Research Article **www.ijcps.com**

International Journal of Chemical and Pharmaceutical Sciences
2017, Mar., Vol. 8 (1)

ISSN: 0976-9390
IJCPS

Synthesis and antimicrobial activity of some novel Quinoxaline 2,3-dione N-mannich base derivatives

[1] Aswartha Umakantha Reddy M*, [2] Sreeramulu J and [3] Satya narayana P.

[1] Department of Chemistry, Rayalaseema University, Kurnool, Andhrapradesh, India.

[2] Department of Chemistry, Srikrishna Devaraya University, Anantapur, Andhrapradesh, India.

[3] Department of Chemistry, Rayalaseema University, Kurnool, Andhrapradesh, India.

* **Corresponding Author:** E-Mail: maukreddy@gmail.com

Received: 19th Feb 2017, Revised and Accepted: 21st Feb 2017

ABSTRACT

Quinoxalines are 1, 4-benzodiazine derivatives which represent an important category among heterocyclic of medical, biological and industrial interests. According to several previous studies, the variation of the substituent on the quinoxaline core, could improve the biological activity, also some quinoxalines fused with N- mannich base moieties have been proved as antimicrobial agents [5a-5y].This study covers the design, synthesis, characterization, and anti microbial activity of a series of quinoxaline2,3-diones N-Mannich bases. Among them, one hybrid compound (**1**), a molecular combination of the potential antimetabolite substituted quinoxaline2,3diones and nitrogen mustard, having potential alkylation capability, was prepared as a Mannich base. Synthesis of mannich base was replacement of formaldehyde in the alkylating group with diethoxymethane for testing for antimicrobial activity. Some of Mannich bases having several amino groups with different pKa values were also synthesized and investigated in terms of antimicrobial activity. Their chemical structures were confirmed by means of their UV, IR, ^{1}H-NMR, ^{13}C-NMR, and MS data. Compounds 5a-5y with secondary amines are reported for the first time in the literature and compounds .Our results are discussed in terms of the significance of these compounds in pharmaceutical us.

Keywords: Quinoxaline-2,3-dione, Antimicrobial activity, Anti-fungal activity, Schiff bases, Mannich base.

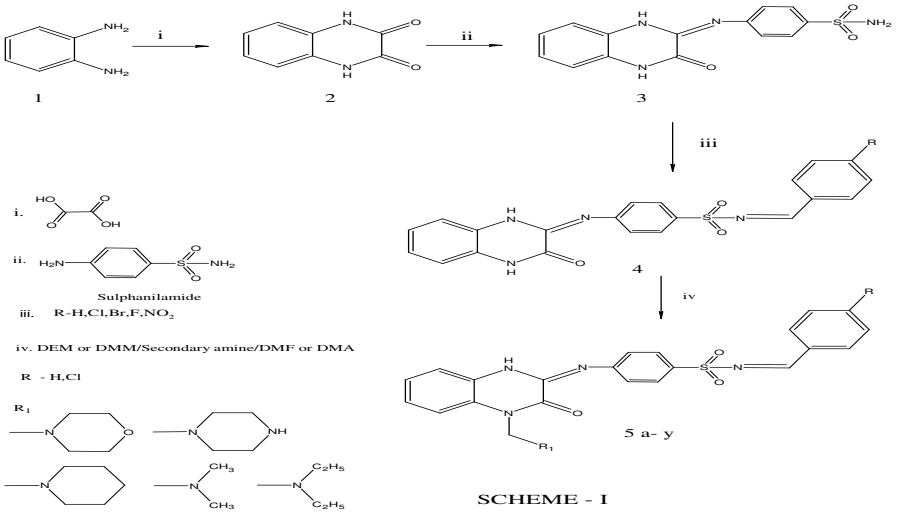
1. INTRODUCTION

Among the various classes of nitrogen-containing heterocyclic compounds, quinoxalines display a broad spectrum of biological activity. It known to possess antibacterial, antifungal, and cyto-toxic activities. Quinoxalines play an important role as a basic skeleton for the design of a number of antibiotics such as Echinomycin, Levomycin and Actinoleucin. The quinoxaline ring is also a constituents of many pharmacologically and biologically active compounds such as insecticides, fungicides, herbicides and anthelmintics.[1] Quinoxaline derivatives[2-4] have been found application in dyes. In view of the literature regarding antimicrobial potency of quinoxaline and its mode of action that prevent DNA-directed RNA synthesis by virtue of binding to cpG site on DNA.

The amino alkylation of aromatic substrates by the Mannich reaction is of considerable importance for the synthesis and modification of biologically active compounds. It also provides a convenient access to many useful synthetic building blocks because the amino group can be easily converted into a variety of other functionalities. It has been generally known that the reaction pathways of the Mannich reaction depend on the nucleophilicity of substrate and the pH of reaction medium

2. EXPERIMENTAL

The following experimental methods were used for the characterization of the synthesized compounds. The melting points (m.p.) were determined using Gallenkamp melting point apparatus. The IR spectra were recorded in KBr discs on a Perkin Elmer 1000 FT-IR spectrophotometer (υmax in cm-1). The 1H NMR



Scheme - 1

and 13C NMR spectra were collected in DMSO-d6 or ($CDCl_3$) using a JEOLECP-400[9]. The chemical shifts were reported as parts per million (d ppm) and the coupling constants (J) are given in Hz, tetra methyl silane (TMS) was used as an internal standard. The mass spectra (m/z, %) were obtained on electron impact using an AEI MS902 mass spectrometer. The purity of all compounds was checked by TLC using glass plates coated with silica gel and dichloromethane/methanol (9:1) as a solvent system. Spectral data (IR, NMR, and mass spectra) confirmed the structures of the synthesized compounds.

2.1. Synthesis of 1, 4-Dihydro-quinoxaline-2, 3-dione

1,4-Dihydro-quinoxaline-2,3-dione (2) was prepared; by heating a solution of oxalic acid dihydrate (0.238 mole, 30 g) in H_2O (100 ml), followed this step by addition of conc.HCl 4.5 ml, then o- phenylendiamine(1) (0.204 mole, 22 g) was added. The reaction was heated under reflux for 20 min, and then was cooled by addition of ice. The solid was filtered, washed with water, purified by recrystallization from ethanol until 1,4-Dihydro-quinoxaline-2,3-dione (1) was isolated as white crystals (32 g, 98%), m.p. >300c°(lit. >300c°, [11]. (δH (DMSO-d6) 11.92 (2H, s, NH), 7.11 (2H, d,3 J 10.28, 5-H & 8-H), 7.08 (2H, d,3 J 10.28, 6-H & 7H); δC (DMSO-d6) 155.72 (C-2 & C-3), 126.14 (C-4a & C-8a), 115.67 (C-5 & C-8), 123.54 (C-7), 123.45 (C6); υmax /cm-1 (KBr) 3445 (N-H), 3049 (C-H, sp2), 1681 (C=O). MS (EI): m/z 162 (M^+., 100%), 134 (M-CO, 54.4%), 134 (M-2CO, 62.8%).

2.2. Synthesis of 4-(3-Oxo-3,4-dihydro-1H-quinoxalin-2-ylideneamino)-benzene-sulfonamide(3)

The compound quinoxaline 2,3-dione (**1**) (27.0 gms,0.25 mol) and sulphanilamide (32.5g, 0.36 mole) was taken in a 500 ml round-bottomed flask fitted with a condenser in oil bath. To this, acetic acid (150ml) was added drop wise during 30 mins and refluxed for 1.0 hr. Completion of the reaction was confirmed by TLC .The mixture was cooled to room temperature. The precipitate formed and washed with water and recrystallized from ethanol.

2.3. Synthesis of arylidene -4-(3-oxo-3, 4dihydroquinoxaline-2(1H)-ylidenemino) benzene sulfonamide[5]

A mixture of Schiff base sulphanilamide (0.01moles) and aromatic aldehyde (0.01 moles) were taken in separate RBF and reflux in ethanol for three hours.[5] The reaction mixture was then poured in to crushed ice and the separated solid wash filtered and re-crystallizes using absolute alcohol.

2.4. Synthesis of imminium ions using diethoxymethane in place of formaldehyde.

Synthesis of Mannich bases: N-Mannich bases (5a-5y) were prepared by condensing equimolar proportions of the appropriate substituted arylidene -4-(3-oxo-3, 4dihydroquinoxaline-2(1H)-ylidenemino) benzene sulfonamide derivatives with secondary amine and diethoxymethane (**Scheme - I**). Structures of the synthesized compounds were established on the basis of physicochemical, elemental analysis are shown in Table -1.

2.5. Synthesis of N-Mannich base reaction

To a solution of Diethoxymethane (27 mg, 0.91 m.mol) and secondary amine in dimethylacetamide (8ml) was added arylidene -4-(3-oxo-3, 4dihydroquinoxaline-2(1H)-ylidenemino) benzene sulfonamide (100 mg, 0.38 mmol) at room temperature. The resulting solution was heated up to 50°C for 60 mins and

cooled to room temperatures and purified as described in the general procedure. All the spectral data of new compounds are in accordance with the assigned structures of compounds.[6-9]

N-benzylidene-4-((E)-4-(morpholinomethyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide (5a)

IR νmax (cm^{-1}) 3372,3056, 2813, 1722, 1670, 1598,1518,1406, 818; 1H-NMR (DMSO) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.67 (t, 4H, J =4.8Hz, CH_2OCH_2), 3.23 (s, 2H, CCH_2 N), 2.47 (t, 4H, J =4.8 Hz, CH_2NCH_2);

13C-NMR ($CDCl_3$) δ 181.4(NCHC),165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons) 108.4(COCCH), 75.2(NCH_2N), 66.4(CH2OCH2), 53.3(CCH2N), 53.2(CH2NCH2) ; MS (m/z): 503.163[M_+].

N-benzylidene-4-((E)-3-oxo-4-(piperidin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide (5b)

IR *vmax* (cm^{-1}) 3372, 3156, 2813, 1732, 1706, 1585,1669,1518,1406, 818,

1H-NMR (DMSO-d6) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.24 (s, 2H, CC*H*$_2$ N),2,46 (t, 4H, *J* =4.8 Hz, CH_2NCH_2), 1.62-1.44 (m, 6H, $CH_2CH_2CH_2CH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC),165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 53.8 (CH_2NCH_2),

53.2 (CCH_2 N), 25.6 ($CH_2CH_2CH_2$) 25.3 ($CH_2CH_2CH_2$); MS (m/z): 501.183 [M_+].

N-benzylidene-4-((E)-3-oxo-4-(piperazin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide (5c)

IR *vmax* (cm^{-1}) 3415,3195, 2935,1705, 1580,1660, 1455, 831; 1H-NMR (DMSO-d6) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 4.02 (s, 2H, CC*H*$_2$ N), 3.67 (t, 2H,*J* =4.8 Hz, CH_2CH_2NH), 3.55 (t, 2H, *J* =4.8 Hz, CH_2CH_2NH), 2.93 (s, 1H, NH), 2.96 (t, 2H, J =4.8Hz, $NHCH_2CH_2$), 2.76 (t, 2H, J =4.8 Hz, $NHCH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 54.3 (CCH_2N), 52.4 (CH_2NC H_2), 51.3 (CH_2NHC H_2); MS (m/z): 502.179[M_+].

N-benzylidene-4-((E)-4-((dimethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino) benzene sulfonamide(5d)

IR *vmax* (cm^{-1}) 3113, 2971,2947, 1730, 1702, 1674, 1585,1450, 818; 1 H-NMR (CDCl3) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.01 (s, 2H, CCH_2 N),2.08 (s, 6H, NCH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC) 165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.3 (CCH_2N), 45.2 (NCH_3); MS (m/z): 461.152 [M_+].

N-benzylidene-4-((E)-4-((diethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylidene-amino) benzene sulfonamide(5e)

IR *vmax* (cm^{-1}) 3430,3320, 2931,1716, 1670,1586, 1446, 1151,820; 1H-NMR (CDCl3) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.36 (s, 2H, CCH_2 N), 2.58 (q, 4H,J =3.2 Hz, NCH_2CH_3), 1.08 (t, 6H, J =3.2 Hz, CH_2CH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.8 (CCH_2N), 46.4 (CH_2CH_3), 10.3 (NCH_2CH_3);

MS (m/z):489.183 [M_+].

N-(4-chlorobenzylidene)-4-((E)-4-(morpholinomethyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5f)

IR νmax (cm^{-1}) 3372,3056, 2813, 1722, 1670, 1598,1518,1406, 818; 1H-NMR (DMSO) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.67 (t, 4H, J =4.8Hz, CH_2OCH_2), 3.23 (s, 2H, CCH_2 N), 2.47 (t, 4H, J =4.8 Hz, CH_2NCH_2);13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),75.2(NCH_2N),66.4(CH_2OCH_2), 53.3(CCH_2N), MS (m/z): 537.124[M_+].

N-(4-chlorobenzylidene)-4-((E)-3-oxo-4-(piperidin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5g)

IR *vmax* (cm^{-1}) 3372, 3156, 2813, 1732, 1706, 1585,1669,1518,1406, 818,

1H-NMR (DMSO-d6) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.24 (s, 2H, CC*H*2 N),2,46 (t, 4H, *J* =4.8 Hz, C*H*2NC*H*2), 1.62-1.44 (m, 6H, $CH_2CH_2CH_2CH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 53.8 (CH_2NCH_2), 53.2 (CCH_2N),25.6 ($CH_2CH_2CH_2$) 25.3 ($CH_2CH_2CH_2$):MS (m/z): 535.144 [M_+].

N-(4-chlorobenzylidene)-4-((E)-3-oxo-4-(piperazin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5h)

IR *vmax* (cm^{-1}) 3415,3195, 2935,1705, 1580,1660, 1455, 831; 1H-NMR (DMSO-d^6) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 4.02 (s, 2H, CCH_2 N), 3.67 (t, 2H,J =4.8 Hz, CH_2CH_2NH), 3.55 (t, 2H, J =4.8 Hz, CH_2CH_2NH), 2.93 (bs, 1H, NH), 2.96 (t, 2H, J =4.8Hz, $NHCH_2CH_2$), 2.76 (t, 2H, J =4.8 Hz, $NHCH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 54.3 (CCH_2N), 52.4 (CH_2NCH_2), 51.3 (CH_2NHCH_2); MS (m/z): 536.140 [M_+].

N-(4-chlorobenzylidene)-4-((E)-4-((dimethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino) benzene sulfonamide(5i)

IR *vmax* (cm^{-1}) 3113, 2971,2947, 1730, 1702, 1674, 1585,1450, 818; 1 H-NMR ($CDCl_3$) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.01 (s, 2H, CCH_2 N),2.08 (s, 6H, NCH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC) 165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.3 (CCH_2N), 45.2 (NCH_3); MS (m/z): 495.113 [M_+].

N-(4-chlorobenzylidene)-4-((E)-4-((diethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylidene-amino) benzene sulfonamide(5j)

IR *vmax* (cm^{-1}) 3430,3320, 2931,1716, 1670,1586, 1446, 1151,820; 1 H-NMR ($CDCl_3$) δ4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.36 (s, 2H, CCH_2 N), 2.58 (q, 4H,J =3.2 Hz, NCH_2CH_3), 1.08 (t, 6H, J =3.2 Hz, CH_2CH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.8 (CCH_2N), 46.4 (CH_2CH_3), 10.3 (NCH_2CH_3);

MS (m/z):523.144 [M_+].

N-(4-flourobenzylidene)-4-((E)-4-(morpholinomethyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5k)

IR νmax (cm^{-1}) 3372,3056, 2813, 1722, 1670, 1598,1518,1406, 818; 1H-NMR (DMSO) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.67 (t, 4H, J =4.8Hz, CH_2OCH_2), 3.23 (s, 2H, CCH_2 N), 2.47 (t, 4H, J =4.8 Hz, CH_2NCH_2); 13C-NMR (CDCl3) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),75.2(NCH_2N),66.4(CH_2OCH_2), 53.3(CCH_2N), MS (m/z): 521.153 [M_+].

N-(4-flourobenzylidene)-4-((E)-3-oxo-4-(piperidin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5l)

IR *vmax* (cm^{-1}) 3372, 3156, 2813, 1732, 1706, 1585,1669,1518,1406, 818; 1H-NMR (DMSO-d6) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.24 (s, 2H, CCH_2 N),2,46 (t, 4H, J =4.8 Hz, CH_2NCH_2), 1.62-1.44 (m, 6H, $CH_2CH_2CH_2CH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 53.8 (CH_2NCH_2), 53.2 (CCH_2 N),25.6 ($CH_2CH_2CH_2$) 25.3 ($CH_2CH_2CH_2$); MS (m/z): 519.174 [M_+].

N-(4-flourobenzylidene)-4-((E)-3-oxo-4-(piperazin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5m)

IR *vmax* (cm^{-1}) 3415,3195, 2935,1705, 1580,1660, 1455, 831; 1H-NMR (DMSO-d6) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 4.02 (s, 2H, CC*H*2 N), 3.67 (t, 2H,*J* =4.8 Hz, CH2C*H*2 NH), 3.55 (t, 2H, *J* =4.8 Hz, CH_2CH_2NH), 2.93 (s, 1H, NH), 2.96 (t, 2H, J =4.8Hz, $NHCH_2CH_2$), 2.76 (t, 2H, J =4.8 Hz, $NHCH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 54.3 (CCH_2N), 52.4 (CH_2NCH_2), 51.3 (CH_2NHCH_2);MS (m/z): 520.169 [M_+].

N-(4-flourobenzylidene)-4-((E)-4-((dimethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino) benzene sulfonamide(5n)

IR *vmax* (cm^{-1}) 3113, 2971,2947, 1730, 1702, 1674, 1585,1450, 818; 1 H-NMR ($CDCl_3$) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.01 (s, 2H, CCH_2N),2.08 (s, 6H, NCH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC) 165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.3 (CCH_2N), 45.2 (NCH_3); MS (m/z): 479.143[M_+].

N-(4-flourobenzylidene)-4-((E)-4-((diethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylidene-amino) benzene sulfonamide(5o)

IR *vmax* (cm^{-1}) 3430,3320, 2931,1716, 1670,1586, 1446, 1151,820; 1 H-NMR ($CDCl_3$) δ4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.36 (s, 2H, CCH_2N), 2.58 (q, 4H,J =3.2 Hz, NCH_2CH_3), 1.08 (t, 6H, J =3.2 Hz, CH_2CH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4

(COCCH),, 54.8 (CCH_2N), 46.4 (CH_2CH_3), 10.3 (NCH_2CH_3); MS (m/z): 507.174 [M_+].

N-(4-bromobenzylidene)-4-((E)-4-(morpholinomethyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5p)

IR νmax (cm^{-1}) 3372,3056, 2813, 1722, 1670, 1598,1518,1406, 818; 1H-NMR (DMSO) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.67 (t, 4H, J =4.8Hz, CH_2OCH_2), 3.23 (s, 2H, CCH_2 N), 2.47 (t, 4H, J =4.8 Hz, CH_2NCH_2); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),75.2(NCH_2N),66.4(CH_2OCH_2), 53.3(CCH_2N), MS (m/z): 581.073[M_+].

N-(4-bromobenzylidene)-4-((E)-3-oxo-4-(piperidin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5q)

IR *vmax* (cm^{-1}) 3372, 3156, 2813, 1732, 1706, 1585,1669,1518,1406, 818, 1H-NMR (DMSO-d6) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.24 (s, 2H, CCH_2N),2,46 (t, 4H, *J* =4.8 Hz, CH_2NCH_2), 1.62-1.44 (m, 6H, $CH_2CH_2CH_2CH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 53.8 (CH_2NCH_2), 53.2 (CCH_2N),25.6 ($CH_2CH_2CH_2$) 25.3 ($CH_2CH_2CH_2$): MS (m/z): 579.094 [M_+].

N-(4-bromobenzylidene)-4-((E)-3-oxo-4-(piperazin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5r)

IR *vmax* (cm^{-1}) 3415,3195, 2935,1705, 1580,1660, 1455, 831; 1H-NMR (DMSO-d6) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 4.02 (s, 2H, CCH_2 N), 3.67 (t, 2H,*J* =4.8 Hz, CH_2CH_2 NH), 3.55 (t, 2H, *J* =4.8 Hz, CH_2CH_2NH), 2.93 (*s*, 1H, N*H*), 2.96 (t, 2H, *J* =4.8Hz, $NHCH_2CH_2$), 2.76 (t, 2H, *J* =4.8 Hz, NHC*H*2CH2); 13C-NMR (CDCl3) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 54.3 (CCH_2N), 52.4 (CH_2NCH_2), 51.3 (CH_2NHCH_2); MS (m/z): 580.089 [M_+].

N-(4-bromobenzylidene)-4-((E)-4-((dimethylamino) methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino) benzene sulfonamide(5s)

IR *vmax* (cm^{-1}) 3113, 2971,2947, 1730, 1702, 1674, 1585,1450, 818; 1 H-NMR ($CDCl_3$) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.01 (s, 2H, CCH_2 N),2.08 (s, 6H, NCH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC) 165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.3 (CCH_2N), 45.2 (NCH_3); MS (m/z): 539.063[M_+].

N-(4-bromobenzylidene)-4-((E)-4-((diethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylidene-amino) benzene sulfonamide(5t)

IR *vmax* (cm^{-1}) 3430,3320, 2931,1716, 1670,1586, 1446, 1151,820; 1 H-NMR ($CDCl_3$) *δ*4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.36 (s, 2H, CCH_2N), 2.58 (q, 4H,*J* =3.2 Hz, NCH_2CH_3), 1.08 (t, 6H, *J* =3.2 Hz, CH_2CH_3); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.8 (CCH_2N), 46.4 (CH_2CH_3), 10.3 (NCH_2CH_3); MS (m/z): 567.094 [M_+].

N-(4-nitrobenzylidene)-4-((E)-4-(morpholinomethyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5u)

IR νmax (cm^{-1}) 3372,3056, 2813, 1722, 1670, 1598,1518,1406, 818; 1H-NMR (DMSO) δ 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.67 (t, 4H, J =4.8Hz, CH_2OCH_2), 3.23 (s, 2H, CCH_2 N), 2.47 (t, 4H, J =4.8 Hz, CH_2NCH_2); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),75.2(NCH_2N),66.4(CH_2OCH_2), 53.3(CCH_2N), MS (m/z): 548.148[M_+].

N-(4-nitrobenzylidene)-4-((E)-3-oxo-4-(piperidin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5v)

IR *vmax* (cm^{-1}) 3372, 3156, 2813, 1732, 1706, 1585,1669,1518,1406, 818; 1H-NMR (DMSO-d6) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.24 (s, 2H, CCH_2N),2,46 (t, 4H, *J* =4.8 Hz, CH_2NCH_2), 1.62-1.44 (m, 6H, $CH_2CH_2CH_2CH_2CH_2$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH), 53.8 (CH_2NCH_2), 53.2 (CCH_2N),25.6 ($CH_2CH_2CH_2$) 25.3 ($CH_2CH_2CH_2$); MS (m/z): 546.169 [M_+].

N-(4-nitrobenzylidene)-4-((E)-3-oxo-4-(piperazin-1-ylmethyl)-3,4-dihydroquinoxalin-2(1H)-ylideneamino)benzenesulfonamide(5w)

IR *vmax* (cm^{-1}) 3415,3195, 2935,1705, 1580,1660, 1455, 831; 1H-NMR (DMSO-d6) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 4.02 (s, 2H, CCH_2 N), 3.67 (t, 2H,*J* =4.8 Hz, CH_2CH_2NH), 3.55 (t, 2H, *J* =4.8 Hz, CH_2CH_2NH), 2.93 (s, 1H, NH), 2.96 (t, 2H, J =4.8Hz, $NHCH_2CH_2$), 2.76 (t, 2H, J =4.8 Hz, $NHCH_2CH_2$);

13C-NMR (CDCl3) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons) 108.4 (COCCH), 54.3 (CCH_2N), 52.4 ($CH_2NC\ H_2$), 51.3 ($CH_2NHC\ H_2$); MS (m/z): 547.164 [M_+].

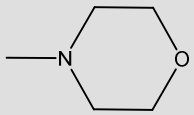
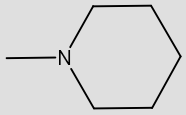
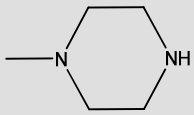
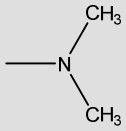
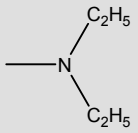
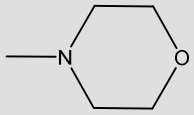
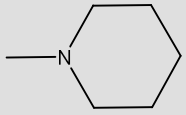
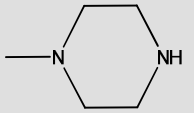
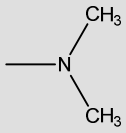
N-(4-nitrobenzylidene)-4-((E)-4-((dimethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylideneamino) benzene sulfonamide(5x)

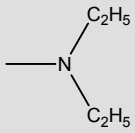
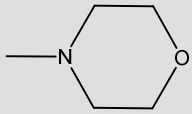
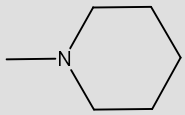
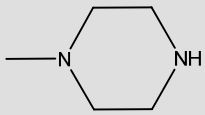
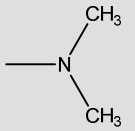
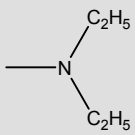
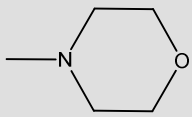
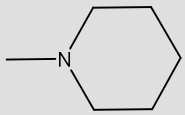
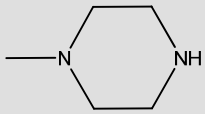
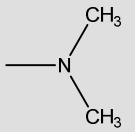
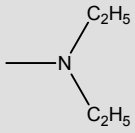
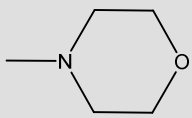
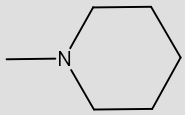
IR *vmax* (cm^{-1}) 3113, 2971,2947, 1730, 1702, 1674, 1585,1450, 818; 1 H-NMR ($CDCl_3$) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.01 (s, 2H, CC*H*$_2$ N),2.08 (s, 6H, NC*H*$_3$);13C-NMR ($CDCl_3$) δ 181.4(NCHC) 165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.3 (CCH_2N), 45.2 (N*C*H$_3$);MS (m/z): 506.137 [M_+].

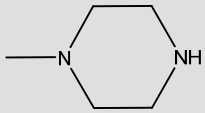
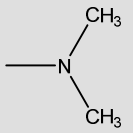
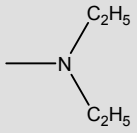
N-**(4-nitrobenzylidene)-4-((E)-4-((diethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylidene-amino) benzene sulfonamide(5y)**

IR *vmax* (cm^{-1}) 3430,3320, 2931,1716, 1670,1586, 1446, 1151,820; 1 H-NMR ($CDCl_3$) *δ* 4.00(s,1H,C-NH-C),7.2-7.8 aromatic protons, 4.03(s,2H,C-CH_2-N), 8.48(s,1H,N=CH-C), 3.36 (s, 2H, CC*H*$_2$ N), 2.58 (q, 4H,*J* =3.2 Hz, NC*H*$_2$CH$_3$), 1.08 (t, 6H, *J* =3.2 Hz, CH_2C*H*$_3$); 13C-NMR ($CDCl_3$) δ 181.4(NCHC)165.0(amide), 162.8.2 (imine), 141.4 (CCHNH), 128.5 (aromatic carbons)108.4 (COCCH),, 54.8 (C*C*H$_2$N), 46.4 (CH_2*C*H$_3$), 10.3 (N*C*H$_2$CH$_3$);MS (m/z):534.169[M_+].

Table-1 ; Physico chemical analysis

S.No	Compounds	M.W	R	R_1	m.p(°C)	yield
5a	$C_{26}H_{25}N_5O_4S$	503.57	H		241-243	80
5b	$C_{27}H_{27}N_5O_3S$	501.60	H		234-235	78
5c	$C_{26}H_{26}N_6O_3S$	502.58	H		243-245	85
5d	$C_{24}H_{23}N_5O_3S$	461.53	H		235-237	89
5e	$C_{26}H_{27}N_5O_3S$	489.58	H		241-243	93
5f	$C_{26}H_{24}ClN_5O_4S$	538.01	Cl		236-238	92
5g	$C_{27}H_{26}ClN_5O_3S$	536.04	Cl		245-246	89
5h	$C_{26}H_{25}ClN_6O_3S$	537.03	Cl		234-235	94
5i	$C_{24}H_{22}ClN_5O_3S$	495.98	Cl		214-215	92

5j	$C_{26}H_{26}ClN_5O_3S$	524.03	Cl		240-241	94
5k	$C_{27}H_{26}FN_5O_3S$	521.56	F		223-224	87
5l	$C_{26}H_{25}FN_6O_3S$	519.59	F		235-236	85
5m	$C_{24}H_{22}FN_5O_3S$	520.57	F		241-242	87
5n	$C_{26}H_{26}FN_5O_3S$	479.52	F		238-239	88
5o	$C_{27}H_{26}FN_5O_3S$	507.58	F		218-219	85
5p	$C_{27}H_{26}BrN_5O_3S$	582.46	Br		223-224	84
5q	$C_{26}H_{25}BrN_6O_3S$	580.49	Br		221-222	83
5r	$C_{24}H_{22}BrN_5O_3S$	581.48	Br		235-236	82
5s	$C_{26}H_{26}BrN_5O_3S$	540.43	Br		228-229	85
5t	$C_{27}H_{26}BrN_5O_3S$	568.48	Br		235-236	87
5u	$C_{27}H_{26}N_6O_5S$	548.57	NO_2		235-236	85
5v	$C_{26}H_{25}N_7O_5S$	546.59	NO_2		246-247	89

5w	$C_{24}H_{22}N_6O_5S$	547.58	NO_2		235-236	85
5x	$C_{26}H_{26}N_6O_5S$	506.53	NO_2		223-224	84
5y	$C_{27}H_{26}N_6O_5S$	534.58	NO_2		236-237	85

3. RESULTS AND DISCUSSION

In the present investigation, we have synthesized a derivative of novel Series of quinoxaline2, 3 Dione derivatives using O-Phenylene diamine & oxalic acid as the starting material. Converted in to quinoxaline 2,3 dione by addition of sulphanilamide is converted into 4-(3-Oxo-3,4-dihydro-1H-quinoxalin-2-ylideneamino)-benzene- sulfonamide. 4-(3-Oxo-3,4-dihydro-1H-quinoxalin-2-ylideneamino)-benzene-sulfonamide by addition of aromatic aldehydes converted in to arylidene -4-(3-oxo-3, 4dihydroquinoxaline-2(1H)-ylidenemino) benzene sulfonamide. arylidene -4-(3-oxo-3, 4dihydroquinoxaline-2(1H)-ylidenemino) benzene sulfonamide converted by the addition of diethoxy methane and dimethyl amine converted into N-(4-benzylidene)-4-((E)-4-((dimethylamino)methyl)-3-oxo-3,4-dihydroquinoxalin-2(1H)-ylidene-amino) benzene sulfonamide. as shown in [Scheme- 1]. The compounds are evaluated in vivo for their anti-inflammatory activity, and anti-fungal activity

3.1. Evaluation of *In- Vitro* anti microbial activity

Bacteria are the most abundant prokaryotic organism that is vital to life of living things. Bacteria are ubiquitous, place a major positive role to the life of living things but some of them cause harmful diseases to the living things (humans. animals, plants, etc.). In nature bacteria can adopt any kind of living conditions than any other groups of organisms. Fungi are eukaryotic organism that is subdivided in to yeasts and moulds. [10] Yeasts are unicellular eukaryotic organisms which have size of large bacteria. The yeast mainly used in the fermentation of wine and beer, and in production of bread. Moulds are long chain cells often seen as fuzzy masses on bread and other acidic food products. Bacteria and fungi are the primary decomposers of organic matters in the world. As like bacteria some of the fungi cause harmful human diseases such as athlete's foot and thrush.

3.2. Preparation of Test Inoculums

Subculture (preparation of seeded broth)

The strains of fungi were inoculated into test tubes containing 10 mL of Sabouraud dextrose broth; bacteria were inoculated into test tubes containing 10 mL of nutrient broth. One loopful of bacteria and fungi were transferred aseptically to each of the test tubes. The test tubes were incubated at 37°C for bacteria and 25°C for fungi for 24 hr. This is referred to as seeded broth. [11]

Standardization of seeded broth (viable count)

1 mL of the 24 hr seeded broth of each strain was diluted with 99 mL of sterile normal saline containing 0.05% TWEEN 80 (8 drops of TWEEN 80 in 1000 mL of normal saline). From that 1 mL was further diluted to 10 mL with sterile normal saline. This was continued till 102, 104, 105 up to 1010 dilution of the seeded broth was obtained.

The dilutions were studied by inoculating 0.2 mL of each dilution on to the nutrient agar at 30 - 40°C. After inoculation it was transferred into Petri dish before it gets solidified. All the Petri dishes were incubated for 24 h at 37°C for bacteria and 25°C for fungi.[12] The number of well-formed colonies on the plates was counted. The seeded broth was then suitably diluted to contain between 107–108 microorganisms/mL. This was designated as working stock, which was used for antimicrobial studies.

Zone of Inhibition of the synthesized compounds

Inoculate the previously prepared working stock appropriate to the assay with requisite quantity of suspension of the micro-organism, to the medium at a temperature between 40oC and 50°C and immediately pour the inoculated medium into petridishes to give a

depth of 3 to 4 mm.The dishes were specially selected with bottoms and were placed on a level surface so as to ensure that there was a uniform thickness. The Petri dishes were allowed to be sterilized at 160 – 170°C for 1 hr, before use as shown in Table 2.

The paper disc (Whatman No.2) was cutdown into small disc (6mm diameter) and sterilized at 180°C for 30 mts in hot air oven impregnated with the test and standard drug separately. The dried discs were placed on the surface of the medium.[13] After all the drugs are added Petri dishes were left standing for 1 to 4 hr at room temperature, as a period of pre-incubation diffusion to minimize the effects of variation in time between the application of different solutions. All the Petri dishes were incubated for 24 hr at the required temperatures, i.e., 37°C for bacteria and 25°C for fungi. After incubation the diameters of the circular inhibition zones were measured and from these values Minimum Inhibitory Concentration and biological activities were calculated.

Table – 2: Zone of inhibition of the synthesized compounds

Compounds	Zone of inhibition (in mm)											
	S.aureus		S.epidermis		B .cerus		K.pneumonia		P.aeroginosa		E .coli	
	100	200	100	200	100	200	100	200	100	200	100	200
5a	25	29	25	28	24	31	20	25	22	29	22	25
5b	20	21	18	25	20	28	18	21	20	23	18	20
5c	21	23	19	22	19	25	17	20	21	24	19	21
5d	19	25	18	24	20	26	18	23	20	26	20	24
5e	23	27	26	31	23	31	19	24	28	33	23	29
5f	21	26	24	32	23	29	19	23	24	32	24	26
5g	25	25	24	24	24	18	18	23	24	26	26	27
5h	20	18	20	20	22	19	18	23	25	24	31	25
5i	21	19	19	19	24	18	19	24	21	24	29	24
5j	22	18	20	20	25	19	17	22	22	20	18	22
5k	24	26	23	23	21	21	19	24	24	19	19	24
5l	23	24	23	23	22	24	20	25	21	20	18	25
5m	25	25	21	22	24	22	20	21	21	23	19	28
5n	24	27	22	24	21	24	18	22	19	23	21	27
5o	21	26	24	21	21	21	17	24	21	21	24	24
5p	21	25	23	18	19	20	18	25	23	24	22	26
5q	24	18	25	17	21	20	17	21	19	21	21	23
5r	19	19	24	21	23	19	19	22	21	20	22	24
5s	24	18	21	20	20	18	17	24	23	20	24	22
5t	26	26	21	19	24	17	18	21	20	19	21	24
5u	24	23	24	20	22	16	19	21	24	18	21	25
5v	21	24	19	24	21	21	18	19	22	17	20	24
5w	22	22	24	21	21	22	20	21	21	21	19	22
5x	20	19	25	20	23	24	21	20	23	20	18	21
5y	19	21	24	19	22	23	19	19	25	21	19	20
Ciprofloxacin 100µg/ml	36		39		39		36		35		37	

3.3. Determination of MIC

Agar Streak Dilution Method

MIC of the synthesized compound was determined by agar streak dilution method. A stock solution of the synthesized compound (100

µg mL-1) in dimethyl formamide was prepared and graded quantities of the test compounds were incorporated in specified quantity of molten sterile agar (nutrient agar for anti-bacterial activity and sabouraud dextrose agar medium for anti-fungal activity). A specified quantity of the medium (40-50°C) containing the compound was poured into a petridish to give a depth of 3-4 mm and allowed to solidify. [14] Suspension of the microorganism were prepared to contain approximately 105 cfu mL-1 and applied to plates with serially diluted compounds in dimethyl formamide to be tested and incubated at 37°C for 24 h and 48 h for bacteria and fungi, respectively. The MIC was considered to be the lowest concentration of the test substance exhibiting no visible growth of bacteria or fungi on the plate as shown in Table 3

Table - 3: Zone of inhibition of the synthesized compounds

Compounds	Zone of inhibition (in mm)			
	Concentration(µg/ml)			
	A.niger		A.fumigatus	
	100	200	100	200
5a	22	29	21	24
5b	21	28	22	23
5c	24	31	24	21
5d	20	28	18	20
5e	28	33	25	31
5f	25	32	27	33
5g	26	28	26	31
5h	27	26	24	30
5i	25	24	18	32
5j	24	25	24	35
5k	26	2	24	34
5l	28	8	25	32
5m	27	28	26	28
5n	25	26	24	27
5o	27	27	25	26
5p	24	24	28	24
5q	25	26	24	25
5r	26	25	24	21
5s	24	24	25	28
5t	28	25	26	21
5u	25	24	22	23
5v	25	25	24	24
5w	26	26	23	22
5x	24	24	21	21
5y	25	28	25	24
Ketoconazole (100µg/ml)	38		37	
Control	-	-	-	-

Table - 4: Minimum Inhibitory Concentration of Synthesized Compound

compounds	Minimum Inhibitory Concentration	
	Concentration(µg/ml)	
	A.niger	A.fumigatus
5a	13.9	15.9
5b	15.3	14.9
5c	14.1	15.4
5d	14.9	15.6
5e	13.2	13.4
5f	13.6	13.2
5g	14.2	13.6
5h	13.8	14.2
5i	14.6	14.3
5j	14.3	14.8
5k	14.5	14.6
5l	14.6	14.5
5m	13.8	14.6
5n	13.4	14.2
5o	13.4	14.3
5p	13.8	14.5
5q	13.6	14.2
5r	13.8	14.2
5s	13.4	13.8
5t	13.5	13.8
5u	13.8	13.6
5v	13.6	13.4
5w	13.9	13.2
5x	14.2	13.4
5y	14.5	12.8
Ketoconazole (100µg/ml)	10.9	11.3

3.4. Antifungal Activity of the Synthesized Compounds

Amphotericin B and Flucytosine are systemically active drugs against fungi they lead to a variety of side effects with renal toxicity and urinary tract infection.[15] Till now more research works are carried out to reduce or complete abolition of these effects. In that way the study of

anti fungal activity of the synthesized compounds were important. They are various methods for preparing anti-fungal activity by 1. Cup plate method/cylinder method 2. Turbidimetry /tube assay method

3.5. Micro organisms

The standard strains were procured from the American Type Culture Collection (ATCC), Rockville, USA, and the pathological strains were procured from the department of microbiology, CEEAL ANALYTICAL LAB, Chennai, India. [16] The anti-microbial activity of the synthesized compounds was screened against the following fungi. *1. Aspergillus niger 2. Aspergillus fumigates*

3.5.1. Evaluation of the In-Vivo antifungal activity

Mice are normally resistant to the oral or intra-peritoneal route of infection with aspergillus species and other fungi. This resistance can be reduced by cortisone treatment which suppresses the immune function; [17] there fore, the mice were inoculated subcutaneously with a single dose of 5 mg of hydrocortisone and intramuscularly with 30,000 units of long-acting penicillin (Benzyl penicillin) two days before intraperitoneally Aspergillus fumigatus spore challenge. 0.1 million spores were found to be sufficient to kill the mice as shown in table 4.

4. CONCLUSION

In the present study attempt was made to synthesize the derivatives of quinoxaline 2,3 dione from Schiff base as intermediate. The compounds are 1a–1y . All the compounds were characterized and confirmed by IR, H NMR, and Mass spectra. Antibacterial activity of synthesized compounds was tested against both gram positive and gram negative bacteria and the standard drug used for the study was ciprofloxacin. The compounds with chloro, nitro substitution in the two derivatives showed better activity when compared to bromo and fluro substitution. The antifungal activity of the synthesized compounds was tested against Aspergillus niger and Aspergillus fumigates and the standard drug used for the study was ketoconazole. The chloro, fluro and bromo substitution in three derivatives showed significant antifungal activity when compared to standard. The nitro groups showed mild activity when compared to standard.

Acknowledgement

The authors wish to express their gratefulness to the Rayalaseema University, Kurnool for providing the necessary facilities to carry out this study in the institution.

5. REFERENCES

1. Dell A. William DH, Morris HR, Smith GA and Freency J. Invitro antitubercular and antimicrobial activities of 1-substituted quinoxaline-2,3(1H,4H)-diones. **Am.Chem.soc** .1975; 97: 2497.
2. Sadana AK and Mirza Omprakash Y. A facile design and efficient synthesis of schiff's bases of tetrazolo[1,5-a] Quinoxalines as potential anti-inflammatory and antimicrobial agents. **Eur.J.Med.Chem** .2003; 28: 533.
3. Francois C, Lemartet O, Delevallee F and Deman De FR. A facile design and efficient synthesis of schiff's bases of tetrazolo[1,5-a] Quinoxalines as potential anti-inflammatory and antimicrobial agents. **Chem.Abstr.** 1984; 101: 9078.
4. Harijyoti Thakuria and Gopal Das. One-pot efficient green synthesis of 1,4-dihydro-quinoxaline-2,3 dione derivatives. **J.Chem.Sci.** 2006; 118: 425-428.
5. Pfister. Sulfaquinoxaline II A new synthesis of 2-aminoquinoxaline. **J. Am Chem. Soc.** 1951; 73: 4955.
6. Joshi KC and Chand P. **Pharmazie,** 1998; 137.
7. Singh BN, Shukla SK and Meera singh, 2007; 19(7): 5013-5018.
8. Maysinger DB. and Mar M. ***Argenieim. Forsch/Drug Res.,*** 1980; 30: 932.
9. Pandeya SN, Sriram D, Nath G and DeEberg E. ***Argenieim. Forsch/Drug Res.,*** 50: 55.
10. Bhargava PN and Chaurasia MR. Synthesis and antimycobacterial activity of a novel series of isonicotinylhydrazide derivatives. **J.Pharm. Sci.** 1969; 58: 896-898.
11. Kharidia SP, Raval BK and Trivedi JJ. Derivatives of 5-diethylaminoacetamino-2-arylimino-3-aryl-4-thiazolidinones. **J.Am.Chem.soc**. 1962; 39: 43.
12. Staudinger H and Liebigs. Synthesis and antimycobacterial activity of a novel series of isonicotinylhydrazide derivatives. **Ann.Chem.,** 1907; 356: 51-123.
13. Akhan S, Mullick P, and Manchanda H. Synthesis and antimicrobial activity of 2,3-disubstituted quinoxalines. **Indian J. of Hetero.Chem.** 2008; 18.
14. Gillespie, Morris Engelmann and Francis spano, Samuel Graff. Synthesis of 2, 3-diphenyl-7-ethoxy-5-nitro quinoxaline. **J.Am Chem.soc.** 1975; 79: 2245-248.
15. Dewar and Maitlis. Synthesis of mononitrated and dinitrated Quinoxalines from nitro

substituted o-phenylenediamine. **J. Am Chem.soc.** 1957; 2518-2521.

16. Figueras. Synthesis of 3-aryl 1,2-dihydroquinoxalines. **J. Org. Chem.** 1966; 31: 803-806-3.
17. Barot and Modi Naik. Synthesis of 2-phenyl,3-benzyl quinoxalines by condensing o-phenylenediamine with chalcone dibromide. **Asian. J. Chem.,** 2001; 22:11-3.
18. Ramalingam P. Invitro antimicrobial and antitubercular activities of 1-substituted quinoxalines-2,3 diones. **Biorganic Med.Chem.** 2010; 20: 406-8.
19. Fischer Michael and Lusiaino. Synthesis and anthelmintic activity of dihydroquinoxaline by cyclising**. J.Pharm.Sci.** 1977; 66-9:1349-1352.
20. Sridevi CH. Synthesis and antihistaminic activity of phenylpyrazolo benzimedazolo quinoxalines derivatives. **E-Journal of Chem.** 2010; 7-1: 234-238.
21. Arvind Kumar. Synthesis and anti-inflammatory and antimicrobial activity of some new hydrazones and quinoxalines derivatives. **Intr. J. of Chem Tech Research**. 2009; 1-4:1177-1181.
22. Pooja Mullick. Antimicrobial and Anti-inflammatory activity of quinoxalines derivatives. **Acta P.Pharmaceutica-Drug Research,** 2009; 66(2):169-172.
23. Umarani Natarajan. Design and efficient synthesis of schiff's bases of tetrazolo quinoxalines as a potent anti-inflammatory and antimicrobial activity. **Der Pharma Chemica** 2010; 2(1):159-167.
24. Panday VK and Gupta VD. A Schiff base undergoes cyclization with phenoxy acetic acid. **Ind. J. of Chem.,** 2005; 44: 158-162.