INTERNATIONAL RESEARCH JOURNAL OF PHARMACY
www.irjponline.com
ISSN 2230 – 8407

Research Article

SYNTHESIS OF PYRIMIDINE DERIVATIVES AND THEIR ANTICONVULSANT ACTIVITY

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Article Received on: 20/04/18 Approved for publication: 10/07/18

DOI: 10.7897/2230-8407.097137

ABSTRACT

A synthesis of a series of 1,2,4-triazole derivatives **(5a-g)** have been accomplished in excellent yields by an oxidation of pyrimidinylhydrazines of various aryl carbaldehydes with iodobenzene diacetate. The chemical structures of the synthesized compounds were confirmed by FT-IR, ^{1}H NMR, ^{13}C NMR and mass spectral studies. All the compounds were screened for their anticonvulsant activity against maximal electroshock (MES) seizure method and their neurotoxic effects were determined by rotorod test. Compound **5f** was found to be the most potent of this series. The same compound showed no neurotoxicity at the maximum dose administered (100 mg/kg).

KEYWORDS: Pyrimidine, Iodobenzene diacetate, Aldehydes, Characterization, Anticonvulsant activity.

INTRODUCTION

1,2,4-Triazoles have drawn great attention to biological chemists from few decades due to its wide variety of activity, low toxicity, good pharmacokinetic and pharmacodynamic profiles.[1] 3-Amino-1,2,4-triazole was the first 1,2,4-triazole to be manufactured on large scale from aminoguanidine formate, useful as herbicides.[2] A number of biological activities such as antimicrobial[3], anti-inflammatory[4], anticonvulsant[5], anticancer[6], antimycobacterial[7], antioxidant[8] and antimalarial[9] have been associated with N- substituted triazole attached with different heterocyclic nuclei. Heterocyclic pyrimidine moiety is a versatile lead molecule in pharmaceutical development and has a wide range of biological activity. In the past few decades, the therapeutic interest of pyrimidine derivatives in pharmaceutical and medicinal fields has been given a great attention to the chemists. Literature survey reveals that pyrimidine derivatives are well known to have antimycobacterial[10], antitumor[11], antiviral[12], anticancer[13], anti-inflammatory[14] and antimicrobial activities.[15] In recent years, the extensive studies have been focused on pyrimidine derivatives because of their diverse chemical reactivity, accessibility and wide range of biological activities.

The anticonvulsants are a diverse group of pharmaceuticals used in the treatment of epileptic seizures. Anticonvulsants are also increasingly being used in the treatment of bipolar disorder, since many seem to act as mood stabilizers. The goal of an anticonvulsant is to suppress the rapid and excessive firing of neurons that start a seizure. Failing this, an effective anticonvulsant would prevent the spread of the seizure within the brain and offer protection against possible excitotoxic effects that may result in brain damage. Some studies have site that anticonvulsants themselves are linked to lower IQ in children.[16] Anticonvulsants are more accurately called antiepileptic drugs (AEDs), sometimes referred to as antiseizure drugs. While an anticonvulsant is a fair description of AEDs, it neglects to differentiate the difference between convulsions and epilepsy. Convulsive non-epileptic seizures are quite common and these types of seizures will not have any response to an antiepileptic drug. In view of these reports, the present paper reports the synthesis of 1,2,4-triazole derivatives and characterized by different spectral studies. Anticonvulsant activity of all the compounds was also reported.

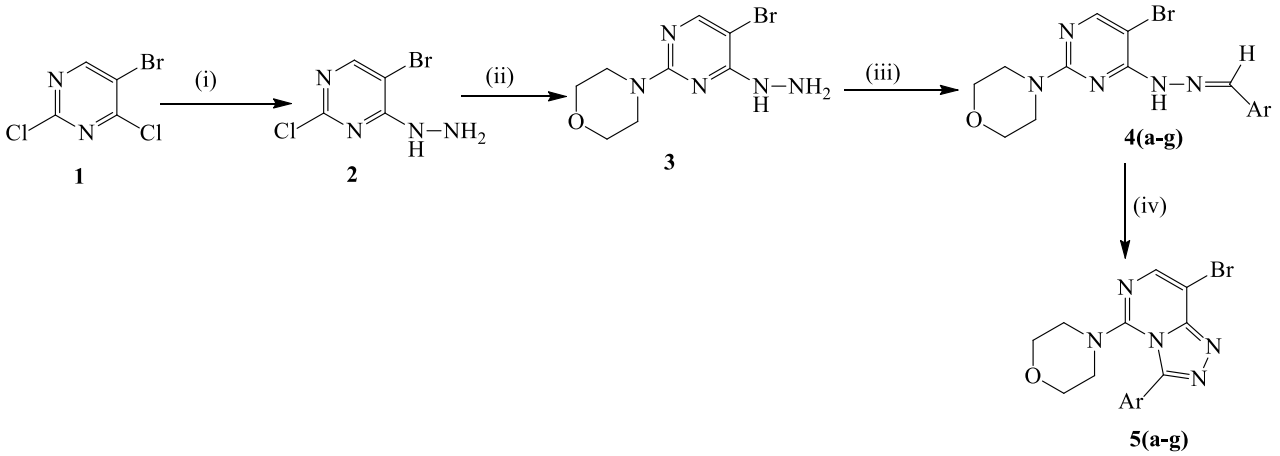
MATERIALS AND METHODS

All solvents and reagents were purchased from Sigma Aldrich Chemicals Pvt Ltd. Melting range was determined by Veego Melting Point VMP III apparatus. The FT-IR spectra were recorded using KBr discs on FT-IR Jasco 4100 infrared spectrophotometer. ^{1}H NMR spectra were recorded on Bruker DRX -500 spectrometer at 400 MHz using DMSO-d_6 as solvent and TMS as an internal standard. ^{13}C NMR spectra were recorded at 100 MHz Bruker DRX 500 spectrometer using DMSO- d_6 as solvent and TMS as internal standard. The mass spectra of the samples were recorded using the instrument LC -MSD-Trap-XCT.

General procedures for the synthesis of (5a-g)

Initially 1-(5-bromo-2-chloropyrimidin-4-yl)hydrazine (**2**) was synthesized by the reaction of 5-bromo-2,4-dichloropyrimidine (**1**) in MeOH and hydrazine hydrate, the mixture was stirred for about 1 h at r.t. to afforded desired product **2** with high yield.[17] The reaction of **2** with morpholine was carried out in the presence of EtOAc to furnish 1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (**3**) in 75–85 % yield. The hydrazones (**4a-g**) were obtained by condensation of **3** (0.01 mol) with different aldehydes (0.01 mol) in EtOH. Compounds (**5a-g**) were obtained in good

yield by the reaction of (**4a-g**) (0.01 mol) with IBD (0.012 mol) in MeOH stirred for about 2 h at 15-20 °C. The synthesized molecules (**5a-g**) were structurally characterized by mass, ^{13}C NMR, ^{1}H NMR and FT-IR spectral studies. The synthetic route for the synthesis of (**5a-g**) is summarized in Scheme 1. Chemical structures and physical data of the synthesized compounds are given in Table 1.

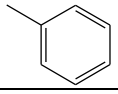
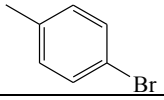
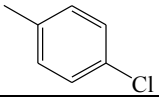
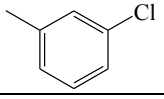
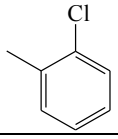
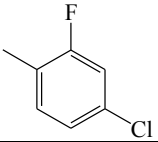
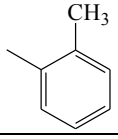


1 2 3 5(a-g)

Scheme 1: Synthetic pathway for the 1,2,4-triazole derivatives (5a-g)

Reagents and conditions:(i) $NH_2NH_2.H_2O$, MeOH, TEA, 5-10 °C, 1 h. (ii) morpholine, EA, r.t., 1 h. (iii) ArCHO, EtOH, r.t., 1 h. (iv) IBD, MeOH, 15-20 °C, 2 h.

Table 1: Chemical structures and physical data of 5a-g

Compound	Ar	Yield (%)	m. p. (°C)	Solvent for recrystallization
5a		76	124-126	Methanol
5b		74	160-163	Ethanol
5c		81	170-172	Ethanol
5d		80	179-181	Ethanol
5e		79	200-202	Methanol
5f		81	164-166	Methanol
5g		80	137-140	Ethanol

Synthesis of 1-(5-bromo-2-chloropyrimidin-4-yl)hydrazine (2)

A solution of 5-bromo-2,4-dichloropyrimidine (**1**) (0.01 mol) in EtOH was cooled to 0–5 °C in an ice bath. Triethylamine (0.01 mol) was added to the cold reaction mixture and then hydrazine hydrate (0.02 mol) was added slowly at 5-10 °C. The reaction mixture was allowed to stir at room temperature for 1h. The solid thus obtained was filtered, washed with chilled water and dried to afford compound **2**.[17] ^{1}H NMR (DMSO-d_6) δ: 8.06 (s, 1H, NH), 7.85 (s, 1H, py-H), 4.34 (s, 2H, NH_2).

Synthesis of 1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (3)

To a solution of 1-(5-bromo-2-chloropyrimidin-4-yl)hydrazine (**2**) (0.01 mol) in EtOAc (50 ml) and morpholine (0.021 mol) was added. Reaction mixture was refluxed on a water bath for 1 h. The solvent was evaporated on a steam bath, water was added into reaction mixture and stirred for 15 min. The solid thus obtained was filtered, washed with chilled water and dried to afford compound **3**. ^{1}H NMR (DMSO-d_6) δ: 8.06 (s, 1H, py-H), 7.85 (s, 1H, NH), 4.38 (s, 2H, NH_2), 3.63-3.60 (m, 8H, $4CH_2$).

2-Benzylidene-1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (4a)

Compound **4a** was obtained from **3** (2.74 g, 0.01 mol) and benzaldehyde (1.06 g, 0.01 mol). ^{1}H NMR (DMSO-d_6) δ: 10.46 (s, 1H, NH), 8.43 (s, 1H, P y-H), 8.11 (s, 1H, C H), 7.69-7.66 (d, 2H, Ar-H, J=9.0 Hz), 7.45-7.37 (m, 3H, Ar-H), 3.66-3.64 (m, 8H, $4CH_2$).

2-(4-Bromobenzylidene)-1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (4b)

Compound **4b** was obtained from **3** (2.74 g, 0.01 mol) and 4-bromobenzaldehyde (1.85 g, 0.01 mol). ^{1}H NMR (DMSO-d_6) δ: 10.53 (s, 1H, NH), 8.40(s, 1H, Py-H), 8.11 (s, 1H, CH), 7.61 (s, 4H, Ar-H), 3.66-3.63 (m, 8H, $4CH_2$).

2-(4-Chlorobenzylidene)-1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (4c)

Compound **4c** was obtained from **3** (2.74 g, 0.01 mol) and 4-chlorobenzaldehyde (1.40 g, 0.01 mol). ^{1}H NMR (DMSO-d_6) δ: 10.53 (s, 1H, NH), 8.41 (s, 1H, Py-H), 8.12 (s, 1H, CH), 7.70-7.67 (d, 2H, Ar-H, J=9.0 Hz), 7.50-7.47 (d, 2H, Ar-H), 3.66-3.64 (m, 8H, $4CH_2$).

2-(3-Chlorobenzylidene)-1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (4d)

Compound **4d** was obtained from **3** (2.74 g, 0.01 mol) and 3-chlorobenzaldehyde (1.40 g, 0.01 mol). ^{1}H NMR (DMSO-d_6) δ: 10.52 (s, 1H, NH), 8.41 (s, 1H, P y-H), 8.11 (s, 1H, CH), 7.70 (d, 2H, Ar-H, J=9.0 Hz), 7.49 (d, 2H, Ar-H, J=9.0 Hz), 3.66-3.65 (m, 8H, $4CH_2$).

2-(2-Chlorobenzylidene)-1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (4e)

Compound **4e** was obtained from **3** (2.74 g, 0.01 mol) and 2-chlorobenzaldehyde (1.40 g, 0.01 mol). ^{1}H NMR (DMSO-d_6) δ: 10.82 (s, 1H, NH), 8.86 (s, 1H, Py-H), 8.13 (s, 1H, CH), 8.02 (d, 1H, Ar-H, J=9.0 Hz), 7.52 (d, 1H, Ar-H, J=9.0 Hz), 7.40-7.37 (t, 2H, Ar-H), 3.66-3.63 (m, 8H, $4CH_2$).

2-(4-Chloro-2-fluorobenzylidene)-1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (4f)

Compound **4f** was obtained from **3** (2.74 g, 0.01 mol) and 4-chloro-2-fluorobenzaldehyde (1.58 g, 0.01 mol). ^{1}H NMR (DMSO-d_6) δ: 10.68 (s, 1H, NH), 8.40 (s, 1H, P y-H), 8.13 (s, 1H, CH), 7.67 (d, 2H, Ar-H, J=9.0 Hz), 7.54 (s, 1H, Ar-H), 3.66-3.64 (m, 8H, $4CH_2$).

2-(2-Methylbenzylidene)-1-(5-bromo-2-morpholinopyrimidin-4-yl)hydrazine (4g)

Compound **4g** was obtained from **3** (2.74 g, 0.01 mol) and 2-methylbenzaldehyde (1.20 g, 0.01 mol). ^{1}H NMR (DMSO-d_6) δ: 10.44 (s, 1H, NH), 8.72 (s, 1H, P y-H), 8.10 (s, 1H, CH), 7.78 (d, 1H, Ar-H, J=8.0 Hz), 7.25 (d, 1H, Ar-H, J=8.0 Hz), 7.23-7.21 (t, 2H, Ar-H), 3.65-3.62 (m, 8H, $4CH_2$).

8-Bromo-5-morpholino-3-phenyl-[1,2,4]triazolo[4,3-f]pyrimidine (5a)

The product obtained from **4a** (3.62 g) and iodobenzene diacetate (IBD, 3.86 g). FT-IR (KBr, cm^{-1}) ν: 2936 (C-H), 1640 (C=N), 1472 (C=C), 1376 (C-N), 521 (C-Br). ^{1}H NMR (DMSO-d_6) δ: 7.87 (s, 1H, Py-H), 7.73-7.71 (d, 2H, Ar-H), 7.60-7.52 (m, 3H, Ar-H), 3.25-3.05 (m, 8H, $4CH_2$). ^{13}C NMR (DMSO-d_6) δ: 152.2, 144.8, 129.0, 65.0, 49.3. MS: *m/z*, M^+ 359, 360 (M+2).

8-Bromo-3-(4-bromophenyl)-5-morpholino-[1,2,4]triazolo[4,3-f]pyrimidine (5b)

The product obtained from **4b** (4.41 g) and IBD (3.86 g). FT-IR (KBr, cm^{-1}) ν: 2930 (C-H), 1638 (C=N), 1460 (C=C), 1375 (C-N), 520 (C-Br). ^{1}H NMR (DMSO-d_6) δ: 7.88 (s, 1H, Py-H), 7.71-7.68 (d, 2H, Ar-H), 7.63-7.61 (d, 2H, Ar-H), 3.35-3.04 (m, 8H, $4CH_2$).^{13}C NMR (DMSO-d_6) δ: 152.2, 144.3, 129.0, 65.7, 49.3, 21.0. MS: *m/z*, M^+ 436, 438 (M+2), 440 (M+4).

8-Bromo-3-(4-chlorophenyl)-5-morpholino-[1,2,4]triazolo[4,3-f]pyrimidine (5c)

The product obtained from **4c** (3.96 g) and IBD (3.86 g). FT-IR (KBr, cm^{-1}) ν: 2945 (C-H), 1645 (C=N), 1470 (C=C), 1375 (C-N), 721 (C-Cl), 520 (C-Br). ^{1}H NMR (DMSO-d_6) δ: 7.88 (s, 1H, Py-H), 7.70-7.68 (d, 2H, Ar-H), 7.55-7.53 (d, 2H, Ar-H), 3.34-3.04 (m, 8H, $4CH_2$). ^{13}C NMR (DMSO-d_6) δ: 150.7, 145.8, 140.8, 128.0, 64.4, 49.5. MS: *m/z*, M^+ 393, 395 (M+2), 396 (M+3).

8-Bromo-3-(3-chlorophenyl)-5-morpholino-[1,2,4]triazolo[4,3-f]pyrimidine (5d)

The product obtained from **4d** (3.96 g) and IBD (3.86 g). FT-IR (KBr, cm^{-1}) ν: 2930 (C-H), 1644 (C=N), 1470 (C=C), 1375 (C-N), 720 (C-Cl), 525 (C-Br). ^{1}H NMR (DMSO-d_6) δ: 7.91 (s, 1H, Py-H), 7.79 (d, 1H, Ar-H, J= 8.0 Hz), 7.50 (s, 1H, Ar- H), 7.48 (d, 1H, Ar-H, J= 8.0 Hz), 7.46 (t, 1H, Ar-H), 3.31-3.00 (m, 8H, $4CH_2$). ^{13}C NMR (DMSO-d_6) δ: 152.3, 144.8, 129.0, 65.7, 49.3. MS: *m/z*, M^+ 393, 395 (M+2), 396 (M+3).

8-Bromo-3-(2-chlorophenyl)-5-morpholino-[1,2,4]triazolo[4,3-f]pyrimidine (5e)

The product obtained from **4e** (3.96 g) and IBD (3.86 g). FT-IR (KBr, cm^{-1}) ν: 2935 (C-H), 1645 (C=N), 1478 (C=C), 1375 (C-N), 721 (C-Cl), 520 (C-Br). ^{1}H NMR (DMSO-d_6) δ: 7.89 (s, 1H, Py-H), 7.74-7.69 (d, 2H, Ar-H), 7.58-7.47 (t, 2H, Ar- H), 3.33-3.04 (m, 8H, $4CH_2$). ^{13}C NMR (DMSO-d_6) δ: 151.1, 147.1, 141.2, 125.9, 64.8, 49.9. MS: *m/z*, M^+ 393, 395 (M+2), 396 (M+3).

8-Bromo-3-(4-chloro-2-fluorophenyl)-5-morpholino-[1,2,4]triazolo[4,3-f]pyrimidine (5f)

The product obtained from **4f** (4.14 g) and IBD (3.86 g). FT-IR (KBr, cm^{-1}) ν: 2930 (C-H), 1640 (C=N), 1475 (C=C), 1376 (C-N), 1299 (C–F), 720 (C-Cl), 520 (C-Br). ^{1}H NMR (DMSO-d_6) δ: 8.10 (s, 1H, Py-H), 7.94-7.92 (d, 1H, Ar-H, J= 8.0 Hz), 7.86 (s, 1H, Ar-H), 7.72-7.70 (d, 1H, Ar-H, J = 8.0 Hz), 3.33-2.97 (m, 8H, $4CH_2$). 13C NMR (DMSO-d_6) δ: 152.2, 144.8, 126.8, 65.7, 49.3. MS: *m/z*, M^+ 410, 412 (M+2), 414 (M+4).

8-Bromo-5-morpholino-3-o-tolyl-[1,2,4]triazolo[4,3-f]pyrimidine (5g)

The product obtained from **4g** (3.76 g) and IBD (3.86 g). FT-IR (KBr, cm^{-1}) ν: 2935 (C-H), 1645 (C=N), 1476 (C=C), 1370 (C-N), 520 (C-Br). ^{1}H NMR (DMSO-d_6) δ: 7.85 (s, 1H, Py-H), 7.50-7.45 (D, 2H, Ar-H), 7.37-7.26 (t, 2H, Ar-H), 3.10-2.95 (m, 8H, $4CH_2$), 2.18 (s, 3H, CH_3). ^{13}C NMR (DMSO-d_6) δ: 150.2, 144.3, 129.1, 65.7, 49.4. MS: *m/z*, M^+ 373, 375 (M+2).

In vivo anticonvulsant activity

Male Wistar rats (190-220 g) and mice (19-20 g) procured from National Institute of Nutrition, Hyderabad (190-220 g) were used in the present study. The animals were kept in individual cages for 1 week to acclimatize for the laboratory conditions. They were allowed to free access of water and food. All the experimental procedures were carried out in accordance with Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) guidelines. The study was reviewed and approved by the Institutional Animal Ethics Committee, G Pulla Reddy College of Pharmacy, Hyderabad, India.

Maximal electroshock seizure model (MES)

MES seizure model was used in the present study to evaluate the anticonvulsant activity of the compounds on male Wistar rats.[18] Seizures were induced in rats by delivering electro shock of 150mA for 0.2 s by means of a convulsiometer through a pair of ear clip electrodes. The test compounds (100 mg/kg) were administered by oral route in the form of solution (the compounds were dissolved in 1% sodium carboxy methyl cellulose), 30 min before the MES seizure test. The animals were observed closely for 2 min (noted tonic flexion (F) and extension (E) phases in seconds). The percentage of inhibition of seizure relative to control was recorded and calculated. Phenytoin (100 mg/kg) was used as a standard drug.

Neurotoxicity screening

The minimal motor impairment was measured in mice by the rotorod test.[18] The mice were trained to stay on the accelerating rotorod that rotates at 10 revolutions per minute. The rod diameter was 3.2 cm. Trained animals were administered with the test compounds at a dose of 100 mg/kg by oral route. Neurotoxicity was indicated by the inability of the animal to maintain equilibrium on the rod for at least 1 min in each of the three trails. Phenytoin was used as a standard drug.

RESULTS AND DISCUSSION

Chemistry

A series of new 1,2,4-triazole derivatives (**5a-g**) have been synthesized by the reaction of aryl carbaldehydes with one equivalent of iodobenzene diacetate (IBD) in MeOH. The synthesized molecules (**5a-g**) were structurally characterized by mass, ^{13}C NMR, ^{1}H NMR and FT-IR spectral studies. The absence of N-H absorption bands in the IR spectra indicated the full conversion of the substrates in to the target compounds. The appearance of a medium to strong absorption band from 1460 to 1478 cm^{-1} is due to the stretching vibration of C=C bond formation in the synthesized compounds. The ^{1}H NMR spectrum of compound (**5a**) exhibited a singlet in the region of δ = 7.87 ppm due to pyrimidine proton. The aromatic doublet and multiplet protons appeared between δ = 7.73-7.52 (Ar-H). A multiplet was observed between δ = 3.25 and 3.05 ppm due to methylene protons of morpholine moiety. The spectra of ^{13}C NMR contained the correct number of carbon atoms at the appropriate chemical shift values. The mass spectra of all the synthesised compounds contained molecular ion peaks, which mass/charge ions are in agreement with their proposed molecular formulas.

All the synthesized triazole analogs were screened for their anticonvulsant potential through MES model in the dose of 100 mg/kg. Antiepileptic drug research has, for several decades, focused on identifying new potential drugs based on their anticonvulsant activity against single acute seizures induced by various stimulators, usually in mice and rats. All established antiepileptic drugs have anticonvulsant activity in at least MES model.[19] Compound **5f** was shown to have significant protective effect on MES-induced seizure, and the effect was similar to that of standard (phenytoin). Similarly, compounds **5b**, **5c**, **5d** and **5e** showed moderate protective effect and a significant difference in protectiveness was observed when compared to standard group (Table 2). Compounds **5a–g** was examined for their neurotoxicity using rotorod method given in dose 100 mg/kg. Compounds **5b**, **5c**, **5d 5e** and **5f** did not exhibit toxicity, whereas compounds **5a** and **5g** showed 25% toxicity compared to standard at 2 h of oral administration (Table 3).

Table 2: *In vivo* anticonvulsant activity of compounds 5a-g

Compound	E/F	% Protection
5a	3.98	22.31
5b	3.13	31.10
5c	2.20	33.95
5d	2.18	34.00
5e	2.10	34.21
5f	1.65	66.45
5g	3.85	22.40
Standard	1.61	75.60
Control (Vehicle)	4.71	–

Values are expressed as mean ± SE. n = 6 animals in each group
E/F = Extension/Flexion [Decrease in ratio of extension phase (in seconds)/flexion phase (in seconds)] ,
% Protection = (Control-test)/(Control) x 100

Table 3: Neurotoxicity screening of the compounds

Compound	Neurotoxicity screen			
	0.5 h	1 h	2 h	4 h
5a	0/4	0/4	1/4	1/4
5b	0/4	0/4	0/4	0/4
5c	0/4	0/4	0/4	0/4
5d	0/4	0/4	0/4	0/4
5e	0/4	0/4	0/4	0/4
5f	0/4	0/4	0/4	0/4
5g	0/4	0/4	1/4	1/4
Standard	0/4	0/4	1/4	1/4

The data in the table represent ratio between the numbers of the animals that exhibited neurotoxicity against the number of tested animals

CONCLUSION

In conclusion, a series of new 1,2,4-triazole derivatives (**5a-g**) were synthesized in good yield, characterized by spectral data and their anticonvulsant activity have been evaluated. Compound **5f** demonstrated good anticonvulsant activity without the significant neurological toxicity. It has been demonstrated that the substituent on phenyl ring influence on an anticonvulsant activity of tested 1,2,4-triazole derivatives. The additional modification and diversification of functional groups in order to improve the activity is currently in progress.

ACKNOWLEDGMENT

One of the authors (L. Mallesha) is grateful to the UGC-SWRO, Bengaluru for financial support Minor Research Project, Order No. 2177-MRP/15-16/KAMY013/UGC-SWRO. The Authors sincerely thank to JSS Research Foundation, Mysuru, JSS Mahavidyapeeta and JSS College of Arts, Commerce and Science, for providing research facilities to carry out this work.

REFERENCES

1. Kartritzky AR. Hand Book of Heterocyclic Chemistry. 1st Edition. Pergamon Press: Oxford; 1985.
2. Havaldar Freddy H, Patil Abhay R. Synthesis of 1, 2, 4-triazole derivatives and their biological activity. European Journal of Chemistry. 2008; 5(2): 347-354.
3. Zhang J, Redman N, Litke AP, Zeng J, Zhan K, Chan KY, Chan CT. Synthesis and antibacterial activity study of a novel class of cationic anthraquinone analogs. Bioorgnic Medicicnal Chemistry. 2011; 19(1): 498-503. https://doi.org/10.1016/j.bmc.2010.11.001 PMid:21111625
4. Shehry MF, Abu-Hashem A, El-Telbani EM. Synthesis of 3-((2,4-dichlorophenoxy)methyl)-1,2,4-triazolo(thiadiazoles and thiadiazines) as anti-inflammatory and molluscicidal agents. European Journal of Medicinal Chemistry. 2010; 45(5): 1906-1911. https://doi.org/10.1016/j.ejmech. 2010.01.030 PMid:20153090
5. Siddiqui N, Ahsan W. Triazole incorporated thiazoles as a new class of anticonvulsants: design, synthesis and in vivo screening. European Journal of Medicinal Chemistry. 2010; 45 (4): 1536-1543. https://doi.org/10.1016 /j.ejmech.2009.12.062 PMid:20116140
6. Yan S., Liu Y., Chen Y., Liu L., and Lin J. An efficient one-pot synthesis of heterocycle-fused 1,2,3-triazole derivatives as anticancer agents. Bioorgnic Medicicnal Chemistry Letters. 2010; 20(17): 5225-5228. https://doi.org/ 10.1016/j.bmcl.2010.06.141 PMid:20655212
7. Patel NB, Khan IH, Rajani SD. Pharmacological evaluation and characterizations of newly synthesized 1,2,4-triazoles. European Journal of Medicinal Chemistry. 2010; 45(9): 4293-4299. https://doi.org/10.1016/j.ejmech.2010.06.031 PMid:20630629
8. Diwedi R, Alexandar S, Chandrashekar MJN. Rapid and efficient synthesis of microwave assisted some bis-1,2,4-triazole derivatives and their antioxidant and anti-inflammatory evaluation. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2011; 2(1):194-204.
9. Guantai EM, Ncokazi K, Egan TJ, Rosenthal PJ, Smith PJ, Chibale K. Design, synthesis and in vitro antimalarial evaluation of triazole-linked chalcone and dienone hybrid compounds. Bioorgnic Medicicnal Chemistry. 2010; 18(23): 8243-8256. https://doi.org/10.1016/j.bmc.2010.10.009 PMid:21044845
10. Kumar A, Sinha S, Chauhan MS. Syntheses of novel antimycobacterial combinatorial libraries of structurally diverse substituted pyrimidines by three-component solid-phase reactions. Bioorgnic Medicicnal Chemistry Letters. 2002; 12(4): 667-669. https://doi.org/10.1016/S0960-894X(01)00829-0
11. Baraldi PG, Pavani MG, Nunez M, Brigidi P, Vitali B, Gambari R, Romagnoli. Antimicrobial and antitumor activity of N-heteroimmine-1,2,3-dithiazoles and their transformation in triazolo-, imidazo-, and pyrazolopirimidines. Bioorgnic Medicicnal Chemistry. 2002; 10(2); 449-456. https://doi.org/10.1016/S0968-0896(01)00294-2
12. Nasr MN, Gineinah MM. sPyrido[2, 3-d]pyrimidines and pyrimido[5',4':5, 6]pyrido[2, 3-d]pyrimidines as new antiviral agents: synthesis and biological activity. Archiv der Pharmacol. 2002; 335(6): 289-295. https://doi.org/10.1002/1521-4184(200208)335:6<289 ::AID-ARDP289>3.0.CO;2-Z
13. Sondhi SM, Johar M, Rajvanshi S, Dastidar SG, Shukla R, Raghubir R, Lown JW. Anticancer, anti-inflammatory and analgesic activity evaluation of heterocyclic compounds synthesized by the reaction of 4-isothiocyanato-4-methylpentan-2-one with substituted o-phenylenediamines, o-diaminopyridine and (un)substituted o-diaminopyrimidines. Australian Journal of Chemistry. 2001; 54(1): 69-74. https://doi.org/10.1071/CH00141
14. Gangjee A, Vidwans A, Elzein E, McGuire JJ, Queener SF, Kisliuk RL. () Synthesis, antifolate, and antitumor activities of classical and nonclassical 2-amino-4-oxo-5-substituted-pyrrolo[2,3-d]pyrimidines. Jornal of Medicinal Chemistry. 2001; 44(12): 1993-2003. https://doi.org/10.1021/jm0100382
15. Kumar N, Singh G, Yadav AK. Synthesis of some new pyrido[2,3-d] pyrimidines and their ribofuranosides as possible antimicrobial agents. Heterocyclic Chemistry. 2001; 12(1): 52-56. https://doi.org/10.1002/1098-1071(2001)12:1<52::AID-HC11>3.0.CO;2-0
16. Loring and David W. Cognitive side effects of antiepileptic drugs in children. Psychiatric Times, XXII (10). 2005.
17. Prasanna kumar B, Mohana KN, Mallesha L. Synthesis, characterization and in vitro antimicrobial evaluation of new 5-chloro-8-bromo-3-aryl-1,2,4-triazolo[4, 3-c]pyrimidines. Medicinal Chemistry Research. 2014; 23(4): 445-453. https://doi.org/10.1007/s00044-013-0656-7
18. Hossein H, Marjan NA. Anticonvulsant, sedative and muscle relaxant effects of carbenoxolone in mice. BMC Pharmacology. 2003; 3(3): 1-6.
19. Loscher W, Schmidt D. Strategies in antiepileptic drug development: is rational drug design superior to random screening and structural variation? Epilepsy Research. 1994; 17(2): 95-134. https://doi.org/10.1016/0920-1211(94)90012-4

Cite this article as:

G. Vinay *et al*. Synthesis of pyrimidine derivatives and their anticonvulsant activity. Int. Res. J. Pharm. 2018;9(7):131-135 http://dx.doi.org/10.7897/2230-8407.097137

Source of support: UGC-SWRO, Bengaluru, India, Conflict of interest: None Declared