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Research Article

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Synthesis of Novel 5-Benzilidine (3-Alkyl-2-(4-(1H-Pyrrol-1-yl-Phenylimino)-Thiazolidin-4-Onesand its Antimicrobial Activity

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ABSTRACT

A series of novel 3-methyl-2-4-(1-H-pyrrol-1-yl-phenylimino)–thiazolidin-4-ones and 3-ethyl 2-4-(1-H-pyrrol-1-yl-phenylimino)–thiazolidin-4-ones derivatives were synthesized and were tested for their antibacterial and antifungal activities. These compounds showed moderate in vitro activities against the microorganisms tested.

Keywords: 3-methyl-2-4-(1-H-pyrrol-1-yl-phenylimino); Thiazolidin-4-ones; Antibacterial; Antifungal

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INTRODUCTION

The treatment of infectious disease always remains an important and challenging problem. A search of novel antimicrobial agents is a field of current and growing research interest [1-3]. The thiazolidinone nucleus is also known as "wonder nucleus" because it gives out different derivatives with all different types of biological activities. Thiazolidin-4-one ring also occurs in nature, such as the natural product Actithiazic acid (–)–2-(5- carboxypentyl) - thiazolidin-4-one isolated from streptomyces strains exhibits highly specific *in vitro* activity against Mycobacterium tuberculosis [4]. Thiazolidin-4-one derivatives are known to exhibit diverse bioactivities such as anti-microbial [5], anti-diabetic [6], cycloxygenase inhibitory [7], Ca^{2+} channel blocker [8], PAF antagonist [9], cardio protective [10], anti-ischemic [11], anticancer [12], anti HIV [13], non-peptide thrombin receptor antagonist [14] and tumor necrosis factor-α antagonist activities [15].

Pyrrol derivatives are known to possess antimicrobial activities. It was reported in literature that PNU171933 is a potent antibacterial compound which have substituted 1-H-pyrrol-1-yl-phenylimino moiety [16]. One more derivative of pyrrol BM212 i.e. 5-diaryl-2-methyl-3-(4-methylpiperazin-1-yl)-methyl-pyrrol is reported as a potent antimicrobial agent [17] (Figure 1). In continuation of our interest in thiazolidin- 4-one derivatives, to achieve the excellent antimicrobial activity, we reported that 5-benzylidene derivatives of 3-methyl-2-4-(1-H-pyrrol-1-yl-phenylimino)–thiazolidin-4-ones would possess potential antimicrobial properties.

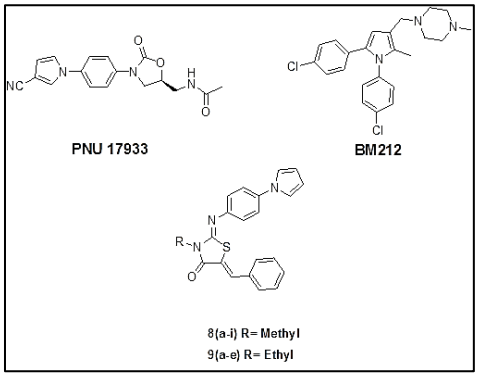


Figure 1: Derivative of pyrrol BM212

EXPERIMENTAL SECTION

Progress of reaction was monitored by silica gel-G coated TLC plates in Ethyl acetate: Hexane system (5:5). The spot was visualized by exposing dry plate in iodine vapor's. Melting points were determined by the melting point determination apparatus (TEMPO) in open capillary tubes and are uncorrected. Infrared spectra were recorded on Schimadzu 8201 PC, FTIR spectrophotometer (max in cm^{-1}) spectrophotomer in KBr phase. Proton NMR spectra were recorded on Bruker Advance II 400&200 NMR Ultra Shield Spectrometer using DMSO-d_6/$CDCl_3$ as a solvent and tetramethyl silane as internal standard. Chemical shift value is expressed in delta parts per million (ppm).

General Procedure for Preparation 3-Alkyl-2-4-(1-H-pyrrol-1-yl-phenylimino)–thiazolidin-4-ones (6,7))

To a solution of 1-(4-(1H-pyrrol-1-yl)phenyl)-3-alkylylthiourea (4,5) (2.5 gm, 0.010 mole) in absolute ethanol (30 ml) ethylbromoacetate (2.25 gm, 0.013 mole) and diisopropylethylamine (2.1 gm, 0.015) was added and reaction mixture was heated at 80-90°C for 6 hour. After completion of reaction (TLC check 1:1 Hexane: ethylaetate) reaction mixture was cooled to room temperature and ethanol was removed under vacuo. Water (30 ml) was added to the residue, stirred for 15 min and extracted with ethyl acetate (20 ml × 3). The organic layer seperated and evaporated to get sticky red solid. It was then recrystalised using absolute ethanol to give 2.25 gm (76%) of (3-alkyl -2-(4-(1H- pyrrol -1-yl-phenylimino) thiazolidin-4-ones (6,7)) as off white solid.

General Procedure for Preparation 5-benzilidine (3-alkyl-2-(4-(1H-pyrrol-1-yl-phenylimino)-thiazolidin-4-ones (8a-i) & (9a-e)

A mixture (3-akyll-2-(4-(1H- pyrrol -1-yl-phenylimino) thiazolidin-4-ones (6,7) (1 mmol), aldehyde (1.2 mmol) and diisopropylethyl amine (1.6 mmol) in absolute ethanol was refluxed at 90-95°C for 10 hr. After completion of the reaction (TLC check), ethanol was evaporated, cold water was added to residue and extracted with ethyl acetate (3× 20 ml). The combined organic layers were washed with brine, dried over anhydrous sodium sulfate, filtered, and concentrated under reduced pressure. The crude product was recrystalised using absolute ethanol to get title compound in good yields (8a-i).

Spectroscopic Data of Representative Compounds

3-methyl -2-(4-(1H- pyrrol -1-yl-phenylimino) thiazolidin-4-ones (6):

White solid; MP: 132-134°C. ^{1}H NMR (CDCl3, 400 MHz)*:* δ 3.32 (s, 3H), 3.83 (s, 2H), 6.34 (t, J= 2Hz, 2H), 7.01-7.04 (m, 2H), 7.07 (t, J = 2Hz, 2H), 7.35- 7.39 (m, 2H). MS (m/z): 272.2 [M^+ +1]; IR (KBr): 1731, 1634, 1514, 1356 cm^{-1}.

(3-ethyl -2-(4-(1H- pyrrol -1-yl-phenylimino) thiazolidin-4-ones (7):

White solid; MP: 144-146°C. ^{1}H NMR (DMSO-d6, 400 MHz): δ 1.30 (t, J = 7.0 Hz, 3H), 3.82 (s, 3H), 3.91 (q, J = 7.0 Hz, 2H), 6.34 (t, J = 2 Hz, 2H), 7.05 (d, J = 8.6 Hz, 2H), 7.05 (t, J = 2Hz, 2H), 7.39 (d, J= 8.6 Hz, 2H). MS (m/z): 286.7 [M^+ +1]; IR (KBr): 1702, 1637, 1600 cm^{-1}.

(2Z,5Z)-5-(benzilidine)-2-(4-(1H-pyrrol-1-yl)phenylimino)-3-methyl-thiazo-lidin-4-one (8a):

Yellow solid; MP: 154-156°C. ^{1}H NMR (CDCl3, 400 MHz): δ 3.44 (s, 3H), 6.36-6.39 (bs, 2H), 7.01-7.04 (m, 4H), 7.31-7.44 (m, 7H), 7.79 (s, 1H). MS (m/z): 360.5 [M^++1]. ; IR (KBr): 3040, 2362, 1712, 1630, 1518, 1414, 1152, 1035 cm^{-1}.

(2Z, 5Z)-5-(4-hydroxybenzilidine)-2-(4-(1H-pyrrol-1-yl) phenylimino)-3-methyl-thiazolidin-4-one (8b):
Yellow solid; MP: 148-150°C. ^{1}H NMR (CDCl3, 400 MHz) : δ 3.45 (s, 3H), 6.36 (t, J = 2Hz,1H), 6.77-6.79 (J = 8.2 Hz, 2H), 7.07-7.11 (m, 4H), 7.11 (t, J = 2Hz,1H), 7.33 (d, J = 8.2Hz, 2H), 7.41(d, J = 2Hz, 2H), 7.71(s, 1H).
MS (m/z): 376.5 [M^+ +1]. ; IR (KBr): 3228, 2934, 1705, 1624, 1589, 1514, 1366, 1125 cm^{-1}.

(2Z,5Z)-5-(4-nitrobenzilidine)-2-(4-(1H-pyrrol-1-yl) phenylimino)-3-methyl-thiazolidin-4-one (8c):
Yellow solid; MP: 167-169°C. ^{1}H NMR (CDCl3, 400 MHz) : δ 3.44 (s, 3H), 6.35 (t, J = 2Hz, 2H), 7.03-7.05 (m, 1H), 7.06-7.08 (m, 1H), 7.12 (t, J= 2Hz, 2H), 7.37-7.41 (m, 2H), 7.43-7.47 (m, 2H) 7.60-7.62 (m, 1H), 7.80 (s, 1H), 8.25- 8.28 (d, 1H). MS (m/z): 405.5 [M^+ +1]. ; IR (KBr): 1731, 1634, 1514, 1338, 1124 cm^{-1}.

(2Z,5Z)-2-(4-(1H-pyrrol-1-yl) phenylimino)-5-(4-bromo-benzilidene)-3-methyl-thiazolidin-4-one (8d):
Yellow solid; MP: 175-177°C. ^{1}H NMR (CDCl3, 400 MHz): δ 3.47 (s, 3H), 6.36 (t, J = 2.0 Hz, 2H), 7.06-7.08 (m, 2H), 7.10 (t, J = 2.0 Hz, 2H), 7.30-7.32 (d, 2H), 7.41-7.43 (d, 2H), 7.52- 7.54 (d, 2H), 7.69 (s, 1H). MS (m/z): 439.2 [M^+ +1].; IR (KBr): 3448, 1716, 1632, 1560, 1415, 1359, 1212 cm^{-1}.

(2Z,5Z)-5-(3, 4-diflourobenzilidine)-2-(4-(1H-pyrrol-1-yl) phenylimino)-3-methylthiazolidin-4-one (8e):
Yellow solid; MP: 171-173°C. ^{1}HNMR (CDCl3, 400 MHz): δ 3.45 (s, 3H), 6.36 (t, J = 2.4Hz, 2H), 6.92 (bs, 1H), 7.06- 7.09 (m, 3H), 7.11 (t, J = 2.4Hz, 2H), 7.12- 7.17 (m, 1H), 7.41- 7.44 (m, 2H), 7.65(s, 1H). MS (m/z): 396.5 [M^+ +1].; IR (KBr): 2944, 1698, 1632, 1598, 1512, 1363, 1110 cm^{-1}.

(2Z,5Z)-5-(2,4-dimethoxybenzylidene)-2-(4-(1H-pyrrol-1-yl) phenylimino)-3-methylthiazolidin-4-one (8f):
Yellow solid; M.P.: 137-139°C. ^{1}HNMR (CDCl3, 400 MHz) : δ 3.43 (s, 3H), 3.80 (s, 6H) ,6.34 (t, J = 2Hz, 2H), 6.50 (d, J = 8.8 Hz, 2H), 7.04- 7.06 (d, J = 8.8Hz, 2H), 7.08 (t, J = 2Hz, 2H), 7.34- 7.37 (d, J = 8.8 Hz, 2H), 8.04 (s, 1H). MS (m/z): 420.5 [M^+ +1].; IR (KBr): 2938, 1701, 1629, 1597, 1514, 1330, 1258, 1129, 1022 cm^{-1}.

(2Z,5Z)-5-(4-methoxybenzilidine)-2-(4-(1H-pyrrol-1-yl)phenylimino)-3-methyl thiazolidin-4-one(8h):
Yellow solid; MP: 146-148°C. ^{1}HNMR (CDCl3, 400 MHz): δ 3.46 (s, 3H), 3.82 (s, 3H), 6.36 (t, J = 2Hz, 2H), 6.92- 6.94(d, J = 8.8 Hz, 2H) 7.07- 7.09 (d, J = 8.8 Hz, 2H), 7.11(t, J = 2Hz, 2H), 7.40-7.43 (m, 4H), 7.73 (s, 1H).
MS (m/z): 390.5 [M^+ +1]; IR (KBr): 1704, 1642, 1566, 1440, 1258, 1181 cm^{-1}.

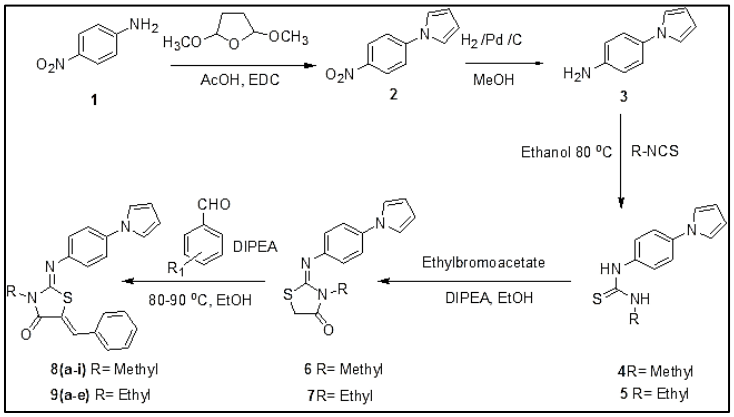
(2Z,5Z)-5-(3-indolidine)-2-(4-(1H-pyrrol-1-yl)phenylimino)-3-methyl-thiazo-lidin-4-one (8i):
Yellow solid; MP: 151-153°C. ^{1}H NMR (CDCl3, 400 MHz): δ 3.43 (s, 3H), 6.28 (t, 2H), 7.15-7.18 (m, 4H), 7.26-7.28 (m, 3H), 7.39-7.41 (m, 3H), 7.82- 7.83 (d, 1H), 8.17 (s, 1H), 8.58 (bs, 1H). MS (m/z): 420.5 [M^+ +1]; IR (KBr): 3309, 1686, 1634, 1601, 1515, 1417, 1372, 1155 cm^{-1}.

(2Z,5Z)-5-(furylidine)-2-(4-(1H-pyrrol-1-yl)phenylimino)-3-methylthiazolidin-4-one (8j):
Yellow solid; MP: 117-119°C. 1H NMR (CDCl3, 400 MHz): δ 3.46 (s, 3H), 6.37 (t, J = 2Hz, 2H), 6.51- 6.52 (m, 1H), 7.08-7.10 (m, 2H), 7.12 (t, J = 2Hz, 2H), 7.41- 7.44 (d, J = 2Hz, 2H), 7.54 (s, 1H), 7.58 (d, 1H). MS (m/z): 350.5 [M^+ +1]. ; IR (KBr): 3040, 2362, 1712, 1630, 1518, 1414, 1152, 1035 cm^{-1}.

(2Z,5Z)-5-(4-phenylbenzilidine)-2-(4-(1H-pyrrol-1-yl)phenylimino)-3-methyl-thiazolidin-4-one (8k):
Yellow solid; MP: 205-207°C. ^{1}HNMR (CDCl3, 400MHz): δ 3.45 (s, 3H), 6.39 (t, 2H), 7.10-7.16 (m, 4H), 7.38-7.45 (m, 5H), 7.47-7.50 (m, 4H), 7.61-7.63 (d, 2H), 7.80 (s, 1H). MS (m/z): 436.5 [M^+ +1].; IR (KBr): 1702, 1637, 1513, 1366, 1207, 1101 cm^{-1}.

Antimicobacterial Activity
The synthesized compounds were evaluated for their *in vitro* antimicrobial activity against Gram-positive bacteria: *Staphylococous aureus* (NCLM- 2602), *Bacillus subtillis* (NCLM- 2458), Gram negative *Escherichiacoli* (NCLM- 2809) and fungal strain *Aspergillus niger (*NCLM- 617), *Rhizopus otyzae* (NCLM- 1299). The antimicrobial activity of the compuond was assayed by antimicrobial susceptibilty test [18-20]. 100 µl of 24 h growth of each microorganism was spread on the surface of nutrient agar for bacteria (Mac Conkey's agar for *Escherichia coli*) and potato dextrose agar for fungi, in Petri plates. 50 µl compound at the concentration of 100 µg/ml in DMSO saturated on discs of 6mm diameter were kept on agar surface. The plates refrigerated for two hours to allow prediffusion of the compound from the discs in to the seeded agar layer and then incubated at 37°C for 24 h for bacteria and 28°C for 48 h for fungi. Zones of inhibition were measured in mm and size of the disc was subtracted from the zone size to measured final activity. DMSO saturated discs served as

solvent control or negative control and Streptomycin saturated discs (30 µg) for bacteria and Nystatin (30 µg) for fungi as a reference or positive control.



Scheme 1: (5-benzilidine (3-alkyl-2-(4-(1H-pyrrol-1-yl-phenylimino)-thiazolidin-4-ones

RESULTS AND DISCUSSION

The synthesis starts with reaction of 4-nitroaniline 1 with cis-2,5-dimethoxy tetrahydrofuran in glacial acetic acid and 1,2-dichloroethane at 80°C afforded 1-(4-nitrophenyl)-1H-pyrrol **2**. The product was confirmed by mass spectroscopy, it shows m/z at 189.2 for [M+ +1] (Scheme 1). The 1-(4-nitrophenyl)-1H-pyrrol 2 on catalytic reduction by using H2/Pd/C in methanol afforded 4-(1H-pyrrol) benzamine 3. The resulting product showed the m/z at 159.1 [M+ +1] which confirms the formation of 4-(1H-pyrrol)-benzamine 3. The 4-(1H-pyrrol)-benzamine 3 was further treated with methylisothiocynate and ethylisothiocynate separately in ethanol at 80°C to afford the 1-(4-(1H-pyrrol-1-yl)phenyl)-3-methylthiourea 4 and 1-(4-(1H-pyrrol-1-yl)phenyl)-3-ethyl- thiourea 5 respectively. The formation of product was confirmed by the mass spectroscopy it shows m/z at 232.1 for [M+ +1] for 4 and m/z at 246.1 for [M+ +1] for 5. Both the 1-(4-(1H-pyrrol-1-yl)phenyl)-3-alkylthiourea 4 and 5 were treated with ethylbromoacetate in presence of diisopropylethylamine in refluxing ethanol respectively gave the key intermediate 3-methyl-2-(4-(1H-pyrrol-1-yl)-phenyl imino)-thiazolidin-4-ones 6 and (3-ethyl-2-(4-(1H-pyrrol-1-yl)-phenylimino)-thiazolidin-4-ones **7** with 72% and 76% yield respectively. IR spectrum of the compound 6 showed the strong absorption bands at 1634 cm^{-1} (C=O) and 1731 cm-1 (C=N) confirms the presence of C=O and C=N functional groups respectively. The 1H NMR spectrum of compound 6 showed a singlet at 3.32 ppm for three protons was due to the methyl protons of N-methyl group. A singlet at 3.83 ppm integrating for two protons was due to the methylene group attached to S-atom of iminothiazolidinone ring. The protons of pyrrol showed two triplets at 6.34 and 7.07 each integrating for two protons with a coupling constant of 2.0 Hz. Remaining aromatic protons showed two multiplates between 7.01- 7.08 and 7.35- 7.39 ppm each integrating for two protons. The mass spectrum showed a peak at m/z = 272.2 (M+ +1) was in accordance with the molecular formula $C_{14}H_{13}N_3OS$.

Similarily In the IR spectrum of the compound **7** the strong absorption bands at 1637 cm^{-1} (C=O) and 1702 cm^{-1} (C=N) confirms the presence of C=O and C=N functional groups respectively. The 1H NMR spectrum of compound **7** showed a triplet at 1.30 ppm with a coupling constant of 7.0 Hz integrating for three protons was due to the methyl protons of N-ethyl group. A singlet at 3.82 ppm integrating for two protons was due to the protons of methylene group attached to S-atom of iminothiazolidinone ring. The methylene protons of N-ethyl group showed a quartet at 3.91 ppm with a coupling constant of 7.0 Hz. The protons of pyrrol showed two triplets at 6.34 and 7.07 ppm each integrating for two protons with a coupling constant of 2.0 Hz. Remaining aromatic protons showed two doublets at 7.05 and 7.39 ppm each integrating for two protons with a coupling constant of 8.6 Hz. The mass spectrum showed a peak at m/z = 286.7(M+ +1) was in tune with the molecular formula $C_{15}H_{15}N_3OS$. All the spectral values and analysis data confirmed the gross structure of the key intermediate (3-ethyl -2-(4-(1H- pyrrol -1-yl)-phenylimino) thiazolidin-4-ones 6&7. Knoevengel condensation of 3-methyl-2-(4-(1H- pyrrol-1-yl)-phenylimino)-thiazolidin-4-ones 6&7 with aryl aldehydes in presence of diisopropyl-ethylamine as a base in absolute ethanol afforded (5-benzilidine (3-alkyl-2-(4-(1H-pyrrol-1-yl-phenylimino)-thiazolidin-4-ones(8a-i)&9(a-e) ,spectaral data of representative compound (8h) 2-(4-(1H-pyrrol-1-yl)-phenyl- imino)-5-(4-methoxybenzilidene)-3-methylthiazolidin-4-one showed strong IR absorption bands at 1566 cm^{-1} (C=C), 1642cm^{-1} (C=O) and at 1704 cm^{-1} (C=N) confirms the presence of C=C, C=O and C=N functional groups respectively. In the ^{1}H NMR spectrum, the absence of the signal of methylene protons of thiazolidin-4-one ring of starting compound 22 at 3.83 ppm together with the resonance of the methine proton as a singlet at 7.73 ppm confirms the formation of proposed structure 24 h. A singlet at 3.46 ppm integrating for three protons was attributed to the protons of N-methyl group. A singlet at 3.82 ppm integrating for three

protons was assigned to the protons of methoxy group. The protons of pyrrol showed two triplets at 6.36 and 7.11 ppm each integrating for two protons with a coupling constant of 2.0 Hz. Aromatic protons of phenylimino group showed two doublets at 6.94 and 7.07 ppm with couling constant of 8.8 Hz integrating for two protons each. Remaining aromatic protons resonated as two multiplates between 7.40- 7.41 and 7.42-7.43 ppm each integrating for two protons.

Knoevenagel condensation with different substituted aryl aldehydes in presence of diisopropyl-ethylamine as a base in absolute ethanol afforded (2Z,5Z)-5-(benzilidine)-2-(4-(1H-pyrrol-1-yl)phenylimino)-3-methyl-thiazo-lidin-4-one in excellent yields (Table 1). All the novel benzilidine derivatives of 2-imino thiazolidinone (8-a-l) & (9a-e)compounds were evaluated for antibacterial and antifungal activity. All these compounds were found to exhibit moderate to good antibacterial and antifungal activity against different species of bacteria and fungi. From the activity data (Table 2) it was observed that among all the compounds tested, compounds 9(a-e) shows moderate activity against all the tested bacteria and fungi. Compound 9d showed moderate activity against all bacteria.Compound 9b showed moderate activity against fungi. Among all tested bacteria and fungi, compounds 8f and 8g showed good activity against *staphylococcus aureus*, *Bacillus subtillis* and *Escherichia coli*. Among the other compounds 8a, 8b, 8d and 8e shown good activity against all the bacteria. and the compounds 8f, 8j, 8k and 8l showed good activity against *Aspergillus Niger* and *Rhizopus Ostoyae* fungi. Among all the compounds 8f was found to be most active compound. Overall results shows compounds 7(a-l) enhanced activity than 8(a-e).

Table 1: Knoevengel condensation with different substituted aryl aldehydes

Sr. No.	Aldehyde	Product	Yield%	MP °C
1	Benzaldehyde	8a	79	154-156
2	4-Hydroxy benzaldehyde	8b	78	148-150
3	4-Nitro benzaldehyde	8c	84	167-169
4	4-Bromo benzaldehyde	8d	83	175-177
5	3,4-Difluoro benzaldehyde	8e	86	171-173
6	2,4-Dimethoxy benzaldehyde	8f	82	137-139
7	2-Fluoro,4-bromo benzaldehyde	8g	84	188-190
8	4-Methoxy benzaldehyde	8h	80	146-148
9	4-Dimethylamino benzaldehyde	8i	78	133-135
10	1H-Indol-3 carboxaldehyde	8j	78	151-153
11	Furfuraldehyde	8k	74	117-119
12	Biphenylcarboxaldehyde	8l	80	205-207
13	Benzaldehyde	9a	81	160-162
14	4-Hydroxy benzaldehyde	9b	85	138-140
15	4-Nitro benzaldehyde	9c	79	179-181
16	4-Bromo- benzaldehyde	9d	82	199-201
17	3,4-Difluoro benzaldehyde	9e	85	211-213

Table 2: Antimicrobial activity of 5-(benzilidene)-3-methyl-2-(4-(1-H-pyrrol-1-yl-phenylimino) thiazolidin-4-ones (23a-e) and (24a-g)

Comp No	Zone of Inhibition (mm)				
	Bacteria			Fungi	
	SA	***BS***	***EC***	***AN***	***RO***
	NCLM No.2602	*NCLM No.2458*	*NCLM No.2809*	*NCLM No.617*	*NCLM No.1299*
8a	6.7	6.4	6.6	6.1	5.2
8b	8.3	7.9	6.1	7	5.9
8c	5	5.5	5.8	6.6	4.91
8d	7.2	7.7	6.61	5.9	4.7
8e	9	8	7.4	6.5	5.6
8f	11	10.7	9.3	8.9	6.91
8g	8.19	8	7.4	6.5	5.6
8h	7.2	7.2	8.9	7.7	4.3
8i	7.4	7.8	6.4	5.9	5.15
8j	5.9	6	6.7	7.1	5.81
8k	10.1	8.7	8.18	7.9	5.7
8l	7.7	6.4	7	5	6
9a	3.2	3.1	3.1	2.5	3.2
9b	3.2	2.4	3.5	4.1	4.1
9c	2.5	2.5	3.2	3.2	3.2
9d	3.5	3.2	2.5	4.1	4.2
9e	2.7	3.2	3.5	3.2	4
Standard	12	10	11	10	9

Note: SA- Staphylococcus aureus, BS- Bacillus subtilis, EC- Escherichia coli, AN- Aspergillius Niger, RO- Rhizopus Ostoyae

- These results are average results of four experiments.
- These compounds were used at concentration of 100 µg/mL. Streptomycin for bacteria and Nystain for fungi were used as standard at concentration of 30 µg.

CONCLUSION

In summary, we have synthesized a novel 2-iminothiazolidinone of 5-benzilidine (3-alkyl-2-(4-(1H-pyrrol-1-yl-phenylimino)-thiazolidin-4-ones ring systems to optimize chain length of N- Alkyl substitution at iminothiazolidinone ring , Further these compounds were evaluated for their antimicobacterial activity. Compounds having N-methyl substitution showed good activity against gram positive and gram negative bacterial strains and fungi than N-ethyl substituted iminothiazolidinone ring Compound **8f** was most active among all the synthesized compounds.

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