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Research Article

# Synthesis, Characterization and Antimicrobial Activity of 3-{4-[3-(substitutedphenyl)prop-2-enoyl]phenyl}-6-iodo-2-thioxo-2,3-dihydroquinazolin-4-one derivatives : I

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**ABSTRACT**

A new series of Chalcones derivatives (2a-2e) have been synthesized by reacting 3-(4-acetyl phenyl)-6-iodo-2-thioxo-2,3-dihydro quinazolin-4-one(1) with different aromatic aldehydes($R_1$-$R_5$) in presence of sodium hydroxide and ethanol at room temperature. After synthesis compounds were characterized by chemical as well as instrumental methods. Like elemental, IR. This compound screened for their anti bacterial and anti fungal activities.

**Keywords:** Ethanol ,Quinazolin-4-one , IR, Anti bacterial and Antifungal activities.

## INTRODUCTION

Chalcones have been reported to possess various biological activities such as antifungal,[1-2]antiviral,[3]anticancer[4] and anti HIV[5]agents.They have also been reported as good chelating agents.[6]

Chalcones are Product of Condensation of simple or substituted aromatic with simple or substituted acetophenones in presence of alkali. In recent years there has been an increasing interest in the chemistry of quinazolin-4-one derivatives because of their biological significance. Many of them show antifungal, antibacterial, anticancer, anti-inflammatory, anticonvulsant, immunotropic, hypolipidemic, antitumor, antiulcer and analgesic [7-13]

Literature survey reveals mention of the above compounds with antimicrobial properties and hence more and more derivatives are worth tested for the possible medicinal applications. So we have decided to synthesis Chalcones derivatives.

## MATERIALS AND METHODS

All reagents were of analytical reagent grade and were used without further purification. All the product were synthesized and characterized by their spectral analysis, Chemicals NaOH, HCl, ethanol and various aldehyde were purchased from S.D.fine chemicals (india).Melting points were taken in open capillary tube. IR spectra (KBr) were recorded on Shimadzu-PerkinElmer F.T I.R. Spectrophotmeter Gx.

## EXPERIMENTAL

**Preparation of 3-{4-[3-(substitutedphenyl)prop-2-enoyl]phenyl}-6-iodo-2-thioxo-2,3-dihydroquinazolin-4-one(2a-2e).**

To the solution of 3-(4-acetylphenyl)-6-iodo-2-thioxo-2,3-dihydro quinazolin-4-one in absolute ethanol , substituted benzaldehyde and 2% NaOH were added and refluxed for 10 hours. After refluxing the reaction mixture was concentrated, cooled, filtered and neutralized with dil. HCl. The solid residue thus obtained was crystallized by absolute ethanol.

## RESULTS AND DISCUSSION

The Chalcones derivatives obtained are shown in the reaction scheme-I. All the synthesized compounds

were characterized by Melting point and elemental analysis (C,H,N) confirmed by table:1. The observed bands in the IR spectra for 2a – 2e are shown in table:2. Analysis indicate by the symbols of the elements is very close to the theoretical values. The Minimal inhibition concentrations of the standard drugs' for Antibacterial and Antifungal are as per table 3 and 4. Antimicrobial activities of 3-{4-[3-(substitutedphenyl)prop-2-enoyl]phenyl}-6-iodo-2-thioxo-2,3-dihydroquinazolin-4-one are in table: 5.

## ANTIMICROBIALACTIVITY

### Antibacterial activity

Antibacterial activities of all the newly synthesized compounds were studied against gram-positive bacteria staphylococcus aureus (MTCC96), streptococcus pyogenes (MTCC442) and gram-negative bacteria escherichia coli (MTCC443), pseudomonas aeruginosa (MTCC1688) using the broth dilution method. The test compounds compared with standard drugs gentamycin, ampicillin, chloramphenicol, ciprofloxacin and norfloxacin.

### Antifungal activity

All the newly synthesized compounds were also screened for their antifungal activity against candida albicans (MTCC227), aspergillus niger (MTCC282) and aspergillus clavatus (MTCC1323) using the broth dilution method. The test compounds compared with standard drugs Greseofulvin and Nystatin.

## CONCLUSION

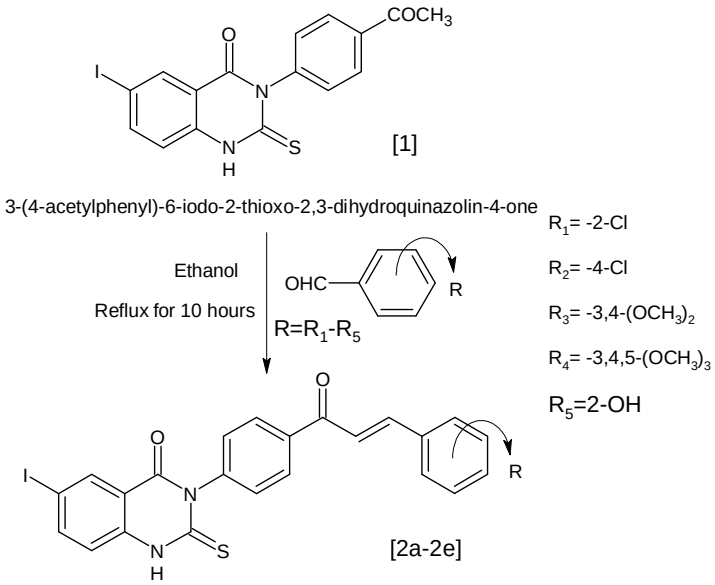
### Antibacterial activity:

From screening results, substituted derivatives 2a, 2b and 2d (500 gm/ml) possesses very good activity against E. *coli (MTCC 443) and* P.*aeruginosa (MTCC 1688), and 2e* (500 gm/ml) possesses very good activity against *S. aureus (MTCC 96)and S. pyogenes (MTCC 442)*compared with standard drugs. The modrate antibacterial activity was shown by the compounds 2c and 2e (250 gm/ml) against E. *coli (MTCC 443) and* P.*aeruginosa (MTCC 1688),* and 2c and 2d (200 gm/ml) modrate antibacterial activity against *S. aureus (MTCC 96)and S. pyogenes (MTCC 442)*compared with standard drugs.. While Compound 2a and 2b poor activity against against *S. aureus (MTCC 96)and S. pyogenes (MTCC 442)*compared with all standard drugs gentamycin, ampicillin, chloramphenicol, ciprofloxacin and norfloxacin.

### Antifungal activity:

From screening results, substituted derivatives 2a, 2b, 2c and 2e possesses very good activity and 2d was shown poor activity against *Aspergillus Niger (MTCC 282) and Aspergillus Clavatus (MTCC 1323), The derivatives of 2c and 2d* possesses very good activity against C.albicans *(MTCC 227) 2a, 2b and 2e* compound moderate activity against C.albicans *(MTCC 227)* with the standard drugs nystatin, greseofulvin.

**Reaction Scheme : I**




3-{4-[3-(substitutedphenyl)prop-2-enoyl]phenyl}-6-iodo-2-thioxo-2,3-dihydroquinazolin-4-one

**Table 1**
**Physical constant of 3-{4-[3-(substitutedphenyl)prop-2-enoyl]phenyl} -6-iodo-2-thioxo-2,3-dihydroquinazolin-4-one**

| No. | Sub No. | R | Molecular Formula | Mol.Wt. (gm) | Yield (%) | M.P. \C | Carbon(%) | | Hydrogen(%) | | Nitrogen(%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Found | required | Found | required | Found | required |
| 1 | 2a | - 2-Cl | $C_{23}H_{14}ClIN_2O_2S$ | 544.80 | 62 | 184 | 50.65 | 50.71 | 2.55 | 2.59 | 5.11 | 5.14 |
| 2 | 2b | - 4-Cl | $C_{23}H_{14}ClIN_2O_2S$ | 544.80 | 63 | 162 | 50.35 | 50.71 | 2.56 | 2.59 | 5.10 | 5.14 |
| 3 | 2c | - 3,4-$(OCH_3)_2$ | $C_{25}H_{19}IN_2O_4S$ | 570.40 | 69 | 156 | 52.23 | 52.64 | 3.33 | 3.36 | 4.88 | 4.91 |
| 4 | 2d | - 3,4,5-$(OCH_3)_3$ | $C_{26}H_{21}IN_2O_5S$ | 600.42 | 75 | 210 | 52.00 | 52.01 | 3.50 | 3.53 | 4.61 | 4.67 |
| 5 | 2e | - 2- OH | $C_{23}H_{15}IN_2O_3S$ | 526.35 | 65 | 180 | 52.30 | 52.48 | 2.84 | 2.87 | 5.28 | 5.32 |

**Table 2**
**IR spectra of 3-{4-[3-(substitutedphenyl)prop-2-enoyl]phenyl}-6-iodo-2-thioxo-2,3-dihydroquinazolin-4-one**

| No. | Sub. No. | >NH- | -OH | =C-H | =C-H (Stretch) | >C=O (Stretch) | >C=C< Aromatic | $-CH_3$ (Bend) | C-N | C-O-C | >C=S | C-Cl | C-I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2a | 3460 | | 3040 | | 1700 | 1590 | | 1290 | | 1220 | 690 | 530 |
| 2 | 2b | 3460 | | 3030 | | 1680 | 1600 | | 1290 | | 1240 | 700 | 520 |
| 3 | 2c | 3360 | | 3050 | 3050 | 1700 | 1580 | 1400 | 1300 | 1150 | 1240 | | 520 |
| 4 | 2d | 3440 | | 3020 | 3070 | 1690 | 1600 | 1410 | 1280 | 1170 | 1220 | | 520 |
| 5 | 2e | 3410 | 3330 | 3020 | | 1690 | 1590 | | 1300 | | 1230 | | 520 |

**Table : 3**
**The Antibacterial Standard Drugs' Minimal Inhibition Concentration**

| DRUGS | E.COLI | P.AERUGI NOSA | S .AUREUS | S.PYOGENUS |
|---|---|---|---|---|
| - | MTCC 443 | MTCC 1688 | MTCC 96 | MTCC 442 |
| (MICROGRAMME/ML ) | | | | |
| GENTAMYCIN | 0.05 | 1 | 0.25 | 0.5 |
| AMPICILLIN | 100 | -- | 250 | 100 |
| CHLORAMPHENICOL | 50 | 50 | 50 | 50 |
| CIPROFLOXACIN | 25 | 25 | 50 | 50 |
| NORFLOXACIN | 10 | 10 | 10 | 10 |

**Table : 4**
**The Antifungal Standard Drugs' Minimal Inhibition Concentration**

| DRUG | C .ALBIC ANS | A .NIGER | A .CLAVATUS |
|---|---|---|---|
| - | MTCC 227 | MTC C 282 | MTCC 1323 |
| (MICROGRAMME/ML ) | | | |
| NYSTATI N | 100 | 100 | 100 |
| GRESEOFULVIN | 500 | 100 | 100 |

**Table : 5**
**Antimicrobial activity of 3-{4-[3-(substitutedphenyl)prop-2-enoyl]phenyl} -6-iodo-2-thioxo-2,3-dihydroquinazolin-4-one**

| Sr. No. | Comp. No. | R | ANTIBACTERIAL ACTIVITY Minimal Inhibition Concentration (µgm/ | | | | ANTIFUNGAL ACTIVITY Minimal Inhibition Concentration (µgm/ml) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Gram +Ve bacteria | | Gram -Ve bacteria | | Fungus | | |
| | | | S. aureus | S. pyogenus | E. coli | P. aeruginosa | C.albicans | A.niger | A.clavatus |
| | | | MTCC 96 | MTCC 442 | MTCC 443 | MTCC 1688 | MTCC 227 | MTCC 282 | MTCC 1323 |
| 1 | 2a | - 2-Cl | 100 | 100 | 500 | 500 | 250 | 1000 | 1000 |
| 2 | 2b | - 4-Cl | 100 | 100 | 500 | 500 | 500 | 1000 | 1000 |
| 3 | 2c | - 3,4-$(OCH_3)_2$ | 200 | 125 | 250 | 250 | 1000 | 1000 | 1000 |
| 4 | 2d | - 3,4,5-$(OCH_3)_3$ | 200 | 200 | 500 | 500 | 1000 | 250 | 250 |
| 5 | 2e | - 2- OH | 500 | 500 | 250 | 250 | 500 | 500 | 1000 |

**REFERENCES**


1. Mizabuchis, Satoy, Agri. Boil Chem.1984; 48:2771.
2. Bhakunin DS, Chaturvedi RJ, Nat prod. 1984; 47: 585.
3. Simmonds MS, Blaney WM, Monuche FD, Marini Bettollo, j. Chem. Ecol. 1996; 16: 365.
4. Schewnolt M, Kittstein W, Murk F, Fuerslenberger, Cancer Lett. 1984; 25: 177.
5. Chung YJ, Kim DH, Choi KY, Kim BH, Korean J Med Chem 1995; 5(2): 141.
6. Syam Sunder K, Proc. Indian Acad. Sciences 1964; 4: 241.
7. Nawrocka W., Zimecki M., Arch. Pharm. 1997; 330: 399.
8. Kurogi Y., Inoue Y., Tsutsumi K., Nakamura S., Nagao K., Yoshitsugu H., Tsuda Y., J.Med. Chem. 1996; 39: 143.
9. Hamel E., Lin CM, Plowman J., Wang HK, Lee KH, Paull KD, Bioorg. Pharm. 1996; 51: 53.
10. Terashima K, Shimamura H, Kawase A, Tanaka Y, Tanimura T, Kamisaki T, Ishizuka Y, M. Chem. Pharm. Bull. 1995; 43: 2021.
11. Raffa D., Dailone G., Maggio B., Sehillaci D., Plescia F., Arch. Pharm. 1999; 332: 317.
12. Baek DJ, Park YK, Heo HI, Lee MH, Yang ZY, Chio MH, Bioorg. Med. Chem.Lett. 1998; 8: 3287.
13. Griffin RJ, Srinivasan S, Bowman K, Calvert AH, Curtin NJ, Newell DR, Pemberton LC, Golding BT, J. Med. Chem. 1998; 41: 5256.