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Original Research Article

Synthesis, characterisation and antimicrobial activity of schiff base of 7-hydroxy-3-methyl-2-quinolone

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Abstract

Compounds having 2-quinolone moiety are associated with interesting biological activities. In the present study, we synthesized Schiff bases of 7-hydroxy-3-methyl-2-quinolone and their antibacterial activity was evaluated by wells diffusion method. Schiff bases of 7-hydroxy-3-methyl-2-quinolone (1 to 5 named as Q2aa-Q2ae) were prepared by refluxing 7-hydroxy-3-methyl-2-quinolone with substituted aromatic aldehydes. The final test compounds were purified and characterized by IR, 1HNMR and Mass Spectral studies. M.P. of these compounds was confirmed by open capillary method instrument chemline cl 725. They were evaluated for antibacterial activity. Compounds were active against Klebsiella pneumonia and Enterococcus faecalis. While ciprofloxacin was used as standards.
Key Words: Antimicrobial activity, 2-quinolone, Schiff base.

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INTRODUCTION

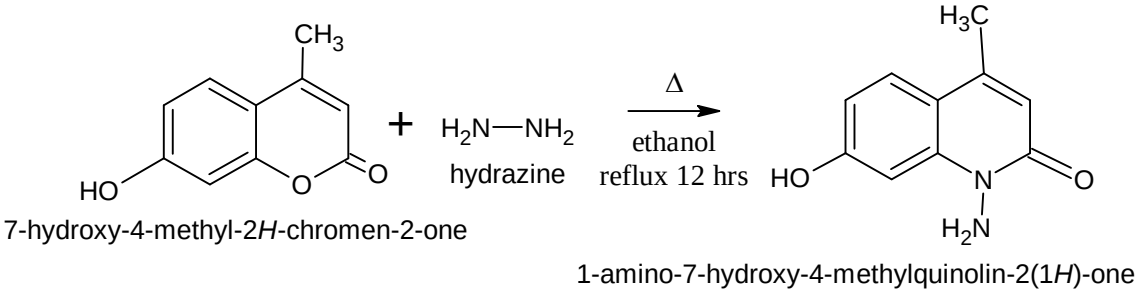
Bacterial infection is one of the most complex global health issues of this century. The rise of resistant microorganisms is perceived as a serious threat, which aggravates the problem. As a result, increasing efforts have been placed during recent years towards the search for new antimicrobials[1]. 2-Quinolones are isosteric with coumarins and isomeric to 4-quinolones could become the probable potential candidate for antibacterial activity[2]. A number of biological activities have been associated with quinoline-containing compounds such as anti-inflammatory[3], antiallergic[4], antimalarial[5], antibacterial[6],antitubercular[7]. Quinolin-2-ones or 1-azacoumarins is a part of quinoline alkaloids are known for their diverse biological activity and recently, 6-functionalized 1-aza coumarins are undergoing human clinical trials as an orally active anti-tumor drug in view of its farnesyl protein-inhibiting activity in the Nano molar range[8]. The compounds containing azomethine (-CH=N-) group are known as Schiff bases constitute an important class of compounds for new drug development[9]. In the present study, an attempt was made to synthesize other correlated structures nearing the existing quinolones present in the marketed drugs, to achieve improved biological activities of the parent compounds and a novel series of schiff's bases derived from 7-hydroxy-3-methyl-2-quinolone.

MATERIALS AND METHODS

The chemicals used were of AR grade and LR grade, purchased from Loba Chemicals, Qualigens, NR Chemicals, Lancaster, Sigma, Reachem, S.D Fine Chemicals Ltd. and Merck.

Synthesis of 7-hydroxy-3-methyl-2-quinolone[10] (Q2a): 1.46g of Coumarin dissolved in 15ml of ethanol and 3.2g of hydrazine hydrate was added to the mixture and reflux for 12hours. Cool it and evaporate the solvent at reduced pressure. Then neutral the mixture, the brown color ppt obtained. Reaction confirms by **TLC**

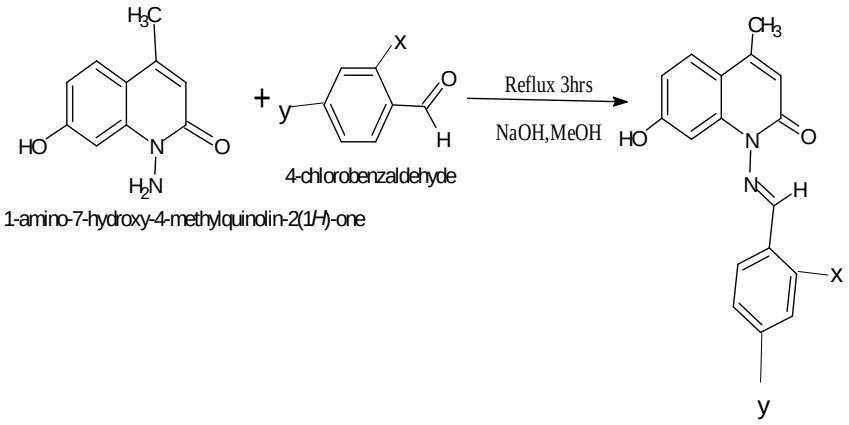
Synthesis of Schiff Base of 7-hydroxy-3-methyl-2-quinolone[10] (Q2aa-Q2ae): Quinolone(Q2a) (10mmol) was dissolved in 2M NaOH (5mL) and to it was added a solution of substituted benzaldehyde (10mmol) in methanol(20mL) drop wise. The mixture was heated under reflux for three hours. After cooling, the mixture was filtered and evaporated under reduced pressure. The product obtained was washed with acetone and dried. In the present study, N-amino quinoline-2-one was allowed to react with aryl aldehydes.



7-hydroxy-4-methyl-2*H*-chromen-2-one

1-amino-7-hydroxy-4-methylquinolin-2(1*H*)-one

Figure 1: Scheme: 1



1-amino-7-hydroxy-4-methylquinolin-2(1*H*)-one

4-chlorobenzaldehyde

Figure 2: Scheme: 2

Table 1:

COMPOUND	X	Y
Q_2aa	-H	-Cl
Q_2ab	-H	$-NO_2$
Q_2ac	-H	$-N(CH_3)_2$
Q_2ad	-Cl	-Cl
Q_2ae	-H	-Br

Spectral Data:

1-{[(*E*)-(4-chlorophenyl) methylidene] amino}-7-hydroxy-4-methylquinolin-2(1*H*)-one (Q_2AA): Yield: 61%, MP. 86^{0}C, Colour: cream, IR (KBr, cm-1): 3366.76(N-H), 2930(C=CH,C=O overtone), 1665(Ar C-C,C-N), 1405(N-N). 1H NMR δ ppm7.53(C=N), 7.36(CH benzene), 5.86(CH benzene), 4.87(OH ar).

7-hydroxy-4-methyl-1-{[(E)-(4-nitrophenyl)methylidene]amino}quinolin-2(1H)-one(Q_2AB): Yield: 57%, Mp. 120^{0}C Colour: dark yellow, IR (KBr, cm-1) : 3355(N-H),3054(CH), 2800(CH_2.C=O),1578(C-C Ar), 1410(N-N), 1H NMR δ ppm 8.32(C=N),8.13(CH benzene), 6.99(CH benzene), 4.84(OH ar).

1-({(E)-[4-(dimethylamino)phenyl]methylidene}amino)-7-hydroxy-4-methylquinolin-2(1H)-one(Q_2AC): Yield : 54%, Mp. 124^{0}C, Colour :Bright yellow, IR(KBr, cm-1): 3317(N-H),2358(C=CH), 1648(C=O), 1581(C-C Ar), 1517(N-N). 1H NMR δ ppm 8.44(C=N), 7.83(CH benzene), 6.92(CH benzene), 4.83(OH ar).

1-{[(E)-(2,4-dichlorophenyl)methylidene]amino}-7-hydroxy-4-methylquinolin-2(1H)-one(Q_2AD): Yield: 62%, Mp. 108^{0}C Colour: light yellow, IR (KBr, cm-1): 3360(NH), 2358(C=C), 1644(C=O), 1597(C-C Ar) 1376(N-N). 1H NMR δ ppm 8.35(HC=N), 7.42(CH

benzene), 6.70(CH benzene adjacent to quinolone),4.84(OH ar).

1-{[(E)-(4-bromophenyl) methylidene]amino}-7-hydroxy-4-methylquinolin-2(1H)-one(Q_2AE):

Yield: 60%, Mp. 86^{0}C Colour: creamish yellow, IR(KBr, cm-1): 3332(NH),2314(C=C), 1641(C=O), 1551(C-C ar),1478(N-N). 1H NMR δ ppm 8.15(HC=N), 7,52 (CH benzene), 6.4(CH), 4.96(OH ar).

ANTIMICROBIAL ACTIVITY

For the studies of antimicrobial effect of synthesized compound, there were 2, microbial successfully procured from Microbial Culture collection, National Centre forcell science, Pune, Maharashtra, India The lyophilized cultures of bacterial strains upon culturing in nutrient broth for 24-48 hours at 37^{o}C in an incubator resulted into turbid suspension of activated live bacterial cell ready to be used for microbiological study.. The synthesized compound used to suitably dilute upto the concentrations of 100, 50 and 25 µg per ml and applied on to the test organism using well diffusion method[11]. Results of the experiment are being concluded in the Table2, which clearly shows the anti-microbial activity of synthesized compound of 2 bacteria used in present work.

RESULTS AND DISCUSSION

Table 1: Antimicrobial activity of drug on antimicrobial agents

S.N	Name of drug	Microbes	Zone of inhibition		
			100 µg/ml	50 µg/ml	25 µg/ml
1.	Ciprofloxacin	*Klebsiella pneumonia*	33±1.5	30±2.88	25±0.57
		Enterococcus faecalis	26±4.04	14±1.15	12±0.57

Table 2: Biological activity of synthesized compounds.(Inhibition zone measurements in mm)

Micro- organism→ Sample↓	*Klebsiella pneumoniae* In mm Mean			*Enterococcus faecalis* In mm Mean		
	100(µg/ml)	50(µg/ml)	25(µg/ml)	100(µg/ml)	50(µg/ml)	25(µg/ml)
Q_2AA	18±0.57	14±0.28	11±0.57	21±0.86	15±0.76	13±0.86
Q_2AB	-	-	-	16±0.57	13±0.86	10±0.57
Q_2AC	-	-	-	-	-	-
Q_2AD	-	-	-	18±0.86	12±0.28	11±0.57
Q_2AE	18±0.57	11±0.57	10±0.57	22±0.28	17±0.28	15±0.76

Chemistry: Schiff bases of 7-hydroxy-3-methyl-2-quinolone (Q2AA-Q2AE) was synthesised according to literature method[10]. All the compounds were characterized by IR, NMR, and Mass spectral data.

Antimicrobial Activity: Activity table shows that compound Q2aa and Q2ae shows less activity against klebsiella Pneumonia than standard drug while compound Q2aa,Q2ab and Q2ae has good activity against Eneterococcus faecalis as good as has activity of standard drug.

CONCLUSION

In the present study we have synthesized five new derivatives of 7-hydroxy-3-methyl-2-quinoloneThe scheme of synthesis is efficient and provides satisfactory yield of the desired compounds. These compounds were confirmed by physical data and spectral studies. The compounds were screened for antimicrobial activity against *Klebsiella pneumonia and Enterococcus faecalis.* Three compounds Q2aa, Q2ab and Q2ae have good activity against Eneterococcus faecalis as good as has activity of standard drug.

REFERENCES

1. Peet NP: Drug resistance: a growing problem: Drug Discov. Today. 2010; (15):583-6.
2. Milecki J, Baker SP, Standifer KM, Ishizu T: Carbostyril derivatives having potent β-adrenergic agonistproperties.J Med Chem. 1987; 30:1563-66.
3. Takagaki, Hidetsugu, Nakanishi, Shigenori:Quinolinone glycoside, production process and antiallergic agent. Chem. Abstr. 1999; 131, 9. 116454d.
4. Fiona M Gribble, Timothy M E Davis:The antimalarial agent mefloquine inhibits ATP-sensitive K-channels: British Journal of Pharmacology. 2000; 131(4):756-60.
5. Rajat Dutta, Debayan Mandal, Nilendu Panda: General methodology for synthesis of fused tricyclic oxazino-2-quinolones under phase-transfer catalyzed conditions:Tetrahedron Letters. 2004; 45:9361–9364.
6. B.P. Kansagra, H.H. Bhatt, A.R. Parikh, Ind J. Heterocyclic Chem. 2000; 10: 05-06.
7. Z.Gaiying, J.M. Marvin, F.Scott, W.Baoji: Bioorg. Med. Chem. Lett. 2006 Nov; 16(21):5534-7.

8. B.S.Jayashree, Manpreet Kaur and Aravinda Pai: Synthesis, characterisation, antioxidant and anticancer evaluation of novel schiff's bases of 2-quinolones: Elixir Org. Chem.2012; 52:11317-22.
9. R. S. Dawood: Synthesis, Characterization and Biological Activity Study of Some New Schiff Bases Derived From Phenyl quinoline-2(1H)-one: Al-Anbar J.Vet. Sci. 2012; 5(2):114-22.
10. Al-Bayati RIH, Mahdi FR: Synthesis of novel 2-quinolonederivatives:Afr J Pure Appl Chem.2010; 4(10): 228-232.
11. S.Magaldi:Well diffusion for antifungal susceptibility testing: International journal of infectious diseases.2004;8:39-45.

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