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Research Article

# MICROWAVE ASSISTED SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL STUDIES ON 1,3,4-THIADIAZINAN-5-ONE DERIVATIVES

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**ABSTRACT**

Heterocyclic compounds play an important role as the main sources of lead molecules of agrochemicals. The 1,3,4-thiadiazinan-5-one nucleus is one of the most important and well known heterocyclic nuclei, which is a common and integral feature of a variety of natural products and medicinal agents. To find the novel lead compounds with various biological activities a series of thiadiazinan-5-one were rationally designed and synthesized. In this study an effort is made to synthesize 1,3,4-Thiadiazinan-5-one derivatives through the condensation reaction of Aryl aldehydes, substituted hydrazine derivatives and thioacetic acid using green solvent which is an efficient, green and facile three-component reaction. Using this method, 80% yield of thiadiazinan-5-one was obtained, while in conventional method, the yield only exceeded upto 50%. The chemical structures of the synthesized compounds were characterized by considering the data of their elemental analysis as well as their spectral data using, FT-IR, $^{1}$H-NMR, $^{13}$C-NMR and Mass spectra. The compounds are found to possess good biological activity. Especially, compounds were bearing the sulfur and nitrogen atoms showed activity than those bearing the oxygen atom.



## INTRODUCTION

In recent years green chemistry, which is an environmental friendly processes, has become an alternative to traditional synthetic approach which plays an important role in organic synthesis. Due to environmental awareness, the development of environmentally begin organic reactions has become a crucial and demanding research area in modern organic chemical research.[1]

Microwave irradiation can be used as a facile method forthe construction of a wide variety of thiadiazinone derivatives. Multicomponent reactions (MCRs) are a promising and vital field of chemistry because the synthesis of complicated molecules can be achieved in a very fast, efficient and time saving manner without the isolation of any intermediate. These reactions offer a wide range of possibilities for the efficient construction of highly complex molecules in a single step. In recent years, the discovery of MCRs has become an increasingly active area of research yielding novel chemical scaffolds for drug discovery. Thus the development of new multicomponent reaction is a popular area of research in current organic chemistry. [2-4]

1,2,4-triazoles fused with 1,3,4-thiadiazines are found to possess diverse applications in the field of medicine [5,6].

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Triazolo-thiadiazines are reported to show a broad spectrum of pharmacologically important properties like antifungal [7], antibacterial [8], antiviral [9], anthelmintic [10], antitumor [11], anti-inflammatory [12], antituberculor [13], diuretics [14], anticancer [15] and hypoglycemic agents [16].

1,3,4-Thiadiazines constitute an important class of heterocycles, which has attracted much interest because of their wide range of biological activities. Considerable attention has been focused on these compounds because many of these derivatives are important matrix metalloproteinase inhibitors. They show excellent cardio tonic and hypertensive activities. These can be used for treatment of tumors and acquired immune deficiency syndrome (AIDS).[17]

Thiadiazepines are reported for their potent anti-microbial, anti-fungal activity and metalloproteinase inhibition. The literature survey has shown that some fused thiadiazepines exhibit antidepressant, central nervous depressant, bactericidal, fungicidal, anti-cancer activity. Recently 1,4,5-dibenzolo thiadiazepine has been reported to show good neuroprotective properties against neurodegenerative diseases without anticholinergic effects.[18]

In recent years, interest in thiadiazines has increased due to the high biological activity and broadspectrum action of their derivatives [19-20]. Many thiadiazines have been discovered with possible applications in medical practice as sedatives, antianxiety agents, antiasthmatic agents, anticonvulsants, myorelaxants, coronary vasodilators, and spasmolytic.

Synthesis of the 1,3,4-thiadiazine system employing a reaction of α-bromoacetophenone with thiosemicarbazide was first reported by Bose [21]. In continuation of the synthesis of novel heterocyclic compounds and studying their activities, it is interesting to synthesize compounds containing thiadiazine groups in their structure.

## MATERIALS AND METHODS

All the chemicals and the reagents used in the study were synthetic grade purity. Benzaldehyde, phenyl hydrazine, hydrazine hydrate, thioacetic acid and various related chemicals were purchased from scientific chemicals pvt ltd. Solvents used were purified by distillation. All substance prepared for studies were purified by crystallization using appropriate solvents and established procedures. Melting points were determined in open capillary tubes and are uncorrected. The purity of the compounds was confirmed and checked by thin layer chromatography (TLC). All the reactions were monitored using ether: chloroform (4:1 v\v) as a solvent system. The spots were visualized by using iodine vapour. Full form (IR) spectra were recorded on FTIR – 8300 Shimadzu spectrometer. Full form (NMR) spectra were recorded on Jeol- FXQ (90 MHz), Jeol GSX (400 MHz) and DPX 200 (200 MHz). Mass spectra were recorded on Jeol-JMS- DX 303hf.

### *General method for the synthesis of substituted 1.3.4-thiadiazinan-5-one derivatives*

Equal molar of Substituted Aryl aldehydes, substituted hydrazine derivatives and thioacetic acid (1:1:1)is treated on microwave irradiation for 2-3 minutes afforded the formation of the red orange solid mass of thiadiazinan-5-one derivatives of an excellent yield(85-92%). Various substituted thiadiazinan-5-one were prepared and are reported in Fig 1.

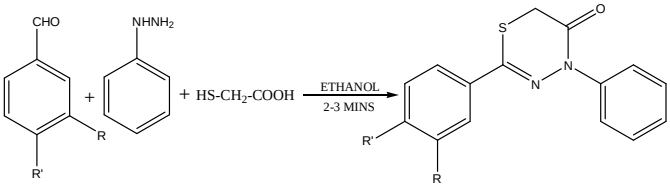


**Fig 1(a)** Synthesis of 2,4-substituted1,3,4-thiadiazinan-5-one (1)

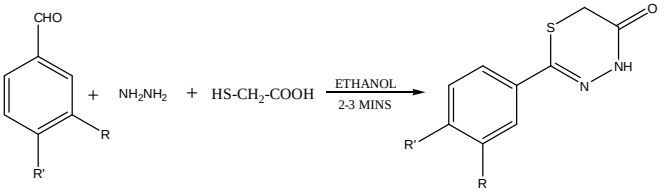


**Fig 1(b)** Synthesis of 2-substituted 1,3,4-thiadiazinan-5-one (2)

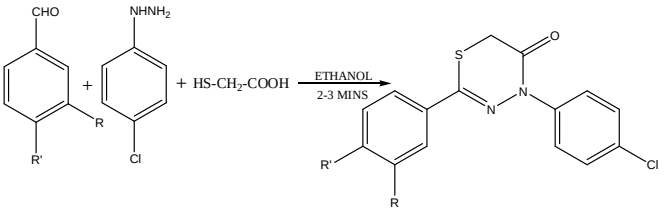


**Fig 1(c)** Synthesis of 2,4-substituted 1,3,4-thiadiazinan-5-one (3)

**Table 1** Physical data of substituted 1.3.4- thiadiazinan-5-one

| Compound | R | R' | Yield % | M.P $^0$C |
|---|---|---|---|---|
| 1a | H | H | 84 | 162 |
| 1b | $NO_2$ | H | 78 | 158 |
| 1c | H | Cl | 80 | 153 |
| 1d | H | OH | 82 | 150 |
| 1e | OMe | OH | 69 | 140 |
| 2a | H | H | 88 | 159 |
| 2b | $NO_2$ | H | 76 | 148 |
| 2c | H | OH | 82 | 160 |
| 2d | OMe | OH | 86 | 144 |
| 3a | H | H | 73 | 156 |
| 3b | H | OH | 79 | 165 |
| 3c | H | Cl | 77 | 156 |
| 3d | $NO_2$ | H | 83 | 162 |
| 3e | H | Cl | 88 | 158 |
| 3f | OMe | OH | 72 | 148 |
| 4a | H | H | 75 | 154 |
| 4b | H | OH | 78 | 163 |
| 4c | OMe | OH | 79 | 168 |
| 4d | H | $NO_2$ | 87 | 153 |
| 4e | H | Cl | 81 | 146 |

## RESULTS AND DISCUSSION

Thiadiazinan-5-one plays a major role in drug industry because of its applications continued in the effort to developed new thiadiazinan-5-one derivatives. Pharmaceutical industries are facing constraints regarding environmental and energy saving aspects. In this study, we used an excellent synthetic method for the synthesis of thiadiazinan-5-one derivatives through microwave technique. Synthesis of the compounds was accomplished through only one step, aryl aldehydes with substituted hydrazine and thioacetic acid in equimolar quantities in the presence of green solvent were treated with microwave irradiation method.

Generally, the reaction that employed aromatic aldehydes bearing electron-withdrawing or electron donating functional groups at different positions produced the corresponding products thiadiazinan-5-one in good to excellent yields. Further research and applications of the reactions are in progress in our laboratories. We believe that this method is highly useful for the synthesis of biologically potent highly substituted thiadiazinan-5-one derivatives. Synthesis of the compounds was carried out under mild reaction condition and the products were obtained in high yields. The resulted compounds were monitored by TLC. The structures of the newly synthesized compounds were deduced from the analysis of their $^1$H and $^{13}$CNMR, IR spectra, and confirmed by elemental analysis.

**2,4-diphenyl-1,3,4-thiadiazinan-5-one 1a**

Benzaldehyde (1g,0.0094m), phenyl hydrazine (1.4g,0.0094m) with thioacetic acid (1:1:1) (0.8g,0.0094m) and added ethanol were treated on microwave irradiation for 2-3 minutes. The formation of the red orange solid mass of thiadiazinan-5one derivatives is confirmatory.
$^1$H-NMR: 2.17 (s, 1H, NH), 2.66-2.80 (s, 2H, $CH_2$), 5.20 (s, 1H, METHINE), 7.12-7.64 (m, Ar-H). $^{13}$C-NMR: 35.80, 76.40, 127.20, 128.48, 129.52, 130.17, 130.50, 134.9, 170.65. IR: 3250, 3085, 1724, 1567, 812 cm$^{-1}$. Mass: M/Z 268.

**2-(3-nitro phenyl)-4-phenyl-1,3,4-thiadiazinan-5-one 1b**

A mixture of 3-nitrobenzaldehyde (1g,0.0066m), phenyl hydrazine (1.03g,0.0066m) with thioacetic acid (0.6g,0.0066m) and added ethanol is treated on microwave

irradiation for 4 minutes. The crude product is obtained. The crude was obtained as reddish brown which confirms the product as thiadiazinan-5-one derivatives.

$^1$H-NMR: 2.18 (s, 1H, NH), 2.38-2.39 (s, 2H, $CH_2$), 4.90 (s, 1H, METHINE), 7.30-7.94 (m, Ar-H). $^{13}$C-NMR: 21.19, 30.46, 76.74, 112.97, 113.21, 119.17, 120.64, 122.52, 129.04, 130.18, 133.87, 135.52, 168.80. IR: 3324, 3066, 1652, 1550, 1527, 750 cm$^{-1}$. Mass: M/Z 314.

**2-(4-chloro phenyl)-4-phenyl-1,3,4-thiadiazinan-5-one 1c**

The microwave irradiation of equal molar 4-chlorobenzaldehyde (1g, 0.0070m), phenyl hydrazine (1.1g,0.0070m) and with thioacetic acid (0.6g,0.0070m) in ethanol is treated for 4minutes. The formation of reddish brown crude confirmed thiadiazinan-5-one derivatives with excellent yields.

$^1$H-NMR: 2.13 (s, 1H, NH), 2.68-3.09 (s, 2H, $CH_2$), 5.12 (s, 1H, METHINE), 7.17-8.00 (m, Ar-H). $^{13}$C-NMR: 21.21, 31.46, 77.75, 113.09, 121.04, 124.89, 127.72, 128.17, 129.20, 131.55, 133.14, 140.12, 170.80. IR: 3320, 3077, 1696, 1546, 810, 728 cm$^{-1}$. Mass: M/Z 303.

**2-(4-hydroxy phenyl)-4-phenyl-1,3,4-thiadiazinan-5-one 1d**

4-hydroxy benzaldehyde (1g, 0.0081m), phenyl hydrazine (1.2g,0.0081m) with Thioacetic acid (1:1:1) (0.8g,0.0081m) and added ethanol were treated on microwave irradiation for 2-3 minutes. The formation of the red orange solid mass of thiadiazinan-5one derivatives is confirmatory.$^1$H-NMR: 2.20 (s, 1H, NH), 3.52-3.61 (s, 2H, $CH_2$), 3.94 (s, 1H, METHINE), 5.60 (s, OH), 6.89-7.52 (m, Ar-H). $^{13}$C-NMR: 21.10, 55.29, 76.75, 114.07, 115.96, 119.90, 121.90, 129.03, 129.47, 130.24, 131.13, 132.33, 156.90, 167.55. IR: 3417, 3100, 1666, 1532, 1370, 717 cm$^{-1}$. Mass: M/Z 285.

**2-(4-hydroxy-3-methoxyphenyl)-4-phenyl-1,3,4-thiadiazinan-5-one 1e**

A mixture of vanillin (1g,0.0066m), phenyl hydrazine (1.03g,0.0066m) with thioacetic acid (0.6g,0.0066m) and added ethanol is treated on microwave irradiation for 4 minutes. The crude product is obtained. The crude was obtained as reddish brown which confirms the product as thiadiazinan-5-one derivatives.

$^1$H-NMR: 2.07 (s, 1H, NH), 3.03-3.13 (s, 2H, $CH_2$), 4.90 (s, 1H, METHINE), 6.95-7.82 (m, Ar-H). $^{13}$C-NMR: 36.80, 76.75, 121.04, 124.80, 127.72, 128.17, 130.50, 131.64, 133.15, 148.70, 165.80. IR: 3328, 3034, 1672, 1548, 1352, 848 cm$^{-1}$. Mass: M/Z 314.

**2-phenyl-1,3,4-thiadiazinan-5-one 2a**

The microwave irradiation of equal molar benzaldehyde (1g,0.0094m),hydrazine (0.9g,0.0094m) and with thioacetic acid (0.8g, 0.0094m) in ethanol is treated for 4minutes. The formation of reddish brown crude confirmed thiadiazinan-5-one derivatives with excellent yields.

$^1$H-NMR: 2.26 (s, 1H, NH), 3.28-3.30 (s, 2H, $CH_2$), 4.39 (s, 1H, METHINE), 7.24-7.98 (m, Ar-H). $^{13}$C-NMR: 44.06, 77.06, 125.75, 126.54, 127.13, 128.54, 129.11, 130.12, 131.19, 132.87, 170.08. IR: 3332, 3085, 1692, 1580, 760 cm$^{-1}$. Mass: M/Z 192.

**2-(3-nitro phenyl)-1,3,4-thiadiazinan-5-one 2b**

3-nitro benzaldehyde (1g, 0.0066m), hydrazine (0.7g,0.0066m) with Thioacetic acid (1:1:1) (0.6g,0.0066m) and added ethanol were treated on microwave irradiation for 2-3 minutes. The formation of the red orange solid mass of thiadiazinan-5-one derivatives is confirmatory. $^1$H-NMR: 2.32 (s, 1H, NH), 3.12-3.25 (s, 2H, $CH_2$), 4.43 (s, 1H, METHINE), 7.07-7.81 (m, Ar-H). $^{13}$C-NMR: 39.20, 79.12, 118.72, 121.02, 123.80, 126.72, 127.17, 131.50, 132.64, 133.14, 148.30, 170.80. IR: 3318, 3026, 1620, 1525, 813 cm$^{-1}$. Mass: M/Z 238.

**2-(4-hydroxy phenyl)-1,3,4-thiadiazinan-5-one 2c**

A mixture of 4-hydroxy benzaldehyde (1g,0.0081m), hydrazine (0.8g,0.0081m) with thioacetic acid (0.7g,0.0081m) and added ethanol is treated on microwave irradiation for 4minutes. The crude product is obtained. The crude was obtained as reddish brown which confirms the product as thiadiazinan-5-one derivatives.

$^1$H-NMR: 2.08 (s, 1H, NH), 3.10-3.23 (s, 2H, $CH_2$), 4.71 (s, 1H, METHINE), 5.5 (s, OH), 6.61-7.56 (m, Ar-H). $^{13}$C-NMR: 38.46, 78.07, 115.80, 121.30, 128.60, 130.20, 131.61, 132.80, 134.70, 135.52, 168.31. IR: 3231, 3020, 1690, 1517, 768 cm$^{-1}$. Mass: M/Z 209.

**2-(4-hydroxy-3-methoxy phenyl)-1,3,4-thiadiazinan-5-one 2d**

The microwave irradiation of equal molar vanillin (1g,0.0064m), hydrazine (0.68g,0.0064m) and with thioacetic acid (0.6g,0.0064m) in ethanol is treated for 4minutes. The formation of reddish brown crude confirmed thiadiazinan-5-one derivatives with excellent yields.$^1$H-NMR: 2.31 (s, 1H, NH), 3.28-3.32 (s, 2H, $CH_2$), 5.17 (s, 1H, METHINE), 5.40 (s, OH) 6.50-7.68 (m, Ar-H). $^{13}$C-NMR: 28.19, 35.20, 55.02, 67.30, 116.80, 122.50, 127.17, 129.30, 132.82, 133.80, 135.02, 144.8, 151.8, 178.10. IR: 3229, 3018, 1712, 1561, 778 cm$^{-1}$. Mass: M/Z 240.

**4-(2,4-dinitro phenyl)-2-phenyl-1,3,4-thiadiazinan-5-one 3a**

Benzaldehyde (1g, 0.0.0094m), 2,4-dinitro phenyl hydrazine (1.7g,0.0094m) with Thioacetic acid (1:1:1) (0.8g, 0.0094m) and added ethanol were treated on microwave irradiation for 2-3 minutes. The formation of the red orange solid mass of thiadiazinan-5-one derivatives is confirmatory.$^1$H-NMR: 2.28 (s, 1H, NH), 3.02-3.15 (s, 2H, $CH_2$), 4.87 (s, 1H, METHINE), 7.01-7.75 (m, Ar-H). $^{13}$C-NMR: 44.06, 77.06, 125.75, 126.54, 127.06, 127.64, 128.28, 129.24, 130.12, 131.19, 172.90. IR: 3326, 3085, 1698, 1562, 1365, 812 cm$^{-1}$. Mass: M/Z 348.

**2-(4-hydroxy phenyl)-4-(2,4-dinitro phenyl)-1,3,4-thiadiazinan-5-one 3b**

A mixture of 4-hydroxy benzaldehyde (1g,0.0081m), 2,4-dinitro phenyl hydrazine (1.5g,0.0081m) with thioacetic acid (0.7g,0.0081m) and added ethanol is treated on microwave irradiation for 4 minutes. The crude product is obtained. The crude was obtained as reddish brown which confirms the product as thiadiazinan-5-one derivatives.$^1$H-NMR: 2.36 (s, 1H, NH), 2.68-2.82 (s, 2H, $CH_2$), 4.37 (s, 1H, METHINE), 6.61-7.28 (m, Ar-H). $^{13}$C-NMR: 31.93, 76.75, 113.02, 121.04, 124.80, 127.70, 128.14, 130.50, 131.64, 133.15, 133.87, 146.62, 165.60. IR: 3390, 3066, 1712, 1571, 742 cm$^{-1}$. Mass: M/Z 365.

**4-(2,4-dinitro phenyl)-2-(3-nitro phenyl)-1,3,4-thiadiazinan-5-one 3c**

3-nirobenzaldehyde (1g, 0.0066m), 2,4-dinitro phenyl hydrazine (1.2g,0.0066m) with Thioacetic acid (1:1:1)

(0.6g,0.0066m) and added ethanol were treated on microwave irradiation for 2-3 minutes. The formation of the red orange solid mass of thiadiazinan-5-one derivatives is confirmatory.$^{1}$H-NMR: 2.02 (s, 1H, NH), 2.82-3.12 (s, 2H, $CH_2$), 4.32 (s, 1H, METHINE), 6.98-7.98 (s, Ar-H). $^{13}$C-NMR: 30.46, 76.75, 121.04, 124.80, 127.60, 128.10, 130.14, 131.52, 133.11, 140.12, 169.10. IR: 3326, 3033, 1692, 1562, 1523, 770 cm$^{-1}$. Mass: M/Z 394.

**2-(4-chlorophenyl)-4-(2,4-dinitro phenyl)-1,3,4-thiadiazinan-5-one 3d**

A mixture of 4-chloro benzaldehyde (1g,0.0071m), 2,4-dinitro phenyl hydrazine (1.3g,0.0071m) with thioacetic acid (0.6g,0.0071m) and added ethanol is treated on microwave irradiation for 4 minutes. The crude product is obtained.The crude was obtained as reddish brown which confirms the product as thiadiazinan-5-one derivatives.$^{1}$H-NMR: 2.21 (s, NH), 3.23-3.28 (s, 2H, $CH_2$), 4.57 (s, METHINE), 7.01-7.51 (m, Ar-H). $^{13}$C-NMR: 32.33, 74.21, 115.96, 117.20, 119.90, 121.81, 127.04, 129.30, 129.47, 130.79, 131.13, 132.33, 152.09, 168.20. IR: 3330, 3073, 1714, 1542, 1502, 832 cm$^{-1}$. Mass: M/Z 383.

**2-(4-hydroxy-3-methoxyphenyl)-4-(2,4-dinitro phenyl)-1,3,4-thiadiazinan-5-one 3e**

The microwave irradiation of equal molar vanillin (1g,0.0064m), 2,4-dinitro phenyl hydrazine (1.2g,0.0064m) with thioacetic acid (0.5g, 0.0064m) in ethanol is treated for 4minutes. The formation of reddish brown crude confirmed thiadiazinan-5-one derivatives with excellent yields.$^{1}$H-NMR: 2.98 (s, 1H, NH), 3.12-3.15 (s, 2H, $CH_2$), 3.63, 4.91(s, 1H, METHINE),5.02 (1H,OH), 6.40-7.38 (m, Ar-H). $^{13}$C-NMR: 34.17, 77.50, 125.25, 126.54, 127.13, 128.54, 129.11, 130.50, 131.64, 132.08, 141.20, 144.12, 167.20. IR: 3378, 3012, 1698, 1532, 1512, 812 cm$^{-1}$. Mass: M/Z 396.

**4-(4-chlorophenyl)-2-phenyl-1,3,4-thiadiazinan-5-one 4a**

Benzaldehyde (1g, 0.0.0094m), 4-chloro phenyl hydrazine (1.3g,0.0094m) with thioacetic acid (0.8g,0.0094m) (1:1:1) and added ethanol were treated on microwave irradiation for 2-3 minutes. The formation of the red orange solid mass of thiadiazinan-5-one derivatives is confirmatory.$^{1}$H-NMR: 2.12 (s, 1H, NH), 3.33-3.41 (s, 2H, $CH_2$), 5.10 (s, 1H, METHINE), 6.88-7.38 (m, Ar-H). $^{13}$C-NMR: 28.09, 75.09, 118.09, 120.03, 123.00, 127.10, 128.08, 129.02, 139.20, 164.70. IR: 3218, 3032, 1665, 1520,917, 760 cm$^{-1}$. Mass: M/Z 291.

**4-(4-chlorophenyl)-2-(4-hydroxyphenyl)-1,3,4-thiadiazinan-5-one 4b**

A mixture of 4-hydroxybenzaldehyde (1g,0.0081m), 4-chloro phenyl hydrazine (1.1g,0.0081m) with thioacetic acid (0.7g,0.0081m) and added ethanol is treated on microwave irradiation for 4 minutes. The crude product is obtained. The crude was obtained as reddish brown which confirms the product as thiadiazinan-5-one derivatives.$^{1}$H-NMR: 2.08 (s, 1H, NH), 3.01-3.12 (s, 2H, $CH_2$), 4.73 (s, 1H, METHINE), 5.20, 6.60-7.58 (m, Ar-H). $^{13}$C-NMR: 35.80, 75.40, 116.89, 123.03, 129.01, 130.10, 131.08, 133.22, 150.20, 164.02. IR: 3317, 3018, 1698, 1515,1021, 797 cm$^{-1}$. Mass: M/Z 308.

**4-(4-chlorophenyl)-2-(4-hydroxy-3-methoxyphenyl)-1,3,4-thiadiazinan-5-one 4c**

The microwave irradiation of equal molar vanillin (1g,0.0064m), 4-chloro phenyl hydrazine (0.9g,0.0064m) with thioacetic acid (0.5g, 0.0064m) in ethanol is treated for 4minutes. The formation of reddish brown crude confirmed thiadiazinan-5-one derivatives with excellent yields.$^{1}$H-NMR: 2.21 (s, 1H, NH), 3.10-3.22 (s, 2H, $CH_2$), 3.73(s, 3H, $OCH_3$), 5.12 (s, 1H, METHINE), 5.09, 6.40-7.52 (m, Ar-H). $^{13}$C-NMR: 40.21, 55.03, 78.04, 119.20, 122.05, 123.01, 125.60, 129.87, 133.08, 142.20, 163.02. IR: 3351, 3081, 1712, 1530,917, 817 cm$^{-1}$. Mass: M/Z 323.

**4-(4-chlorophenyl)-2-(3-nitrophenyl)-1,3,4-thiadiazinan-5-one 4d**

3-nirobenzaldehyde (1g, 0.0.0066m), 4-chloro phenyl hydrazine (0.9g, 0.0066m) with Thioacetic acid (1:1:1) (0.6g,0.0066m) and added ethanol were treated on microwave irradiation for 2-3 minutes. The formation of the red orange solid mass of thiadiazinan-5-one derivatives is confirmatory.$^{1}$H-NMR: 2.08 (s, 1H, NH), 2.87-2.92 (s, 2H, $CH_2$), 4.71 (s, 1H, METHINE), 6.82-7.71 (m, Ar-H). $^{13}$C-NMR: 36.18, 74.40, 119.20, 122.02, 123.08, 127.20, 129.18, 131.62, 132.21, 134.09, 167.30. IR: 3321, 3023, 1712, 1535,930, 812 cm$^{-1}$. Mass: M/Z 337.

**4-(4-chlorophenyl)-2-(4-chloro phenyl)-1,3,4-thiadiazinan-5-one 4e**

A mixture of 2-hydroxy benzaldehyde (1g,0.0081m), 4-chloro phenyl hydrazine (1.1g,0.0081m) with thioacetic acid (0.7g,0.0081m) and added ethanol is treated on microwave irradiation for 4 minutes. The crude product is obtained. The crude was obtained as reddish brown which confirms the product as thiadiazinan-5-one derivatives.$^{1}$H-NMR: 2.14 (s, 1H, NH), 2.98-3.12 (s, 2H, $CH_2$), 4.94 (s, 1H, METHINE), 6.57-7.85 (m, Ar-H). $^{13}$C-NMR: 41.20, 77.07, 124.09, 125.83, 129.21, 128.60, 131.21, 133.02, 134.80, 143.20, 168.12. IR: 3300, 3042, 1694, 1517,1010, 787 cm$^{-1}$. Mass: M/Z 308.

***Antibacterial activity***

All the newly synthesized thiadiazinan-5-one were evaluated for antibacterial activity by disc diffusion technique against gram positive organism *Staphylococcus aureus* and gram negative organism, *Escherichia coli*. Norflaxin (bacteria). 10 µg/µl Concentration of the newly synthesized compounds were prepared using chloroform as the solvent. Disc containing only chloroform was used as negative control. The results of antibacterial activity are listed in Table2.

**Table 2** Antimicrobial activity of Ph and Hy sample against the bacteria clinical isolates by disc diffusion method

| Sample Id | Name of the bacteria | Zone of inhibition (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 5µg/µl | 10µg/µl | 15µg/µl | 20µg/µl | 25µg/µl | 30µg/µl | 10µg/µl Norflaxin |
| Ph | *E.coli* | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.5 |
| Ph | *Proteus vulgaris* | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Ph | *S. aureus* | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Hy | *E.coli* | 0 | 0 | 0 | 0 | 0 | 1.8 | 1.5 |
| Hy | *Proteus vulgaris* | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Hy | *S. aureus* | 0 | 0.1 | 0.3 | 0.4 | 0.5 | 0.7 | 1.5 |

***Antifungal activity***

The newly synthesized thiadiazin-5-one was evaluated for antifungal activity by disc diffusion technique against *Aspergillum Niger*, *Aspergillum fumigatus*, *Klebesiella pneumonia*. 10 µg/µl disc of Fluconazole (Aspergillum Niger, Aspergillum fumigatus); Norfloxin (Klebesiella pneumonia) (fungi) was used as the standard. Disc containing 10 µg/µl concentrations of the newly synthesized compounds as test and 10 µg/µl of chloroform was used as a negative control. The results of antifungal activity are listed in Table3.

**Table 3** Antimicrobial activity of Ph and Hy sample against the fungal clinical isolates by disc diffusion method

| Sample Id | Name of the microorganism | Zone of inhibition (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 5µg/µl | 10µg/µl | 15µg/µl | 20µg/µl | 25µg/µl | 30µg/µl | Standard |
| Ph | Aspergillum niger | 1.5mm | 1.8 | 2 | 2.1 | 2.2 | 2.3 | 1 |
| Hy | Aspergillum niger | 1 | 1.7 | 1.8 | 1.9 | 2 | 2.1 | 1.2 |
| Ph | Aspergillum fumigatus | 0 | 0 | 0 | 0 | 0 | 0.1 | 1.5 |
| Hy | Aspergillum fumigatus | 0 | 0 | 0 | 0 | 0.5 | 1 | 2.5 |
| Ph | Klebesiella pneumonia | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 |
| Hy | Klebesiella pneumonia | 0.1 | 1 | 1.3 | 1.5 | 1.7 | 1.8 | 0.1 |

Standard: Fluconazole (Aspergillum Niger, Aspergillum fumigatus, Norflaxin (Klebesiella pneumonia)

## CONCLUSION

In summary, we have developed title compounds by one pot, three-component synthesis in practical and green synthetic method with good yields. This method uses short reaction time, mild condition with simple work-up procedure and environmentally begins process. Therefore in present work, thiadiazinan-5-one wassynthesized by condensation of substituted aromatic aldehyde and substituted hydrazine in presence of thioacetic acid and ethanol, as a green solvent. All the target compounds were synthesized in only one step with over all yields 85%-90%, respectively. The structures of these novel targets and part of intermediates were confirmed by $^{1}H$, $^{13}C$ NMR and IR spectra.

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