IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 11, March 2025
Impact Factor: 7.67

Efficient Synthesis of 1,2,3 - Triazole Based Benzothiazinones.

Kshitija Tambe[a], Komal Takankhar[b], Shivani Raut[b], Dr. Dnyaneshwar Gaikwad[b], Dr. Devendra Wagare[b], Dr. Sangita Pawar[a]
Vivekananda Arts Sardar Dalip Singh Commerce and Science College, Aurangabad[a]
BPHE Society Ahmednagar College, Ahmednagar[b]
(Corresponding author mail id = Kshitijatambe91197@gmail.com)

Abstract: *Present studies demonstrated the development of new 1,2,3 triazolylbenzothiazinone derivatives possessing in vitro antibacterial and antifungal properties. To understand the binding affinity of cytochrome P450 lanosterol 14α demethylase, a pretended molecular docking analysis is performed with synthetic benzothiacinone derivatives. This results showed the binding of antibodies and the corresponding scores of synthesized drugs. In vitro and silico studies revealed promising results that these compounds can meet the necessary criteria for the advancement of novel anti-inflammatory pharmaceuticals.*

Keywords: Molecular docking, Benzothiazinone, antifungal, ADME

I. INTRODUCTION

The chemistry of heterocycles has arisen as a captivating field encompassing a broad spectrum of bio-applications in recent years. Much attention is focused toward the synthesis as well as bioactivities of 1,2,3-triazoles. A lot of interest has been shown in 1,2,3-triazole(C2H3N3) compounds that have undergone many modifications. Considering the physiological importance of C2H3N3-containing derivatives of benzothiazinone(C8H7NOS), numerous studies have revealed antibacterial as well as anti-oxidant activities.

The chemistry of heterocyclic molecules has emerged as a captivating field to have a look at in recent years, encompassing a large spectrum of organic applications. Heterocyclic compounds containing N and S are identified for their better biological and pharmacological traits. [1, 2]. The incorporation of N and S renders 1,4-benzothiazine- primarily based compounds a giant class of benzo-fused heterocycles with several biological activities. The synthesis of novel 1, 4-benzothiazine derivatives and the assessment in their chemical and organic houses have won significance for medical and agricultural programs[3-5]. Published research shows that C8H7NOS molecules has many healing activities, inclusive of antifungal[4], anticancer[6], anti-inflammatory[7], antibacterial[8], antihypertensive[9] and antitumor[10] effects.

For drug design and discovery, synthetic as well as medicinal chemists carefully inspect C2H3N3-based total compounds produced by the use of "click chemistry[11-12]. Anti-fungal [13], anti-bacterial,[14] anti-microbial,[15] anti-oxidant,[16] anti-cancer,[17] anti-HIV,[18] anti-malarial,[19] anti-tubercular[20] anticonvulsant, [21] α glycosidaseinhibitor,[22] anti-viral,[23] as well as anti-inflammatory [24] activities" are just a few of their many biological characteristics.

A lot of interest has been proven in C2H3N3 compounds that have undergone many changes. Severa research on the synthesis of physiologically giant C2H3N3-based C8H7NOS derivatives as antibacterial[25], antitubercular, and antioxidant[26] retailers was posted, in keeping with an overview of the literature. Fluconazole analog has additionally been pronounced to act as a possible anti-Candida[27] agent. Synthesized C8H7NOS with 1,2,4-triazole by-product proven antifungal[29] and non-glucoside SGLT2[28] inhibition. The synthesis and assessment of C2H3N3congers of 2-mercapto and a couple of -aminobenzothiazinone derivatives as anti-tubercular pills[30] have been said by Yaddanapudi and friends.

DOI: 10.48175/IJARSCT-26510

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 11, March 2025
Impact Factor: 7.67

The 1,4-disubstituted-C2H3N3 compound with amide capability confirmed several biological houses, inclusive of "anti-bacterial[31], glycosidase inhibitors[32],non-steroidal anti-androgens[33], anti-oxidant[34], anti-fungaland anti-tubercular[39] activity.

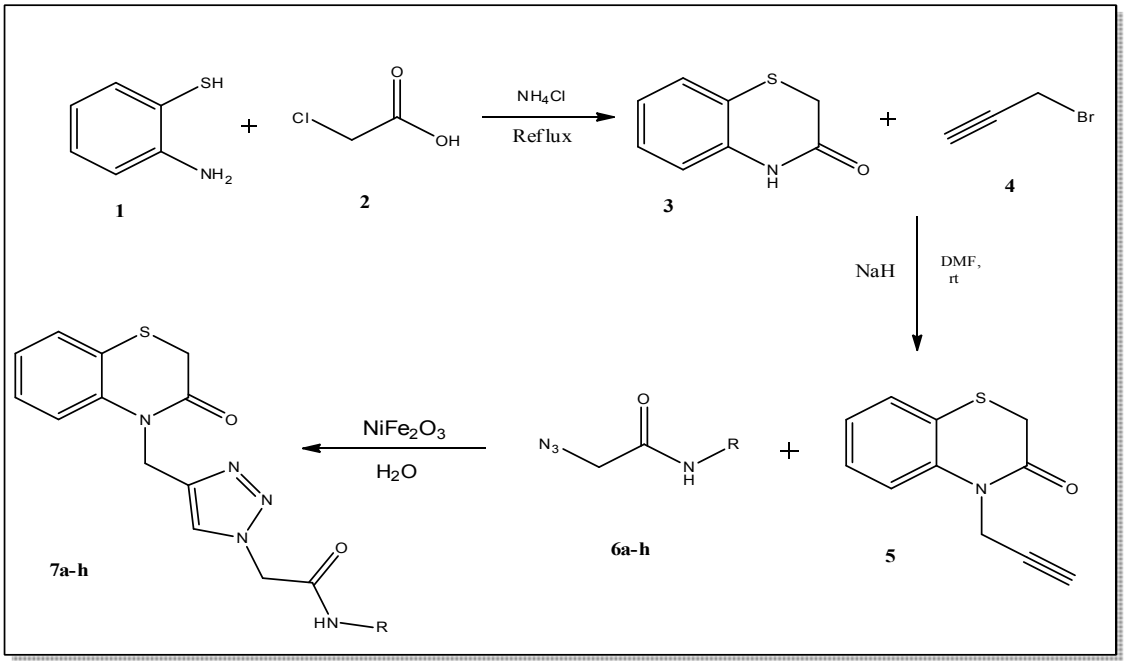
Herein, we" present the synthesis of novel C8H7NOS derivatives based on amide-linked C2H3N3.

II. EXPERIMENTAL

Material and Methods:

The unpurified solvents and reagents have been all received from commercial companies including Sigma Aldrich, Rankem India Ltd., and Spectrochem Pvt.Ltd. thin layer chromatography (TLC) silica gel 60F254 (Merck) covered on aluminum plates at a thickness of 0.25mm turned into used to study the crowningglory of the reaction. The additives have been diagnosed using iodine fumes or UV mild. The uncorrected melting points were determined using the open capillary technique. The Bruker DRX-400 as well as 500MHz spectrometers had been used to file 1 H NMR spectra in "DMSO-d6. 13C NMR spectra in DMSOd6were recorded with the usage of Bruker DRX-100 and 125MHz spectrometers. IR spectra had been recorded with to use of a Bruker ALPHA ECO-ATRFTIR". High-resolution mass spectra have been acquired with the usage of an Agilent 6520(QTOF) mass spectrometer.

General Procedure:



General Experiments

Synthesisof2H-benzo[b][1,4]thiazin-3(4H)-one(3):

The aggregate of 2-aminothiophenol 1(1.25gm, 10mmol), monochloroacetic acid 2(1.13gm, 12mmol), and Ammonium chloride (0.98gm,12mmol) was agitated.for 2-3hrs, the response mixture becomes allowed to reflux. When the reaction changed into finished, as indicated with the aid of TLC, it turned into cooled byway of ice after which extracted utilizing the natural solvent ethyl acetate(C4H8O2) (3x30mL). The natural layers have been combined, rinsed with a saline solution, dried over anhydrous Na2SO4, after which concentrated under low strain. Additionally, the consequent crude chemical 3 was recrystallized by the usage of aqueous ethanol.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 11, March 2025 Impact Factor: 7.67

Synthesis of 4-(prop-2-yn-1-yl)-2H-benzo[b][1,4]thiazin-3(4H)-one(5):

stirred suspension of sodium hydride(NaH)(0.36gm,1.5mmol) in dry DMF (10mL) becomes mixed with 2H-benzo[b][1,4]thiazin-3(4H)-one 3(C8H7NOS)(0.165gm, 1mmol) to create an anion. The mixture have been shaken at RT(room temperature) until hydrogen stopped converting. This response mixture wasshaken with a dropwise solution of propargyl bromide (0.13gm, 1.1mmol) in DMF. For around 2hrs, the reaction combination became constantly agitated. After the reaction was completed, as indicated through TLC, 20mL of water(H2O) was changed into introduced dropwise to quench it, and 3×30mL of C4H8O2 wasused for extraction. Following mixing, the organic layers have been rinsed with brine solution, dried over anh.Na2SO4, as well as then concentrated beneath low pressure. Vital "4-(prop-2-yn-1-yl)" mixture became furnished. 91% yield of -C8H7NOS 5 as a white solid.

Synthesis of Amide Linked 1,2,3-triazole Tethered Benzothiazinone Derivatives (7a-h):

Synthesis of "C8H7NOS-3" as well as "4-(prop-2-yn-1-yl)-C8H7NOS 5" is given in supplementary facts. Furthermore, to the stirred solution of alkyne 5(1mmol),azides 6a-hand Nickel Iron Oxide (NiFe2O4)(20mole%) in H2O had been added, and the resultant mixture was agitated at RT for 10-15h. TLC has been used tomonitor the response development the usage of a C4H8O2: hexane "solvent system. The reaction solution was cooled with over whelmed ice before beinge xtracted" using 30mL of C4H8O2. The organic extracts have been rinsed with 30mL of brine solution and is dried over anh.Na2SO4. To get the corresponding crude compounds 7a-h, solvent changes into evaporated below decreased pressure. Using ethanol, the crude compounds have been recrystallized.

III. RESULT AND DISCUSSION

In chemistry, C8H7NOS **3** reacted with propargyl bromide **4**in the presence of basic NaH in DMF for producing C8H7NOS alkyne intermediate **5** syntheses with a 91% yield. A known physical constant has verified the development of intermediate **5**[26] .2-azido-N-arylacetamides **6a-h**were synthesized using a previously described technique[38].Additionally, "intermediate **5** and 2-azido-N-arylacetamides **6a-h**were subjected to" 1,3-dipolar cycloaddition response with use of the click chemistry techniquein H2O and acatalytic quantity of NiFe2O4 at RT for 10-12hrs so that you can attain the corresponding regioselective compound. This produced super yields of"1,4-disubstituted-C2H3N3-based 2H-benzo[b][1,4]". The derivatives of "thiazin-3(4H)-one**7a-h**".

Spectral data

2-(4-((3-Oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4-yl)methyl)-1*H*-1,2,3- triazol-1-yl)-*N*-phenylacetamide (7a)

The compound **7a** was obtained *via* 1,3-dipolar cycloaddition reaction between azide **6a** and alkyne **5** in 11 h as a white solid with 89% yield. Mp: 122-124 °C. FT-IR $\nu_{max}cm^{-1}$: 3296 (-NH), 1647 and 1592 (C=O); ^{1}H NMR (500 MHz, $CDCl_3$,□,ppm): 3.42 (s, 2H, -SCH_2),5.17(s,2H,-NCH_2),5.31(s,2H,-NCH_2CO-),7.04(t,1H,*J*=8.0,Hz,Ar H),7.12(t,1H,*J*=8.0Hz,Ar-H),7.28(m,4H,Ar-H),7.34(d,1H,*J*=8.0Hz,Ar-H),7.43(d,2H,*J*=8.0Hz,Ar-H),7.67(s,1H,triazole) and 8.15(s,1H,NH);^{13}CNMR(100MHz,$CDCl_3$,□ppm):31.8,45.0,53.9,118.7,120.4,123.6,124.1,125.4,127.8,128.4,129.2,136.7,139.9,162.8and165.7;HRMS Calculated for C19H18N5O2S[M+H]$^+$:380.1181 and found 380.1524.

***N*-(2-Nitrophenyl)-2-(4-((3-oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4-yl)methyl)-1*H*-1,2,3-triazol-1-yl)acetamide (7b)**

The compound **7b** was obtained *via*1,3-dipolarcycloaddition reaction between azide **6b**
And alkyne **5** in 12 has a yellow solid with 85% yield. Mp:136-138 °C.

IR ν_{max} cm^{-1}: 3210 (NH), 1663 and 1611 (C=O); ^{1}H NMR (400 MHz, $CDCl_3$, □ppm): 3.44 (s, 2H, -SCH_2), 5.24 (s, 2H, -NCH_2), 5.31 (s,2H, -NCH_2CO-), 7.04 (t, 1H, J=8.0, Hz, Ar-H), 7.22 (t, 1H, J=8.0 Hz, Ar-H), 7.31 (t, 2H, J=8.0 Hz, Ar-H), 7.34 (d, 1H, J=8.0 Hz, Ar-H), 7.65 (t, 1H, J=8.0 Hz, Ar-H), 7.85 (s, 1H, triazole), 8.15 (d, 1H, J=8.0 Hz, Ar-H), 8.71 (d, 1H, J=8.0 Hz, Ar-H) and 10.41 (s, 1H, NH); ^{13}C NMR (100 MHz, $CDCl_3$,□ppm): 31.7(S-CH_2), 48.2 (benzothiazinone-N-CH_2), 58.6(CO-N-CH_2), 118.7, 122.3, 123.4, 123.8, 124.4, 125.8, 127.7, 128.2, 133.4, 136.3, 136.8, 140.1, 162.3 (CONH) and 164.1 (CONH); HRMS: $C_{19}H_{17}N_6O_4S$ $[M+H]^+$: 425.1032 and found 425.1408.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 11, March 2025 Impact Factor: 7.67

***N*-(3-Nitrophenyl)-2-(4-((3-oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4- yl)methyl)-1*H*-1,2,3-triazol-1-yl)acetamide (7c)**

The compound **7c** was obtained *via* 1,3-dipolarcycloaddition reaction between azide **6c** And alkyne **5** in15 hasared dish solid with 82% yield. Mp: 108-110 °C.

IR ν_{max} cm^{-1}: 3254 (-NH), 1671 and 1582 (C=O);^{1}H NMR (400 MHz,$CDCl_3$+DMSO-$d_6$ppm):3.27(s,2H,-SCH□$_2$),5.09(s,2H,- NCH_2),5.12(s,2H,-NCH_2CO-),6.88(t,1H,*J*=8.0,Hz,Ar-H), 7.13(t,1H,*J*=8.0Hz,Ar-H),7.21(d,1H,*J*=8.0Hz,Ar-H),7.33(t,1H,*J*=8.0Hz,Ar- H),7.57(d,1H,*J*=8.0Hz,Ar-H),7.81(s,2H)7.92(d,1H, *J* = 8.0 Hz, Ar-H), 8.33 (s, 1H,Ar-H) and 10.46(s, 1H, NH); HRMS: $C_{19}H_{17}N_6O_4S$ $[M+H]^+$: 425.1033, observed at 425.1434.

***N*-(4-Nitrophenyl)-2-(4-((3-oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4- yl)methyl)-1*H*-1,2,3-triazol-1-yl)acetamide (7d)**

The compound **7d** was obtained *via* 1,3-dipolarcycloaddition reaction between azide **6d** And alkyne **5** in13 has a white solid with 90% yield. Mp:158-160 °C.

^{1}H NMR (400 MHz, $CDCl_3$+DMSO-$d_6$ppm): 3.37 (s, 2H, -SCH□$_2$),5.17(s,2H,-NCH_2),5.21(s,2H,-NCH_2CO-),6.96-7.22(m, 2H, Ar-H), 7.69-7.75 (m, 4H, Ar-H), 7.88 (s, 1H, triazole), 8.13 (d, 2H,*J*= 8.0 Hz, Ar-H) and 10.56 (s, 1H, NH); HRMS: $C_{19}H_{17}N_6O_4S$ $[M+H]^+$: 425.1033 and found 425.1434.

***N*-(2-Methoxyphenyl)-2-(4-((3-oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4-yl)methyl)-1*H*-1,2,3-triazol-1-yl) acetamide (7e)**

The compound **7e** was obtained v*ia* 1,3-dipolarcycloaddition reaction between azide **6e** And alkyne **5** in10 has a brown solid with 84% yield. Mp: 96-98 °C.

IR ν_{max} cm^{-1}: 3277 (-NH), 1684 and 1643 (C=O); ^{1}H NMR (400 MHz, ppm):3.46(s,2H,-SCH),3.83(s,3H,-OMe),5.25□CDCl,(s, 2H,-NCH_2),5.33(s,2H,-NCH_2CO-),6.87(d,1H,*J*=8.0,Hz,Ar- H),6.96(t,1H,*J*=8.0Hz,Ar-H),6.98-7.11(m,3H,Ar-H),7.37(d,1H,*J*=8.0Hz,Ar-H),7.76(s,1H,triazole) and 8.25(d,2H,*J*=8.0Hz, Ar-H);^{13}CNMR(100MHz,$CDCl_3$ppm):31.7(O-□,CH_3), 42.5(S-CH_2),53.6(benzothiazinone-*N*-CH_2),56.1(CO-*N*-CH_2), 110.3,118.7,120.1,121.3,123.6,124.2,125.1,126.6,127.8,128.5, 140.1,148.2,162.4(CONH) and 165.7(CONH);HRMS: $C_{20}H_{20}N_5O_3S[M+H]^+$:410.1286; observe data 410.1705.

***N*-(3-Methoxyphenyl)-2-(4-((3-oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4-yl)methyl)-1*H*-1,2,3-triazol-1-yl)acetamide (7f)**

The compound **7f** was obtained v*ia* 1,3-dipolar cycloaddition reaction between azide**6f** and alkyne **5** in10 h as a white solid with 91% yield. Mp: 120-122°C.

^{1}H NMR (400 MHz, $CDCl_3$+DMSO-$d_6$ppm):□, 3.35 (s, 2H, - SCH_2),3.72(s,3H,-OMe),5.14(s,4H,-$NCH_2$and-NCH_2CO-),6.58(d,1H,*J*=8.0,Hz,Ar-H),6.97(t,2H,*J*=8.0Hz,Ar-H),7.13 (t,2H,*J*=8.0Hz,Ar-H),7.18(t,1H,*J*=8.0Hz,Ar-H),7.28(d, 2H,*J*=8.0Hz,Ar-H),7.65(d,1H,*J*=8.0Hz,Ar-H),7.93(s,1H, triazole) and9.67(s,1H,NH);^{13}CNMR(100MHz,$CDCl_3$+DMSO-$d_6$ppm):31.7(O-CH□,$_3$),41.8(S-CH_2),53.5 (benzothiazinone-N- CH_2),55.4(CO-*N*-CH_2),105.8,110.6,112.1, 118.6, 123.4, 123.8, 127.8, 128.3, 129.7, 139.1, 140.2, 160.2, 163.5(CONH)and165.5(CONH);HRMS:$C_{20}H_{20}N_5O_3S[M+H]^+$: 410.1286 and found 410.1435.

***N*-(4-Methoxyphenyl)-2-(4-((3-oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4-yl)methyl)-1*H*-1,2,3-triazol-1-yl)acetamide (7g)**

The compound **7g** was obtained v*ia* 1,3-dipolar cycloaddition reaction between azide **6g** and alkyne **5** in11 h as a white solid with 92% yield. Mp: 140-142 °C.

^{1}H NMR (400 MHz, $CDCl_3$+DMSO-$d_6$ppm):□, 3.36(s, 2H, - SCH_2),3.75(s,3H,-OMe),),5.15(s,2H,-NCH_2),5.19(s,2H,- NCH_2CO-),6.81(d,2H,*J*=8.0,Hz,Ar-H),6.98(t,1H,*J*=8.0Hz,Ar-H),7.21(t,1H,*J*=8.0Hz,Ar-H),7.32(d,1H,*J*=8.0Hz,Ar-H),7.42(d,2H,*J*=8.0Hz,Ar-H),7.67(d,1H,*J*=8.0Hz,Ar-H),7.94 (s, 1H, triazole) and 9.43(s,1H,NH);^{13}CNMR(100MHz,$CDCl_3$+DMSO-$d_6$ppm):31.3(O-CH□,$_3$),42.2(S-CH_2),53.4(benzothiazinone-*N*-

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 11, March 2025 Impact Factor: 7.67

CH_2),55.5(CO-*N*-CH_2),114.4,119.2,122.1, 123.6, 124.2, 128.2, 128.3, 131.1, 156.7, 163.4 (CONH) and 165.9 (CONH); HRMS: $C_{20}H_{20}N_5O_3S$ $[M+H]^+$: 410.1286, observed at 410.1434.

_N_-(2-Chlorophenyl)-2-(4-((3-oxo-2,3-dihydro-4*H*-benzo[*b*][1,4]thiazin-4-yl)methyl)-1*H*-1,2,3-triazol-1-yl)acetamide (7h)

The compound **7h** was obtained v*ia* 1,3-dipolar cycloaddition reaction between azide **6h** and alkyne **5** in14 h as a white solid with 89% yield. Mp: 165-167 °C.
^{1}HNMR(400MHz,$CDCl_3$ppm):3.41(s,2H,-SCH□,2),5.24(s,4H,-$NCH_2$and-NCH_2CO-),7.08(d,2H,*J*=8.0Hz,Ar-H),7.28-7.39(m,4H,Ar-H),7.75(s,1H,triazole),7.93(s,1H,NH)and8.25(d,2H,*J*=8.0Hz,Ar-H);^{13}CNMR(100MHz,$CDCl_3$ppm):31.5(S-CH□,2),41.5(benzothiazinone-*N*-CH_2),53.7(CO-*N*-CH_2),118.5,121.5,124.1,123.6,125.6,127.8,128.2,128.8,133.2,
139.7,144.8,162.8(CONH)and165.7(CONH);HRMS:$C_{19}H_{17}ClN_5O_2S$[M+H]$^+$:414.0792 and found 414.1256.

IV. CONCLUSION

We used a click chemistry approach to synthesize amide-linked C2H3N3 tethered C8H7NOS derivatives. The synthesis of the compounds was shown through thespectral strategies. Pharmacokinetic parameter predictions give us the information that synthesized compounds possess the potential for 1st rate oral medication bioavailability.

REFERENCES

[1] Keri, R.S.; Patil, M.R.; Patil, S.A.; Budagumpi, S. A comprehensive reviewin current developments of benzothiazole-based molecules in medicinal chemistry. *Eur. J. Med. Chem.,* **2015**, *89*, 207-251.http://dx.doi.org/10.1016/j.ejmech.2014.10.059 PMID: 25462241

[2] Sabatini, S.; Gosetto, F.; Serritella, S.; Manfroni, G.; Tabarrini, O.; Iraci, N.;Brincat, J.P.; Carosati, E.; Villarini, M.; Kaatz, G.W.; Cecchetti, V. Pyrazolo[4,3-c][1,2] benzothiazines 5,5-dioxide: A promising new class of *Staphylococcusaureus* NorA efflux pump inhibitors. *J. Med. Chem.,* **2012**, *55*(7),3568-3572.http://dx.doi.org/10.1021/jm201446h PMID: 22432682

[3] Armenise, D.; Trapani, G.; Arrivo, V.; Laraspata, E.; Morlacchi, F. Researchon potentially bioactive aza and thiaza polycyclic compounds containing abridgehead nitrogen atom. **III**. Synthesis and antimicrobial activity of some1,4-benzothiazines and pyrrolo benzothiazines. *J. Heterocycl. Chem.,* **2000**,*37*(6), 1611-1616.http://dx.doi.org/10.1002/jhet.5570370634

[4] Schiaffella, F.; Macchiarulo, A.; Milanese, L.; Vecchiarelli, A.; Fringuelli, R.Novel ketoconazole analogues based on the replacement of 2,4-dichlorophenyl group with 1,4-benzothiazine moiety: Design, synthesis, andmicrobiological evaluation. *Bioorg. Med. Chem.,* **2006**, *14*(15), 5196-5203.http://dx.doi.org/10.1016/j.bmc.2006.04.004 PMID: 16650767

[5] Cecchetti, V.; Calderone, V.; Tabarrini, O.; Sabatini, S.; Filipponi, E.; Testai,L.; Spogli, R.; Martinotti, E.; Fravolini, A. Highly potent 1,4-benzothiazinederivatives as K(ATP)-channel openers. *J. Med. Chem.,* **2003**, *46*(17), 3670-3679.http://dx.doi.org/10.1021/jm030791q PMID: 12904071

[6] Marchetti, C.; Ulisse, S.; Bruscoli, S.; Russo, F.P.; Migliorati, G.; Schiaffella,F.; Cifone, M.G.; Riccardi, C.; Fringuelli, R. Induction of apoptosisby 1,4-benzothiazine analogs in mouse thymocytes. *J. Pharmacol. Exp.Ther.,* **2002**, *300*(3), 1053-1062.http://dx.doi.org/10.1124/jpet.300.3.1053 PMID: 11861815

[7] Gowda, J.; Khader, A.M.A.; Kalluraya, B.; Shree, P.; Shabaraya, A.R. Synthesis,characterization and pharmacological activity of 4-[1-substituted aminomethyl-4-arylideneamino-5-sulfanyl-4,5-dihydro-1H-1,2,4-triazol-3-yl]methyl-2H-1,4-benzothiazin-3(4H)-ones. *Eur. J. Med. Chem.,* **2011**, *46*(9),4100-4106.http://dx.doi.org/10.1016/j.ejmech.2011.06.010 PMID: 21724303

[8] Dabholkar, V.V.; Gavande, R.P. Synthesis and antimicrobial activities ofnovel 1,4-benzothiazine derivatives. *Arab. J. Chem.,* **2016**, *9*, S225-S229.http://dx.doi.org/10.1016/j.arabjc.2011.03.009

[9] Watanabe, Y.; Osanai, K.; Nishi, T.; Miyawaki, N.; Shii, D.; Honda, T.;Shibano, T. Synthesis of azido derivatives of semotiadil, a novel 1,4-benzothiazine calcium antagonist, for photoaffinity probes of calcium channels.*Bioorg. Med. Chem. Lett.,* **1996**, *6*(16), 1923-1926.http://dx.doi.org/10.1016/0960-894X(96)00338-1

DOI: 10.48175/IJARSCT-26510

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 11, March 2025 Impact Factor: 7.67

[10] Rai, A.; Singh, A.K.; Raj, V.; Saha, S. 1,4-benzothiazines-a biologicallyattractive scaffold. *Mini Rev. Med. Chem.,* **2018**, *18*(1), 42-57.PMID: 28552049

[11] Wang, X.; Huang, B.; Liu, X.; Zhan, P. Discovery of bioactive moleculesfrom CuAAC click-chemistry-based combinatorial libraries. *Drug Discov.Today,* **2016**, *21*(1), 118-132.http://dx.doi.org/10.1016/j.drudis.2015.08.004 PMID: 26315392

[12] Gao, P.; Sun, L.; Zhou, J.; Li, X.; Zhan, P.; Liu, X. Discovery of novel anti-HIV agents *via* Cu(I)-catalyzedazide-alkyne cycloaddition (CuAAC) clickchemistry-based approach. *Expert Opin. Drug Discov.,* **2016**, *11*(9), 857-871.http://dx.doi.org/10.1080/17460441.2016.1210125 PMID: 27400283

[13] Fu, N.; Wang, S.; Zhang, Y.; Zhang, C.; Yang, D.; Weng, L.; Zhao, B.;Wang, L. Efficient click chemistry towards fatty acids containing 1,2,3-triazole: Design and synthesis as potential antifungal drugs for *Candida albicans.Eur. J. Med. Chem.,* **2017**, *136*, 596-602.http://dx.doi.org/10.1016/j.ejmech.2017.05.001 PMID: 28551587

[14] Zhang, B. Comprehensive review on the anti-bacterial activity of 1,2,3-triazole hybrids. *Eur. J. Med. Chem.,* **2019**, *168*, 357-372.http://dx.doi.org/10.1016/j.ejmech.2019.02.055 PMID: 30826511

[15] Yadav, P.; Yadav, J.K.; Agarwal, A.; Awasthi, S.K. Insights into the interactionof potent antimicrobial chalcone triazole analogs with human serum albumin:spectroscopy and molecular docking approaches. *RSC Advances,***2019**, *9*(55), 31969-31978.http://dx.doi.org/10.1039/C9RA04192C PMID: 35530759

[16] Bistrović, A.; Stipaničev, N.; Opačak-Bernardi, T.; Jukić, M.; Martinez, S.;Glavaš-Obrovac, L.; Raić-Malić, S. Synthesis of 4-aryl-1,2,3-triazolyl appendednatural coumarin-related compounds with antiproliferative and radicalscavenging activities and intracellular ROS production modification. *NewJ. Chem.,* **2017**, *41*(15), 7531-7543.http://dx.doi.org/10.1039/C7NJ01469D

[17] Xu, Z.; Zhao, S.J.; Liu, Y. 1,2,3-Triazole-containing hybrids as potentialanticancer agents: Current developments, action mechanisms and structureactivityrelationships. *Eur. J. Med. Chem.,* **2019**, *183*, 111700.http://dx.doi.org/10.1016/j.ejmech.2019.111700 PMID: 31546197

[18] Feng, L.S.; Zheng, M.J.; Zhao, F.; Liu, D. 1,2,3-triazole hybrids with anti-HIV-1 activity. *Arch. Pharm.,* **2021**, *354*(1), 2000163.http://dx.doi.org/10.1002/ardp.202000163 PMID: 32960467

[19] Raj, R.; Singh, P.; Singh, P.; Gut, J.; Rosenthal, P.J.; Kumar, V. Azidealkynecycloaddition en route to 1*H*-1,2,3-triazole-tethered 7-chloroquinoline-isatin chimeras: Synthesis and antimalarial evaluation. *Eur.J. Med. Chem.,* **2013**, *62*, 590-596.http://dx.doi.org/10.1016/j.ejmech.2013.01.032 PMID: 23434528

[20] Sharma, A.; Agrahari, A.K.; Rajkhowa, S.; Tiwari, V.K. Emerging impact oftriazoles as anti-tubercular agent. *Eur. J. Med. Chem.,* **2022**, *238*, 114454.http://dx.doi.org/10.1016/j.ejmech.2022.114454 PMID: 35597009

[21] Kelley, J.L.; Koble, C.S.; Davis, R.G.; McLean, E.W.; Soroko, F.E.; Cooper,B.R. 1-(Fluorobenzyl)-4-amino-1*H*-1,2,3-triazolo[4,5-*c*]pyridines: Synthesisand Anticonvulsant Activity. *J. Med. Chem.,* **1995**, *38*(20), 4131-4134.http://dx.doi.org/10.1021/jm00020a030 PMID: 7562950

[22] Shareghi-Boroujeni, D.; Iraji, A.; Mojtabavi, S.; Faramarzi, M.A.; Akbarzadeh,T.; Saeedi, M. Synthesis, *in vitro* evaluation, and molecular dockingstudies of novel hydrazineylideneindolinone linked to phenoxymethyl-1,2,3-triazole derivatives as potential α-glucosidase inhibitors. *Bioorg. Chem.,***2021**, *111*, 104869.http://dx.doi.org/10.1016/j.bioorg.2021.104869 PMID: 33839583

[23] Macan, A.M.; Harej, A.; Cazin, I.; Klobučar, M.; Stepanić, V.; Pavelić, K.;Pavelić, S.K.; Schols, D.; Snoeck, R.; Andrei, G.; Raić-Malić, S. Antitumorand antiviral activities of 4-substituted 1,2,3-triazolyl-2,3-dibenzyl-Lascorbicacid derivatives. *Eur. J. Med. Chem.,* **2019**, *184*, 111739.http://dx.doi.org/10.1016/j.ejmech.2019.111739 PMID: 31586832

[24] Sambasiva Rao, P.; Kurumurthy, C.; Veeraswamy, B.; Santhosh Kumar, G.;Poornachandra, Y.; Ganesh Kumar, C.; Vasamsetti, S.B.; Kotamraju, S.;Narsaiah, B. Synthesis of novel 1,2,3-triazole substituted-*N*-alkyl/aryl nitronederivatives, their anti-inflammatory and anticancer activity. *Eur. J. Med.Chem.,* **2014**, *80*, 184-191.http://dx.doi.org/10.1016/j.ejmech.2014.04.052 PMID: 24780595

[25] (a) Ellouz, M.; Sebbar, N.K.; Fichtali, I.; Ouzidan, Y.; Mennane, Z.; Charof,R.; Mague, J.T.; Urrutigoïty, M.; Essassi, E.M. Synthesis and antibacterialactivity of new 1,2,3-triazolylmethyl-2*H*-1,4-benzothiazin-3(4*H*)-one derivatives.*Chem. Cent. J.,* **2018**, *12*(1), 123.http://dx.doi.org/10.1186/s13065-018-0494-2 PMID: 30499014(b) Sebbar, N.K.; Mekhzoum, M.E.M.; Essassi, E.M.; Zerzouf, A.; Talbaoui,A.; Bakri, Y.; Saadi, M.; Ammari, L.E. Novel 1,4-

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 11, March 2025 Impact Factor: 7.67

benzothiazine derivatives:Synthesis, crystal structure, and anti-bacterial properties. *Res. Chem. Intermed.,***2016**, *42*(9), 6845-6862.http://dx.doi.org/10.1007/s11164-016-2499-6

[26] Shaikh, M.H.; Subhedar, D.D.; Arkile, M.; Khedkar, V.M.; Jadhav, N.;Sarkar, D.; Shingate, B.B. Synthesis and bioactivity of novel triazole incorporatedbenzothiazinone derivatives as antitubercular and antioxidant agent.*Bioorg. Med. Chem. Lett.,* **2016**, *26*(2), 561-569.http://dx.doi.org/10.1016/j.bmcl.2015.11.071 PMID: 26642768[27] Borate, H.B.; Maujan, S.R.; Sawargave, S.P.; Chandavarkar, M.A.; Vaiude,S.R.; Joshi, V.A.; Wakharkar, R.D.; Iyer, R.; Kelkar, R.G.; Chavan, S.P.;Kunte, S.S. Fluconazole analogues containing 2*H*-1,4-benzothiazin-3(4*H*)-one or 2*H*-1,4-benzoxazin-3(4*H*)-one moieties, a novel class of anti-*Candida*agents. *Bioorg. Med. Chem. Lett.,* **2010**, *20*(2), 722-725.http://dx.doi.org/10.1016/j.bmcl.2009.11.071 PMID: 19963383

[28] Li, A.R.; Zhang, J.; Greenberg, J.; Lee, T.; Liu, J. Discovery of nonglucosideSGLT2 inhibitors. *Bioorg. Med. Chem. Lett.,* **2011**, *21*(8), 2472-2475.http://dx.doi.org/10.1016/j.bmcl.2011.02.056 PMID: 21398124

[29] Fringuelli, R.; Schiaffella, F.; Bistoni, F.; Pitzurra, L.; Vecchiarelli, A. Azolederivatives of 1,4-benzothiazine as antifungal agents. *Bioorg. Med. Chem.,***1998**, *6*(1), 103-108.http://dx.doi.org/10.1016/S0968-0896(97)10016-5 PMID: 9502109

[30] Sahoo, S.K.; Ahmad, M.N.; Kaul, G.; Nanduri, S.; Dasgupta, A.; Chopra, S.;Yaddanapudi, V.M. Synthesis and evaluation of triazole congeners of nitrobenzothiazinonespotentially active against drug resistant *Mycobacterium tuberculosis*demonstrating bactericidal efficacy. *RSC Med. Chem.,* **2022**,*13*(5), 585-593.http://dx.doi.org/10.1039/D1MD00387A PMID: 35694687

[31] Neeraja, P.; Srinivas, S.; Mukkanti, K.; Dubey, P.K.; Pal, S. 1*H*-1,2,3-Triazolyl-substituted 1,3,4-oxadiazole derivatives containing structural featuresof ibuprofen/naproxen: Their synthesis and antibacterial evaluation.*Bioorg. Med. Chem. Lett.,* **2016**, *26*(21), 5212-5217.http://dx.doi.org/10.1016/j.bmcl.2016.09.059 PMID: 27727124

[32] Wang, G.; Peng, Z.; Wang, J.; Li, X.; Li, J. Synthesis, *in vitro* evaluation andmolecular docking studies of novel triazine-triazole derivatives as potentialα-glucosidase inhibitors. *Eur. J. Med. Chem.,* **2017**, *125*, 423-429.http://dx.doi.org/10.1016/j.ejmech.2016.09.067 PMID: 27689725

[33] Ferroni, C.; Pepe, A.; Kim, Y.S.; Lee, S.; Guerrini, A.; Parenti, M.D.; Tesei,A.; Zamagni, A.; Cortesi, M.; Zaffaroni, N.; De Cesare, M.; Beretta, G.L.;Trepel, J.B.; Malhotra, S.V.; Varchi, G. 1,4-substituted triazoles as nonsteroidalanti-androgens for prostate cancer treatment. *J. Med. Chem.,* **2017**,*60*(7), 3082-3093.http://dx.doi.org/10.1021/acs.jmedchem.7b00105 PMID: 28272894

[34] Siddiqui, M.A.; Nagargoje, A.A.; Shaikh, M.H.; Siddiqui, R.A.; Pund, A.A.;Khedkar, V.M.; Asrondkar, A.; Deshpande, P.P.; Shingate, B.B. Design, synthesisand bioevaluation of highly functionalized 1,2,3-triazole-guanidineconjugates as anti-inflammatory and antioxidant agents. *Polycycl. Aromat.Compd.,* **2023**, *43*(6), 5567-5581.http://dx.doi.org/10.1080/10406638.2022.2105904

[35] Shaikh, M.H.; Subhedar, D.D.; Akolkar, S.V.; Nagargoje, A.A.; Khedkar,V.M.; Sarkar, D.; Shingate, B.B. Tetrazoloquinoline-1,2,3-triazole derivativesas antimicrobial agents: Synthesis, biological evaluation and moleculardocking study. *Polycycl. Aromat. Compd.,* **2022**, *42*(4), 1920-1941.http://dx.doi.org/10.1080/10406638.2020.1821229

[36] Akolkar, S.V.; Nagargoje, A.A.; Krishna, V.S.; Sriram, D.; Sangshetti, J.N.;Damale, M.; Shingate, B.B. New *N*-phenylacetamide-incorporated 1,2,3-triazoles: [Et 3 NH][OAc]-mediated efficient synthesis and biological evaluation.*RSC Advances,* **2019**, *9*(38), 22080-22091.http://dx.doi.org/10.1039/C9RA03425K PMID: 35518861

[37] Akolkar, S.V.; Nagargoje, A.A.; Shaikh, M.H.; Warshagha, M.Z.A.; Sangshetti,J.N.; Damale, M.G.; Shingate, B.B. New *N* -phenylacetamide-linked1,2,3-triazole-tethered coumarin conjugates: Synthesis, bioevaluation, andmolecular docking study. *Arch. Pharm.,* **2020**, *353*(11), 2000164.http://dx.doi.org/10.1002/ardp.202000164 PMID: 32776355

[38] Akolkar, S.V.; Shaikh, M.H.; Bhalmode, M.K.; Pawar, P.U.; Sangshetti,J.N.; Damale, M.G.; Shingate, B.B. Click chemistry inspired syntheses ofnew amide linked 1,2,3-triazoles from naphthols: biological evaluation and*in silico* computational study. *Res. Chem. Intermed.,* **2023**, *49*(6), 2725-2753.http://dx.doi.org/10.1007/s11164-023-05008-4

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 11, March 2025
Impact Factor: 7.67

[39] Shaikh, M.H.; Subhedar, D.D.; Nawale, L.; Sarkar, D.; Khan, F.A.K.; Sangshetti,J.N.; Shingate, B.B. Novel benzylidenehydrazide-1,2,3-triazole conjugatesas antitubercular agents: synthesis and molecular docking. *Mini Rev.Med. Chem.,* **2019**, *19*(14), 1178-1194.http://dx.doi.org/10.2174/1389557518666180718124858 PMID: 30019644
[40] Akolkar SV, Shaikh MH, Nagargoje AA, Sangshetti JN, Damale MG, Shingate BB. Synthesis and Biological Evaluation of 1, 2, 3-Triazole Appended Benzothiazinone Derivatives via Click Chemistry. Current Organic Chemistry. 2024 Dec;28(20):1621-30.