Indian Journal of Chemistry
Vol. 62, November 2023, pp. 1131-1140
DOI: 10.56042/ijc.v62i11.1154

Design, synthesis and antitubercular activity of pyrazole and benzo[*d*]imidazole clubbed dihydroimidazo[1,2-*a*]pyrimidinones

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Received 9 May 2023; accepted (revised) 17 October 2023

The discovery and development of new pharmaceutically active drugs by medicinal chemists is being impeded by the emerging issue of antimicrobial resistance. It has triggered the urgent necessity for the generation of new medicinally active compounds. In addition, novel dihydroimidazo[1,2-*a*]pyrimidinone containing clubbed pyrazole and benzo[*d*]imidazole derivatives (**5a-o**) have been developed, synthesized, and tested for their antitubercular efficacy. IR, ^{1}H and ^{13}C NMR, and mass spectroscopy are among the analytical methods used to establish structures of the novel compounds. *Mycobacterium* TB H_{37}Rv strain has been used in the antitubercular screening. The most effective derivatives (**5c** and **5h**) against the tested strain have MIC values of 50 µg/mL. The MIC values of the further derivatives **5a**, **5b**, **5e**, **5f**, **5g**, **5i**, and **5l** ranged from 62.5 to 125 µg/mL.

Keywords: Antitubercular activity, Pyrazole, Benzo[*d*]imidazole, Dihydroimidazo[1,2-*a*]pyrimidinone

The main concern for medicinal chemists working on the development of new medicinally active drugs is the rise of infections that are resistant to the present antibiotic. According to Global Tuberculosis Report, an estimated 10.6 million people fell ill with tuberculosis in 2021. It is increased by 4.5% in comparison to 2020 (10.1 million). Between 2020 and 2021, there is an increase in drug-resistant tuberculosis, with 450 000 new cases of rifampicin-resistant TB reported in 2021. In 2021, there were 1.6 million tuberculosis-related deaths worldwide. It exceeds the 1.5 million predicted for 2020. India reported 32% of the 82% of TB deaths worldwide that occurred in the African and South-East Asian regions[1]. Globally, mortality from tuberculosis was correlated with the emergence of extensively drug-resistant (XDR) and multidrug-resistant (MDR) TB strains. The *de novo* design process is influenced by knowledge of synthetic organic chemistry, biological targets, and the *in silico* approach[2].

For the purpose of evaluating their antitubercular activity, the active components of benzo[*d*]imidazole clubbed dihydroimidazo[1,2-*a*]pyrimidinone have been synthesized. Heterocyclic compound containing pyrazole was an active pharmacophore used in medicinal chemistry for the development of bio-active compounds. In addition it has antimicrobial, antitubercular, anti-inflammatory, anticancer, anti-proliferative and, antiviral activities[3-9]. A fused benzene and imidazole molecule, benzo[*d*]imidazole has a variety of therapeutic advantages[10-18]. It is known that dihydroimidazo[1,2-*a*]pyrimidinone is biologically active[19-22].

Based on medical impotence of commercially available pharmaceuticals in the market, a drug design concept was elaborated as shown in Fig. 1. The commercially available drugs mepirizole and ruxolitinib were considered to design the targeted molecules. Benzo[*d*]imidazole clubbed dihydroimidazo [1,2-*a*]pyrimidinone was introduced at 4th position of pyrazole moiety of mepirizole. Modified dihydroimidazo[1,2-*a*]pyrimidinone was introduced at 4th position of pyrazole moiety of ruxolitinib. The 1st and 3rd positions of pyrazole of both commercially available drugs were occupied with phenyl and *m*-nitrophenyl rings respectively in developed molecule.

Kalirajan *et al.* developed pyrazole substituted benzimidazoles and evaluated their biological activities[23]. With a MIC value of 100 µg/mL, the synthesized molecule possessed antitubercular activity. In continuation to this, we prepared pyrazole and benzo[*d*]imidazole clubbed dihydroimidazo [1,2-*a*]pyrimidinones as potential antitubercular agents in accordance with this result. By using

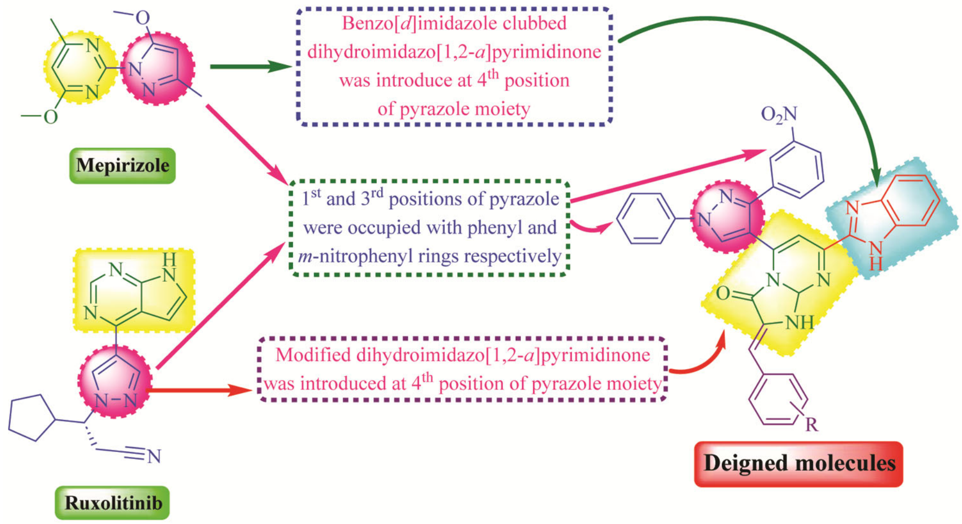


Fig. 1 — The concept of drug design based on medicinally used drugs for targeted pharmacophores (**5a-o**)

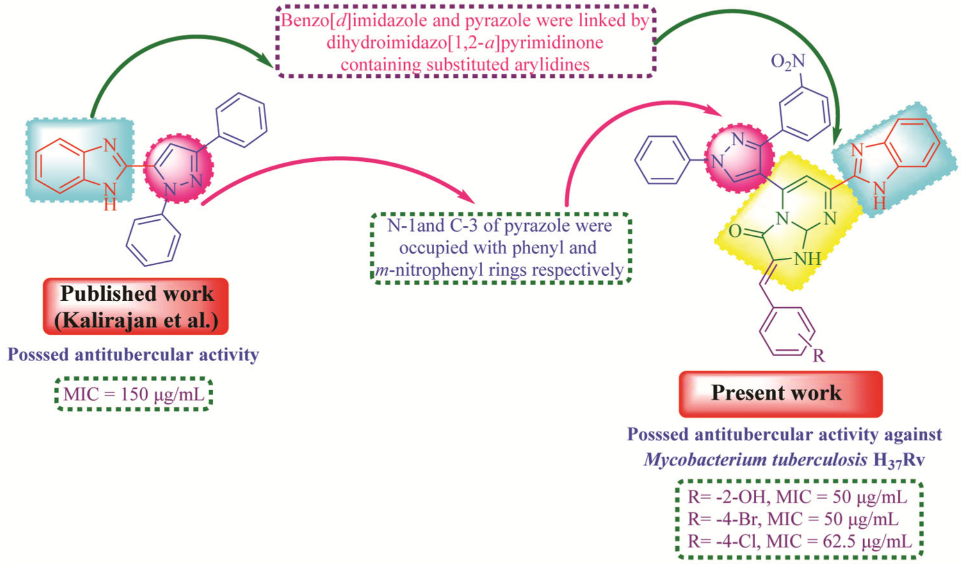


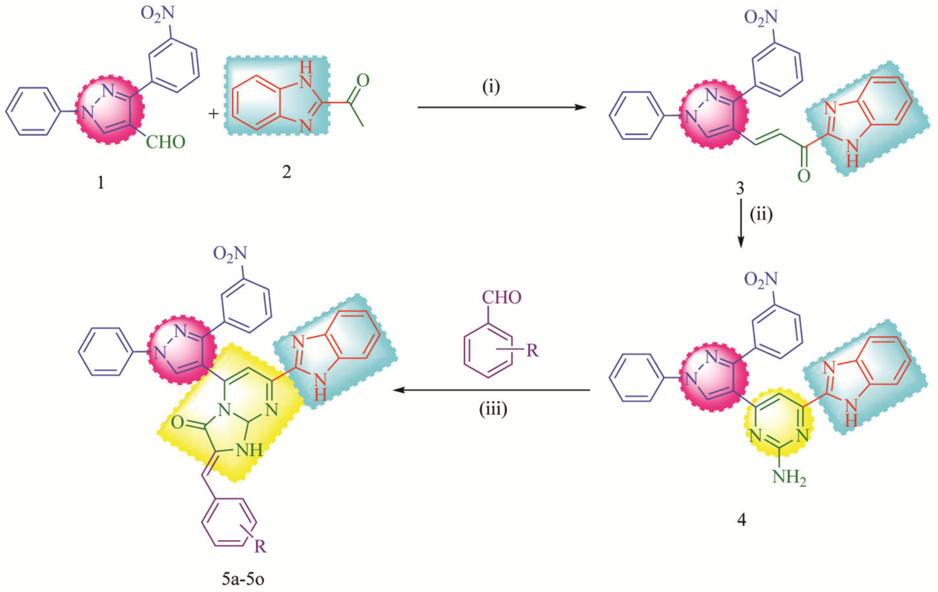
Fig. 2 — Rationale for the designed molecules in accordance to previously published work

dihydroimidazo[1,2-*a*]pyrimidinone, which contains substituted arylidines, benzo[*d*]imidazole and pyrazole. The results of antitubercular activity revealed the potency of designed molecules against *Mycobacterium tuberculosis* $H_{37}Rv$ strain. The rationale for designed compounds is summarized in Fig. 2.

Results and Discussion

Chemistry

Scheme 1 provides the synthesis of **5a-o**. In order to synthesise chalcone 1-(1*H*-benzo[*d*]imidazol-2-yl)-3-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)prop-2-en-1-one **3**, 3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazole-4-carbaldehyde **1** and 2-acetyl benzimidazole **2** were dissolved in methanol and agitated for 2 h in basic media using KOH. In addition, chalcone **3** produces a pyrimidine derivative 4-(1*H*-benzo[*d*]imidazol-2-yl)-6-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)pyrimidin-2-amine **4** when it reacted with guanidine and KOH at 60°C for 6 to 8 h using ethanol as the solvent. By refluxing compound **4** with substituted benzaldehydes, chloroacetic acid, sodium acetate, and acetic anhydride for 5 to 6 h in an acetic acid solvent, the final compounds **5a–5o** were formed.



Reagents and Conditions

(i) Methanol, KOH, Stirring, 2 h, (ii) $NH_2C(=NH)NH_2.HCl$, Methanol, KOH, Reflux, 60 °C 6-8 h, (iii) Chloroacetic acid, Sodium acetate, Acetic anhydride, Acetic acid, Reflux, 5-6 h

Where R = (a) -H, (b) -3-Br, (c) -4-Br, (d) -3-Cl, (e) -4-Cl, (f) -3-F, (g) -4-F, (h) -2-OH, (i) -4-OH, (j) -3-OCH_3, (k) -4-OCH_3, (l) -4-CH_3, (m) -3-NO_2, (n) -4-NO_2, (o) -2,4-$(OCH_3)_2$

Scheme 1 — Scheme for the synthesis of 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-arylidene-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8*a*-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-ones (**5a-o**)

Spectral Discussion

The IR spectra of compound **5a** showed the stretching frequencies at 3510 and 3396 cm^{-1} corresponds to the N-H stretching vibrations. Stretching frequencies at 1691 cm^{-1} and 1595 cm^{-1} confirmed the presence of >C=O and >C=N stretching vibrations, respectively. Stretching frequencies at 1531 cm^{-1} and 1506 cm^{-1} confirmed the presence of N=O stretching vibrations. ^{1}H NMR of compound **5a** showed signals at δ 5.75, 6.66, and 8.14 corresponding to the protons of dihydroimidazo [1,2-*a*]pyrimidinone. Pyrazole proton was confirmed at δ 8.59. Benzo[*d*]imidazol proton was confirmed at δ 9.83. ^{13}C NMR was also recorded for the reported compound. Pyrazole ring could be affirmed by observing the peaks at δ 110.7, 130.9, and 153.0 while peaks furnished at δ 85.1 was due to C_1 of dihydroimidazo[1,2-*a*]pyrimidinone. Signal at δ 148.9 was due to C_2 of benzo[*d*]imidazole. Mass spectra at *m/z* 604.24 was in the agreement with the proposed molecular weight of **5a**.

Discussion on antitubercular activity

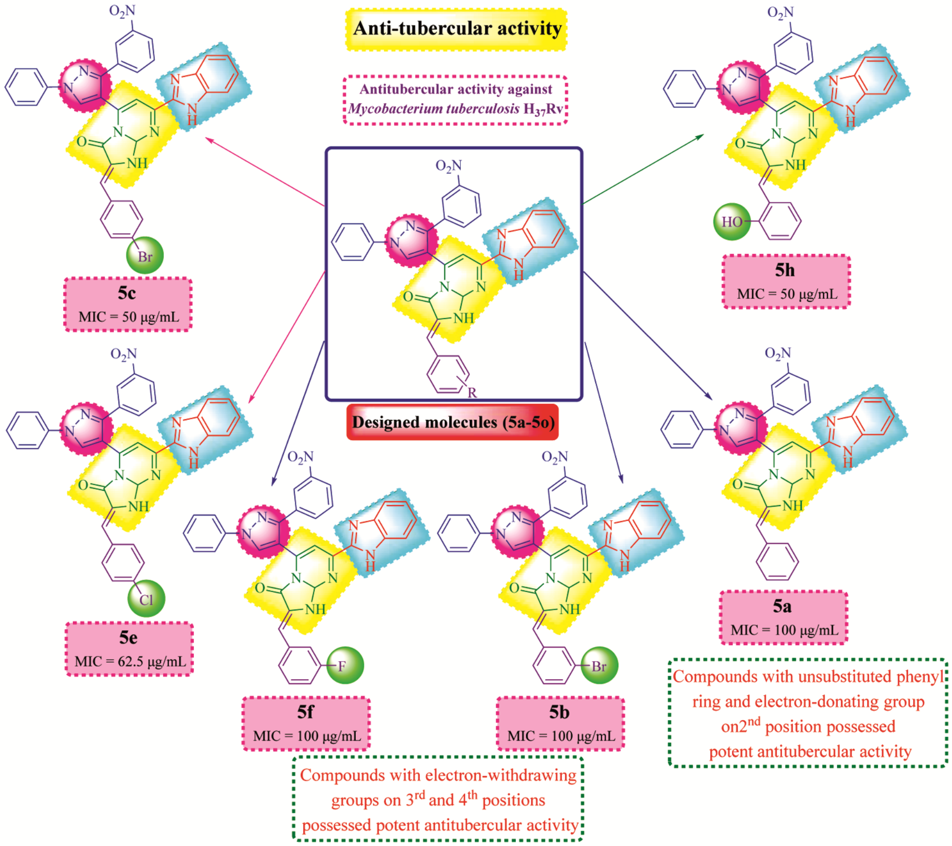
7-(1*H*-benzo[*d*]imidazol-2-yl)-2-arylidene-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8*a*-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-ones **(5a-o)** were synthesized for the development of novel antitubercular agents. Table 1 depicts results of the antitubercular activity of synthesised compounds. The most effective compounds against *Mycobacterium tuberculosis* $H_{37}Rv$ had a MIC value of 50 µg/mL, and these were compounds **5c** and **5h** containing a bromo group in the 4th position and a hydroxyl group in the 2nd position on the phenyl ring. The derivative **5e** with chloro group on 4th position on phenyl ring possessed MIC value of 62.5 µg/mL against *Mycobacterium tuberculosis* $H_{37}Rv$. The other derivatives **5a**, **5b**, **5f**, **5g**, **5i**, and **5l** were moderately potent having MIC values in the range of 100-125 µg/mL.

Structure-activity relationship

The structure-activity relationship (SAR) in Fig. 3 depicts the impact of various electron-donating and electron-withdrawing functional groups on the phenyl ring on the pyrazole and benzo[*d*]imidazole clubbed dihydroimidazo[1,2-*a*]pyrimidinones **(5a-o)** on antitubercular activity. The compounds that were most effective against *Mycobacterium tuberculosis* $H_{37}Rv$ with MIC values of 50 µg/mL were compound **5h** with an electron-donating

Table 1 — Antitubercular activity of pyrazole and benzo[*d*]imidazole clubbed dihydroimidazo[1,2-*a*]pyrimidinones (**5a-o**) against *Mycobacterium tuberculosis* $H_{37}Rv$ (µg/mL)

Entry	-R	m.p.(°C)	Mol. Formula	Yield (%)	Antitubercular activity
5a	-H	128-130	$C_{35}H_{24}N_8O_3$	80	100
5b	-3-Br	142-144	$C_{35}H_{23}BrN_8O_3$	73	100
5c	-4-Br	150-152	$C_{35}H_{23}BrN_8O_3$	83	050
5d	-3-Cl	124-126	$C_{35}H_{23}ClN_8O_3$	84	250
5e	-4-Cl	128-130	$C_{35}H_{23}ClN_8O_3$	81	62.5
5f	-3-F	136-138	$C_{35}H_{23}FN_8O_3$	86	100
5g	-4-F	132-134	$C_{35}H_{23}FN_8O_3$	78	125
5h	-2-OH	118-120	$C_{35}H_{24}N_8O_4$	82	050
5i	-4-OH	090-92	$C_{35}H_{24}N_8O_4$	70	125
5j	-3-OCH$_3$	126-128	$C_{36}H_{26}N_8O_4$	82	250
5k	-4-OCH$_3$	125-127	$C_{36}H_{26}N_8O_4$	78	500
5l	-4-CH$_3$	128-130	$C_{36}H_{26}N_8O_3$	85	125
5m	-3-NO$_2$	96-98	$C_{35}H_{23}N_9O_5$	83	250
5n	-4-NO$_2$	88-90	$C_{35}H_{23}N_9O_5$	84	500
5o	-2,4-(OCH$_3$)$_2$	98-100	$C_{37}H_{28}N_8O_5$	71	500
Isoniazid		–	–	–	0.20



Compounds with unsubstituted phenyl ring and electron-donating group on2nd position possessed potent antitubercular activity

Compounds with electron-withdrawing groups on 3rd and 4th positions possessed potent antitubercular activity

Fig. 3 — Structure-activity relationship representing effects of various electron-withdrawing and electron-donating groups on antitubercular activity

hydroxyl group in the second position on the phenyl ring and compound **5c** with an electron-withdrawing bromo group in the fourth position on the phenyl ring. The MIC value for compound **5e**, which has an electron-withdrawing chloro group in the fourth position on the phenyl ring, was 62.5 µg/mL. Compound **5a** has a MIC value of 100 µg/mL and an unsubstituted phenyl ring. The MIC values of compounds **5b** (–Br) and **5f** (–F), which both included electron-withdrawing functional groups on the phenyl ring's third position, were comparable to those of compound **5a**.

Experimental Section

Materials and instruments

Completion of the reaction and purity of compounds was checked on Aluminium coated TLC plates [60 F_{254} (E. Merck)]. n-hexane: ethyl acetate (3:2 V/V) was used as a mobile phase and was visualized in an iodine chamber. An electrothermal melting point apparatus was used to determine melting points and are uncorrected. Elemental analysis (% CHN) was confirmed by a Perkin-Elmer 2400 CHN analyser. A Perkin-Elmer FT-IR spectrophotometer was used to record IR spectra by using KBr. ^{1}H NMR and ^{13}C NMR spectra were recorded on a Bruker Avance III 400 MHz in DMSO as a solvent and tetramethylsilane (TMS) as an internal standard using a 5 mm tube. Mass spectra were obtained on SHIMADZU MS 2010 spectrometer[24].

Synthesis of 1-(1*H*-benzo[*d*]imidazol-2-yl)-3-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)prop-2-en-1-one, 3

A mixture of 3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazole-4-carbaldehyde (**1**, 0.01 mol) and 2-acetyl benzimidazole (**2**, 0.01 mol) in methanol was stirred for 2 h with drop-wise addition of KOH (1 g) in methanol. After completion of the reaction, the chalcone formed was filtered and washed with methanol. Yield 84%. Solid. m.p. 156-158°C. Anal. Calcd for $C_{25}H_{17}N_5O_3$: C, 68.96; H, 3.94; N, 16.08. Found: C, 68.98; H, 3.90; N, 16.12%.

Synthesis of 4-(1*H*-benzo[*d*]imidazol-2-yl)-6-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)pyrimidin-2-amine, 4

Chalcone (4, 0.01 mol), guanidine (0.01 mol), and KOH (1 g) were refluxed in ethanol (20 mL) for 6 to 8 h at 60°C. The mixture was poured onto crushed ice after the reaction was finished. Filtered, washed, and recrystallized from methanol was the isolated product. Yield 84%. Solid. m.p. 160-162°C. Anal. Calcd for $C_{26}H_{18}N_8O_2$: C, 65.82; H, 3.82; N, 23.62. Found: C, 65.80; H, 3.88; N, 23.65%.

Synthesis of 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-arylidene-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8*a*-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-ones, 5a-o

Chloroacetic acid, sodium acetate, acetic anhydride, 4-(1*H*-benzo[*d*]imidazol-2-yl)-6-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)pyrimidin-2-amine, substituted benzaldehydes, and chloroacetic acid were mixed in acetic acid (20 mL) and refluxed for 5 to 6 h. The product was separated and re-crystallized from the reaction mixture using crushed ice.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-benzylidene-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5a

Yield 80%. Solid. m.p. 128-130°C. IR (KBr): 3510 (N-H stretching), 3396 (N-H stretching), 3082 (C–H stretching, aromatic), 2872, 2835 (C–H stretching, aromatic), 1691 (C=O stretching), 1595 (C=N stretching), 1531 (N=O stretching), 1506 (N=O stretching), 1454 cm^{-1} (C-N stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 5.75 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.66 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 7.04 (s, 1H, =C*H*-Ar), 7.26-7.89 (m, 18H, Ar-*H*), 8.14 (s, 1H, =C*H*-C), 8.59 (s, 1H, =C*H*-N), 9.83 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.1 (C_1 of dihydroimidazo[1,2-*a*]pyrimidinone), 105.0, 110.2 (=*C*H-Ar), 110.7 (C_4 of pyrazole ring), 114.6, 118.5, 120.5, 121.8, 122.7, 124.7, 126.7, 127.7, 129.3, 129.4, 129.6, 129.8, 130.1, 130.3, 130.7, 130.9 (C_3 of pyrazole ring), 132.7, 134.3, 135.6, 138.0, 139.0, 140.8, 146.7, 147.4, 148.9 (C_2 of benzo[*d*]imidazol), 153.0 (C_3 of pyrazole ring), 154.1, 161.7 (-C=O); MS: *m/z* 604.24 (M^+). Anal. Calcd for $C_{35}H_{24}N_8O_3$: C, 69.53; H, 4.00; N, 18.53. Found: C, 69.52; H, 3.96; N, 18.57%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(3-bromobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5b

Yield 73%. Solid. m.p. 142-144°C. IR (KBr): 3512 (N-H stretching), 3390 (N-H stretching), 3080 (C–H stretching, aromatic), 2875, 2830 (C–H stretching, aromatic), 1695 (C=O stretching), 1593 (C=N stretching), 1532 (N=O stretching), 1510 (N=O stretching), 1450 (C-N stretching), 647 cm^{-1} (C-Br stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 5.90 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.73 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 7.11 (s, 1H, =C*H*-Ar), 7.27-7.93 (m, 17H, Ar-*H*), 8.11 (s, 1H, =C*H*-C), 8.41 (s, 1H, =C*H*-N), 9.92 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.3 (C_1 of dihydroimidazo[1,2-*a*]pyrimidinone), 105.2 (=*C*H-Ar), 110.5 (C_4 of pyrazole ring), 111.7, 114.1, 119.1, 119.3, 120.5, 122.7, 123.5, 125.9, 126.1, 127.0, 127.2, 128.3, 129.5, 129.8, 130.1 (C_3 of pyrazole ring), 131.9, 132.3, 132.4, 133.1, 134.3, 134.4, 136.0, 137.3, 139.4, 140.0, 146.7, 147.6, 148.9 (C_2 of benzo[*d*]imidazol), 152.6 (C_3 of pyrazole ring), 154.3, 163.5 (-C=O); MS: *m/z* 682.16 (M^+). Anal. Calcd for $C_{35}H_{23}BrN_8O_3$: C, 61.50; H, 3.39; N, 16.39. Found: C, 61.58; H, 3.34; N, 16.40%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(4-bromobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5c

Yield 83%. Solid. m.p. 150-152°C. IR (KBr): 3514 (N-H stretching), 3387 (N-H stretching), 3070 (C–H stretching, aromatic), 2865, 2832 (C–H stretching, aromatic), 1697 (C=O stretching), 1596 (C=N stretching), 1533 (N=O stretching), 1511 (N=O stretching), 1455 (C-N stretching), 650 cm^{-1} (C-Br stretching); ^1H NMR (DMSO-d_6, 400 MHz): δ 5.62 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.72 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 7.03 (s, 1H, =C*H*-Ar), 7.27-7.84 (m, 17H, Ar-*H*), 8.22 (s, 1H, =C*H*-C), 8.65 (s, 1H, =C*H*-N), 9.83 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.4 (C_1 of dihydroimidazo[1,2-*a*]pyrimidinone), 105.2 (=*C*H-Ar), 110.1 (C_4 of pyrazole ring), 111.2, 114.3, 119.3, 119.4, 120.1, 122.4, 123.8, 125.9, 126.1, 127.1, 127.2, 128.5, 129.4, 129.8, 130.0 (C_3 of pyrazole ring), 131.5, 132.8, 132.7, 133.2, 134.7, 134.8, 136.1, 137.4, 139.7, 140.0, 146.8, 147.9, 148.4 (C_2 of benzo[*d*]imidazol), 152.5 (C_3 of pyrazole ring), 154.3, 163.7 (-C=O); MS: *m/z* 682.12 (M^+). Anal. Calcd for $C_{35}H_{23}BrN_8O_3$: C, 61.50; H, 3.39; N, 16.39. Found: C, 61.52; H, 3.43; N, 16.34%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(3-chlorobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5d

Yield 84%. Solid. m.p. 124-126°C. IR (KBr): 3515 (N-H stretching), 3397 (N-H stretching), 3082 (C–H stretching, aromatic), 2870, 2835 (C–H stretching, aromatic), 1690 (C=O stretching), 1590 (C=N stretching), 1530 (N=O stretching), 1510 (N=O stretching), 1457 (C-N stretching), 750 cm^{-1} (C-Cl stretching); ^1H NMR (DMSO-d_6, 400 MHz): δ 5.70 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.66 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 7.04 (s, 1H, =C*H*-Ar), 7.27-7.91 (m, 17H, Ar-*H*), 8.20 (s, 1H, =C*H*-C), 8.54 (s, 1H, =C*H*-N), 9.80 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 86.2 (C_1 of dihydroimidazo[1,2-*a*]pyrimidinone), 105.5(=*C*H-Ar), 109.7, 110.5 (C_4 of pyrazole ring), 114.4, 120.5, 120.7, 122.0, 122.2, 123.2, 123.4, 126.1, 126.7, 127.4, 127.9, 129.6, 129.8, 130.3 (C_3 of pyrazole ring), 131.9, 132.1, 133.1, 133.6, 134.3, 136.3, 137.3, 140.3, 141.0, 146.9, 149.7 (C_2 of benzo[*d*]imidazol), 152.8 (C_3 of pyrazole ring), 154.3, 163.5 (-C=O); MS: *m/z* 638.22 (M^+). Anal. Calcd for $C_{35}H_{23}ClN_8O_3$: C, 65.78; H, 3.63; N, 17.53. Found: C, 65.76; H, 3.68; N, 17.50%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(4-chlorobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5e

Yield 81%. Solid. m.p. 128-130°C. IR (KBr): 3517 (N-H stretching), 3390 (N-H stretching), 3088 (C–H stretching, aromatic), 2870, 2830 (C–H stretching, aromatic), 1690 (C=O stretching), 1590 (C=N stretching), 1535 (N=O stretching), 1512 (N=O stretching), 1457 (C-N stretching), 750 cm^{-1} (C-Cl stretching); ^1H NMR (DMSO-d_6, 400 MHz): δ 5.76 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.62 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 7.11 (s, 1H, =C*H*-Ar), 7.25-7.89 (m, 17H, Ar-*H*), 8.21 (s, 1H, =C*H*-C), 8.51 (s, 1H, =C*H*-N), 9.81 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.7 (C_1 of dihydroimidazo[1,2-*a*]pyrimidinone), 105.4 (=*C*H-Ar), 110.7 (C_4 of pyrazole ring), 111.3, 114.5, 119.8, 119.9, 120.2, 122.8, 123.4, 125.8, 126.8, 127.1, 127.2, 128.7, 129.4, 129.5, 130.7 (C_3 of pyrazole ring), 131.4, 132.4, 132.8, 133.0, 134.6, 134.9, 136.7, 137.7, 139.8, 140.5, 146.7, 147.8, 148.7 (C_2 of benzo[*d*]imidazol), 152.8 (C_3 of pyrazole ring), 154.9, 163.8 (-C=O); MS: *m/z* 638.18 (M^+). Anal. Calcd for $C_{35}H_{23}ClN_8O_3$: C, 65.78; H, 3.63; N, 17.53. Found: C, 65.79; H, 3.62; N, 17.46%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(3-fluorobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5f

Yield 86%. Solid. m.p. 136-138°C. IR (KBr): 3517 (N-H stretching), 3390 (N-H stretching), 3080 (C–H stretching, aromatic), 2878, 2834 (C–H stretching, aromatic), 1692 (C=O stretching), 1590 (C=N stretching), 1535 (N=O stretching), 1515 (N=O stretching), 1452 (C-N stretching), 1430 cm^{-1} (C-F stretching); ^1H NMR (DMSO-d_6, 400 MHz): δ 5.69 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.60 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 7.10 (s, 1H, =C*H*-Ar), 7.26-7.87 (m, 17H, Ar-*H*), 8.25 (s, 1H, =C*H*-C), 8.51 (s, 1H,

=C*H*-N), 9.83 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.4 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 105.0 (=*C*H-Ar), 110.0 (C$_4$ of pyrazole ring), 111.1, 114.3, 119.0, 119.5, 120.8, 122.2, 123.4, 125.5, 126.6, 127.5, 127.7, 128.8, 129.9, 130.2, 130.9 (C$_3$ of pyrazole ring), 131.5, 132.7, 132.9, 133.8, 134.6, 134.8, 136.3, 137.4, 139.1, 140.4, 146.7, 147.5, 148.6 (C$_2$ of benzo[*d*]imidazol), 152.3 (C$_3$ of pyrazole ring), 154.7, 163.1 (-C=O); MS: *m/z* 638.18 (M$^+$).MS: *m/z* 622.12 (M$^+$). Anal. Calcd for C$_{35}$H$_{23}$FN$_8$O$_3$: C, 67.52; H, 3.72; N, 18.00. Found: C, 67.53; H, 3.72; N, 17.96%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(4-fluorobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5g

Yield 78%. Solid. m.p. 132-134°C. IR (KBr): 3518 (N-H stretching), 3392 (N-H stretching), 3085 (C–H stretching, aromatic), 2885, 2831 (C–H stretching, aromatic), 1690 (C=O stretching), 1593 (C=N stretching), 1527 (N=O stretching), 1518 (N=O stretching), 1457 (C-N stretching), 1427 cm^{-1} (C-F stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 5.71 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.59 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 7.11 (s, 1H, =C*H*-Ar), 7.24-7.85 (m, 17H, Ar-*H*), 8.23 (s, 1H, =C*H*-C), 8.54 (s, 1H, =C*H*-N), 9.82 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.1 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 105.3 (=*C*H-Ar), 110.7 (C$_4$ of pyrazole ring), 111.4, 114.7, 119.3, 119.5, 120.1, 122.9, 123.0, 125.5, 126.4, 127.0, 127.3, 128.8, 129.5, 129.9, 130.1 (C$_3$ of pyrazole ring), 131.7, 132.8, 132.9, 133.4, 134.5, 134.7, 136.1, 137.5, 139.2, 140.7, 146.9, 147.0, 148.5 (C$_2$ of benzo[*d*]imidazol), 152.3 (C$_3$ of pyrazole ring), 154.1, 163.4 (-C=O); MS: *m/z* 638.18 (M$^+$).MS: *m/z* 622.20 (M$^+$). Anal. Calcd for C$_{35}$H$_{23}$FN$_8$O$_3$: C, 67.52; H, 3.72; N, 18.00. Found: C, 67.57; H, 3.68; N, 18.02%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(2-hydroxybenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1, 8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5h

Yield 82%. Solid. m.p. 118-120°C. IR (KBr): 3517 (N-H stretching), 3395 (N-H stretching), 3085 (C–H stretching, aromatic), 2872, 2830 (C–H stretching, aromatic), 1694 (C=O stretching), 1597 (C=N stretching), 1530 (N=O stretching), 1515 (N=O stretching), 1454 (C-N stretching), 1325 cm^{-1} (O-H stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 5.71 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.72 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 6.80 (s, 1H, -OH), 7.12 (s, 1H, =C*H*-Ar), 7.28-7.90 (m, 17H, Ar-*H*), 8.16 (s, 1H, =C*H*-C), 8.56 (s, 1H, =C*H*-N), 9.88 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.3 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 105.8 (=*C*H-Ar), 110.8 (C$_4$ of pyrazole ring), 111.5, 114.7, 119.0, 119.8, 120.7, 122.5, 123.4, 125.2, 126.6, 127.8, 127.3, 128.4, 129.6, 129.8, 130.4 (C$_3$ of pyrazole ring), 131.8, 132.6, 132.5, 133.4, 134.3, 134.2, 136.1, 137.4, 139.3, 140.6, 146.8, 147.0, 148.8 (C$_2$ of benzo[*d*]imidazol), 152.7 (C$_3$ of pyrazole ring), 154.5, 163.8 (-C=O); MS: *m/z* 620.22 (M$^+$). Anal. Calcd for C$_{35}$H$_{24}$N$_8$O$_4$: C, 67.74; H, 3.90; N, 18.06. Found: C, 67.72; H, 3.92; N, 18.10%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(4-hydroxybenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2H)-one, 5i

Yield 70%. Solid. m.p. 90-92°C. IR (KBr): 3510 (N-H stretching), 3397 (N-H stretching), 3070 (C–H stretching, aromatic), 2871, 2833 (C–H stretching, aromatic), 1696 (C=O stretching), 1595 (C=N stretching), 1528 (N=O stretching), 1520 (N=O stretching), 1456 (C-N stretching), 1330 cm^{-1} (O-H stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 5.74 (d, *J* = 5.9 Hz, 1H, -CH-N*H*-), 6.72 (d, *J* = 5.9 Hz, 1H, C*H*-NH-), 6.83 (s, 1H, -OH), 7.14 (s, 1H, =C*H*-Ar), 7.21-7.85 (m, 17H, Ar-*H*), 8.10 (s, 1H, =C*H*-C), 8.53 (s, 1H, =C*H*-N), 9.85 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.1 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 105.5 (=*C*H-Ar), 110.2 (C$_4$ of pyrazole ring), 111.4, 114.7, 119.1, 119.6, 120.8, 122.7, 123.0, 125.7, 126.8, 127.2, 127.3, 128.4, 129.2, 129.8, 130.7 (C$_3$ of pyrazole ring), 131.0, 132.5, 132.6, 133.8, 134.0, 134.2, 136.1, 137.7, 139.5, 140.0, 146.5, 147.5, 148.3 (C$_2$ of benzo[*d*]imidazol), 152.0 (C$_3$ of pyrazole ring), 154.1, 163.6 (-C=O); MS: *m/z* 620.26 (M$^+$). Anal. Calcd for C$_{35}$H$_{24}$N$_8$O$_4$: C, 67.74; H, 3.90; N, 18.06. Found: C, 67.76; H, 3.86; N, 18.11%.

Characterization of compound 7-(1*H*-benzo [*d*]imidazol-2-yl)-2-(3-methoxybenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5j

Yield 82%. Solid. m.p. 126-128°C. IR (KBr): 3518 (N-H stretching), 3392 (N-H stretching), 3087 (C–H stretching, aromatic), 2871, 2835 (C–H stretching, aromatic), 1690 (C=O stretching), 1592 (C=N stretching), 1530 (N=O stretching), 1510 (N=O stretching), 1452 (C-N stretching), 1250 cm^{-1} (C-O stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 3.82 (s, 3H, -OCH$_3$), 5.72 (d, J = 5.9 Hz, 1H, -CH-N*H*-), 6.70 (d, J = 5.9 Hz, 1H, C*H*-NH-), 7.07 (s, 1H, =C*H*-Ar), 7.27-7.93 (m, 17H, Ar-*H*), 8.26 (s, 1H, =C*H*-C), 8.66 (s, 1H, =C*H*-N), 9.85 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 56.1 (Ar-OCH$_3$), 83.6 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 105.7, 110.4 (=*C*H-Ar), 113.1 (C$_4$ of pyrazole ring), 113.3, 113.9, 115.1, 119.6, 120.5, 123.2, 123.5, 124.0, 126.1, 127.0, 127.6, 129.2, 129.4, 129.8, 131.9 (C$_3$ of pyrazole ring), 132.1, 133.6, 134.3, 137.5, 137.9, 140.5, 140.8, 146.7, 147.1, 147.6, 153.7 (C$_2$ of benzo[*d*]imidazol), 154.3 (C$_3$ of pyrazole ring), 160.7, 162.2 (-C=O); MS: *m/z* 634.16 (M$^+$). Anal. Calcd for $C_{36}H_{26}N_8O_4$: C, 68.13; H, 4.13; N, 17.66. Found: C, 68.15; H, 4.15; N, 17.61%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(4-methoxybenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5k

Yield 78%. Solid. m.p. 125-127°C. IR (KBr): 3510 (N-H stretching), 3385 (N-H stretching), 3077 (C–H stretching, aromatic), 2870, 2830 (C–H stretching, aromatic), 1693 (C=O stretching), 1590 (C=N stretching), 1530 (N=O stretching), 1512 (N=O stretching), 1454 (C-N stretching), 1257 cm^{-1} (C-O stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 3.85 (s, 3H, -OCH$_3$), 5.75 (d, J = 5.9 Hz, 1H, -CH-N*H*-), 6.71 (d, J = 5.9 Hz, 1H, C*H*-NH-), 7.09 (s, 1H, =C*H*-Ar), 7.27-7.93 (m, 17H, Ar-*H*), 8.22 (s, 1H, =C*H*-C), 8.60 (s, 1H, =C*H*-N), 9.83 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 56.5 (Ar-OCH$_3$), 83.7 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 105.8, 110.5 (=*C*H-Ar), 113.3 (C$_4$ of pyrazole ring), 113.4, 113.9, 115.0, 119.3, 120.0, 123.1, 123.5, 124.2, 126.0, 127.0, 127.5, 129.2, 129.7, 129.8, 131.0 (C$_3$ of pyrazole ring),, 132.2, 133.4, 134.3, 137.1, 137.4, 140.0, 140.8, 146.4, 147.7, 147.8, 153.0 (C$_2$ of benzo[*d*]imidazol), 154.2 (C$_3$ of pyrazole ring), 160.3, 162.5 (-C=O); MS: *m/z* 634.20 (M$^+$). Anal. Calcd for $C_{36}H_{26}N_8O_4$: C, 68.13; H, 4.13; N, 17.66. Found: C, 68.09; H, 4.10; N, 17.70%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(4-methylbenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5l

Yield 85%. Solid. m.p. 128-130°C. IR (KBr): 3515 (N-H stretching), 3392 (N-H stretching), 3085 (C–H stretching, aromatic), 2874, 2832 (C–H stretching, aromatic), 1697 (C=O stretching), 1595 (C=N stretching), 1530 (N=O stretching), 1512 (N=O stretching), 1457 cm^{-1} (C-N stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 2.25 (s, 3H, -CH$_3$), 5.76 (d, J = 5.9 Hz, 1H, -CH-N*H*-), 6.72 (d, J = 5.9 Hz, 1H, C*H*-NH-), 6.99 (s, 1H, =C*H*-Ar), 7.23-7.87 (m, 17H, Ar-*H*), 8.17 (s, 1H, =C*H*-C), 8.46 (s, 1H, =C*H*-N), 9.88 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 22.1 (Ar-CH$_3$), 83.0 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 104.8, 109.2 (=*C*H-Ar), 110.5 (C$_4$ of pyrazole ring), 112.4, 114.4, 119.6, 121.3, 123.0, 123.2, 123.5, 125.7, 126.1, 126.2, 127.7, 128.9, 129.8, 130.4, 131.1, 131.2, 131.9 (C$_3$ of pyrazole ring), 132.1, 133.1, 134.3, 136.6, 137.5, 138.0, 138.3, 141.0, 147.1, 147.6, 149.3, 153.0 (C$_2$ of benzo[*d*]imidazol), 154.8 (C$_3$ of pyrazole ring), 163.0 (-C=O); MS: *m/z* 618.24 (M$^+$). Anal. Calcd for $C_{36}H_{26}N_8O_3$: C, 69.89; H, 4.24; N, 18.11. Found: C, 69.62; H, 4.26; N, 18.07%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(3-nitrobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5m

Yield 84%. Solid. m.p. 88-90°C. IR (KBr): 3514 (N-H stretching), 3392 (N-H stretching), 3081 (C–H stretching, aromatic), 2870, 2830 (C–H stretching, aromatic), 1693 (C=O stretching), 1597 (C=N stretching), 1532 (N=O stretching), 1505 (N=O stretching), 1455 cm^{-1} (C-N stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 5.56 (d, J = 5.9 Hz, 1H, -CH-N*H*-), 6.75 (d, J = 5.9 Hz, 1H, C*H*-NH-), 7.21 (s, 1H, =C*H*-Ar), 7.29-7.91 (m, 17H, Ar-*H*), 8.15 (s, 1H, =C*H*-C), 8.60 (s, 1H, =C*H*-N), 9.84 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.2 (C$_1$ of dihydroimidazo[1,2-*a*]pyrimidinone), 105.6 (=*C*H-Ar), 110.1 (C$_4$ of pyrazole ring), 111.4, 114.7, 119.0, 119.5, 120.0, 122.5, 123.4, 125.5, 126.4, 127.6, 127.9, 128.0, 129.4, 129.8, 130.1 (C$_3$ of pyrazole ring), 131.2, 132.4, 132.8, 133.2, 134.2, 134.8, 136.4, 137.5, 139.3, 140.4, 146.3, 147.9, 148.2 (C$_2$ of benzo[*d*]imidazol), 152.6 (C$_3$ of pyrazole ring), 154.6, 163.3 (-C=O); MS: *m/z* 649.25 (M$^+$). Anal. Calcd for $C_{35}H_{23}N_9O_5$: C, 64.71; H, 3.57; N, 19.41. Found: C, 64.76; H, 3.52; N, 19.42%.

Characterization of compound 7-(1*H*-benzo[*d*]imidazol-2-yl)-2-(4-nitrobenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5n

Yield 83%. Solid. m.p. 96-98°C. IR (KBr): 3517 (N-H stretching), 3395 (N-H stretching), 3085 (C–H stretching, aromatic), 2874, 2835 (C–H stretching, aromatic), 1691 (C=O stretching), 1595 (C=N stretching), 1530 (N=O stretching), 1512 (N=O stretching), 1450 cm^{-1} (C-N stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 5.50 (d, J = 5.9 Hz, 1H, -CH-N*H*-), 6.70 (d, J = 5.9 Hz, 1H, C*H*-NH-), 7.21 (s, 1H, =C*H*-Ar), 7.25-7.88 (m, 17H, Ar-*H*), 8.17 (s, 1H, =C*H*-C), 8.64 (s, 1H, =C*H*-N), 9.85 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 85.7 (C_1 of dihydroimidazo[1,2-*a*]pyrimidinone), 105.8 (=*C*H-Ar), 110.0 (C_4 of pyrazole ring), 111.0, 114. 8, 119.1, 119.9, 120.2, 122.7, 123.4, 125.8, 126.5, 127.6, 127.7, 128.6, 129.5, 129.9, 130.0 (C_3 of pyrazole ring), 131.7, 132.5, 132.6, 133.7, 134.8, 134.9, 136.0, 137.4, 139.1, 140.2, 146.3, 147.4, 148.6 (C_2 of benzo[*d*]imidazol), 152.9 (C_3 of pyrazole ring), 154.6, 163.7 (-C=O); MS: *m/z* 649.29 (M^+). Anal. Calcd for $C_{35}H_{23}N_9O_5$: C, 64.71; H, 3.57; N, 19.41. Found: C, 64.72; H, 3.55; N, 19.36%.

Characterization of compound 7-(1*H*-benzo[*d*] imidazol-2-yl)-2-(2,4-dimethoxybenzylidene)-5-(3-(3-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)-1,8a-dihydroimidazo[1,2-*a*]pyrimidin-3(2*H*)-one, 5o

Yield 71%. Solid. m.p. 98-100°C. IR (KBr): 3510 (N-H stretching), 3392 (N-H stretching), 3084 (C–H stretching, aromatic), 2874, 2831 (C–H stretching, aromatic), 1694 (C=O stretching), 1590 (C=N stretching), 1535 (N=O stretching), 1503 (N=O stretching), 1451 (C-N stretching), 1252 cm^{-1} (C-O stretching); ^{1}H NMR (DMSO-d_6, 400 MHz): δ 3.84 (s, 3H, -OCH_3), 3.96 (s, 3H, -OCH_3), 5.54 (d, J = 5.9 Hz, 1H, -CH-N*H*-), 6.70 (d, J = 5.9 Hz, 1H, C*H*-NH-), 7.22 (s, 1H, =C*H*-Ar), 7.36-7.92 (m, 16H, Ar-*H*), 8.15 (s, 1H, =C*H*-C), 8.62 (s, 1H, =C*H*-N), 9.85 (s, 1H, N*H*-C); ^{13}C NMR (DMSO-d_6, 100 MHz): δ 56.8 (Ar-OCH_3), 83.3 (C_1 of dihydroimidazo[1,2-*a*]pyrimidinone), 105.4, 110.6 (=*C*H-Ar), 113.0 (C_4 of pyrazole ring), 113.8, 113.9, 115.4, 119.6, 120.8, 123.2, 123.7, 124.9, 126.9, 127.6, 127.8, 129.4, 129.6, 129.9, 131.1 (C_3 of pyrazole ring),, 132.7, 133.9, 134.4, 137.5, 137.9, 140.4, 140.8, 146.5, 147.6, 147.9, 153.8 (C_2 of benzo[*d*]imidazol), 154.4 (C_3 of pyrazole ring), 160.9, 162.6 (-C=O); MS: *m/z* 664.26 (M^+). Anal. Calcd for $C_{37}H_{28}N_8O_5$: C, 66.86; H, 4.25; N, 16.86. Found: C, 66.82; H, 4.30; N, 16.85%.

Antitubercular assay

Culture

Tubercle bacilli are aerobes, grow slowly (generation time 14-15 h), optimum temperature 37°C, *p*H 6.4-7.0. They grow only in specially enriched media containing egg, asparagines, potatoes, serum and meat extracts. Colonies appear in 2-6 weeks. *M. tuberculosis* grows more luxuriantly in culture (eugenic) than *M. bovis* which grows sparsely (dysgenic). All the newly synthesized compounds were screened for their *in vitro* antitubercular activity against *Mycobacterium tuberculosis* H_{37}Rv strain using Lowenstein-Jensen medium. Rifampicin was used as standard drug. We have used the minimal inhibition concentration to evaluate the anti-tuberculosis activity. It is one of the non-automated *in vitro* bacterial susceptibility tests. This classic method yields a quantitative result for the amount of antimicrobial agents that is needed to inhibit growth of specific microorganisms. It is carried out in bottle. Each Synthesized drug was diluted obtaining 1000 microgram/mL concentration, as a stock solution. Its *in-vitro* study and not used any cell lines. 1 mg of sample, 1 mL solvent and sterile D/W were taken for final concentration is 1000 microgram/mL then it diluted by serial dilution method. DMSO used as 2% diluted as per CLSI Guidelines and so its activity against bacteria is nil. We used Lowenstein-Jensen medium for the study its composition[25].

Conclusion

For the generation of potent antitubercular agents, we have designed and synthesised novel pyrazole and benzo[*d*]imidazole clubbed dihydroimidazo[1,2-*a*]pyrimidinones **(5a-o)**. 3-(3-Nitrophenyl)-1-phenyl-1*H*-pyrazole-4-carbaldehyde and 2-acetyl benzimidazole were used to synthesize chalcone. Chalcone and guanidine were combined to produce a pyrimidine derivatives. By reacting the pyrimidine derivative with substituted benzaldehydes, chloroacetic acid, sodium acetate, and acetic anhydride, the final compounds were formed. The results of antitubercular activity showed that the synthetic compounds were potent against the *Mycobacterium tuberculosis* H_{37}Rv strain. The most effective compounds were **5c**, which has an electron-withdrawing bromo group in the fourth position on the phenyl ring, and **5h**, which has an electron-donating hydroxyl group in the second position on the phenyl ring. Moderate activity was present in compound **5e**.

Acknowledgement

Prof. Nisheeth C. Desai is appreciative to the UGC, New Delhi for grant BSR Faculty Fellowship

2019 [No. F. 18-1/2011(BSR)] and financial help. Jahnvi D. Monapara is grateful to the Department of Science and Technology, INSPIRE PROGRAM for the award of INSPIRE Fellowship [No. IF180817]. Aratiba M. Jethawa is thankful to SHODH (ScHeme of Developing High-quality research) for providing a research fellowship, KCG, Government of Gujarat.

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