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# Synthesis, Characterization and Antibacterial Evaluation of N-[arylmethylidene]-5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine

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## ABSTRACT

*A series of N-[arylmethylidene]-5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine (**4**) were synthesized by the condensation of different aldehydes with 5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine (**3**) in presence of sodium acetate catalyst. 5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine were inturn prepared by the reaction of aryloxyacetic acid with thiosemicarbazide in presence of phosphorous oxychloride. The newly synthesized compounds where characterized by analytical, IR, NMR and Mass spectral data. The results are in agreement with the assigned structure. Few compounds were screened for their antibacterial activities. Compounds containing chloro and citryl groups showed significant activity comparable with that of the standard drug.*

**Keywords:** Thiadiazole amine, Schiff Bases, Aryloxy acetic acid, Antibacterial activities.

## INTRODUCTION

Schiff bases are some of the most widely used organic compounds [1]. They are used as pigments and dyes, catalysts, intermediates in organic synthesis, and polymer stabilizers. Schiff bases have also been shown to exhibit a broad range of biological activities including antimicrobial [2,3], anti-tubercular [2], antimycobacterial [4] and anti-inflammatory [5]. Various thiadiazole [6] and triazole [7] derivatives are found to be associated with diverse pharmacological activity. Encouraged by this and in continuation of our effort to synthesis biologically active heterocycles [8,9], the synthesis and characterization of some Schiff bases containing thiadiazole moiety along with their antimicrobial activity is described.

## MATERIALS AND METHODS

All Chemicals used were of laboratory grade (Merck and Aldrich) and were purified by distillation or crystallization. The melting points of the newly synthesized compounds were determined in open capillaries and are uncorrected. The IR spectra were recorded on a SHIMADZU FTIR spectrophotometer

in KBr pellet. The $^1$H-NMR spectra were recorded on a Bruker AC 300F (400MHz) NMR spectrometer using DMSO-$d_6$ as solvent and TMS as an internal standard. All chemical shift values are expressed in δ, scale downfield from TMS and proton signals are indicated as s = singlet, d = doublet, t = triplet, m = multiplet. Mass spectra of some selected compounds were recorded on a Jeol JMS-D300 mass spectrometer operating at 70eV. The purity of all compounds was confirmed by TLC.

During the present investigation a series of Schiff Bases (**4**) were synthesized by the condensation of different aldehydes with thiadiazolamines (**3**) in presence of sodium acetate Catalyst. 5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine (**3**) were prepared by the reaction of aryloxyacetic acid (**1**) with thiosemicarbazide (**2**) in presence of phosphorous oxychloride following the method of Sunny Jalhan et al.[10].

**General method for preparation of N-[arylmethylidene]-5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine (4):** An equimolar mixture of 5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine (**3**) and suitable aldehydes were dissolved in ethanol and dimethyl farmamide and sodium acetate was added to it. The contents were refluxed on water bath for 8-10 h. The precipitate formed was filtered, washed with ethanol, dried and recrystallized from ethanol/DMF mixture. The yield, melting point and other characterization data of newly synthesized compounds (**4**) are given in table1**.**

**Table: 1** Characterization data of N-[arylmethylidene]-5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine(4):

| Comp No. | R | $R^1$ | Yield (%) M.P($^0$C) | Molecular formula | Colour & crystal nature | Analysis (%) found (calculated) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | C | N | H |
| **4a** | H | Furfuryl | 77<br>196-198 | $C_{14}H_{11}N_3O_2S$ | Light brown crystals | 57.89<br>(58.93) | 14.93<br>(14.73) | 3.80<br>(3.89) |
| **4b** | H | Citryl | 76<br>183-185 | $C_{19}H_{23}N_3OS$ | Light yellow crystals | 66.75<br>(66.83) | 12.51<br>(12.31) | 6.59<br>(6.79) |
| **4c** | H | Cinnamyl | 68<br>203-205 | $C_{18}H_{15}N_3OS$ | Orange crystals | 67.57<br>(67.27) | 13.57<br>(13.07) | 4.50<br>(4.70) |
| **4d** | H | Piperinyl | 72<br>113-115 | $C_{17}H_{13}N_3O_3S$ | Light brown crystals | 64.37<br>(64.08) | 12.38<br>(12.45) | 4.80<br>(4.48) |
| **4e** | o-$CH_3$ | Furfuryl | 69<br>208-210 | $C_{15}H_{13}N_3O_2S$ | Light yellow cystals | 60.28<br>(60.18) | 14.24<br>(14.04) | 4.08<br>(4.38) |
| **4f** | o-$CH_3$ | Citryl | 52<br>213-215 | $C_{20}H_{25}N_3OS$ | Light yellow cystals | 67.57<br>(67.57) | 11.22<br>(11.82) | 7.29<br>(7.09) |
| **4g** | o-$CH_3$ | Cinnamyl | 63<br>206-208 | $C_{19}H_{17}N_3OS$ | Light yellow cystals | 68.23<br>(68.03) | 12.23<br>(12.53) | 5.21<br>(5.11) |
| **4h** | o-$CH_3$ | Piperinyl | 68<br>201-203 | $C_{19}H_{17}N_3O_3S$ | Light yellow cystals | 64.58<br>(64.94) | 11.89<br>(11.96) | 4.28<br>(4.88) |
| **4i** | p-$CH_3$ | Furfuryl | 65<br>207-209 | $C_{15}H_{13}N_3O_2S$ | White crystals | 60.18<br>(60.18) | 14.44<br>(14.04) | 4.48<br>(4.38) |
| **4j** | p-$CH_3$ | Citryl | 55<br>225-227 | $C_{20}H_{25}N_3OS$ | White crystals | 67.57<br>(67.57) | 11.42<br>(11.82) | 7.49<br>(7.09) |
| **4k** | p-$CH_3$ | Cinnamyl | 68<br>156-158 | $C_{19}H_{17}N_3OS$ | White crystals | 68.53<br>(68.03) | 12.03<br>(12.53) | 5.01<br>(5.11) |
| **4l** | p-$CH_3$ | Piperinyl | 73<br>210-212 | $C_{19}H_{17}N_3O_3S$ | White crystals | 64.18<br>(64.94) | 11.89<br>(11.96) | 4.28<br>(4.88) |
| **4m** | p-Cl | Furfuryl | 71<br>168-170 | $C_{14}H_{10}ClN_3O_2S$ | Yellow crystals | 52.18<br>(52.59) | 14.04<br>(13.14) | 4.38<br>(3.15) |
| **4n** | p-Cl | Citryl | 59<br>183-185 | $C_{19}H_{22}ClN_3OS$ | Yellow crystals | 60.57<br>(60.71) | 11.82<br>(11.18) | 3.09<br>(3.15) |
| **4o** | p-Cl | Cinnamyl | 74<br>164-166 | $C_{18}H_{14}ClN_3OS$ | White crystals | 60.03<br>(60.76) | 10.53<br>(11.81) | 3.11<br>(3.97) |
| **4p** | p-Cl | Piperinyl | 76<br>145-147 | $C_{18}H_{14}ClN_3O_2S$ | White crystals | 58.18<br>(58.14) | 11.89<br>(11.30) | 3.28<br>(3.79) |

Solvent for recrystalization: EtOH + Dioxane

**N-(Furan-2-ylmethylidene)-5-(phenoxymethyl)1,3,4-thiadiazol-2-amine (4a):** IR (KBr) *v* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1675$cm^{-1}$(C=C Str.),1600$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 5.222(s, 2H, -$OCH_2$); 7.252-7.316(m, 5H, ArH); 6.83 (t, 1H Furan -4H); 7.47 (d, 1H Furan -3H); 8.03 (d, 1H Furan -5H) 8.822(s, 1H, N=CH-); MS, m/z; 285($M^+$).

**N-(3,7-Dimethylocta-2,6-dien-1-ylidene)-5-(phenoxymethyl)1,3,4-thiadiazol-2-amine (4b)** IR (KBr) *v* $cm^{-1}$: 3055$cm^{-1}$(Ar-H Str.); 1670$cm^{-1}$(C=C Str.),1610$cm^{-1}$(Ar C=C Str.); 1655$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 1.710(s, 3H, $CH_3$); 1.820(s, 6H, $2CH_3$); 2.001(s, 4H, $2CH_2$); 5.201(s, 1H, $CH_2$); 5.232(s, 2H, -$OCH_2$); 5.271(s, 1H, $CH_2$) 7.012-7.15(m, 5H, ArH); 9.122(s, 1H, N=CH-); MS, m/z; 341($M^+$).

**5-(Phenoxymethyl)-N-(3-phenylprop-2-en-1-ylidene)-1,3,4-thiazol-2-amine (4c):** IR (KBr) *v* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1610$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.), $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 5.232(s, 2H, -$OCH_2$); 7.252-7.316(m, 8H, ArH); 8.222(s, 1H, N=CH-); MS m/z; 321($M^+$).

**N-(1,3-Dihydro-2-benzofuran -5-ylmethylidene)-5-(phenoxymethyl)1,3,4-thiadiazol-2-amine (4d):** IR (KBr) *v* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1600$cm^{-1}$(Ar C=C Str.); 1655$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 5.232(s, 2H, -$OCH_2$); 5.259(s, 2H,-O-$CH_2$-O); 6.948-7.032(m, 4H, piperonal ArH); 7.252-7.316(m, 4H, phenyl protons); 7.322(s, 1H, N=CH-); MS, m/z; 337($M^+$).

**N-(Furan-2-ylmethylidene)-5-[(2-methylphenoxy)methyl]-1,3,4-thiadiazol-2-amine (4e):** IR (KBr) *v* $cm^{-1}$: 3055$cm^{-1}$(Ar-H Str.); 1670$cm^{-1}$(C=C Str.),1605$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 3.308(s, 3H, $CH_3$); 5.213(s, 2H, -$OCH_2$); 7.110-7.210(m, 4H, ArH); 6.86(t, 1H Furan -4H); 7.42 (d, 1H Furan -3H); 8.01 (d, 1H Furan -5H) 8.818(s, 1H, N=CH-); MS, m/z; 299($M^+$).

**N-(3,7-Dimethylocta-2,6-dien-1-ylidene)-5-[(2-methylphenoxy)methyl]-1,3,4-thiadiazol-2-amine (4f) :** IR (KBr) *v* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1675$cm^{-1}$(C=C Str.),1605$cm^{-1}$(Ar C=C Str.); 1655$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 1.712(s, 3H, $CH_3$); 1.810(s, 6H, $2CH_3$); 2.001(s, 4H, $2CH_2$); 5.201(s, 1H, $CH_2$); 5.230(s, 2H, -$OCH_2$); 5.271(s, 1H, $CH_2$); 7.210(m, 4H, ArH); 9.122(s, 1H, N=CH-); MS, m/z; 355 ($M^+$).

**5-(-[(2-Methylphenoxy)methyl]-N-(3-phenylprop-2-en-1-ylidene)-1,3,4-thiazol-2-amine (4g):**IR (KBr) *v* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1605$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.), $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 3.310(s, 3H, $CH_3$); 5.232(s, 2H, -$OCH_2$); 7.252-7.316(m, 9H, ArH); 8.320(s, 1H, N=CH-); MS m/z; 335 ($M^+$).

**N-(1,3-Dihydro-2-benzofuran-5-ylmethylidene)-5-[(2-methylphenoxy)methyl]-1,3,4-thiadiazol-2-amine (4h):** IR (KBr) *v* $cm^{-1}$: 3055$cm^{-1}$(Ar-H Str.); 1600$cm^{-1}$(Ar C=C Str.); 1655$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 3.308(s, 3H, $CH_3$); 5.232(s, 2H, -$OCH_2$); 5.259(s, 2H,-O-$CH_2$-O); 6.948-7.032(m, 4H, piperonal ArH); 7.252-7.316(m, 4H, tolyl protons); 8.304(s, 1H, N=CH-); MS, m/z; 351($M^+$).

**N-(Furan-2-ylmethylidene)-5-[(4-methylphenoxy)methyl]-1,3,4-thiadiazol-2-amine (4i):** IR (KBr) *v* $cm^{-1}$: 3040$cm^{-1}$(Ar-H Str.); 1675$cm^{-1}$(C=C Str.),1610$cm^{-1}$(Ar C=C Str.); 1655$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 3.302(s, 3H, $CH_3$); 5.222(s, 2H, -$OCH_2$); 7.110(d, 2H, ortho protons of p-tolyl); 7.410(d, 2H, meta protons of p-tolyl);6.83 (t, 1H Furan -4H); 7.47 (d, 1H Furan -3H); 8.03 (d, 1H Furan -5H) 8.812(s, 1H, N=CH-); MS, m/z; 299($M^+$).

**N-(3,7-Dimethylocta-2,6-dien-1-ylidene)-5-[(4-methylphenoxy)methyl]-1,3,4-thiadiazol-2-amine (4j)** IR (KBr) *v* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1675$cm^{-1}$(C=C Str.),1605$cm^{-1}$(Ar C=C Str.); 1645$cm^{-1}$(N=CH

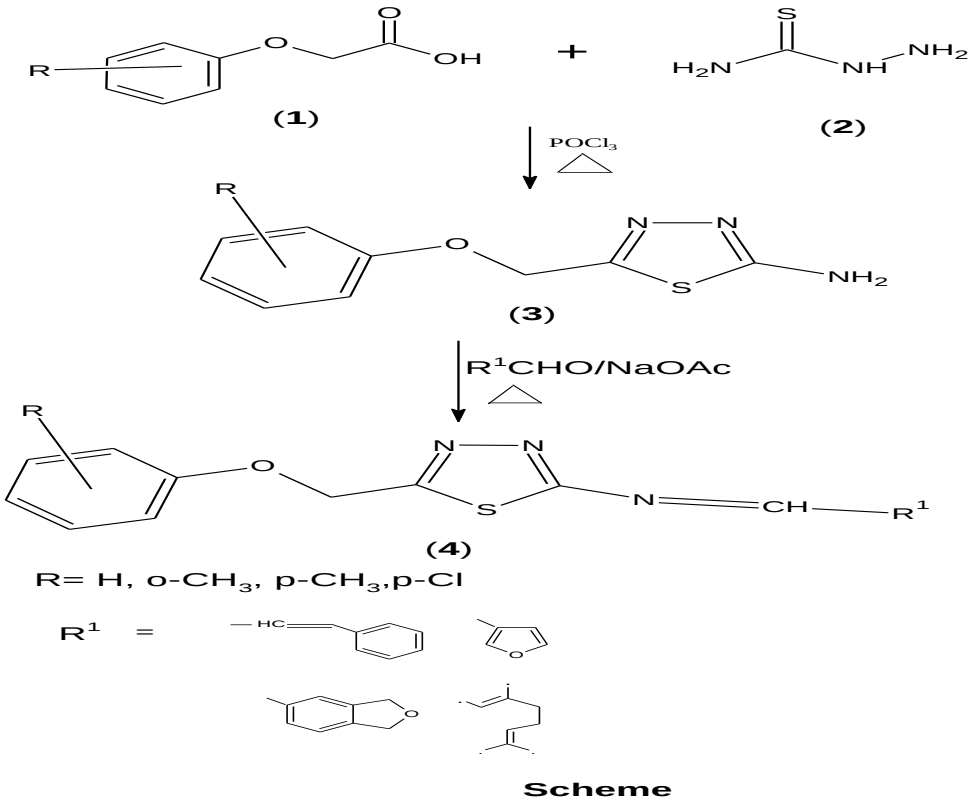
Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 1.712(s, 3H, $CH_3$); 1.810(s, 6H, $2CH_3$); 2.001(s, 4H, $2CH_2$); 2.512(s, 3H, $CH_3$); 5.201(s, 1H, $CH_2$); 5.230(s, 2H, -$OCH_2$); 5.271(s, 1H, $CH_2$); 7.120(d, 2H, ortho protons of p-tolyl); 7.310(d, 2H, meta protons of p-tolyl); 9.102(s, 1H, N=CH-); MS, m/z; 355 ($M^+$).

**5-(-[(4-Methylphenoxy)methyl]-N-(3-phenylprop-2-en-1-ylidene)-1,3,4-thiazol-2-amine (4k):** IR (KBr) *ν* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1600$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.), $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 3.308(s, 3H, $CH_3$); 5.232(s, 2H, -$OCH_2$); 7.121(d, 2H, ortho protons of p-tolyl); 7.216(d, 2H, meta protons of p-tolyl) 7.252-7.316(m, 5H, ArH); 8.322(s, 1H, N=CH-); MS m/z; 335 ($M^+$).

**N-(1,3-Dihydro-2-benzofuran-5-ylmethylidene)-5-[(4-methylphenoxy)methyl]-1,3,4-thiadiazol-2-amine (4l) :** IR (KBr) *ν* $cm^{-1}$: 3055$cm^{-1}$(Ar-H Str.); 1600$cm^{-1}$(Ar C=C Str.); 1655$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 3.308(s, 3H, $CH_3$); 5.232(s, 2H, -$OCH_2$); 5.259(s, 2H,-O-$CH_2$-O); 6.948-7.032(m, 4H, piperonal ArH); 7.252-7.316(m, 4H, tolyl protons); 7.322(s, 1H, N=CH-); MS, m/z; 351($M^+$).

**5-[(4-Chlorophenoxy)methyl]-*N*-[furan-2-ylmethylidene]-1,3,4-thiadiazol-2-amine (4m):** IR (KBr) *ν* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1675$cm^{-1}$(C=C Str.),1610$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 5.213(s, 2H, -$OCH_2$); 7.121(d, 2H, meta protons of p-chlorophenyl); 7.216(d, 2H, ortho protons of chlorophenyl);6.862(t, 1H Furan -4H); 7.422 (d, 1H Furan -3H); 8.11 (d, 1H Furan -5H) 8.819(s, 1H, N=CH-); MS, m/z; 319/321($M^+$).

**5-[(4-Chlorophenoxy)methyl]-*N*-[-3,7-dimethylocta-2,6-dien-1-ylidene]-1,3,4-thiadiazol-2-amine (4n):** IR (KBr) *ν* $cm^{-1}$: 3055$cm^{-1}$(Ar-H Str.); 1675$cm^{-1}$(C=C Str.),1600$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.),): $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 1.712(s, 3H, $CH_3$); 1.810(s, 6H, $2CH_3$); 2.001(s, 4H, $2CH_2$); 5.201(s, 1H, $CH_2$); 5.230(s, 2H, -$OCH_2$); 5.271(s, 1H, $CH_2$); 7.121(d, 2H, meta protons of p-chlorophenyl); 7.216(d, 2H, ortho protons of p-chlorophenyl); 9.112(s, 1H, N=CH-); MS, m/z; 375/377 ($M^+$).




**Scheme**

**5-[(4-Chlorophenoxy)methyl]-*N*-[3-phenylprop-2-en-1-ylidene]-1,3,4-thiadiazol-2-amine (4o) :** IR (KBr) *v* $cm^{-1}$: 3050$cm^{-1}$(Ar-H Str.); 1605$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.), $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 5.232(s, 2H, -$OCH_2$); 7.110-7.210(m, 5H, ArH); 7.252-7.316(m, 4H, chlorophenyl protons); 8.322(s, 1H, N=CH-); MS m/z; 355/357 ($M^+$).

**5-[(4-Chlorophenoxy)methyl]-*N*-[1,3-dihydro-2-benzofuran-5-ylmethylidene]-1,3,4-thiadiazol-2-amine (4p) :** IR (KBr) *v* $cm^{-1}$: 3045$cm^{-1}$(Ar-H Str.); 1610$cm^{-1}$(Ar C=C Str.); 1650$cm^{-1}$(N=CH Str.); $^1$H-NMR (400MHz); Solvent DMSO-$d_6$: δ, 5.232(s, 2H, -$OCH_2$); 5.259(s, 2H,-O-$CH_2$-O); 6.948-7.032(m, 4H, piperonal ArH); 7.252-7.316(m, 4H, chlophenyl); 8.322(s, 1H, N=CH-); MS m/z; 371/373($M^+$).

**Antimicrobial Studies:** The newly synthesized compounds (**4**) were screened for their antibacterial activity in vitro against both Gram-positive and Gram-negative bacteria. *Staphylococcus aureus* (NCIM 2794), *Klebsiella pneumoniae* (NCIM 2719), and *Escherichia coli* (NCIM 2575), were the microorganisms employed.

The modified agar well diffusion method was employed [11]. The bacterial suspensions were inoculated onto nutrient agar media by spread plate technique. Once it is dried, 4mm diameter wells were punched onto the media into which 25, 50 and 75 mL of each compound were added. About 0.5g $mL^{-1}$ of different synthesized compounds were dissolved in DMSO (Dimethyl Sulfoxide), DMSO alone which did not affect microorganisms' growth. Tetracycline was used as standard antibiotic (0.5 mg $mL^{-1}$). The plates were sealed and incubated at $27^0$C for 24 h. Antimicrobial activities were evaluated by measuring zone of inhibition in diameter. The inhibition zone was recorded after the incubation period along the two cardinal diameters and averaged. All the experiments were conducted in quadruplicates.

## RESULTS AND DISCUSSION

The structures of newly synthesized Schiff bases (**4a-p**) were confirmed by elemental analysis, IR, $^1$H-NMR and mass spectral data. The characterization data of Schiff bases (**4a-p**) are given in table-**1.** The results of elemental analysis are in agreement with the theoretical values within the limits of experimental error.

The IR spectra of Schiff bases (**4**) showed strong absorption band around 1600-1620$cm^{-1}$ which is characteristic of hydrazone moiety (-N=CH-) indicates the formation of the product. The evidence for the proposed structure of Schiff base was obtained by recording their $^1$H-NMR spectra. The (-N=CH-) proton observed as a sharp singlet at around 8.5 to 9.0 clearly shows the formation of Schiff bases. Further evidence is obtained by recording the mass spectra. The spectra were in agreement with the respective molecular formula and proposed structure.

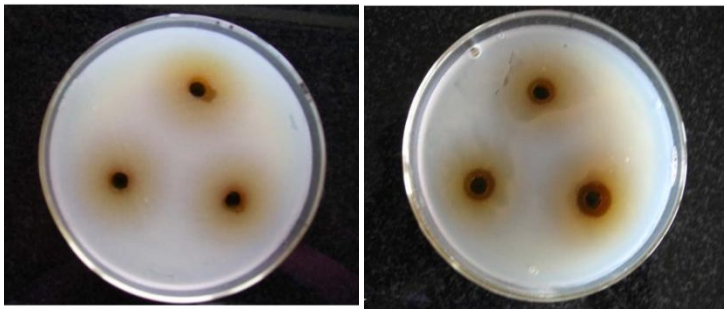
The antibacterial activities of the some selected compounds studied against *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella pneumonia*. The results are shown in table 2. It has shown that compounds **4b**, **4f, 4j**, and **4n** showed maximum inhibition against all the tested microorganisms. (fig.**1**, fig.**2**, fig.**3**). Compounds **4m** and **4p** showed moderate inhibition. Structure activity relationship (SAR) study clearly shows that compounds containing electron withdrawing chloro substituent causes more activity. Also compounds having citryl moiety exhibited maximum activity towards tested microorganisms.

**Table-2:** Antimicrobial activities of synthesized compounds (4)

| Compd No. | Inhibition zone diameter in mm** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***Staphylococcus aureus*** | | | ***Escherichia coli*** | | | ***Klebsiella pneumoniae*** | | |
| | *1 | *2 | *3 | *1 | *2 | *3 | *1 | *2 | *3 |
| **4b** | 8 | 11 | 12 | 6 | 7 | 9 | 4 | 5 | 7 |
| **4e** | 4 | 5 | 6 | 4 | 4 | 5 | 4 | 5 | 6 |
| **4f** | 9 | 12 | 13 | 5 | 8 | 10 | 7 | 9 | 10 |

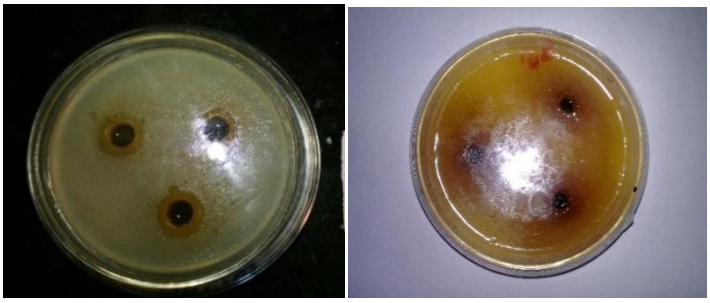
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **4g** | 5 | 5 | 7 | 4 | 4 | 6 | 4 | 5 | 6 |
| **4j** | 8 | 10 | 14 | 5 | 8 | 12 | 5 | 7 | 12 |
| **4m** | 6 | 8 | 10 | 5 | 8 | 10 | 5 | 6 | 8 |
| **4n** | 8 | 10 | 14 | 6 | 8 | 12 | 6 | 8 | 12 |
| **4p** | 6 | 7 | 9 | 5 | 7 | 9 | 5 | 8 | 10 |

*Concentration of extracts**:** 25 mL, 50 mL, 75 mL. ****** Each value in the table was obtained by calculating the average of four experiments



Compound-**4e** Compound-**4n**

**Fig: 1** Effect of synthesized compounds on *Staphylococcus aureus*



Compound-4j Compound-4g

**Fig-2:** Effect of different compounds on *Escherichia coli*

Compound-4n Compound-4p

**Figure-3:** Effect of different synthesized compounds on *Klebsiella pneumoniae*

All the compounds exhibited antimicrobial activity in comparison with the standard antibiotic Tetracycline (20-22 mm zone of inhibition)

## APPLICATIONS

The syntheses of Schiff bases of thiadiazoles that have been reported in the above work gives different approaches to the challenge of preparing these bioactive products and allow the synthesis of many novel chemical derivatives. The area of the synthesis of these rings continues to grow, and the organic chemistry will provide more and better methods for the synthesis of this interesting heterocycles, allowing the discovery of new drug candidates more active, more specific and safer.

## CONCLUSIONS

The new N-[arylmethylidene]-5-(aryloxymethyl)-1,3,4-thiadiazol-2-amine (**4a-p**) were synthesized in good yield. All compounds were characterized and structures were confirmed by analytical and spectral data. The result of antibacterial study shows that most of them showed promising activity comparable with that of the standard drug.

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