus 1,3,4-thiadiazole. In recent decades, the synthesis of novel thiadiazole derivatives as well as research into their chemical and biological behavior have become more crucial. A focus of ongoing research in medicinal chemistry is the hunt for antiepileptic substances with higher selectivity and lower toxicity. The pharmacological effects of various classes of thiadiazole compounds, including those with antimicrobial, anticonvulsant, antifungal, anti-diabetic, anti-inflammatory, antioxidant, and other activities, have been the focus of intense research in recent years. A significant global issue is the rise of drug resistance to current treatments.The versatile moiety thiadiazole has a wide range of biological effects.The thiadiazole moiety functions as a "two-electron donor system" and a "hydrogen binding domain." Additionally, it serves as a restricted pharmacophore.

Key word: Thhiadiazole, pharmacological activity, heterocyclic compounds.

Introduction
Cholera, syphilis, anthrax, leprosy, and plague are examples of bacterial illnesses that can be fatal. In contrast, fungi infections like Tinea, Candida, and athlete's foot are related to bacterial infections that are potentially fatal.

Consequently, the prevalence of global public health issues is rising due to harmful bacteria and their antibiotic resistance. Several bacterial species that may survive after being exposed to one or more antibiotics may be the cause of antibiotic resistance. In some situations, pathogens can develop resistance to numerous antibiotics to become multidrug resistant (MDR) species.

Multi-drug-resistant (MDR) infections are to blame for the deaths of millions of patients worldwide every year due to the degree of their fatal effect and their enormous impact on morbidity and mortality. Because of all these issues, it is vital that powerful antibiotics with distinct properties be developed. Thiadiazole is a five-membered heterocyclic ring structure that contains two nitrogen atoms and one sulphur atom. It can be found in nature in four isomeric forms: 1,2,3, 1,2,5, 1,2,4, and 1,3,4-thiadiazole.

Sturcture of 1,2,3, 1,2,4, 1,2,5, and 1,3,4-thiadiazole.

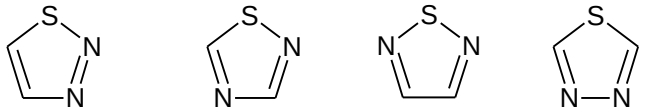


Figure (1) (2) (3) (4)

Tijen onkol et al [1] were prepared new series of 2-[[1(2H)-phthalazinone- 2-yl] methyl/ethyl]-5-arylamino-1,3,4-thiadiazole derivatives obtain by the cyclization of [1(2H)-phthalazinone-2-yl] -acetyl/ propanoyl thiosemicarbazide under the acidic condition. Using the broth microdilution method, the antimicrobial activities of the title compounds were examined against two Gram positive bacteria (S. aureus, B. subtilis), two Gram negative bacteria (P. aeruginosa, E. coli), and two yeast-like fungi (C. albicans and C. parapsilosis). In general, the compounds were found to be potent against B. subtilis and the fungi. All synthesized compounds shown no activity against S. aureus, P. aeruginosa and E.coli but some synthesized compounds were found the activity against B. subtilis and the fungi. Phenyl derivative showed potent antibacterial activity against B. Subtilis than other derivatives. b, g, i,k &l derivatives also showed moderate antibacterial activity against B. Subtilis .c,e& i compounds showed antifungal activity against C. Albicans and g & l exhibit the antifungal acvtivity against C. parapsilosis

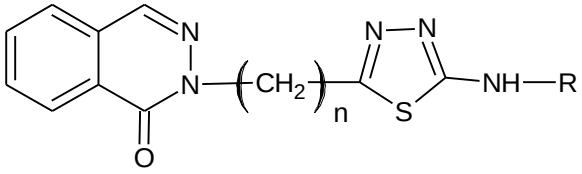


Figure-5

Where	n	R
a	1	Phenyl
b	1	Benzyl
c	1	Phenethyl
d	1	4-chlorophenyl
e	1	4-methoxyphenyl
f	1	4-methylphenyl
g	2	Phenyl
h	2	Benzyl
i	2	Phenethyl
j	2	4-chlorophenyl
k	2	4-methoxyphenyl
l	2	4-methylphenyl

Alok Pandey et al [2] were synthesized some new 1,3,4 thiadiazole derivative of Schiff bases with different aromatic aldehyde. The antimicrobial screening of synthesized compounds against gram positive (S. Aureus) and gram negative (E. coli) bacterial strain by cup plate diffusion method. The compounds A,D,E,and J showed good antibacterial activity against gram positive bacteria and the compounds B,D,E,and J showed good antibacterial activity against gram negative bacteria.

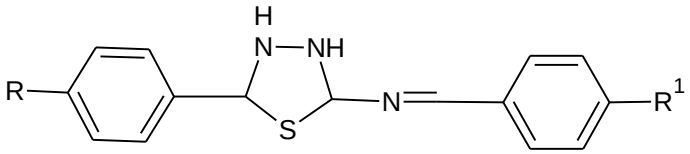


Figure-6

Where	R	R^1
A	OCH_3	OH
B	OH	OH
C	Cl	OH
D	NO_2	OH
E	$N(CH_3)_2$	OH
F	OCH_3	NO_2
G	OH	NO_2
H	Cl	NO_2
I	NO_2	NO_2
J	$N(CH_3)_2$	NO_2

Lincy joseph et al [3] was produced new series of 5-aryl N-phenyl-1, 3, 4-thiadiazole 2-amino derivatives by the oxidative cyclization of substituted phenyl thiosemicarbazone with FeCl3 as a catalyst. Antibacterial, anti-inflammatory, anti-diabetic, anti-oxidant, anxiolytic, and locomotor properties were investigated in these compounds. Antibacterial activity was determined using the disc diffusion method, in vitro anti-inflammatory activity was determined using the protein denaturation method, in vitro anti diabetic activity was determined using the amylase inhibitory activity method, in vitro anti-oxidant activity was determined using the H2O2 scavenging method, in vivo anxiolytic activity was determined using the hole board apparatus, and in vivo locomotor activity was determined using the actophotometer. N-phenyl 5-(2, 3, 4-trimethoxyphenyl)-1, 3, 4-thiadiazole-2-amine exhibited the greatest antibacterial and anti-inflammatory activity. N 5-diphenyl-1,3,4-thiadiazole-2-amine exhibited the highest antioxidant and anxiolytic efficacy. N-phenyl 5-(2, 4-dimethoxyphenyl)-1, 3, 4 -thiadiazole-2-amine exhibited the greatest anti-diabetic action, while N-phenyl 5-(3-bromophenyl)-1, 3, 4 -thiadiazole-2-amine exhibited the most anxiolytic activity.

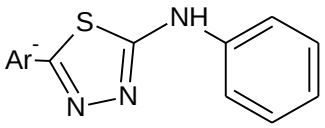


Figure- 7

Molecular formulas of 5-aryl N-phenyl-1, 3, 4- thiadiazole 2-amino derivatives

S no.	Molecular formula
1	$C1_4H_{11}N_3$ S
2	$C_{14}H_{10}N_3$ SCl
3	$C_{14}H_{11}N_3$ SBr
4	$C_{14}H_{10}N_3$ SCl
5	$C_{16}H_{15}N_3$ SO_2
6	$C_{17}H_{17}N_3$ SO_3
7	$C_{16}H_{15}N_3$ SO_2
8	$C_{16}H_{16}N_3$ S
9	$C_{15}H_{13}N_3$ S
10	$C_{14}H_{10}N_3$ SBr

Malleshappa N Noolvi et al [4] synthesized a series of 1,3,4-thiadiazole derivatives of 2-(4-formyl-2-methoxyphenoxy) acetic acid Using thiosemicarbazide and the carboxylic acid group of 2-(2-methoxy-4-(3-oxo-3-substituted phenylprop-1-enyl) phenoxy) acetic acid. The antibacterial and antifungal activity of each of the synthesized 1,3,4-thiadiazole derivatives were examined by Using the cup-plate agar diffusion method. Eight different bacterial strain and one fungus strain were used for antimicrobial activity. S. aureus, Salmonella enterica, Vibrio cholera, Bacillus subtilis, Proteus mirabili, Escherichia coli V517, Mycobacterium smegmatics,Pseudomonas aeruginosa in nutrient agar medium, and one fungal culture Candida albicans in sabouraud's dextrose agar medium were used.

The 1,3,4-thiadiazole 4-NO_2 derivative showed antibacterial activity against all the strain. 3-NO_2 derivative showed maximum inhibition against Salmonella enterica,& Vibrio cholera , 3-OH compound showed activity against S. Aureus ,2,4-dihyroxy derivative exhibit maximum activity against Escherichia coli V517 and 4-NH2 showed activity against Pseudomonas aeruginosa. Rest of all the 1,3,4-thiadiazole derivative showed moderate to good activity. Whereas 4-NO2 derivative exhibit inhibition against fungal strain and other all showed moderate to good activity.

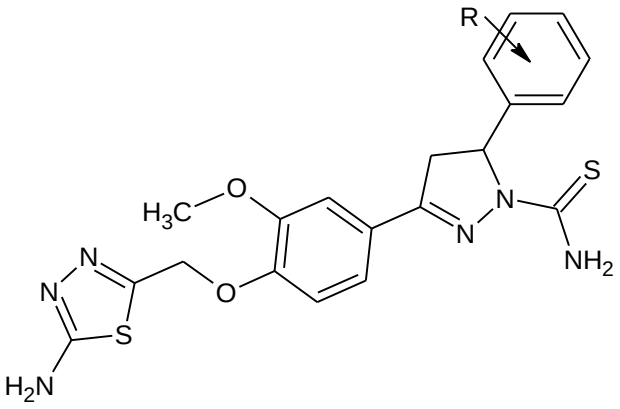


Figure – 8

Where =R

H	2-OCH_3	2,4 dichloro	3-NH_2	3-NO_2
4-OCH_3	4-P	4-NO_2	4-Br	4- CH_3
3-OH	2-OH	4-Cl	2-NH_2	2,4-Dihydroxy
4-NH_2	2-Cl	4-OH	4- CH_3	

S.G.Shingade, and S.S. Shirodkar [5] were prepared some derivatives of isatin base 1,3,4-thiadiazole. The agar well diffusion method was used to test all of the produced compounds for in vitro antibacterial activity. The results showed that all of the compounds had better antibacterial and antifungal action against the selected strains. Compounds with an electron-withdrawing substituent in the isatin's fifth position i.e.compounds A,B,D,F,I & J showed good antibacterial activity as well as antifungal activity . due to presence of electron withdrawing substituent at the fifth position of isatin, compound D exhibit antitubercular activity, compound I showed better activity due to the presence of electron withdrawing group at position 5^{th} and 7^{th} .

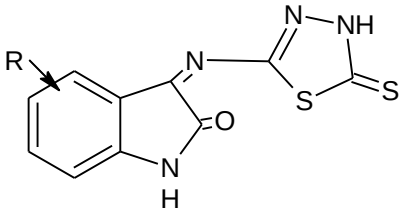


Figure -9

Where	R
A	5-Cl
B	5-Br
C	6-Cl
D	5-F
E	3-H
F	5-CH_3
G	7-CH_3
H	4,5-dichloro
I	5,7- dichloro
J	5-NO_2

Zi-Ning Cui et al [6] were synthesized new series under microwave irradiation, Lawesson's reagent was effectively used to create a variety of 2,5-disubstituted 1,3,4-thiadiazoles in good yields.Their in vitro and in vivo fungicidal activities showed that the title compounds had a lot of activity against Phytophthora infestans and five other fungi. Transmission electron micrographs (TEM) and scanning electron micrographs (SEM) were used to demonstrate the action of the title compounds against P. infestans**.** The antifungal

activities of compounds 10, 18, 19, and 25 were superior to those of both pyrimorph and hymexazol C. fulvum, and it was noteworthy that compounds 18 and 20, whose efficacy rates were found to be significantly more effective than the fungicide pyrimorph, showed a significant inhibition effect (exceeding 80% efficacy rate) against P. infestans. All of the evaluated substances, nonetheless, were discovered to be secure for plants.

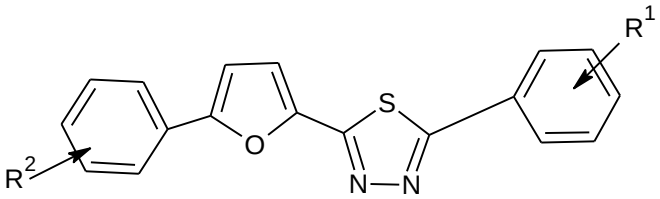


Figure - 10

Where	R^1	R^2
1	4-OCH_3	4-NO_2
2	4-Br	2-Cl
3	4-Cl	4-OCH_3
4	2-OCH_3	4-Cl
5	3-Cl	4-Cl
6	4-OCH_3	4-Br
7	4-Cl	2-Cl
8	2-Cl	2-Cl
9	4-OEt	2-Cl
10	H	2-Cl
11	4-Cl	2,4-di-F
12	2-Cl	2,4-di-F
13	4-CH_3	2,4-di-F
14	4-OCH_3	2,4-di-F
15	3-CH_3	4-F
16	2-Cl	3-F
17	4-CH_3	4-F
18	H	4-F
19	4-Cl	H
20	2-Cl	H
21	3-CH_3	4-OCH_3

22	4-Cl	4-CH_3
23	4-OCH_3	2-F
24	3-CH_3	2-F
25	H	2-F
26	4-CH_3	4-Cl
27	4-OCH_3	2,6-di-F
28	4-Cl	2,6-di-F
29	2-Cl	2-NO_2
30	4-CH_3	2-NO_2
31	4-OCH_3	3-NO_2
32	H	2,6-di-F

P. K. Upadhyay and P.Mishra [7] a sequence of 5-(4-substituted phenyl)-1,3,4-thiadiazole-2-amines were produced by the 4 substituted benzoyl thiosemicarbazides were dehydrocyclized with strong sulfuric acid. These substances were tested for their ability to inhibit the growth of Aspergillus niger and Candida albicans while also having antibacterial effects against Staphylococcus aureus, Bacillus substilis, Eschereria coli, and Pseudomonas aeruginosa. According to the data, compounds (a), (b), and (c) have strong antibacterial activity, whereas compounds (f) and (g) have significant antifungal activity. c, f, and g are substances having moderate to good anticancer activity. As a result, synthetic substances may be found to have strong antibacterial action and modest antifungal activity.

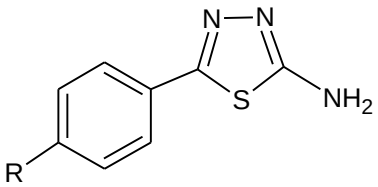


Figure - 11

Where	R
a	F
b	Cl
c	Br
d	I
e	CH_3
f	OH
g	OCH_3
h	OC_2H_5

Mazin Nadhim Mousa [8] were created Six compounds that include 1,3,4-thiadiazole and Schiff base. Four microorganisms were used to test the antibacterial activity: two gram positive S. aureus and B. cereus, two gram negative E. coli, and P. aeroginosa bacteria. The disc diffusion method was employed. When compared to a conventional medicine, the synthesized molecule demonstrated a noticeable antibacterial activity. The examined germs were most effectively combated by compound **f**, while compound **b** displayed the least effective antibacterial action. The antibacterial activity of compounds **a** and **c** was greater than that of

compounds **b** and lower than that of compounds **d, e**, and f. The impact on gram-negative bacteria (E. Coli) was greater than that on gram-positive bacteria, with P. Aeroginosa seeing the least impact.

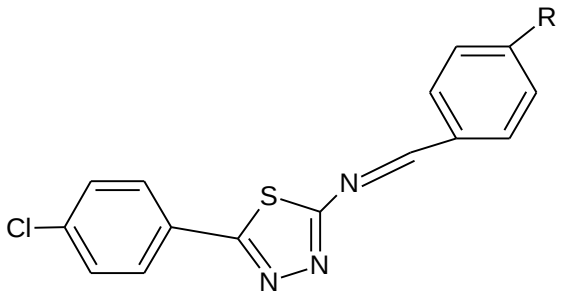


Figure - 12

Where	R
a	H
b	CH_3
c	OH
d	NO_2
e	Cl
f	Br

Hanif Shirinzadeh et al [9] were synthesized the new series of 1,3,4-thaidaizole derivatives. Standard strains were tested for antibacterial and antifungal activities. Antimicrobial activity was tested using the following strains: Gram-positive bacteria include S. aureus ATCC 25923, MRSA ATCC 43300, and Bacillus subtilis ATCC 6633. Gram-negative bacteria include E. coli ATCC 25922, yeast include Candida albicans ATCC 10231 and Candida krusei ATCC 6258. Chloro phenyl indole 1,3,4 thaidaizole derivative exhibit excellent activity against S. Aureus bacteria. NH2 containing 1,3,4 thaidaizole derivative showed excellent activity against MRSA. Other derivatives exhibit good antibacterial activites. All the derivatives showed excellent antifungal activities against C. krusei and moderate activities against C. Albicans.

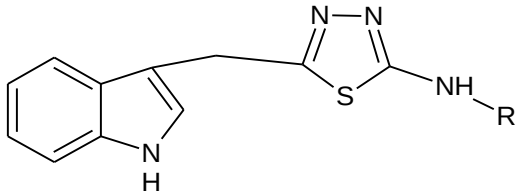
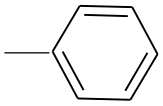
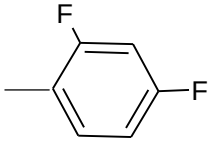
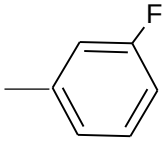
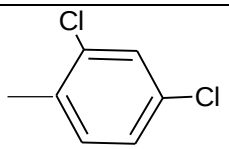
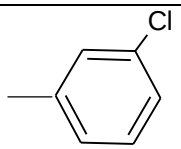


Figure- 13

Where	R
A	CH_3-CH_2-
B	CH_3-CH_2- CH_2-
C	H
D	
E	

F	
G	
H	

Ajit Kumar Pandey et al [10] were prepared different novel series of shciff bases of 2,5 disubstitue 1,3,4-thiadiazole. The analgesic efficacy of 1, 3, and 4-thiadiazole derivatives was assessed in adult male Swiss albino rats (250 g) using the acetic acid-induced writhing reflex method.Swiss albino male adult rats (250 g) were utilized to assess 1, 3, and 4 thiadiazole compounds' anti-inflammatory efficacy paw edema model produced by carrageenan. The synthesis of a novel class of substances with analgesic and anti-inflammatory effects. Compound f in particular was found to have a low incidence of stomach ulcers and a superior analgesic and anti-inflammatory profile.

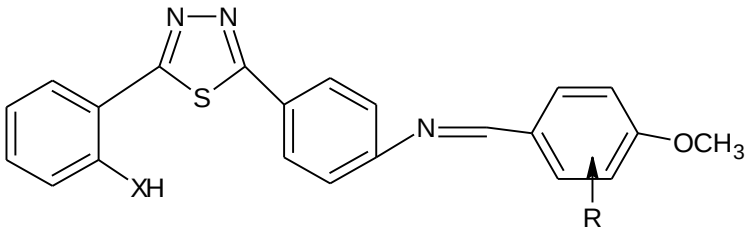


Figure- 14

Where	X	R
a	2-OH	2-NH_2
b	2-OH	4-NH_2
c	2-OH	3-NH_2
d	2-SH	3-NH_2
e	2-OH	4-NH_2
f	2-SH	4-NH_2

Harigopal S Sawarkar et al [11] A unique series of [(5-[4-(acetylamino) phenoxy] methyl-1,3,4-thiadiazol-2-yl] sulfanyl] Under the circumstances of a Schotten-Baumann reaction, sodium salts of N-4-[(5-sulfanyl-1,3,4-thiadiazole-2-yl)methoxy]phenyl acetamide were condensed with variously substituted carboxamides to produce N substituted 2-acetamide and 2/3-propanamide.By using the serial dilution method, all recently synthesized compounds were tested for antibacterial activity against the pathogenic bacteria Staphylococcus aureus (gram positive) and Escherichia coli (gram negative), as well as for antifungal activity against Aspergillus flavus and Candida albicans. Significant antibacterial activity comparable to that of the conventional medication was present in the majority of the compounds. Among the substances studied, a few showed antibacterial action against bacteria that was as effective as conventional medicine. Due to the presence of electron-withdrawing groups like -NO2 and -Cl, the compounds' greater activity was explained. Additionally, the compound's phenyl group demonstrated acceptable antibacterial activity.

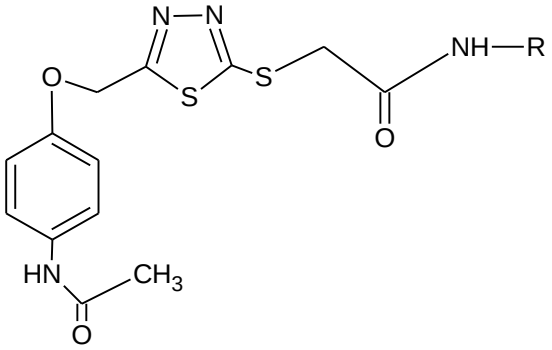


Figure- (15a)

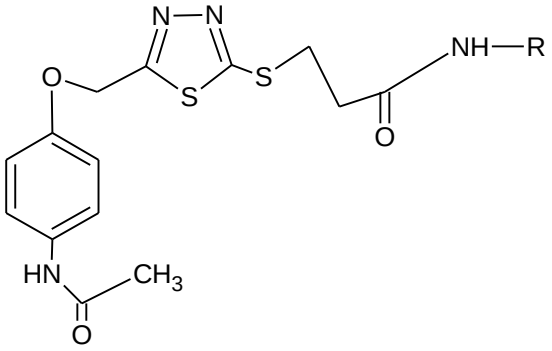


Figure-(15b)

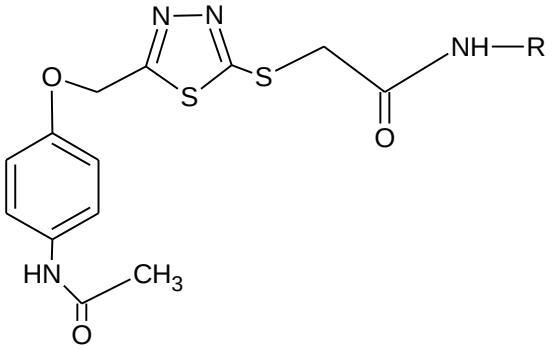


Figure –(15c)

Where R	1	2	3
a	C_6H_5	C_6H_5	C_6H_5
b	2-CH_3-C_6H_4	2-CH_3-C_6H_4	2-CH_3-C_6H_4
c	$C_{10}H_7$	$C_{10}H_7$	$C_{10}H_7$
d	2-Cl-C_6H_4	2-Cl-C_6H_4	2-Cl-C_6H_4
e	4-NO_2-C_6H_4	4-NO_2-C_6H_4	4-NO_2-C_6H_4

Sagar Sahu et al [12] were synthesized some new compounds of heterocyclic containg1,3,4-thiadiazole derivative. By cyclizing a group of diverse benzaldehydes with thiosemicarbazide in the presence of various reagents such FeCl3, HCHO, and losing a molecule of water, a series of 1,3,4-Thiadiazole

derivatives were created. These derivatives were discovered to have strong antibacterial action. New series of synthesized compounds were exhibit the antifungal activity rather than antibacterial activity.

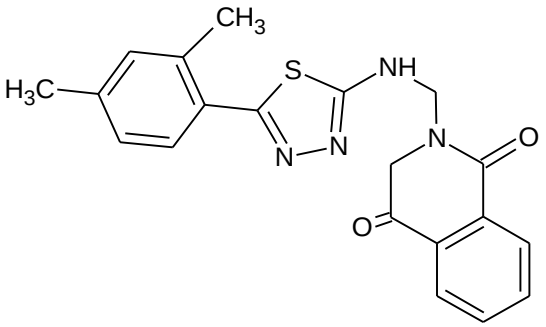


Figure – (16A)

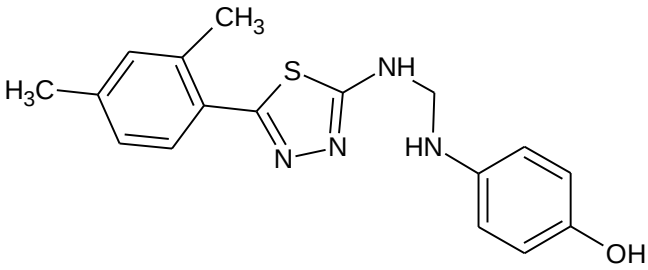


Figure –(16B)

Meihang Chen et al [13] by using the ingredients D-glucose and 5-amino-1,3,4-thiadiazole-2-thiol and following a convergent synthesis method, a number of novel 1,3,4-thiadiazole derivatives of glucosides were produced in good yields. According to the bioactivities' findings, some of the target compounds have effective antifungal properties. The target compounds had moderate to poor antibacterial activity against Xanthomonas oryzae pv. oryzae (Xoo) and Xanthomonas campestris pv. citri (Xcc), in particular, compounds I showed greater bioactivities against Phytophthora infestans (P. infestans). The poison plate method is used to assess the in vitro antifungal properties of the target compounds against G. zeae, Botryosphaeria dothidea (B. dothidea), Phomopsis sp., P. infestans, and Thanatephorus cucumeris (T. cucumeris).

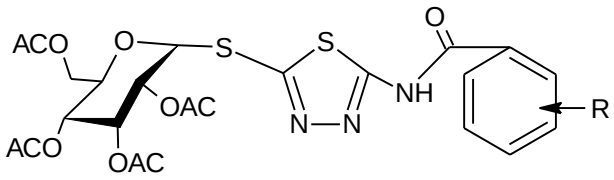


Figure -17

Where	R
A	2-CH_3
B	3-CH_3
C	4-CH_3
D	2-OCH_3
E	3-OCH_3
F	4-OCH_3

G	2-F
H	3-F
I	4-F
J	2- Cl
K	3- Cl
L	4- Cl
M	2-Br
N	3- Br
O	4 -Br
P	2-NO_2
Q	4 NO_2

Aadesh Kumar et al [14] were prepared novel series of 1,3,4-thiadiazole derivatives. all the novel compounds were synthesized with the help of different benzaldehydes were mixed with phosphorous oxychloride and thiosemicarbazide in same quantitiy. The novel synthetic compounds' antimicrobial effects were investigated using the agar diffusion method and common strains of Gram-positive and -negative bacteria.compounds 1,2,3 and 4 exhibit good antibacterial activity against gram positive and gram negative bacteria.

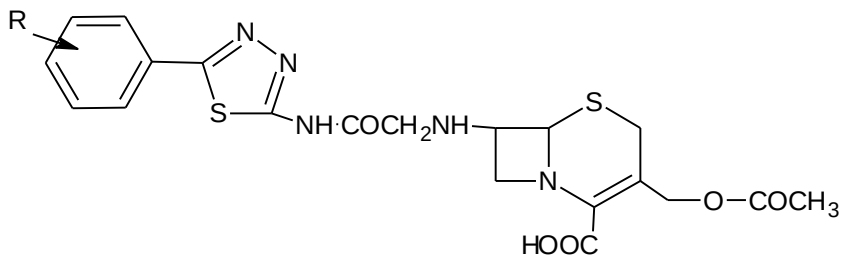


Figure - 18

Where	R
1	H
2	o-CH_3
3	p- CH_3
4	o-Cl
5	p-Cl
6	o-Br
7	p-Br
8	m-NO_2
9	p- NO_2
10	2,4-Cl
11	OH
12	OCH_3

Ahmad E. Mohamed et al [15] were chitosan has been used to create the synthetic 1,3,4-thiadiazole compounds, which have been used to create two novel polymers known as Cs-EATT and Cs-BATT. The activity of two synthesized chitosan derivatives designated as Cs-EATT and Cs-BATT to control the growth of pathogenic Gram-positive bacteria (Staphylococcus aureus ATCC6538 and Bacillus subtilis ATCC6633), Gramnegative bacteria (Escherichia coli ATCC8739 and Pseudomonas aeruginosa ATCC9022), and Candida albicans ATCC10231 (unicellular fungi) was assessed by the agar well diffusion technique. Data analysis revealed that Cs-EATT had stronger activity against all types of bacteria than Cs-BATT .C. albicans was not among the organisms tested.

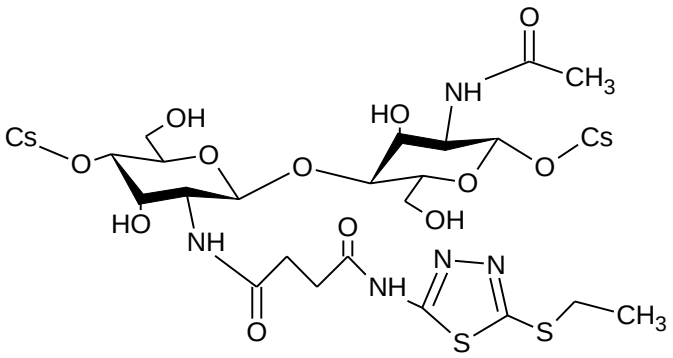


Figure –(19 a)

Cs-EATT = chitosan [5-(ethyl)-1,3,4-thiadiazole-2 amine
Where Cs =$CH_2Cl_2/(C_2H_5)_3N$

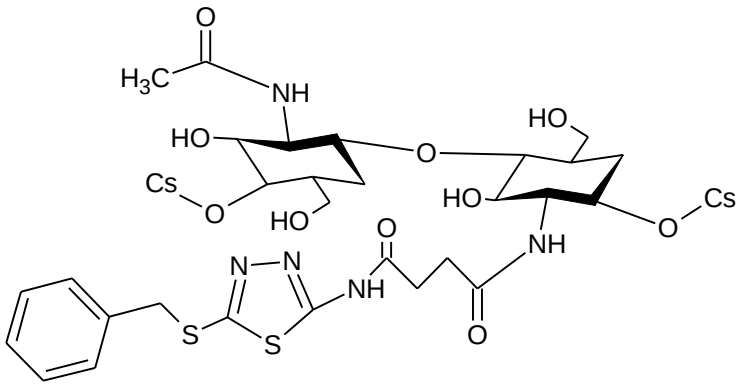


Figure-(19 b)

Cs-BATT= chitosan [5-(benzylthio)-1,3,4-thiadiazole-2 amine
Where Cs =$CH_2Cl_2/(C_2H_5)_3N$

Asrat Ergena et al [16] were made seven 1, 3, and 4-thiadiazole 5- and 2-thioate derivatives by utilizing acetone as a solvent and K2CO3 as a base in a substitution procedure. On Swiss albino mice, the diuretic action of the substances was assessed by measuring urine volume, urinary pH, and urinary Na+, K+, and Cl. The &e result revealed an increase in the excretion of water and electrolytes through the urine. When compared to the negative control and the 5-amino-substituted derivatives, the 5-methyl-substituted derivatives of 1, 3, and 4-thiadiazoles significantly increased the excretion of both water and electrolytes. The 2-thioate group of 5-methyl-1, 3, 4-thiadiazole's para-nitro-substituted benzene ring displayed the maximum diuretic activity, whilst the propanethioate group in the second position and the amine group in the fifth position displayed the lowest diuretic activity. The results of this investigation revealed that all of the substances have diuretic activity, particularly 5-methyl derivatives of 1, 3, and 4-thiadiazoles showed notable diuretic activity.

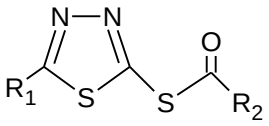
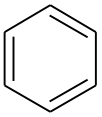
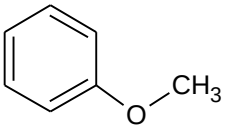
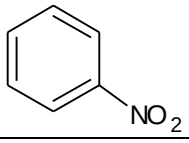
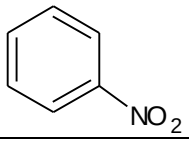
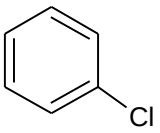
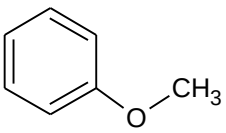


Figure- 20

Where	R_1	R_2
1	CH_3	
2	CH_3	
3	NH_2	
4	CH_3	
5	CH_3	
6	NH_2	CH3-CH2
7	NH_2	

Hakan S. Sayiner et al [17] were prepared a new series 1,3,4-thiadiazole by using Phenylthiosemicarbazide and methoxy cinnamic acid in the presence of phosphorus oxychloride. The 1,3,4-thiodiazole molecules were synthesized, and tests on several Gram-positive and Gram-negative bacterial strains were done to determine their antibacterial activity. The Gram-negative bacteria are made up of Salmonella kentucky, Enterobacter aerogenes, Klebsiella pneumoniae, Escherichia coli, Proteus, and Pseudomonas aeruginosa. The Gram-positive microorganisms under investigation include Listeria monocytogenes, Staphylococcus aureus, Enterococcus durans, Serratia marcescens, Staphylococcus epidermidis, alfa Streptococcus haemolyticus, Staphylococcus hominis, and Enterococcus faecium. Staphylococcus epidermidis and alpha-Streptococcus haemolyticus were both inhibited by molecules 1, 3, and 4. The docking investigation employing the Kinase ThiM from Klebsiella pneumoniae confirmed the experimental findings. The Staphylococcus epidermidis protein was inhibited by every substance that was studied.

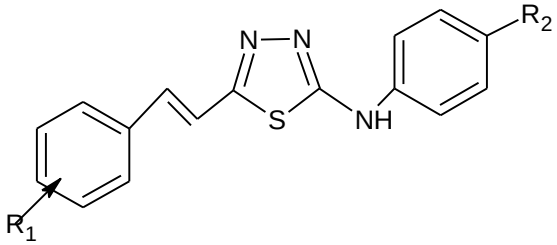


Figure – 21

Where	R_1	R_2
1	5-OCH_3	NO_2
2	6-OCH_3	NO_2
3	5-OCH_3	CH_3
4	6-OCH_3	CH_3

Monica G. Kamel et al [18] were by using N-(4-nitrophenyl)acetohydrazonoyl bromide and 1-[3,5-dimethyl-1-(4-nitrophenyl)-1H-pyrazol-4-yl]ethan-1-one as starting materials, a number of 1,3,4-thiadiazole derivatives were developed and created. 1-[3,5-dimethyl-1-(4-nitrophenyl)-1H-pyrazol-4-yl]ethan-1-one can be converted into 2-[1-[5-methyl-1-(4-nitrophenyl)-1H-pyrazol-4-yl]ethylidene]hydrazine derivatives by treating it with methyl hydrazine carbodithioate or hydrazine carbothioamide. In order to create the desired 1,3,4-thiadiazolyl derivatives, 2-[1-[5-methyl-1-(4-nitrophenyl)-1H-pyrazol-4-yl] ethylidene] hydrazine derivatives were combined with derivatives of hydrazonoyl chloride. In the presence of triethylamine, N-(4-nitrophenyl)acetohydrazonoyl bromide was reacted with 2-[(methylthio)-carbonthioyl]hydrazones to produce the appropriate 1,3,4-thiadiazole derivatives. The newly created compounds were examined for their potential as antibacterial agents. Gram-positive bacteria (B. mycoides) were found to have the most antibacterial action, whilst yeast (C. albicans) and gram-negative bacteria (E. coli) were shown to be the least sensitive to the chemical compounds. Compound 14 demonstrated more antibacterial activity than the positive control, suggesting that this substance may one day be employed to stop the spread of microorganisms.

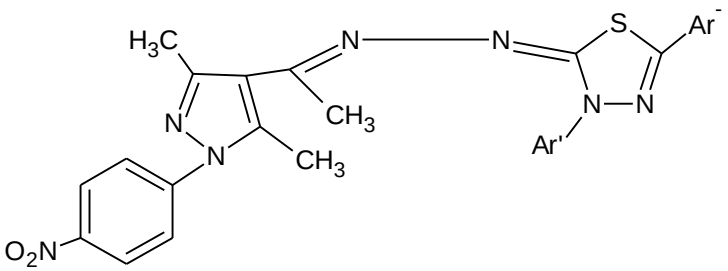


Figure (-22 A)

Where	Ar	Ar’
A	C_6H_5	C_6H_5
B	C_6H_5-CH=CH	C_6H_5
C	2-furyl	4-$NO_2C_6H_4$
D	2-thienyl	4-$NO_2C_6H_4$

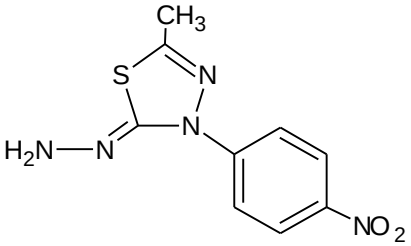


Figure- (22B)

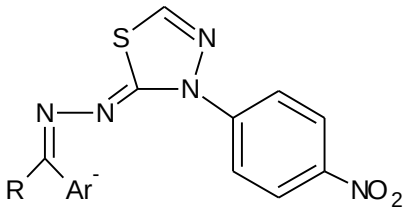


Figure- (22C)

Where	R	Ar
A	CH_3	EtOCO
B	H	2-Thienyl
C	CH_3	2-Thienyl
D	H	2-Furyl
E	CH_3	2-Furyl
F	CH_3	C_6H_5
G	CH_3	2-Pyridinyl
H	H	3-indolyl

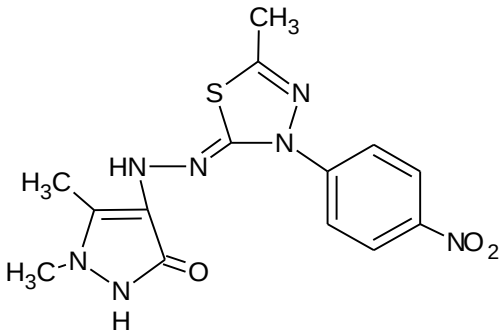


Figure- (22D)

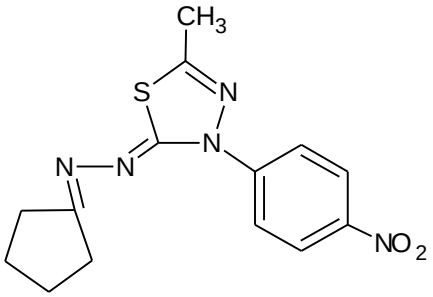


Figure- (22E)

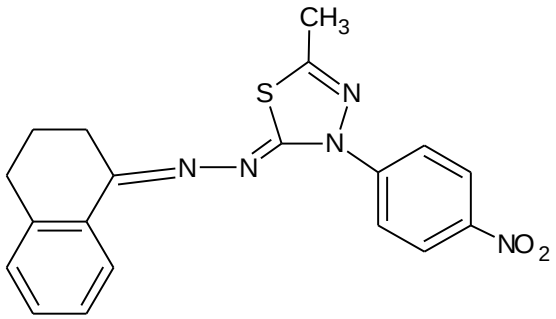


Figure- (22F)

Roaa Salman Baiwn et.al.[19] a number of brand-new 1,3,4 thiadiazole derivatives with imine groups were created.Novel thiadiazole derivatives (e1-6) were examined for their ability to fight against gram-positive strains of bacteria including Staphylococcus aureus and Enterococcus faecalis as well as gram-negative strains like Escherichia coli and Klebsiella pneumonia.Against the majority of studied bacterial species, all thiadiazole compounds exhibit antibacterial activity.The antibacterial activity of the compounds containing electron-donating groups in the para position appeared to be higher.

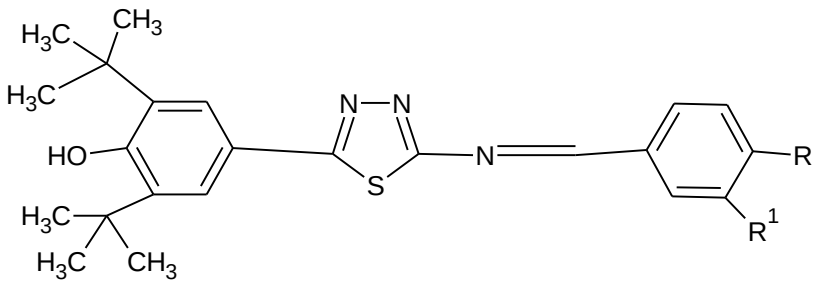


Figure- 23

Where	R	R^1
1	H	H
2	H	OCH_3
3	Cl	H
4	OH	H
5	NO_2	H
6	OCH_3	H

Conclusion

Significant antibacterial activity was found in thiadiazole's heterocyclic derivatives.To develop better agents, additional research is required for a number of compounds that exhibit promise. These could serve as leading compounds in the future. After examining their IR and H-NMR studies, the structures of newly synthesized thiadiazole derivatives were determined. Following the antimicrobial screening, it was determined whether every derivative that had been generated had effective activity against the pathogens tested.

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