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ORIGINAL ARTICLE

A rapid microwave assisted synthesis of 1-(6-chloro-2-methyl-4-phenylquinolin-3-yl)-3-(aryl)prop-2-en-1-ones and their anti bacterial and anti fungal evaluation

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Anti microbial screening

Abstract The 1-(6-chloro-2-methyl-4-phenylquinolin-3-yl)-3-(aryl)prop-2-en-1-ones were synthesized by microwave assisted synthesis, the antimicrobial activities of synthesized compounds were screened against Gram negative organisms such as *Escherichia coli* (ATCC 25922), *Bacillus subtilis* (ATCC 117788), *Salmonella typhi* (ATCC 25264), *Gram positive Staphylococcus aureus* (ATCC 700699) and fungal organisms such as *Aspergillus flavus*, *Aspergillus fumigatus* and *Candida utilius*.

1. Introduction

Quinolines and their derivatives are very important because of their biological activity (Muscia et al., 2006) and their wide occurrence in natural products (Morimoto et al., 1991; Michael, 1997). A large variety of quinolines displayed interesting physiological activities and found to have attractive applications in pharmaceuticals, agrochemicals as well as synthetic building blocks (Markees et al., 1970; Campbell et al., 1988; Maguire et al., 1994; Roma et al., 2000; Chen et al., 2001). They are well-known structural unit in alkaloids, therapeutics and synthetic analogues with interesting biological activities such as antimalarial, antibacterial, antiasthmatic, antihypertensive, anti-inflammatory and tyrokinase PDGF-RTK inhibiting agents (Larsen et al., 1996; Roma et al., 2000; Doube et al., 1998). Among quinolines chloroquine remains a main antimalarial drug but the efficacy of it and other chemotherapeutic agents as mefloquine has been steadily lessened by the spread of resistant parasites. Thus, the development of alternative drugs is a continuing interest (Ayad et al., 2001). Hence some of the derivatives of quinolines such as quinolones have also been synthesised and they were also examined for their biological activities (Siporin et al., 1990). According to the literature information, it is apparent that quinolones are potentiating the antifungal effect. Recently, increased interest in combination therapy has also been developed (Brouillette et al., 2005; Nosanchuk, 2006). The efficacy of the newer quinolones in the treatment of nosocomial pneumonia is currently being assessed in clinical trials. Yet bacterial resistance, relapse of infections and recurrent infections remain

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critical issues. Complex genitourinary tract infections continue to be a niche for this antibiotic class, these invites the exploration of newer quinoline derivatives. We have reported (Sarveswari and Raja, 2006) the microwave assisted synthesis of some quinolone compounds. There are a few reports on synthesis and biological studies of quinolinyl chalcones compared to quinolones. In view of the above literature survey, herein we report the synthesis, anti fungal and antibacterial activities of newer quinolinyl chalcones.

2. Experimental

All the melting points reported were recorded in open capillaries and uncorrected.

IR spectra of all the compounds were recorded on AVATAR330 FT-IR Spectrometer. ^{1}H NMR spectra were recorded on Bruker AMX 300. The microwave assisted reactions were carried out in synthetic microwave: CATA R with maximum power of 700 W. The Mass spectra recorded on JEOL GC mate spectrometer. Chemicals for microbial tests like agar and broths were procured from Hi-Media Laboratories Ltd., Mumbai. Chemicals for the synthesis were from Sigma Aldrich Co, St Louis, USA, and SD fine chemicals Pvt. Ltd., Boisar, India. Bacterial and Fungal culture from National Collection of Industrial Microorganisms (NCIM), National Chemical Laboratory Pune 411 008, Maharashtra, India.

*2.1. General procedure for the synthesis of 1-(6-Chloro-2-methyl-4-phenyl quinolin-3-yl)-(aryl) prop-2-en-1-ones (**3a**–**h**)*

2.1.1. Method I (stirring at room temperature)

A mixture of compound **1** and arylaldehyde in 1:1 molar ratio was added into a 2% solution of KOH in distilled ethanol and stirred at room temperature for 12 h in a round bottom flask. Then the reaction mixture was concentrated and neutralized with acetic acid. The resultant solid was filtered, washed with hot water, dried and purified by 7:1 mixture of petroleum ether–ethyl acetate. Compound **1** was synthesized using literature method (Wang et al., 2006).

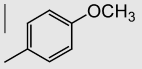
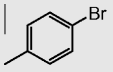
2.1.2. Method II (microwave assisted synthesis)

A mixture of compound **1** and pyridine-2-aldehyde in equimolar ratio was added into a 2% solution of KOH in distilled ethanol taken in a beaker and irradiated with microwave at 240 W for 5 min. The reaction mixture was cooled and poured onto ice and acidified with acetic acid. The resultant solid was filtered, washed with sodium bicarbonate and water, dried and purified by column using petroleum ether–ethyl acetate (7:1). The procedure was extended to other arylaldehydes (**2b**–**h**) to get the corresponding chalcones (**3b**–**h**) and thereby to prove the generality of the reaction. The irradiation time, power levels and the yield of the products are given in Table 1. All the compounds were characterized by IR, ^{1}H NMR and Mass spectral data. The data are given in results and discussion. The compounds are screened for their anti-microbial activities.

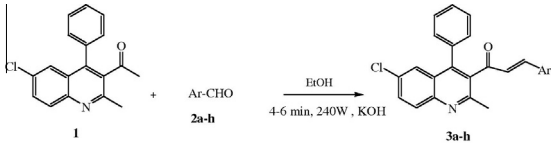
3. Results and discussion

3-Acetyl-6-chloro-2-methyl-4-phenyl quinoline (**1**) has been synthesized using the method (Wang et al., 2006) available in literature which in turn converted into corresponding chalcones (**3a**–**h**) (see Scheme 1) by treating it with various aryl aldehydes in the presence of base in ethanol under the micro wave irradiation at 240 W for 4–6 min, whereas conventional method requires 12 h of stirring. Completion of the reaction was monitored by TLC, then the reaction mixture neutralized with acetic acid, filtered and dried. The obtained crude product was purified through column chromatography using petroleum ether–ethyl acetate (7:1).

Table 1 Physical data of compounds **3a**–**h**.

S. No	Ar	Mp (°C)	Yield (%)	
			MW[a] (time in min)	Conventional method
3a		220–223	61(5)	68
3b		240–242	78(5)	75
3c		230–233	56(5)	60
3d		210–212	90(5)	87
3e		220–224	84(6)	85
3f		231–232	78(4)	79
3g		215–217	83(5)	80
3h		228–230	83(5)	76

[a] Power level at 240 W.



Scheme 1 Synthesis of 1-(6-chloro-2-methyl-4-phenylquinolin-3-yl)-3-(aryl)prop-2-en-1-ones.

The purified compounds **3a**–**h** were characterized through IR, ^{1}H NMR and mass spectral studies. The stretching frequencies at 1656 cm^{-1} (due to α,β-unsaturated carbonyl) and 1565 cm^{-1} (due to conjugated olefinic C=C) in IR confirmed the formation of expected products. The observed signal at δ 2.70 (s, 3H, CH_3) ppm integrating for three protons in ^{1}H NMR spectrum of **3a** is due to the methyl group at C-2. The signals at δ 8.45 (d, 1H, 8 Hz), δ 7.70 (d, 1H, 8.5 Hz), δ 7.50 (s, 1H) ppm are due to protons at C-7, C-6 and C-5 of quinoline ring. The protons of phenyl at C-4 observed as a multiplet in the range of δ 7.10–7.20 ppm. The protons of pyridine

nucleus appear as a multiplet between δ 7.30–7.45 ppm. The characteristic peaks at δ 8.05 (d, 1H, 15.7 Hz) and δ 7.65 (d, 1H, 15.7 Hz) ppm represents cinnamoyl protons which are *trans* to each other. The molecular ion peak at 384.3878 in ES-MS also confirmed the product **3a**. Similarly the other compounds **3b–h** also characterized (spectral data are given in Section 3). The synthesized compounds **3a–h** were screened for their anti bacterial, anti-fungal activities through well diffusion method using streptomycin and cephalosporin as respective standard. All the synthesized compounds were found to have moderate anti bacterial activity in comparison with standard streptomycin (Figs. 1–4). The results revealed that the compound **3b**, **3f** were showed good activity against *Escherichia coli* (*E. coli*). Compounds **3e** and **3c** were active against *Bacillus subtilis* (*B. subtilis*) **3a**, **3e**, **3g** and **3b**, **3d**, **3f** and **3h** were found to be active against *Salmonella typhi* (*S. typhi*) and *Staphylococcus aureus* (*S. aureus*), respectively. In anti fungal screening, compounds **3a**, **3d–f** were found to be active against *Aspergillus flavus* (*A. flavus*), among these **3a** has equivalent activity as the standard cephalosporin. **3d**, **3e** and **3g** were active against *Aspergillus fumigatus* (*A. fumigatus*). The compounds **3b**, **3e** and **3f** were found to be active against *candida utilis* (*C. utilis*)

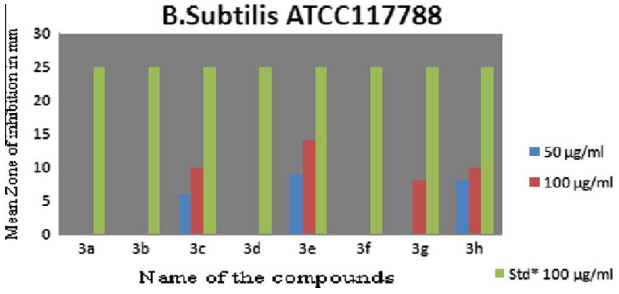


Figure 1 Zone of inhibition by compounds **(3a–h)** on *B. subtilis*.

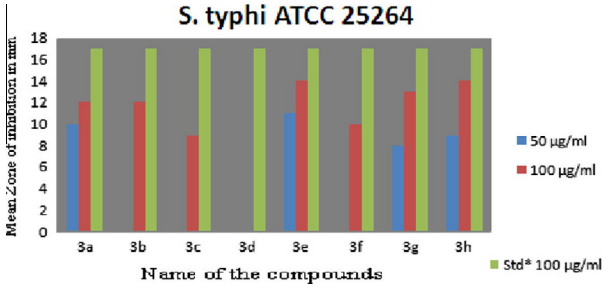


Figure 2 Zone of inhibition by compounds **(3a–h)** on *S. typhi*.

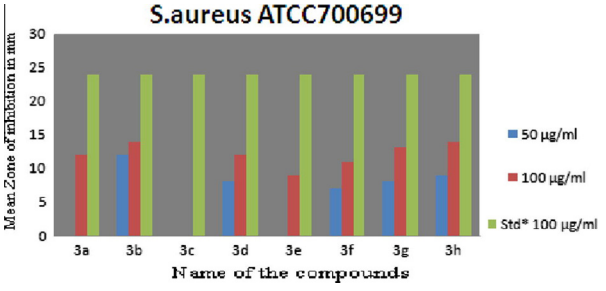


Figure 3 Zone of inhibition by compounds **(3a–h)** on *S. aureus*.

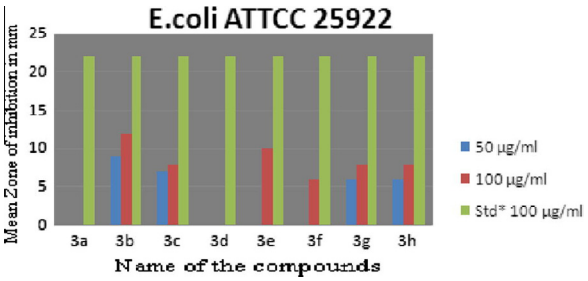


Figure 4 Zone of inhibition by compounds **(3a–h)** on *E. coli*.

among these **3e** is very effective (Figs. 5–7) further studies are required on active derivatives.

*3.1. 1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(pyridin-2-yl)prop-2-en-1-one (**3a**)*

Yellow solid, recrystallised from (1:4) petroleum ether–acetone (R_f = 0.44). IR (KBr): 3615 (NH), 1656 (C═O), 1565 (C═C),

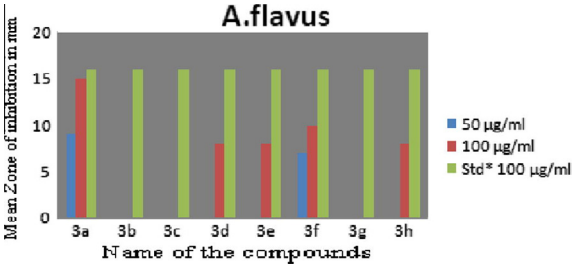


Figure 5 Zone of inhibition by compounds **(3a–h)** on *A. flavus*.

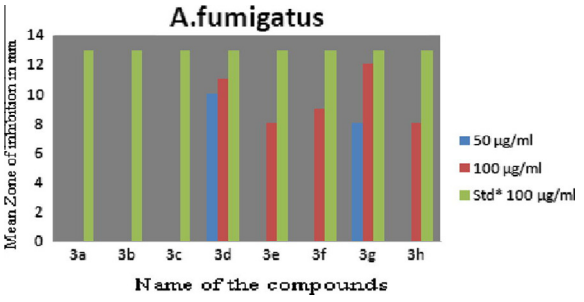


Figure 6 Zone of inhibition by compounds **(3a–h)** on *A. fumigatus*.

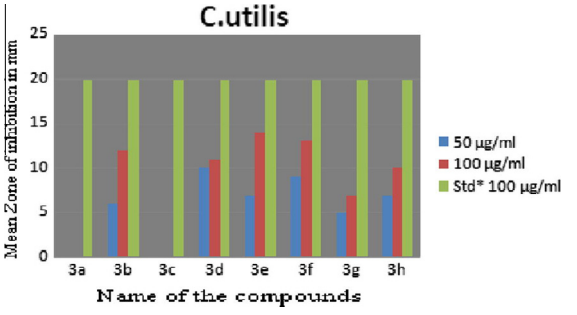


Figure 7 Zone of inhibition by compounds **(3a–h)** on *C. utilis*.

1615 (C═N) cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 8.45 (d, 1H, J = 8 Hz), δ 7.70 (d, 1H, J = 8.5 Hz), δ 7.50 (s, 1H), δ 7.10–7.20 (m, 5H, Ar), δ 7.30–7.45 (m, 4H, py), δ 8.05 (d, 1H, J = 15.7 Hz, CH), δ 7.65 (d, 1H, J = 15.7 Hz, CH) ppm, ES-MS: 384.3878 $[M]^+$.

*3.2. 1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(pyridine-3-yl)prop-2-en-1-one (**3b**)*

Yellow solid, recrystallised from (1:4) petroleum ether–acetone (R_f = 0.42). IR (KBr): 3614 (NH), 1658 (C═O), 1568 (C═C), 1605 (C═N) cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 2.60 (s, 3H, CH_3), 7.30–7.50 (m, 4H, py), 7.10–7.30 (m, 4H, Ar), 7.70 (d, 1H, J = 15.6 Hz, CH), 8.05 (d, 1H, J = 15.4 Hz, CH),. 8.50 (d, 1H, 8.2 Hz $C_{7\text{-Quinoline}}$), 8.15 (m, 1H, $C_{8\text{-Quinoline}}$) 7.60 (s, 1H, $C_{5\text{-Quinoline}}$) ppm, ES-MS: 384.3878 $[M]^+$.

*3.3. 1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(pyridine-4-yl)prop-2-en-1-one (**3c**)*

Yellow solid, recrystallised from (1:4) petroleum ether–acetone (R_f = 0.44). IR (KBr): 3101 (NH), 1657 (C═O), 1573 (C═C),1605 (C═N) cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 2.60 (s, 3H, CH_3), 7.30–7.45 (m, 4H, py), 7.10–7.30 (m, 4H, Ar), 7.70 (d, 1H, J = 15.6 Hz, CH), 8.05 (d, 1H, J = 15.4 Hz, CH),. 8.50 (d, 1H, J = 8.2 Hz $C_{7\text{-Quinoline}}$), 8.10 (m, 1H, $C_{8\text{-Quinoline}}$) 7.50 (s, 1H, $C_{5\text{-Quinoline}}$) ppm, ES-MS: 384.3875 $[M]^+$.

*3.4. 1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(furan-2-yl)prop-2-en-1-one (**3d**)*

Pale yellow solid, recrystallised from (1:4) petroleum ether–ethyl acetate (R_f = 0.47). IR (KBr): 3611 (NH), 1655 (C═O), 1605 (C═N) cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 2.60 (s, 3H, CH_3), 7.30–7.45 (m, 4H, py), 7.10–7.30 (m, 4H, Ar), 8.05 (d, 1H, J = 15.4 Hz, CH), 8.50 (d, 1H, J = 15.6 Hz, CH), 7.60 (s, 1H, $C_{5\text{-Quinoline}}$), 7.70 (d, 1H, J = 8.2 Hz $C_{8\text{-Quinoline}}$), 8.10 (m, 1H, $C_{7\text{-Quinoline}}$) ppm. ES-MS: 389.1503 $[M]^+$.

*3.5. 1, 4-(6-Chloro-2-methyl-4-phenyl quinolin-3-yl-3-oxo-prop-1-enyl) benzene (**3e**)*

Pale yellow solid, recrystallised from (1:4) petroleum ether–ethyl acetate (R_f = 0.50). IR (KBr): 3434 (NH), 1683 (C═O), 1550 (C═C), 1606 (C═N) cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 2.58 (s, 3H), 8.05 (d, 1H, J = 15.4 Hz), 7.69 (d, 1H, J = 15.4 Hz), 8.02 (d, 1H, J = 8.7 Hz), 7.66 (dd, 1H, J = 8.9 Hz, 2.3 Hz), 7.53–7.58 (m, 6H), 7.27–7.36 (m, 5H) ppm. ES-MS: 383.1 $[M]^+$.

*3.6. 1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(2-chlorophenyl)prop-2-en-1-one (**3f**)*

Pale yellow solid, recrystallised from (1:4) petroleum ether–ethyl acetate (R_f = 0.56). IR (KBr): 3736 (NH), 1694 (C═O), 1547 (C═C), 1516 (C═N) cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 2.51 (s, 3H, CH_3), 7.32–7.42 (m, 4H, Ar), 6.60 (d, 2H, J = 8.6 Hz, Ar), 7.24 (d, 2H, Ar), 6.90 (d, 1H, J = 16.2 Hz, CH), 6.30 (d, 1H, J = 16.2 Hz, CH). 8.10 (d, 1H, 4.2 Hz $C_{5\text{-Quinoline}}$), 7.78 (m, 1H, $C_{7\text{-Quinoline}}$), 7.42 (d, 1H, 8.2 Hz $C_{8\text{-Quinoline}}$) ppm. ES-MS: 407 $[M]^+$.

*3.7. 1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(4-methoxyphenyl)prop-2-en-1-one (**3g**)*

Pale yellow solid, recrystallised from (1:4) petroleum ether–ethyl acetate (R_f = 0.66). IR (KBr): 3607 (NH), 1636 (C═O), 1593 (C═C), 1507 (C═N) cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 2.57 (s, 3H, CH_3), 3.78 (s, 3H, OCH_3), 7.34–7.46 (m, 4H, Ar), 6.90 (d, 2H, J = 8.8 Hz, Ar (*meta* to OCH_3), 7.56 (d, 2H, Ar (*ortho* to OCH_3), 7.20 (d, 1H, J = 16.4 Hz, CH), 6.60 (d, 1H, J = 16.4 Hz, CH). 8.1 (d, 1H, J = 4.2 Hz $C_{5\text{-Quinoline}}$), 7.85 (m, 1H, $C_{7\text{-Quinoline}}$), 7.46 (d, 1H, J = 8.2 Hz $C_{8\text{-Quinoline}}$) ppm. ES-MS: 401 $[M]^+$.

*3.8. 1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(4-bromophenyl)prop-2-en-1-one (**3h**)*

Pale yellow solid, recrystallised from (1:4) petroleum ether–ethyl acetate (R_f = 0.54). IR (KBr): 3756 (NH), 1673 (C═O), 1544 (C═C), 1524 (C═N) cm^{-1}; ES-MS: 407 $[M]^+$. ^1H NMR (500 MHz, $CDCl_3$): δ 2.69 (s, 3H, CH_3), 7.39–7.43 (m, 3H, Ar), 7.28–7.30 (m, 5H, Ar), 7.24 (d, 1H, J = 5 Hz, Ar), 7.04 (d, 1H, J = 17.5 Hz, CH), 6.54 (d, 1H, J = 17.5 Hz, CH), 7.69 (dd, 1H, J = 10 Hz, 5 Hz, $C_{7\text{-Quinoline}}$), 7.60 (d, J = 5 Hz, 1H, $C_{5\text{-Quinoline}}$), 8.06 (d, 1H, J = 10 Hz $C_{8\text{-Quinoline}}$) ppm. ^{13}C NMR (125 MHz, $CDCl_3$): δ 23.6 (CH_3), 125.0, 126.0, 127.8, 128.6, 128.9, 129.3, 129.5, 129.9, 130.6, 131.0, 132.4, 132.5, 133.2, 134.5, 137.0, 144.6, 145.0, 146.2, 155.3, 196.9 (C═O) ppm. ES-MS: 451 $[M]^+$.

3.9. Antimicrobial screening

3.9.1. Measurement of minimum inhibitory concentration (MIC)

3.9.1.1. Media used. Muller Hinton broth and soboured dextrose broth from Himedia was used for bacteria and fungi, respectively. All the culture was sterilized by autoclaving at 15 lbs for 20 min.

3.9.1.2. Broth dilution method. Exactly 1 mg/mL stock solution of the synthesized compounds were made using DMSO as a solvent. From the stock solutions required quantities of drug solutions were mixed with the known quantities of the sterile broth aseptically to provide the following concentrations

Table 2a Mean zone of inhibition (mm) (**3a–h)** on *B. subtilis* (ATCC 117788).

S. No	Mean zone of inhibition (mm) and concentrations		
	50 μg/mL	100 μg/mL	Std ∗ 100 μg/mL
3a	–	–	25
3b	–	–	25
3c	6	10	25
3d	–	–	25
3e	9	14	25
3f	–	–	25
3g	–	8	25
3h	8	10	25

Table 2b Mean zone of inhibition (mm) (**3a–h**) on *S. typhi* (ATCC 25264).

S. No	Mean zone of inhibition (mm) and concentrations		
	50 μg/mL	100 μg/mL	Std ∗ 100 μg/mL
3a	10	12	17
3b	–	12	17
3c	–	9	17
3d	–	–	17
3e	11	14	17
3f	–	10	17
3g	8	13	17
3h	9	14	17

Table 2c Mean zone of inhibition (mm) (**3a–h)** on *S. aureus* (ATCC 700699).

S. No	Mean zone of inhibition (mm) and concentrations		
	50 μg/mL	100 μg/mL	Std ∗ 100 μg/mL
3a	0	12	24
3b	12	14	24
3c	0	0	24
3d	8	12	24
3e	–	9	24
3f	7	11	24
3g	8	13	24
3h	9	14	24

Table 2d Mean zone of inhibition (mm) (**3a–h**) on *E. coli* (ATCC 25922).

S. No	Mean zone of inhibition (mm) and concentrations		
	50 μg/mL	100 μg/mL	Std ∗ 100 μg/mL
3a	0	0	22
3b	9	12	22
3c	7	8	22
3d	0	0	22
3e	–	10	22
3f	0	6	22
3g	6	8	22
3h	6	8	22

Std ∗ Streptomycin (for anti bacterial screening).

Table 2e Mean zone of inhibition (mm) (**3a–h**) on *A. flavus*.

S. No	Mean zone of inhibition (mm) and concentrations		
	50 μg/mL	100 μg/mL	Std ∗ 100 μg/mL
3a	9	15	16
3b	–	–	16
3c	–	–	16
3d	–	8	16
3e	–	8	16
3f	7	10	16
3g	–	–	16
3h	–	8	16

Table 2f Mean zone of inhibition (mm) (**3a–h**) on *A. fumigatus*.

S. No	Mean zone of inhibition (mm) and concentrations		
	50 μg/mL	100 μg/mL	Std∗100 μg/mL
3a	–	–	13
3b	–	–	13
3c	–	–	13
3d	10	11	13
3e	–	8	13
3f	–	9	13
3g	8	12	13
3h	–	8	13

Table 2g Mean zone of inhibition (mm) (**3a–h**) on *C. utilis*.

S. No	Mean zone of inhibition (mm) and concentrations		
	50 μg/mL	100 μg/mL	Std∗100 μg/mL
3a	–	–	20
3b	6	12	20
3c	–	–	20
3d	10	11	20
3e	7	14	20
3f	9	13	20
3g	5	7	20
3h	7	10	20

Std∗Cephalosporin (anti-fungal screening).

100, 200, 300, 400, 500 and 600 μg/mL. About 1 mL of the media containing the drug was dispensed into each sterile test tube with 1 μL of standardized microorganism (1×10^5 CFU/mL). After the inoculation all the tubes were incubated at 37 ± 1 °C for 24 h and the growth of microorganisms observed using optical density measurement. The lowest concentration of test sample required to inhibit the growth of concern bacteria was considered as Minimum Inhibitory Concentration (MIC). The MIC have been found for each compound against various organisms such as *E. coli* (ATCC 25922), *B. subtilis* (ATCC 117788), *S. typhi* (ATCC 25264), Gram positive *S. aureus* (ATCC 700699) by adopting the similar procedure and are given in Tables 3a and 3b.

3.10. Antibacterial screening (well diffusion method)

A little of *B. subtilis* was added to the sterile *Muller Hinton* broth medium at 45 °C in aseptic environment and allowed to grow for 24 h. A suspension of *Muller Hinton* agar was transferred to sterile Perti dishes and allowed to solidify, then a little of *B. subtilis* from the broth was applied uniformly on the surface of solidified agar in sterile Perti dishes, in it wells of 6 mm diameter were made using well borer; specified concentration of synthesized compounds and the standard were applied in these wells of agar plates in aseptic condition. DMSO was used as control. Streptomycin was used as standard. All the plates were left for 1–4 h as a period of pre incubation diffusion to minimize the effects of variation in time between the applications of the different solutions. Then the plates were incubated at 37 ± 1 °C for 18–24 h. The diameter of the zone of inhibition was measured for the plates in which the zone of inhibition observed. The experiment was triplicated to get reproducibility. Mean value for zone of inhibition was

Table 3a MIC values of compounds **3a–h** for Bacterial organisms.

S. No	MIC values μg and Name of the organism			
	Bacillus subtilis (ATCC 117788)	*Staphylococcus aureus* (ATCC 700699)	*Salmonella typhi* (ATCC 25264)	*Escherichia coli* (ATCC 25922)
3a	300	200	100	500
3b	400	200	100	100
3c	100	400	200	400
3d	300	100	300	300
3e	100	400	100	100
3f	400	100	100	300
3g	200	200	100	200
3h	100	100	100	200

Table 3b MIC values of compounds **3a–h** for fungal organisms.

S. No	MIC values μg and Name of the organism		
	A. flavus	*A. fumigatus*	*C. utilis*
3a	100	400	400
3b	400	300	100
3c	400	400	400
3d	200	100	100
3e	200	400	100
3f	100	300	100
3g	400	100	300
3h	300	400	100

calculated. A similar procedure was adopted to screen the antibacterial activity of compounds **3b–h** against *E. coli*, *B. subtilis*, *S. typhi*, *S. aureus*. The measured zone of inhibitions (Figs. 1–4) in mm were given in Tables 2a–d. The similar procedure was adopted with soboured dextrose broth for antifungal screening against *A. flavus*, *A. fumigatus*, *C. utilis*. The plates were left for 1–4 h as a period of pre incubation diffusion to minimize the effects of variation in time between the applications of the different solutions. Then the plates were incubated at 37 ± 1 °C for 24–28 h and then observed for antifungal activity. The experiment was triplicated to get reproducibility, mean value for zone of inhibition was calculated. The measured zone of inhibitions (Figs. 5–7) in mm were given in Tables 2e–g.

4. Conclusion

1-(6-Chloro-2-methyl-4-phenylquinolin-3-yl)-3-(aryl) prop-2-en-1-ones were synthesised by microwave assisted method as well as conventional method. When the reaction durations were compared among microwave assisted synthesis (4–6 min) and the conventional method (12 h), former method requires much lesser duration with almost equal yield as in the conventional method. Hence the microwave assisted synthesis can be regarded as an efficient method for the synthesis of these compounds. All the synthesized compounds have been screened for their anti microbial activities and are found to be moderately active in comparison with standards. **3e** has shown good activity against *B. subtilis*. Compounds**3e** and **3h** found to be effective against *S. typhi*. Similarly **3b**, **3h** acting against *S. aerues*. In anti fungal screening, compounds **3a**, **3d**, **3e** and **3f** were found to be active against *A. flavus*, among these **3a** has equivalent activity as the standard cephalosporin. The compounds **3b**, **3e** and **3f** were found to be active against *C. utilis* among these **3e** is very effective. Further studies are required on active derivatives.

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