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Research Article

PHARMACOLOGICAL STUDIES ON DERIVATIVES OF CYTOSINE

T. Pooventhiran[1], N. Elangovan[1], T. Chinnamani[2], G. Vijayakumar[1] and T. Kolochi[1]*

[1]PG and Research Department of Chemistry, Arignar Anna Government Arts College
Musiri-621 211, Tamilnadu, India.
[2]PG and Research Department of Zoology, Arignar Anna Government Arts College
Musiri-621 211, Tamilnadu, India.
**Corresponding Author: kolochi2004@yahoo.com*

Abstract

The Schiff bases of cytosine (I) 4-((2-hydroxy-3,5-diiodobenzylidene)amino)pyrimidin-2(1H)-one, (II) 4-((4-hydroxy-3-methoxybenzylidene)amino)pyrimidin-2(1H)-one, (III) 4-((3,4,5-trimethoxybenzylidene)amino)pyrimidin-2(1H)-one, (IV) 4-((furan-2-ylmethylene)amino)pyrimidin-2(1H)-one, (V) 4-((pyridin-4-ylmethylene)amino) pyrimidin-2(1H)-one, (VI) 4-((2-hydroxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one, (VII) 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one and (VIII) 4-((4-(diethylamino)-2-hydroxybenzylidene) amino)pyrimidin-2(1H)-one were prepared and characterized by physical and analytical data, FTIR , 1H NMR, 13C NMR spectra and were screened against gram positive bacteria *Staphylococcus aureus, Bacillus subtilis* and gram negative bacteria *Escherichia coli, Klebsiella aerogenes* for antibacterial activity and were screened against *Aspergillus niger* and *Candida albicans* for antifungal activity by disc diffusion method. Ciprofloxacin and Nystatin were used as standard for bacteria and fungi.

Keywords: Cytosine, *Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Klebsiella aerogenes,* antifungal activity, *Aspergillus niger, Candida albicans,* Ciprofloxacin and Nystatin.

Introduction

The findings of the Lancet study are shocking that superbugs kill babies as antibiotic resistance rises. Nearly 25 percent of babies with sepsis died despite timely medical intervention and because of unresponsiveness to treatment, is worrisome. If 80 per cent of infection caused by acinetobacter and in more than 50 per cent of klebsiella infections, the first line treatment fails, it clearly indicates the rampant misuse of antibiotics. There is an indiscriminate use of antibiotics[1,2] and analgesic drugs. Unaffordable and inaccessible qualitative health-care services easy availability of drugs over the counter without any prescription and inadequate dosage recommendations by unqualified medical practitioners are the main reasons for the superbug menace. It would be major public health disaster if the rampant use of drugs were left unchecked. Recently[3-5]derivatives of cytosine were found to have potential non antibiotic resistance antibacterial, antiviral and anticancer properties. Our study clearly indicates on the antibacterial antifungal activities of derivatives of cytosine derived from condensation[6-11] of aldehyde and ketone with cytosine.

Materials and Methods

Materials

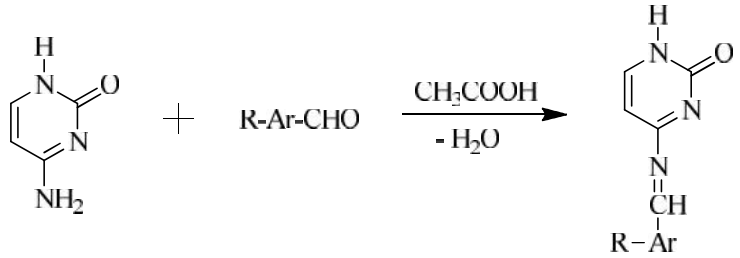
All the reagents used were of AR grade. Commercially available rectified spirit was dried over anhydrous quicklime for 24 hours, filtered and distilled beforeuse (BP 78^{o}C). Dimethylsulphoxide (sigma) and N,Ndimethylformamide(sigma) were used as suchcytosine, 3,5-diiodosalicylaldehyde, vaniline, 34,5-trimethoxybenzaldehyde, furfural, pyridine-4-carboxaldehyde, 5-nitrosalicylaldehyde, 5-nitrovaniline and 4-diethylaminosalicylaldehyde were purchased from Alfa Aesar.

Instruments

Melting points were determined using Elico melting point apparatus. Elemental analyses were performed using Elementar Vario EL III. IR spectra of the compounds were recorded with KB rpellets with carry 630 FTIR Spectrometer in the 4000-400 cm-1range. The ^{1}HNMR and^{13}CNMRspectra were recorded on a Bruker 400 MHz FT- PMR Spectrometer.

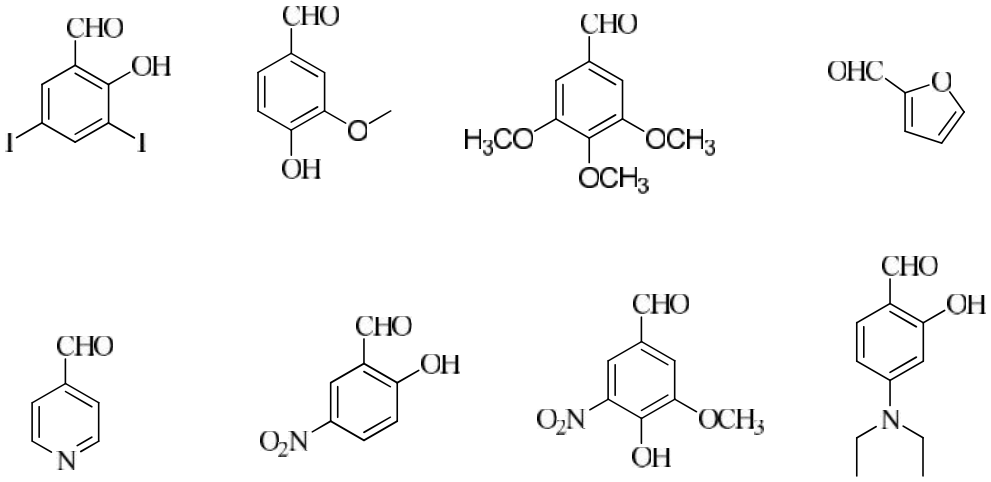
General preparation of derivatives of cytosine

All the azomethine compounds of derivatives of cytosine were prepared as reported in the literature[3-11]by the followings scheme – 1.



Scheme 1

Where, Ar-CHO =



Preparation of (I)4-((2-hydroxy-3,5-diiodobenzylidene)amino)pyrimidin-2(1H)-one

To the hot solution of cytosine 1.11 g (0.01mol)in minimum amount of dimethyl formamide and the DMF solution of 3,5-diiodosalicylaldehyde 3.73 g (0.01mol) were mixed. The reaction mixture was refluxed for 3 hrs. The yellowish-brown coloured solid mass 4-((2-hydroxy-3,5-diiodobenzylidene)amino)pyrimidin-2(1H)-one was formed during refluxing. The crude product was cooled, filtered, washed with ethanol, ether and recrystallized from DMF and then dried over vacuum desiccator.

Preparation of (II)4-((4-hydroxy-3-methoxybenzylidene)amino)pyrimidin-2(1H)-one

Cytosine (1.11 g, 0.01mol) was dissolved in 5ml of hot glacial acetic acid,1.52 g (0.01mol) of vaniline was dissolved in 5ml of glacial acetic acid and were mixed. The reaction mixture was refluxed with stirring for 5 hours. The mixture was allowed to cool, and poured into ice. The crude solid4-((4-hydroxy-3-methoxybenzylidene)amino)pyrimidin-2(1H)-onewas filtered off and washed with distilled water, then re-crystallized from acetic acid and then dried over vacuum desiccator.

Preparation of (III)4-((3,4,5-trimethoxy benzylidene)amino)pyrimidin-2(1H)-one

25ml of ethanolic solution of cytosine(1.11 g, 0.01mol) was added to 25ml of ethanolic solution of 3,4,5-trimethoxybenzaldehyde(1.96g, 0.01mol).Then three drops of glacial acetic acid was added to the reaction mixture. The reaction mixture was heated and refluxed for about 5 hours at 90°C. The resulting solution was further concentrated by water bath. The product 4-((3,4,5-trimethoxybenzylidene)amino)pyrimidin-2(1H)-one obtained was precipitated, cooled and collected after filtration. The precipitate was purified by washing with distilled water and then with ethanol. The 4-((3,4,5-trimethoxybenzylidene)amino)pyrimidin-2(1H)-one was again recrystallized in ethanol and then dried over vacuum desiccator.

Preparation of (IV)4-((furan-2-ylmethylene)amino)pyrimidin-2(1H)-one

The 4-((furan-2-ylmethylene)amino)pyrimidin-2(1H)-one was prepared by stirring a methanolic solution of cytosine (1.11 g, 0.01mol)with furfural (96 g, 0.01mol) in 1:1stoichiometric ratio at room temperature over 24hours.The precipitate obtained were filtered and washed with methanol and recrystallized from methanol and then dried over vacuum desiccator.

Preparation of (V)4-((pyridin-4-ylmethylene)amino)pyrimidin-2(1H)-one

A mixture of Pyridine-4-carboxaldehyde 1.07 g (0.01mol) and cytosine 1.11 g (0.01mol) were grained with a pestle in an open mortar at room temperature for 3minutes. To this reaction mixture sulphuric acid 2dropsand 20ml DMF were added and grained for 5minutes. On completion of reaction as monitored by TLC, the light greenish-colored solid 4-((pyridin-4-ylmethylene)amino)pyrimidin-2(1H)-one was separated out. The obtained solid was isolated by simple Buchner filtration and was recrystallized from DMF and then dried over vacuum desiccator.

Preparation of (VI)4-((2-hydroxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one

2.2 grams of cytosine (0.02mol) was mixed with 3.3g of 5-nitrosalicylaldehyde (0.02mol)and was grained well in acidic acid medium at room temperature. The mixture was transferred into hundred milliliter Round Bottom flask and was refluxed for six hours in oil bath. The solid product 4-((2-hydroxy-5-nitrobenzylidene) amino)pyrimidin-2(1H)-onewasfiltered and washed with ethanol and recrystallized in DMSO and then dried over vacuum desiccator.

Preparation of (VII) 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one

A mixture of 5-nitrovaniline (1.97 g,0.01mol)and cytosine (1.11 g, 0.01mol) was grained in a mortar with a pestle made of porcelain for10 minutes. The mixture turned pasty after few minutes of grainding. It was grained till yellow colour product appears. The mixture was left overnight. The resultant product 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-onewas recrystallized using ethanol and then dried over vacuum desiccator.

Preparation of (VIII) 4-((4-(diethylamino)-2-hydroxybenzylidene)amino)pyrimidin-2(1H)-one

4-((4- (diethylamino)- 2- hydroxybenzylidene) amino)pyrimidin-2(1H)-one was prepared from equimolar quantity of cytosine (1.11 g, 0.01mol) and 4-diethylaminosalicylaldehyde (1.93 g, 0.01mol) in 30 ml of methanol were heated at 70^{o}C on water bath for 4-hrs in presence of few drops of glacial acetic acid. The crude product were obtained after removal of methanol under reduced pressure. The products were recrystallized from methanol and then dried over vacuum desiccator.

Observation Report

Antimicrobial susceptibility

Principle

Disc impregnated with known concentration of **antibacterial** drug are placed on an agar plate that has been inoculated uniformly over the entire plate with a culture of the bacterium to be tested. The plate is incubated for 18 to 24 hours at 37^{o}C. During this period, the **antibacterial** agent diffuses through the agar and may prevent the growth of the organism. Effectiveness of susceptibility is proportional to the diameter of the inhibition zone around the disc. Organisms which grow up to the edge of the disc are resistant.

Procedure

The plate was labeled with the name of the culture, sample and standard at the bottom of the plate. Then sterile cotton swab on a wooden applicator stick was dipped into the bacterial suspension. Excess fluid was removed by rotating the swab and rubbed gently over the plate to obtain uniform distribution of the inoculums. The sterile disc was held on the inoculated plate with the help of micropipette. The sample was leveled in the sterile disc and incubated at 37^{o}C in an incubator. After incubation, the diameter of the zone of inhibition of growth was measured.

Table 1.

Inhibition zone > 15mm	**Highly active**
Inhibition zone > 10mm	**Moderatively active**
Inhibition zone > 5mm	**Slightly active**
Inhibition zone ≤ 5mm	**Inactive**

Results and Discussion

The physical and analytical data of (I) 4-((2-hydroxy-3,5-diiodobenzylidene)amino)pyrimidin-2(1H)-one, (II) 4-((4-hydroxy-3-methoxybenzylidene)amino)pyrimidin-2(1H)-one, (III) 4-((3,4,5-trimethoxybenzylidene)amino)pyrimidin-2(1H)-one, (IV) 4-((furan-2-ylmethylene)amino) pyrimidin-2(1H)-one, (V) 4-((pyridin-4-ylmethylene)amino)pyrimidin-2(1H)-one, (VI) 4-((2-hydroxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one, (VII) 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one and (VIII) 4-((4-(diethylamino)-2-hydroxybenzylidene)amino)pyrimidin-2(1H)-one are given in Table 2.

[I] 4-((2-hydroxy-3,5-diiodobenzylidene) amino)pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3587 & 679 cm^{-1} (—O–H), 3285 & 650 cm^{-1} (—N–H), 1687 cm^{-1} (>C=O), 1633 cm^{-1} (—N=CH), 1624 cm^{-1} (—N=C—), 1210 cm^{-1} (Ar—OH) & 589 cm^{-1} (Ar—I)

^{1}HNMR δ (ppm): 8.48 (s, 1H), 8.43 (d, 1H), 8.07 (s, 1H), 8.00 (s, 1H), 7.88 (s, 1H), 5.40 (d, 1H) & 5.35 (s, 1H)

^{13}CNMR δ (ppm): 163.7 (s), 160.1 (s), 159.1 (s), 156.3 (s), 147.6 (s), 136.9 (s), 127.4 (s), 121.7 (s), 104.8 (s), 88.6 (s) & 83.8 (s)

[II] 4-((4-hydroxy-3-methoxybenzylidene) amino)pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3606 & 690 cm^{-1} (—O–H), 3410 & 750 cm^{-1} (—N–H), 1710 cm^{-1} (>C=O), 1640 cm^{-1} (—N=CH), 1610 cm^{-1} (—N=C—), 1240 cm^{-1} (—N–C<), 1190 cm^{-1} (Ar—OR) & 1140 cm^{-1} (ArO–R)

^{1}HNMR δ (ppm): 8.48 (s, 1H), 8.43 (d, 1H), 8.00 (s, 1H), 7.52 (s, 1H), 7.34 (d, 1H), 6.91 (d, 1H), 5.40 (d, 1H), 5.35 (s, 1H) & 3.83 (s, 3H)

^{13}CNMR δ (ppm): 163.7 (s), 160.1 (s), 156.3 (s), 151.0 (s), 149.3 (s), 127.4 (s), 127.3 (s), 122.9 (s), 117.0 (s), 112.1 (s), 104.8 (s) & 56.1 (s)

[III]4-((3,4,5-trimethoxybenzylidene)amino) pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3289 & 805 cm^{-1} (—N–H), 1732 cm^{-1} (>C=O), 1633 cm^{-1} (N=CH), 1606 cm^{-1} (—N=C—), 1237 cm^{-1} (Ar—OR) & 1120 cm^{-1} (ArO–R)

^{1}HNMR δ (ppm): 8.48 (s, 1H), 8.43 (d, 1H), 8.00 (s, 1H), 7.14 (s, 2H), 5.40 (d, 1H) & 3.83 (s, 9H)

^{13}CNMR δ (ppm): 163.7 (s), 160.1 (s), 156.3 (s), 153.2 (s), 141.5 (s), 128.0 (s), 127.4 (s), 104.8 (s), 104.0 (d), 60.8 (s) & 56.1 (s)

[IV] 4-((furan-2-ylmethylene)amino)pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3270 & 750 cm^{-1} (—N–H), 1700 cm^{-1} (>C=O), 1640 cm^{-1} (—N=CH), 1620 cm^{-1} (—N=C—), 1230 cm^{-1} (ArO–R) & 1040 cm^{-1} (—N–C<)

^{1}HNMR δ (ppm): 8.43 (d, 1H), 8.00 (s, 1H), 7.75 (d, 1H), 7.50 (s, 1H), 6.93 (d, 1H), 6.52 (t, 1H) & 5.40 (d, 1H)

^{13}CNMR δ (ppm): 163.7 (s), 160.1 (s), 156.3 (s), 149.1 (s), 144.4 (s), 127.4 (s), 118.9 (s), 112.6 (s) & 104.8 (s)

[V] 4-((pyridin-4-ylmethylene)amino) pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3300 & 770 cm^{-1} (—N–H), 1640 cm^{-1} (—N=CH), 1620 cm^{-1} (—N=C—) & 1110 cm^{-1} (—N–C<)

^{1}HNMR δ (ppm): 8.66 (d, 2H), 8.43 (s, 1H), 8.00 (s, 1H), 7.98 (d, 2H), 7.50 (s, 1H) & 5.40 (d, 1H)

^{13}CNMR δ (ppm): 163.7 (s), 160.1 (s), 156.3 (s), 149.4 (d), 144.3 (s), 127.4 (s), 120.4 (s) & 104.8 (s)

[VI] 4-((2-hydroxy-5-nitrobenzylidene)amino) pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3622 & 778 cm^{-1} (—O–H), 3271 & 814 cm^{-1} (—N–H), 1741 cm^{-1} (>C=O), 1651 cm^{-1} (—N=CH), 1633 cm^{-1} (—N=C—) and 1480 cm^{-1} (Ar—NO_2)

^{1}HNMR δ (ppm): 8.48 (s, 1H), 8.43 (d, 1H), 8.35 (s, 1H), 8.05 (d, 1H), 8.00 (s, 1H), 7.28 (d, 1H), 5.40 (d, 1H) and 5.35 (s, 1H)

^{13}CNMR δ (ppm): 167.2 (s), 163.7 (s), 160.1 (s), 156.3 (s), 140.6 (s), 128.6 (s), 127.4 (s), 125.5 (s), 119.4 (s), 116.9 (s) and 104.8 (s)

[VII] 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3280 & 796 cm^{-1} (—N—H), 3262 & 751 cm^{-1} (—O—H), 1741 cm^{-1} (>C=O), 1642 cm^{-1} (—N=CH), 1633 cm^{-1} (—N=C—), 1570 cm^{-1} (Ar—NO$_2$), 1309 cm^{-1} (Ar—OR) and 1246cm^{-1} (ArO—R)

^{1}HNMR δ (ppm): 8.48 (s, 1H), 8.43 (d, 1H), 8.00 (s, 1H), 7.91 (s, 2H), 5.40 (s, 1H), 5.35 (s, 1H) and 3.83 (s, 3H)

^{13}CNMR δ (ppm): 163.7 (s), 160.1 (s), 156.3 (s), 152.4 (s), 140.3 (s), 138.1 (s), 128.2 (s), 127.4 (s), 118.2 (s), 116.5 (s), 104.8 (s) and 56.1 (s)

[VIII] 4-((4-(diethylamino)-2-hydroxy benzylidene)amino)pyrimidin-2(1H)-one

FTIR (cm^{-1}): 3253 & 841 cm^{-1} (—N—H), 3145 & 688 cm^{-1} (—O—H), 3064 cm^{-1} (—C—C—), 1678 cm^{-1} (—N=CH), 1624 cm^{-1} (—N=C—) and 1237 cm^{-1} (Ar—N—)

^{1}HNMR δ (ppm): 8.48 (s, 1H), 8.43 (d, 1H), 8.00 (s, 1H), 7.48 (d, 1H), 6.37 (d, 1H), 6.30 (s, 1H), 5.40 (d, 1H), 3.41 (q, 4H) and 1.15 (t, 6H)

^{13}CNMR δ (ppm): 163.7 (s), 162.0 (s), 160.1 (s), 156.3 (s), 153.3 (s), 132.8 (s), 127.4 (s), 108.4 (s), 104.8 (s), 104.5 (s), 47.1 (d) and 12.9 (s)

Table 2.The physical and analytical data of derivatives of cytosine

Derivatives of Cytosine	Molecular Weight	Nature of Appearance	% of yield	Elemental Analysis (in %)				
				C	H	O	N	I
[I] $C_{11}H_7I_2N_3O_2$	467.00	Yellow Crystalline Solid	85	28.29	1.51	6.85	9.00	54.35
[II] $C_{12}H_{11}N_3O_3$	245.23	Yellow Crystalline Solid	87	58.77	4.52	19.57	17.13	-
[III] $C_{14}H_{15}N_3O_4$	289.28	Yellow Crystalline Solid	68	58.13	5.23	22.12	14.53	-
[IV] $C_9H_7N_3O_2$	189.17	Yellow Crystalline Solid	79	57.14	3.73	16.92	22.21	-
[V] $C_{10}H_8N_4O$	200.19	Yellow Crystalline Solid	80	59.99	4.03	7.99	27.99	-
[VI] $C_{11}H_8N_4O_4$	260.19	Yellow Crystalline Solid	84	50.77	3.10	24.60	21.53	-
[VII] $C_{12}H_{10}N_4O_5$	290.23	Yellow Crystalline Solid	86	49.66	3.47	27.56	19.30	-
[VIII] $C_{15}H_{18}N_4O_2$	286.329	Yellow Crystalline Solid	77	62.92	6.34	11.18	19.57	-

Antibacterial bioassay

Antibacterial activities[12,13] of derivatives of cytosine were screened against bacterial gram positive bacteria *Staphylococcus aureus*, and gram negative bacteria *Escherichia coli, Klebsiella aerogenes* and *Bacillus subtilis* by disc diffusion method and the resultsobtained were formulated in Table.3 and Fig. 1-4 The experiments were carried out in DMSO solution at a concentration of 100ppm using Muller Hinton agar media. Ciprofloxacin was used as a standard.

Antifungal bioassay

Antifungal[14,15] screening of derivatives of cytosine were carried out against *Aspergillus niger* and *Candida albicans* by disc diffusion method and the resultsobtained were formulated in Table.3 and Fig. 5and 6. The test was carried out in DMSO solution at a concentration of 100 ppm. Results were compared with Nystatin at the same concentration.

Table 3.Antibacterial and antifungal activity of derivatives of Cytosine

Compounds	Gram negative Bacterias		Gram positive Bacterias		Fungi	
	E. coli	*K. aerogenes*	*B. subtilis*	*S. aureus*	*A. niger*	*C. albicans*
I	33	26	36	33	31	29
II	32	25	35	31	29	28
III	32	25	34	29	27	27
IV	31	24	32	28	26	26
V	30	22	30	27	24	24
VI	26	20	27	25	23	20
VI	24	18	26	23	20	19
VII	20	17	23	22	17	18
VIII	18	15	21	19	15	17
S. control	-	-	-	-	-	-
Standard	38	30	40	35	35	32

Fig. 1

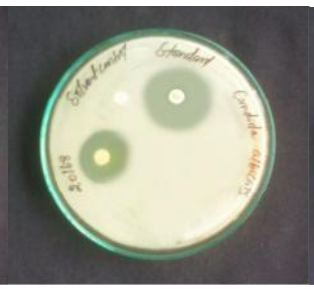


Fig. 2

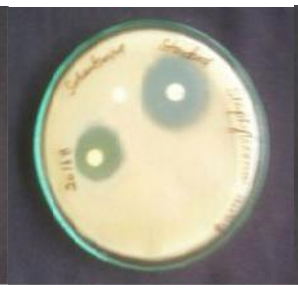


Fig. 3

Fig. 4

Fig. 5

Fig. 6

The antibacterial and antifungal activity of azomethine compounds I- VIII (table. 3 and figure 1-6) clearly indicate that they inhibit the growth of tested bacteria and fungi in the decreasing order I>II>III>IV>V>VI>VII>VIII. Azomethine compounds I- VIII prevent bacterial reproduction by acting as an antimetabolite to paraamino benzoic acid (PABA), where PABA is a vital component in the biosynthesis of tetrahydrofolic acid. Competitive inhibition of PABA processing enzymes by I-VIII ultimately blocks the action of dihydrofolic acid synthetase, and therefore prevents dihydrofolic acid formation. As bacteria are unable to take up tetrahydrofolic acid from their surroundings, inhibition of dihydrofolic acid synthetase will starve the bacteria of thymidine and uridine. These two nucleosides are required for DNA replication and transcription, therefore cell growth and division is disrupted, and thus provides enough time for the body's own immune system to eliminate the bacterial threat[17].

The nature of bonding and structure of azomethine organic compounds were elucidated[3-5] by the elemental analysis, Melting Point, FTIR, ^{1}H NMR,^{13}C NMR, Chromatography and Molar ratio methods Gomathi*et.al* were prepared 4-(3-ethoxy- 2 – hydroxybenxzelideneaminno - N-(thiazole-2-yl-)benzenesulfonamide, Mohamed et.al and wereprepared 4-(-phenyl-propylideneamino)-benzenesulfonamide. In accordance with the dataobtained from antibacterial activities of 4-((2-hydroxy-3,5-diiodobenzylidene)amino)benzenesulfonamidean d 4-((2-hydroxy-3,5-diiodobenzylidene)amino)-N-(thiazole-2-yl-)benzenesulfonamide, were moderately inhibited the growth of tested bacteria but our derivatives of cytosine cytosine (I) 4-((2-hydroxy-3,5-diiodobenzylidene)amino)pyrimidin-2(1H)-one, (II) 4-((4-hydroxy-3-methoxybenzy lidene)amino)pyrimidin-2(1H)-one, (III) 4-((3,4,5-trimethoxybenzylidene)amino)pyrimidin-2(1H)-one, (IV) 4-((furan-2-ylmethylene)amino) pyrimidin-2(1H)-one, (V) 4-((pyridin-4-ylmethylene)amino)pyrimidin-2(1H)-one, (VI) 4-((2-hydroxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one, (VII) 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one and (VIII) 4-((4-(diethylamino)-2-hydroxybenzylidene)amino)pyrimidin-2(1H)-one were highly inhibited the growth of tested bacteria.

In accordance with the data obtained from antifungal activities of 4-(3-ethoxy-2-hydroxybenxzelideneamino-N-(thiazole-2-yl-) benzenesulfonamide[16] (Gomathi et.al) were moderately inhibited the growth of tested fungi but our derivatives of cytosine (I) 4-((2-hydroxy-3,5-diiodobenzylidene) amino) pyrimidin-2(1H)-one, (II) 4-((4-hydroxy-3-methoxybenzylidene) amino)pyrimidin-2(1H)-one, (III) 4-((3,4,5-trimethoxybenzylidene) amino) pyrimidin-2(1H)-one, (IV) 4-((furan-2-ylmethylene)amino) pyrimidin-2(1H)-one, (V) 4-((pyridin-4-ylm ethylene)amino)pyrimidin-2(1H)-one, (VI) 4-((2-hydroxy-5 - nitrobenzylidene) amino) pyrimidin-2(1H)-one, (VII) 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one and (VIII) 4-((4-(diethylamino)-2-hydroxybenzylidene)amino)pyrimidin-2(1H)-one were highly inhibited the growth of tested fungi. From the results and previous work, antibacterial and antifungal activity studies were indicated that iodine substituted derivatives of cytosine were more active against bacteria and fungi than other derivatives of cytosine.

Conclusion

The derivatives of cytosine (I) 4-((2-hydroxy-3,5-diiodobenzylidene) amino) pyrimidin-2(1H)-one, (II) 4-((4-hydroxy-3-methoxybenzylidene) amino) pyrimidin-2(1H)-one, (III) 4-((3,4,5-trimethoxy benzylidene)amino)pyrimidin-2(1H)-one, (IV) 4-((furan-2-ylmethylene)amino)pyrimidin-2(1H)-one, (V) 4-((pyridin-4-ylmethylene)amino) pyrimidin-2(1H)-one, (VI) 4-((2-hydroxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one, (VII) 4-((4-hydroxy-3-methoxy-5-nitrobenzylidene)amino)pyrimidin-2(1H)-one and (VIII) 4-((4-(diethylamino)-2-hydroxybenzylidene)amino) pyrimidin-2(1H)-one were prepared and bio-assay were tested against important bacteria and fungi. It was shown that the growth of bacteria and fungi were highly inhibited by the derivatives of cytosine.

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