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RESEARCH ARTICLE

Synthesis of Some Novel 3, 5-Diaryl-*N*-chalcone-2-pyrazoline Derivatives and Evaluation of their Antimicrobial Activity

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Abstract: In the present investigation, a series of some novel 3,5-diaryl-*N*-chalcone-2-pyrazoline derivatives **(6a-g)** have been synthesized by the treatment of 4,5-dihydro-3-(2-hydroxyphenyl)-5-(6-methoxynaphthalen-5-yl)pyrazole-1-carbaldehyde **(4a-g)** with 2-hydroxy-4-chloro acetophenones **(5)** in presence of sodium hydroxide. The structure of newly synthesized compounds was confirmed by the IR, ^{1}H NMR and Mass spectral analysis. All these newly synthesized compounds were evaluated for their in vitro antimicrobial activity. Most of the compound showed potent activity.

Keywords: 2-Pyrazoline-1-carboxaldehyde, *N*-Chalcone, Formic acid, Hydrazine hydrate, Antibacterial, Antifungal activity

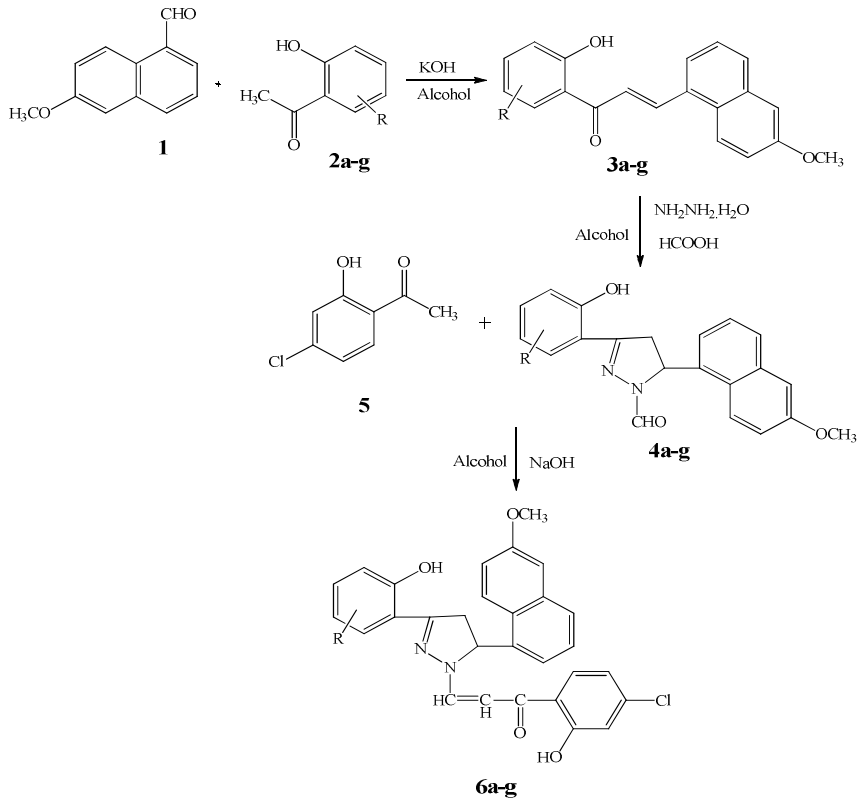
Introduction

Heterocyclic compounds have great applicability in pharmaceutical industry due to their specific activity employed in the treatment of many infectious diseases. The wide varieties of these heterocycles have been explored for developing pharmaceutically important molecules like chalcones and their derivatives like pyrazoline.

Chalcone represents a well-known molecule since last many decades, due to presence of reactive α, β-unsaturated keto group, it is found to wide range of biological activities such as antibacterial[1], anti-inflammatory[2], analgesic[3], antiplatelet[4], antimalarial[5], anticancer[6], antiviral[7], antileishmanial[8], antioxidant[9] and antitubercular[10]. Chalcones are intermediate for the synthesis of number of heterocycles for *e.g*. pyrazoline, isooxazoline, pyridine, pyrimidine, flavanoid and benzodiazepine which shown various pharmacological activities.

Pyrazoline are well-known important nitrogen containing five membered heterocyclic bioorganic molecules. As concerned with different pyrazoline isomer, 2-pyrazoline derivatives became the most frequently studied pyrazolines. Pyrazoline derivatives have gained great interest due to their pharmacological activities such as antidepressant[11], antioxidant[12], anti-inflammatory[13], anticancer[14], antiviral[15], antibacterial[16] and antifungal[17] properties *etc*. They have been found to possess a variety of industrial applications.

In view of importance of pyrazolines and in continuation of our work on the synthesis and structure determination of various pyrazoline derivatives[18,19], we report the synthesis of some novel *N*-substituted pyrazoline derivatives. In this present investigation various 1-(2-hydroxyphenyl)-3-(6-methoxynaphthalen-5-yl)prop-2-en-1-one (Chalcones) **(3a-g),** were prepared by claisen-Schmidt condensation of substituted 2-hydroxy acetophenone with 6-methoxy-1-naphthaldehyde in presence of ethanol and KOH. The chalcones were cyclized in the presence of hydrazine hydrate and hot formic acid to give 2-pyrazoline-*N*-carboxaldehyde derivatives **(4a-g)**, further it is condense with 2-hydroxy-4-chloro acetophenone to afford tittle compound (Scheme 1). The structures of all synthesized compounds were assigned on the basis of IR, Mass, ^{1}H NMR spectral data and elemental analysis. Further these compounds were subjected for antifungal and antibacterial activity.



Scheme 1

Experimental

Melting points were determined in open capillaries and are uncorrected. IR spectra were recorded using Perkin -Elmer spectrometer.^{1}H NMR spectra were recorded on Brucker Advance II 400 spectrometer in DMSO by using TMS as internal standard. Thin layer chromatography was performed with E. Merk precoated TLC plates, silica gel $60F_{254}$ with thickness of 0.25 mm and spots were visualized by irradiation with ultraviolet light (254 nm). Physical constants and analytical data of all the compoundsreported in this paper are summarized in Table 1.

Table 1. Physical and analytical data of compounds **(4a-g)** and **(6a-g)**

Compd. No.	M.F	M.P ^{0}C	Yield %	% Analysis Found (calcd)		
				C%	H%	N%
4a	$C_{21}H_{17}ClN_2O_3$	236	80	66.23(66.20)	4.50(4.45)	7.36(7.34)
4b	$C_{21}H_{16}Cl_2N_2O_3$	210	91	60.74(60.72)	3.88(3.85)	6.75(6.72)
4c	$C_{21}H_{17}ClN_2O_3$	202	95	66.23(66.19)	4.50(4.48)	7.36(7.32)
4d	$C_{22}H_{19}ClN_2O_3$	223	82	66.92(66.88)	4.85(4.84)	7.09(7.00)
4e	$C_{22}H_{20}N_2O_3$	195	75	73.32(73.30)	5.59(5.54)	7.77(7.73)
4f	$C_{22}H_{20}N_2O_3$	230	70	73.32(73.28)	5.59(5.58)	7.77(7.72)
4g	$C_{22}H_{20}N_2O_3$	210	88	73.32(73.31)	5.59(5.54)	7.77(7.75)
6a	$C_{29}H_{22}Cl_2N_2O_4$	208	75	65.30(65.24)	4.16(4.13)	5.25(5.22)
6b	$C_{29}H_{21}Cl_3N_2O_4$	240	82	61.34(61.28)	3.73(3.70)	4.93(4.88)
6c	$C_{29}H_{22}Cl_2N_2O_4$	215	85	65.30(65.29)	4.16(4.10)	5.25(5.20)
6d	$C_{30}H_{24}Cl_2N_2O_4$	215	75	65.82(65.75)	4.42(4.40)	5.12(5.08)
6e	$C_{30}H_{25}ClN_2O_4$	222	78	70.24(70.20)	4.91(4.87)	5.46(5.42)
6f	$C_{30}H_{25}ClN_2O_4$	213	65	70.24(70.19)	4.91(4.85)	5.46(5.39)
6g	$C_{30}H_{25}ClN_2O_4$	195	62	70.24(70.20)	4.91(4.88)	5.46(5.45)

General procedure for preparation of chalcones from substituted 2*-hydroxy acetophenones and 6-methoxy-1-napthaldehyde* **(3a-g)**

A mixture of 6-methoxy-1-napthaldehyde (**1**) (0.01 mol) and substituted 2-hydroxy acetophenones **(2a-g)** (0.01 mol) was stirred in ethanol (30 mL) and then potassium hydroxide solution (15 ml, 0.02 mol) was added to it. The reaction mixture was kept overnight at room temperature and then it was poured on crushed ice and acidified with dilute hydrochloric acid. The chalcones derivative precipitates out as solid. Then it was filtered and purified by recrystallization from acetic acid.

General procedure for the synthesis of 3-(substituted-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde[20] **(4a-g)**

A mixture of substituted chalcone **(3a-g)** (0.001 mol) and hydrazine hydrate (0.002 mol) in 10 mL ethanol was refluxed for 3 h. Then 2 mL of hot formic acid (0.10 mol) was added in reaction mixture, continue refluxing further 2 h. After completion of reaction (checked by TLC), the reaction mixture was cooled and poured into ice cold water. The separated solid product was filtered, washed with cold water, dried and then recrystallized from ethanol.

General procedure for the synthesis of 1-(4-chloro-2-hydroxyphenyl)-3-(3-(substituted-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one[21] **(6a-g)**

A mixture of compound **4a-g** (0.05 mol), 2-hydroxy-4-chloro acetophenones **5** (0.05 mol) and 10% aqueous sodium hydroxide (10 mL) in ethanol (30 mL) was stirred at room temperature for about 3 h. The resulting solid was filtered off, rinsed with water, dried and crystallized from ethanol.

Antimicrobial activity

All the newly synthesized compounds **6a-g** was tested for their antimicrobial activity. The effects of unknown compounds were compared with the standard drug Penicillin for bacteria and Greseofulvin for fungi. Antibacterial activity was performed against *staphylococcus aureus*, *Escherischia coli*, *Salmonella Typhi* and antifungal activity against *Aspergillus niger*, *Aspergillusflavus* and *Penicilliumchrysogenum*. The antibacterial activity was assayed by cup plate method[22] and antifungal activity was assayed by standard agar disc diffusion method[23].

Results and Discussion

The synthesis of the new compounds, *i.e*., the derivatives of 1-(4-chloro-2-hydroxyphenyl)-3-(3-(substituted-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1*H*-pyrazol-1-yl)prop-2-en-1-one **(6a-g)** was carried out as shown in the Scheme 1. The structures of newly synthesized compounds have been confirmed by IR, ^{1}H NMR and Mass spectral data. The IR spectrum of **4a-g** exhibited a band due to 1650 cm^{-1} (C=N, pyrazoline ring), 1606 cm^{-1} (-CHO) 1590 cm^{-1} (C=C), 1150 cm^{-1} (-OCH_3). Further, in their ^{1}H NMR (DMSO) spectrum the appearance of a signal at δ 5.67-5.63 (dd, 1H, Hx pyrazoline), 4.13-4.05 (dd, 1H, H_B pyrazoline) and 3.46-3.44 (dd, 1H, H_A pyrazoline) confirms the presence of the pyrazoline ring, the presence of single peak at δ 9.02-9.01 (s, 1H, N-CHO), absence of singlet at δ 7.0-7.5 due to (N-H) and singlet at δ 10.07 due to proton of ortho hydroxyl group. Similarly, the structures of compounds **6a-g** were confirmed on the basis of spectral and elemental analysis. The IR spectrum of **6a-g** exhibited a band due 1629 cm^{-1} (>C=O), 1585 cm^{-1} (C=N). The ^{1}H NMR spectra of compounds **6a-g** showed a multiplet at δ 6.98-8.28 ppm for the aromatic ring and the disappearance of the singlet peak of N-CHO at δ 9.02 and the presence of peak at δ7.75-7.73 (dd, 1H, >C=CH_B) and 7.41-7.38 (dd, 1H, CH_A=C<) it proved that the formation of chalcone at N-CHO and it confirmed the formation of titled compound.

The investigation of antibacterial screening results indicate that compounds **6b, c** shows promising activity against all bacteria, compound **6a, d** shows good activity and compound **6e, f, g** shows low activity against most of the bacteria. The investigation of antifungal activity data revealed that compound **6b** show inhibitory effect against all the fungus, compound **6a, c** show inhibitory effect against *Penicillium chrysogenum* and *Fusarium moneliforme*, compound **6d, f** show inhibitory effect against *Aspergillus niger, Penicillium chrysogenum, Aspergillus flavus.* Remaining compounds are inactive against all the fungus. Results are shown in Table 2 and 3.

Spectral analysis of compounds

*3-(3-Chloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde **(4a)***

^{1}H NMR DMSO: δ 10.07 (s, 1H, -OH),9.02-9.01 (s, 1H, N-CHO), 8.26-6.93 (m, 9H, Ar-H),5.67-5.63 (dd, 1H, Hx pyrazoline), 4.13-4.05 (dd, 1H, H_B pyrazoline), 3.86 (s, 3H, OCH_3) 3.46-3.44 (dd, 1H, H_A pyrazoline), MS: *m/z* 381 (M+1),IR (KBr pellets cm^{-1}) 1650 (C=N, pyrazoline ring), 1606 (-CHO),1590 (C=C), 1150 (-OCH_3).

Table 2. Antibacterial screening results of the compounds **(6a-g)**

Compd.	*E. coli*	*Salmonella typhi*	*Staphylococcus aureus*	*Bacillus Subtilis*
6a	13	12	18	14
6b	17	18	25	28
6c	16	16	19	16
6d	15	13	18	14
6e	11	12	14	12
6f	11	10	15	10
6g	10	12	14	15
DMSO	-ve	-ve	-ve	-ve
Penicillin	22	25	35	38

-ve no antibacterial activity

Table 3. Antifungal screening results of the compounds **(6a-g).**

Compd.	*Aspergillus niger*	*Penicillium chrysogenum*	*Fusarium moneliforme*	*Aspergillus flavus*
6a	+ve	-ve	-ve	+ve
6b	-ve	-ve	-ve	-ve
6c	+ve	-ve	-ve	+ve
6d	-ve	-ve	+ve	-ve
6e	-ve	RG	-ve	+ve
6f	-ve	-ve	+ve	-ve
6g	+ve	-ve	RG	+ve
Griseofulvin	-ve	-ve	-ve	-ve
DMSO	+ve	+ve	+ve	+ve

+ve no antibacterial activity –ve no growth (Antifungal activity observed) RG Reduced growth

*3-(3,5-Dichloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde **(4b)***

^{1}H NMR DMSO: δ 10.17 (s, 1H, -OH), 9.07-9.05 (s, 1H, N-CHO), 8.20-6.90 (m, 8H, Ar-H), 5.60-5.55 (dd, 1H, Hx pyrazoline), 4.13-4.08 (dd, 1H, H_B pyrazoline), 3.84 (s, 3H, OCH_3) 3.45-3.42 (dd, 1H, H_A pyrazoline),MS: *m/z* 415 (M+1), IR (KBr pellets cm^{-1}) 1652 (C=N, pyrazoline ring), 1600 (-CHO),1595 (C=C), 1152 (-OCH_3).

*3-(5-Chloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde **(4c)***

^{1}H NMR DMSO: δ 10.05 (s, 1H, -OH), 9.05-9.01 (s, 1H, N-CHO), 8.26-6.93 (m, 9H, Ar-H), 5.65-5.63 (dd, 1H, Hx pyrazoline), 4.10-4.04 (dd, 1H, H_B pyrazoline), 3.85 (s, 3H, -$OCH_3$3.45-3.43 (dd, 1H, H_A pyrazoline),MS: *m/z* 381 (M+1), IR (KBr pellets cm^{-1}) 1655(C=N, pyrazoline ring), 1606 (-CHO),1590 (C=C), 1155(-OCH_3).

*3-(5-Chloro-2-hydroxy-4-methylphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde **(4d)***

^{1}H NMR DMSO: δ 10.00 (s, 1H, -OH), 9.00-8.98 (s, 1H, N-CHO), 8.22-6.90 (m, 8H, Ar-H), 5.67-5.63 (dd, 1H, Hx pyrazoline), 4.13-4.05 (dd, 1H, H_B pyrazoline), 3.88 (s, 3H, OCH_3) 3.44-3.42 (dd, 1H, H_A pyrazoline), 2.37 (s, 3H, Ar-CH_3), MS: *m/z* 395 (M+1),IR (KBr pellets cm^{-1}) 1650 (C=N, pyrazoline ring), 1606 (-CHO), 1590 (C=C), 1150 (-OCH_3).

*3-(2-Hydroxy-3-methylphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde **(4e)***

^{1}H NMR DMSO: δ 10.12 (s, 1H, -OH), 9.09-9.01 (s, 1H, N-CHO), 8.28-6.90 (m, 9H, Ar-H), 5.65-5.63 (dd, 1H, Hx pyrazoline), 4.15-4.10 (dd, 1H, H_B pyrazoline), 3.84 (s, 3H, OCH_3) 3.44-3.42 (dd, 1H, H_A pyrazoline), 2.40 (s, 3H, Ar-CH_3), MS: *m/z* 361 (M+1),IR (KBr pellets cm^{-1}) 1655 (C=N, pyrazoline ring), 1620 (-CHO), 1590 (C=C), 1145 (-OCH_3).

*3-(2-hydroxy-4-methylphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde **(4f)***

^{1}H NMR DMSO: δ 10.11 (s, 1H, -OH), 9.07-9.02 (s, 1H, N-CHO), 8.26-6.88 (m, 9H, Ar-H), 5.67-5.62 (dd, 1H, Hx pyrazoline), 4.16-4.10 (dd, 1H, H_B pyrazoline), 3.86 (s, 3H, OCH_3) 3.45-3.42 (dd, 1H, H_A pyrazoline), 2.42 (s, 3H, Ar-CH_3),MS: *m/z* 361 (M+1),IR (KBr pellets cm^{-1}) 1657 (C=N, pyrazoline ring), 1625 (-CHO), 1590 (C=C), 1150 (-OCH_3).

*3-(2-Hydroxy-5-methylphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazole-1-carbaldehyde **(4g)***

^{1}H NMR DMSO: δ 10.15 (s, 1H, -OH), 9.09-9.01 (s, 1H, N-CHO), 8.25-6.90 (m, 9H, Ar-H), 5.69-5.65 (dd, 1H, Hx pyrazoline), 4.15-4.10 (dd, 1H, H_B pyrazoline), 3.90 (s, 3H, OCH_3) 3.40-3.38 (dd, 1H, H_A pyrazoline), 2.47 (s, 3H, Ar-CH_3), MS: *m/z* 361 (M+1),IR (KBr pellets cm^{-1}) 1650 (C=N, pyrazoline ring), 1620 (-CHO), 1590 (C=C), 1140 (-OCH_3).

*1-(4-Chloro-2-hydroxyphenyl)-3-(3-(3-chloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one **(6a)***

^{1}H NMR DMSO: δ 12.70 (s, 2H, 2 X -OH),7.75-7.73 (dd, 1H, >C=CH_B), 7.41-7.38 (dd, 1H, CH_A=C<), 6.98−8.28(m, 12H, Ar-H),3.90-3.85 (dd, 1H, Hx pyrazoline), 3.42-3.37 (dd, 1H, H_B pyrazoline), 3.35 (s, 3H, OCH_3), 2.52-2.51 (dd, 1H, H_A pyrazoline),MS: *m/z* 534 (M+1),IR (KBr pellets cm^{-1}) 1629(>C=O), 1607 (CH=CH), 1585Cm^{-1} (C=N), 1163 (-OCH_3), 863 (C-Cl).

*1-(4-Chloro-2-hydroxyphenyl)-3-(3-(3,5-dichloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one **(6b)***

^{1}H NMR DMSO: δ 12.65 (s, 2H, 2 X -OH),7.76-7.73 (dd, 1H, >C=CH_B), 7.40-7.36 (dd, 1H, CH_A=C<), 6.95−8.38(m, 11H, Ar-H), 3.90-3.85 (dd, 1H, Hx pyrazoline), 3.40-3.37 (dd, 1H, H_B pyrazoline), 3.34 (s, 3H, OCH_3), 2.50-2.49 (dd, 1H, H_A pyrazoline),MS: *m/z* 568 (M+1),IR (KBr pellets cm^{-1})1635(>C=O), 1610 (CH=CH), 1585 cm^{-1} (C=N), 1162 (-OCH_3), 860 (C-Cl).

*1-(4-Chloro-2-hydroxyphenyl)-3-(3-(5-chloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one **(6c)***

^{1}H NMR DMSO: δ 12.72 (s, 2H, 2 X -OH), 7.75-7.73 (dd, 1H, >C=CH_B), 7.42-7.38 (dd, 1H, CH_A=C<), 6.85−8.25(m, 12H, Ar-H), 3.90-3.85 (dd, 1H, Hx pyrazoline), 3.40-3.36 (dd, 1H, H_B pyrazoline), 3.38 (s, 3H, OCH_3), 2.54-2.52 (dd, 1H, H_A pyrazoline),MS: *m/z* 534 (M+1),IR (KBr pellets cm^{-1}) 1630(>C=O), 1606 (CH=CH), 1585 cm^{-1} (C=N), 1160 (-OCH_3), 870 (C-Cl).

*1-(4-Chloro-2-hydroxyphenyl)-3-(3-(5-chloro-2-hydroxy-4-methylphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one **(6d)***

^{1}H NMR DMSO: δ 12.55 (s, 2H, 2 X -OH), 7.76-7.73 (dd, 1H, >C=CH_B), 7.42-7.35 (dd, 1H, CH_A=C<), 6.90−8.38(m, 11H, Ar-H), 3.90-3.85 (dd, 1H, Hx pyrazoline), 3.42-3.37 (dd, 1H, H_B pyrazoline), 3.40 (s, 3H, OCH_3), 2.50-2.49 (dd, 1H, H_A pyrazoline),2.40 (s, 3H, Ar-CH_3), MS: *m/z* 548 (M+1),IR (KBr pellets cm^{-1})1640(>C=O), 1610 (CH=CH), 1575 cm^{-1} (C=N), 1160 (-OCH_3), 860 (C-Cl).

*1-(2-Hydroxy-3-methylphenyl)-3-(3-(3-chloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one **(6e)***

^{1}H NMR DMSO: δ 12.45 (s, 2H, 2 X -OH), 7.76-7.73 (dd, 1H, >C=CH_B), 7.42-7.35 (dd, 1H, CH_A=C<), 6.90−8.38(m, 12H, Ar-H), 3.90-3.85 (dd, 1H, Hx pyrazoline), 3.40-3.37 (dd, 1H, H_B pyrazoline), 3.48 (s, 3H, OCH_3), 2.55-2.53 (dd, 1H, H_A pyrazoline), 2.48 (s, 3H, Ar-CH_3), MS: *m/z* 512 (M+1),IR (KBr pellets cm^{-1})1660(>C=O), 1625 (CH=CH), 1570 cm^{-1} (C=N), 1162 (-OCH_3), 865 (C-Cl).

*1-(2-Hydroxy-4-methylphenyl)-3-(3-(3-chloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one **(6f)***

^{1}H NMR DMSO: δ 12.40 (s, 2H, 2 X -OH), 7.76-7.72 (dd, 1H, >C=CH_B), 7.42-7.35 (dd, 1H, CH_A=C<), 6.92−8.38(m, 12H, Ar-H), 3.88-3.84 (dd, 1H, Hx pyrazoline), 3.42-3.37 (dd, 1H, H_B pyrazoline), 3.53 (s, 3H, OCH_3), 2.52-2.50 (dd, 1H, H_A pyrazoline), 2.48 (s, 3H, Ar-

CH_3), MS: *m/z* 512 (M+1),IR (KBr pellets cm^{-1})1660(>C=O), 1620 (CH=CH), 1555 cm^{-1} (C=N), 1160 (-OCH_3), 875 (C-Cl).

1-(2-Hydroxy-5-methylphenyl)-3-(3-(3-chloro-2-hydroxyphenyl)-5-(6-methoxynaphthalen-1-yl)-4,5-dihydro-1H-pyrazol-1-yl)prop-2-en-1-one ***(6g)***

^{1}H NMR DMSO: δ 12.42 (s, 2H, 2 X –OH), 7.75-7.73 (dd, 1H, >C=CH_B), 7.41-7.36 (dd, 1H, CH_A=C<), 6.90–8.35(m, 12H, Ar-H), 3.92-3.85 (dd, 1H, Hx pyrazoline), 3.40-3.37 (dd, 1H, H_B pyrazoline), 3.55 (s, 3H, OCH_3), 2.55-2.53 (dd, 1H, H_A pyrazoline), 2.50 (s, 3H, Ar-CH_3), MS: *m/z* 512 (M+1),IR (KBr pellets cm^{-1})1655(>C=O), 1622 (CH=CH), 1570 cm^{-1} (C=N), 1162 (-OCH_3), 855 (C-Cl).

Conclusion

The synthesized 3,5-diaryl-*N*-chalcone-2-pyrazoline derivatives **(6a-g)** and 4,5-dihydro-3-(2-hydroxyphenyl)-5-(6-methoxynaphthalen-5-yl)pyrazole-1-carbaldehyde **(4a-g)** all are novel. Compounds with electron releasing groups such as methoxy and compounds having pharmacophors chloro, groups and both these groups are present in one moiety exhibited best antimicrobial activity. The data reported in this article may be helpful guide for the medicinal chemist who is working in this area.

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