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Original Article

Synthesis and Anti-convulsant Activity of 1-[3-(4-Aminophenyl)-3-Oxopropanoyl]- 5,5-Diphenyl imidazolidine -2,4-Dione and its Derivatives

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ABSTRACT

Background: A heterocyclic hydrocarbon with distinct fundamental structural features in its molecular structure of 5, 5-diphenylimidazolidine heterocyclic ring. It is an imidazolidine and aromatic dibenzene fused ring. The flexible heterocyclic compounds that contain two atoms of nitrogen in 5, 5-diphenylimidazolidine. 5, 5-diphenylimidazolidine ring and its derivatives have a robust and promising biological action. In this study, we create a number of 1-[3-(4-aminophenyl)-3-oxopropanoyl] derivatives. A compound with anticonvulsant properties is -5, 5-diphenylimidazolidine-2,4-dione (AC1). The Strychnine Induced Convulsion Method was used to test the pharmacological samples for anticonvulsant action. The compound 5,5-diphenylimidazolidine-2,4-dione was synthesized together with its 14 total derivatives. **Materials and Methods:** Benzoin; Benzil; Urea; Glacial Acetic Acid; 4-amino benzoic acid; Con. HNO_3; Formic Acid; 2-Nitro Aniline; 4-Nitro Aniline; Aniline; Acetyl Chloride; Formic Acid; 4- amino Phenol are used for the synthesis. IR, NMR and MS are used for interpretation. **Results:** Our research led us to the conclusion that a variety of compounds have strong anti-convulsant properties. The compound 5,5-diphenylimidazolidine-2,4-dione (AB); 1-acetyl-5,5-diphenylimidazolidine-2,4-dione (AC); 1-[3-(4-hydroxy-2-[2-oxo-4 (phenylamino) ethyl]butanedioicacid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC5); 1-[3-(4-oxo-4-(oxo(4-phenylamino)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC6); 1-[3-(4-(phenylamino)benzoicacid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC7) gives strong anti-convulsant effects against phenytoin drug. **Conclusion:** The title compounds and its derivatives were examined for their ability to treat convulsion. Studies of the relationship between structure and activity revealed that compounds containing 5, 5-diphenylimidazolidine derivatives that have an electron-withdrawing group have higher activity than those that have an electron-donating group.

Keywords: 5, 5-diphenylimidazolidine, Benzil, Urea, 4-amino benzoic acid, 2-Nitro Aniline, 4-Nitro Aniline, Aniline, Strychnine, Anti Convulsant Activity, Phenytoin.

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INTRODUCTION

In 1954, the 5, 5-diphenylimidazolidine nucleuses was found. It has a combined imidazolidine and dibenzene ring. Its structure resembles that of the medication phenytoin.[1] Due to its numerous pharmaceutical applications, 5, 5-diphenylimidazolidine has significant heterocyclic nuclei. Scientist Brecker created the first 5, 5-diphenylimidazolidine in 1956.[2] In Figure 1, 5, 5-diphenylimidazolidine was displayed. Today, the moiety of choice, 5, 5-diphenylimidazolidine, has a wide range of pharmacological characteristics.

The chemical compound 5, 5-diphenylimidazolidine-2,4-dione has a molecular weight of 252.273 and a chemical formula of $C_{15}H_{14}N_2O_2$. Since 1960, a substance with one imidazolidine and two benzene rings has been widely employed for pharmacological purposes. The active ingredients for numerous medications are composed of 5, 5-diphenylimidazolidine -2, 4-dione rings, which exhibit good outstanding basic properties since they contain 2 nitrogen atoms in their structure. Epidemiological studies indicate that 60 million people globally suffer from epilepsy, which is a prevalent condition of the brain.[3-5] This number is increased by about 2,40,000 new cases per year.

Only 30% of patients with uncontrolled seizures have been cured despite the availability of more than 40 different anti-epileptic medications in the Indian market.[6-9] As a result, research on antiepileptic compounds is currently quite active. The study of novel anti-convulsant drugs is the key focus. Based on the type

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of seizure, the identification of 5, 5-diphenylimidazolidine-2, 4-dione derivatives was done *in vivo*.[10] The existence of an aryl binding site with an aryl/alkyl group, a hydrogen bonding domain, and an electron donor group are necessary conditions for potential anti-convulsant activity, and they all affect the anti-convulsant activity of various derivatives.[11] Due to their structural resemblance to nucleobase and other heterocyclic building blocks, such as the 5, 5-diphenylimidazolidine-2, 4-dione derivative, which inhibits angiogenesis *in vitro* as well as *in vivo* biological activity, many heterocyclic building blocks have biological relevance. Therefore, the WHO and new scientists around the world have made substantial attempts to treat such convulsions, and numerous research groups have made efforts to discover novel anticonvulsant drugs. Contrarily, one of the most significant families of organic heterocyclic compounds with anticonvulsant therapeutic activity is represented pharmacologically by 5, 5-diphenylimidazolidine-2, 4-dione and its derivatives.[12]

MATERIALS AND METHODS

Materials

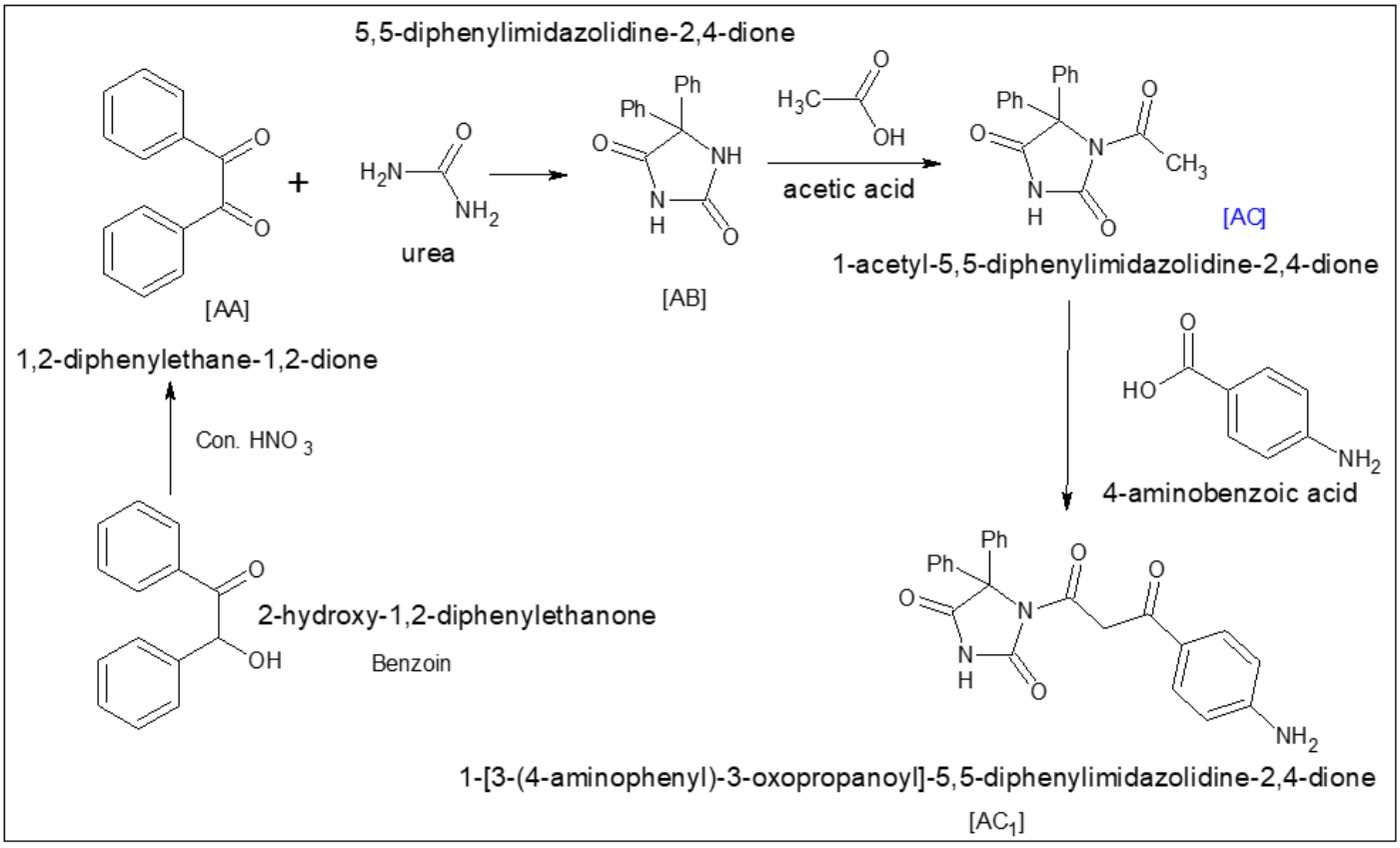
Glacial Acetic Acid, 4-Aminobenzoic Acid, Con. HNO3, Formic Acid, Benzoin, Benzil, Urea, The synthesis involves the use of 2-nitro aniline, 4-nitro aniline, aniline, acetyl chloride, formic acid, 4-amino phenol, 3-nitro aniline, etc. Analytical grade chemicals were used throughout. Some chemicals are available at colleges; however all were obtained from Modern Chemicals in Nashik.

Methods

By using a traditional approach, all diphenyl imidazolidine derivatives were created. By using the open tube capillary method, melting points were measured and determined. The chemicals' purity was examined using Thin Layer Chromatography (TLC) techniques. IR spectra were collected using KBr pellets and a Perkin Elmer Spectrum FTIR spectrometer. It was shown in Schemes 1A and 1B illustrate the synthesis pathway for 1-[3-(4-aminophenyl)-3-oxopropanoyl]-5, 5-diphenylimidazolidine-2,4-dione (AC1).

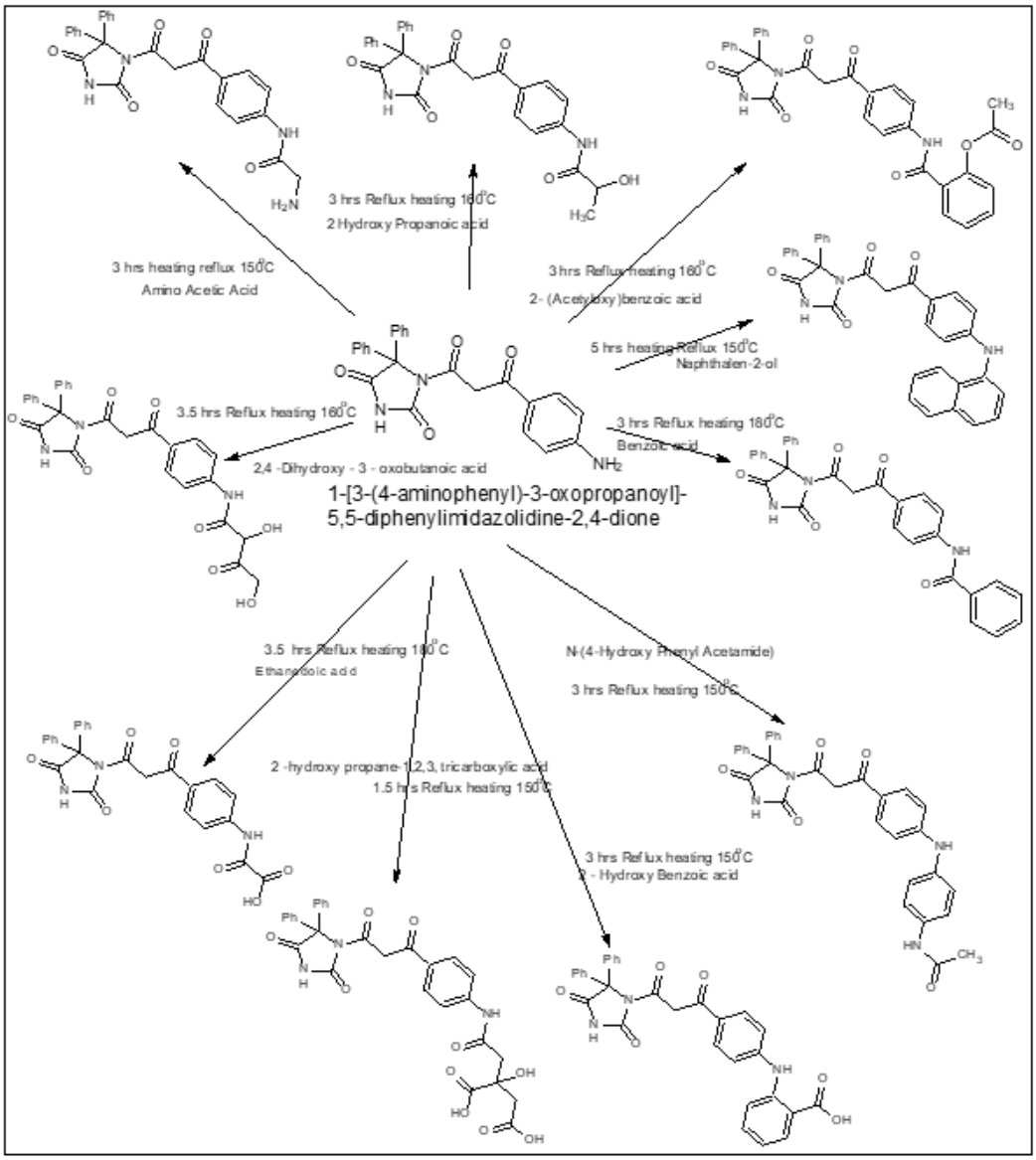
Experimental Work

(Scheme IA)



Scheme 1A: Synthesis of 1-[3-(4-aminophenyl)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC1).

(Scheme IB):



Scheme 1B: Synthesis of 1-[3-(4-aminophenyl)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC1)Derivatives (AC2- AC11).

Synthetic procedures

Synthesis of Benzil (AA)- (scheme 1A)

In a round bottom flask heat a mixture of 4gm of benzoin and 14 mL of concentrated nitric acid on a hot water bath for 11 min, after completion of reaction add 75 mL of water to the reaction mixture, cool the reaction mixture at room temperature and swirl for few min to coagulate the precipitated product. Collect the product on a Buchner funnel press the product well to remove the moisture then recrystalized the above product with 10 mL of ethanol. Once the product is dissolved add water drop wise to reach the cloud point allow the product to recrystalize. Once the product has recrystalized collect it on Buchner funnel and dry it.

Synthesis of 5,5-diphenylimidazolidine -2,4-dione (AB)-(scheme 1A)

Take 5.3 gm of Benzyl in 100 mL RBF The add 3.0 gm of urea in that RBF then add 15mL 30% aq. NaOH(sodium hydroxide) Lastly add 75 mL of C_2H_5OH(ethanol) Attach reflux condenser and boil under reflux using heating mantle for at least 2 hr Cool to the room temperature Pour the reaction mixture product into 125 mL of water and mix thoroughly Allow to stand for 10 min then filter under suction pump to remove an insoluble by-product. Render the product filtrate with strongly acidic acid with concentrated HCl Cool in Ice water and immediately filter off ppt.

Synthesis of 1-acetyl-5,5-diphenylimidazolidine -2,4-dione(AC)-(scheme 1A)

Take 1 gm. of phenytoin into the round bottom flask. Add 1 mL of glacial acetic acid into the RBF of 100 mL. Heat the reaction mixture at about 80-100°C for 2 hr (Refluxing the reaction mixture) Cool the reaction mixture by adding 10 mL of crushed ice. Again add ice cold water. Filter the reaction mixture and collect the product. Record Melting point, Theoretical yield, Practical yield and % of Practical yield.

Synthesis of 1-[3-(4-aminophenyl)-3-oxopropanoyl]-5,5-diphenylimidazolidine -2,4-dione(AC1)-(scheme 1A)

Take 1 gm of 1-Acetyl-5,5-Diphenylimidazolidine-2,4-Dione into the round bottom flask. Add 1 gm 4-amino benzoic acid and 15 mL glacial acetic acid into the RBF of 100 mL. Reflux the reaction mixture at about 80-100°C for 3 hr. Cool the reaction mixture by adding 5 mL of crushed ice water. Filter the reaction mixture and collect the product. Record Melting point, Theoretical yield, Practical yield and % of Practical yield.

Synthesis of 1-[3-(4-*N*-(2-hydroxy-N-Pheny lpropamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC2)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-oxo propanoyl]- 5,5-diphenylimidazolidine-2,4-dione, 2 mL of lactic acid and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(4-*N*-(2hydroxy-N-Phenylpropamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-*N*-(2-Phenylcarbamoyl) phenylacetate)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC3)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-o xopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 gm of aspirin and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(4-*N*-(2-Phenylcarbamoyl) phenylacetate)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(2,4-dihydroxy-3-oxo-*N*-phenylbutanamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC4)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-o xopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 gm of tartaric acid and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(2,4-dihydroxy-3-oxo-*N*-phenylbutan amide)-3-oxopropanoyl]-5, 5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-hydroxy-2-[2-oxo-4(phenylamino) ethyl]butanedioicacid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC5)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3 -oxopropanoyl]-5, 5-diphenylimidazolidine-2,4-dione, 2 gm of citric acid and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol togive1-[3-(2-hydroxy-2-[2-oxo-4(phenylamino)ethyl]butanedioicacid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-oxo-4-(oxo(4-phenylamino)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC6)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-oxo propanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 mL of oxalic acid and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(2-oxo-4-(oxo(4-phenylamino)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-(phenyl amino)benzoic acid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC7)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-o xopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 gm of salicylic acid and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction

mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(4-(phenyl amino)benzoic acid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-(N-[4-(phenylamino) phenyl] acetamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC8)-(scheme-1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3 -oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 gm of paracetamol and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(4-(N-[4-(phenylamino)phenyl]acetamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-(N-phenyl napthalen-2-amine)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC9)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-o xopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 gm of β-napthol and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(4-(N-phenyl napthalen-2-amine)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-(N-phenyl benzamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC10)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-o xopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 gm of benzoic acid and 25 mL of ethanol. The reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with ethanol to give 1-[3-(4-(N-phenyl benzamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione.

Synthesis of 1-[3-(4-amino-N-phen ylacetamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC11)-(scheme 1B)

In a round bottom flask take 2 gm of 1-[3-(4aminophenyl)-3-oxo propanoyl]- 5,5-diphenylimidazolidine -2,4-dione, 2 mL of amino acetic acid and 25 mL of ethanol. the reaction mixture heat under reflux condition for 3 hr. After completion of reaction remove the RBF from hot water bath allow to cool the reaction mixture then add 50 mL of ice cold water into the reaction mixture then allow to stand it for 5 min. Filter the product and recrystalized with water to give 1-[3-(4-amino-N-phenylacetamide)-3-oxop ropanoyl] -5,5-diphenylimidazolidine-2,4-dione.

Characterization

Physical Data like % yield, Molecular weight and Melting Point etc of various derivatives of 1-[3-(4-aminophenyl)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC1) are given in Table 1.

Spectral Data

Synthesis of 1-[3-(4-N-(2-hydroxy-N-Pheny lpropamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC2)

FTIR (KBr) ν cm^{-1}: 1628.10 C=C Stretch (Aromatic), 1132.01 C-C Stretch (Aromatic), 1332.83 C-N Stretch (Aromatic), 3252.36 N-H Stretch (Aromatic), 1718.26 C=O Stretch(Aryl ketone), 2096.24 O-H bend (Aliphatic); ^{1}H NMR (400 MHz, DMSO): δ 11.5 Ar N-H (s, 1H), δ 10.6 N-H (s, 1H), δ 8.7-7.1 Ar C-H (m, 15H), δ 4.3 CH_2 Group (s, 2H), δ 2.1 CH_3(s, 3H); Mol.Wt: 534.

Synthesis of 1-[3-(4-*N*-(2-Phenylcarbamoyl) phenylacetate)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC3)

FTIR (KBr) ν cm^{-1}: 1679.69 C=C Stretch (Aromatic), 1232.29 C-C Stretch (Aromatic), 2828.10 C-N Stretch (Aromatic), 3229.22 N-H Stretch (Aromatic), 1718.26 C=O Stretch(Aryl ketone), 2096.24 O-H bend (Aliphatic); ^{1}H NMR (400 MHz, DMSO): δ 11.5 Ar N-H (s, 1H), δ 10.6 N-H (s, 1H), δ 8.7-7.1 Ar C-H (m, 19H), δ 3.3 CH_2 Group (s, 2H), δ 2.7 CH_3(s, 3H); Mol.Wt: 428.

Synthesis of 1-[3-(2,4-dihydroxy-3-oxo-*N*-phenylbutanamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC4)

FTIR (KBr) ν cm^{-1}: 1718.26 C=C Stretch (Aromatic), 1232.29 C-C Stretch (Aromatic), 2828.10 C-N Stretch (Aromatic), 3229.22 N-H Stretch (Aromatic), 1742.26C=O Stretch(Aryl ketone), 1949.68 O-H bend (Aliphatic); 1H NMR (400 MHz, DMSO): δ 10.1 Ar N-H (s, 1H), δ 12.4 Ar N-H (s, 1H), δ 7.8-6.6 Ar C-H (m, 16 H), δ 3.3 CH_2 Group (d, 4H), δ 5.5 C-OH (d, 1H); Mol. Wt: 534.

Synthesis of 1-[3-(4-hydroxy-2-[2-oxo-4(phenylamino) ethyl]butanedioicacid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC5)

FTIR (KBr) ν cm^{-1}1632.29 C=C Stretch (Aromatic), 946.87 C-C Stretch (Aromatic), 2835.81C-N Stretch (Aromatic), 3267.79 N-H Stretch (Aromatic), 1718.26 C=O Stretch(Aryl Diketone), 2096.24 O-H bend (Aliphatic), 1138.90 C-O (Aromatic stretch); 1H NMR (400 MHz, DMSO): 12.7 Ar N-H (s, 1H), δ 12.3 N-H (s, 1H), δ 8.5-7.0 Ar C-H (m, 15H), δ 3.3 CH_2 Group (t, 6H), δ 5.4 C-OH (t, 1H); Mol.Wt: 442.

Figure 1: 5, 5-diphenylimidazolidine heterocyclic nucleus.

Synthesis of 1-[3-(4-oxo-4-(oxo(4-phenylamino)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC6)

FTIR (KBr) ν cm^{-1}: 1718.26 C=C Stretch (Aromatic), 1191.63 C-C Stretch (Aromatic), 1266.86 C-N Stretch (Aromatic), 3236.93 N-H Stretch (Aromatic), 1728.10 C=O Stretch(Aryl Diketone), 2096.24 O-H bend (Aliphatic), 1138.90 C-O (Aromatic stretch); 1H NMR (400 MHz, DMSO): δ 12.1 Ar N-H (s, 1H), δ 12.0 N-H (s, 1H), δ 8.7-7.1 Ar C-H (m, 15H), δ 3.3 CH_2 Group (s, 2H), δ 5.4 C-OH (s, 1H); Mol.Wt: 514.

Synthesis of 1-[3-(4-(N-[4-(phenylamino) phenyl]acetamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione(AC8)

FTIR (KBr) ν cm^{-1}: 1679.69 C=C Stretch (Aromatic), 1139.72 C-C Stretch (Aromatic), 2828.10 C-N Stretch (Aromatic), 3236.93 N-H Stretch (Aromatic), 1732.26 C=O Stretch(Aryl ketone), 1957.39 O-H bend (Aliphatic), 3630.34 O-H Stretch(Aromatic); 1H NMR (400 MHz, DMSO): δ 11.5 Ar N-H (t, 1H), δ 8.717-7.158 Ar C-H (m, 19H), δ 3.3 CH_2 Group (s, 2H), δ 2.1 CH_3(s, 3H); Mol.Wt: 465.

Synthesis of 1-[3-(4-amino-N-phen ylacetamide)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC11)

FTIR (KBr) ν cm^{-1}: 1682.69 C=C Stretch (Aromatic), 1189.72 C-C Stretch (Aromatic), 2878.10 C-N Stretch (Aromatic), 3286.93 N-H Stretch (Aromatic), 1742.26 C=O Stretch(Aryl ketone), 1977.39 O-H bend (Aliphatic), 3670.34 O-H Stretch(Aromatic); 1H NMR (400 MHz, DMSO): δ 11.5 Ar N-H (s, 1H), δ 10.6 N-H (s, 1H), δ 8.5-7.1 Ar C-H (m, 18H), δ 3.1 CH_2 Group (d, 4H), δ 5.4 C-OH (s, 1H); Mol.Wt: 505.

Biological evaluation

Anticonvulsant activity

There are numerous 1-[3-(4-aminophenyl)-3-oxopropanoyl] derivatives.- 5,5-diphenylimidazolidine-2,4-dione (AC1) are effective against tonic-clonic (grand mal) generalized seizures.[13] Strychnine can be purchased on the market as a crystalline powder that is white, odorless, and bitter. Strychnine was administered intravenously (direct injection into a vein), orally (eaten by mouth, breathed in), or combined with a solution. A small amount of strychnine, a potent poison, is all that is required to cause convulsions.

Strychnine Induced Convulsion Method

Six groups of Wistar Rats will be divided. Each group has six animals (n = 6) and receives treatment for ten days. The first group will be given distilled water as a control treatment, and the second group will be given the normal medication. It uses 100mg/kg of phenytoin. The third group will receive a lower dose of novel substituted 5,5-diphenylimidazolidine-2,4-dione derivatives (a), the fourth group will receive a middle dose of novel substituted 5,5-diphenylimidazolidine-2,4-dione derivatives (b), and the fifth group will receive a higher dose of novel substituted 5,5-diphenylimidazolidine-2,4-dione derivatives (c). Each animal will be observed individually for convulsive behavior for next 30 min. In this method we are used; we used 36 Wistar rats and they having body weight around 150-250 gm. In this Strychnine Induced Convulsion Method; Wistar rats were divided into 6 groups like Group 1is Vehicle control; Group 2 is Negative control (Strychnine 85mg/kg); Group 3 is Standard (Phenytoin 100mg/kg); Group 4 is Novel substituted 1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione(AC1) derivatives (a) Lower dose; Group 5 is Novel substituted 1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione(AC1) derivatives (b) Middle dose; Group 6 is Novel substituted 1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione(AC1) derivatives (c) Higher dose. The results of Anticonvulsant Activity testing of the prepared compounds were shown in Table 2 and Figure 2.

Table 1: Physical Data of 1-[3-(4-aminophenyl)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione derivatives(AC1).

Sl. No.	Compounds	Colors of compounds	Molecular formula	Melting point	%yields	Molecular weight
1	AA	Yellow	$C_{14}H_{12}O_2$	97°C	85%	212
2	AB	White	$C_{15}H_{12}N_2O_2$	306°C	80%	252
3	AC	White	$C_{17}H_{14}N_2O_3$	319°C	92%	294
4	AC1	White	$C_{24}H_{18}N_2O_5$	312°C	95%	414
5	AC2	Yellow	$C^{30}H_{22}N_4O_6$	310°C	95%	534
6	AC3	Brown	$C_{25}H_{20}N_2O_5$	320°C	90%	428
7	AC4	Brown	$C_{30}H_{22}N_4O_6$	305°C	82%	534
8	AC5	White	$C_{25}H_{18}N_2O_6$	317°C	75%	442
9	AC6	White	$C_{28}H_{22}N_2O_8$	323°C	68%	514
10	AC7	Light green	$C_{28}H_{24}N_2O_4$	293°C	80%	452
11	AC8	White	$C_{28}H_{23}N_3O_4$	316°C	70%	465
12	AC9	White	$C_{26}H_{20}N_2O_6$	318°C	65%	456
13	AC10	White	$C_{26}H_{18}N_2O_8$	298°C	80%	486
14	AC11	Black	$C_{30}H_{23}N_3O_5$	302°C	70%	505

Table 2: Strychnine Induced Convulsion Method by using Wistar Rats.

No. of Groups	No. of Rats
Vehicle Control (Water)	6
Negative Control (Strychnine 85mg/kg)	6
Standard (Phenytoin 100mg/kg)	6
1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione derivative (a) Lower dose	6
1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione derivative (b) Middle dose	6
1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione derivative (c) Higher dose	6
Total	36

Table 3: Anti-convulsant Activity result of Synthesized 1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione(AC1) derivatives.

Compounds	Doses (mg/kg)	Onset of Convulsions (sec)	Duration of Convulsions (sec)	Avg. % Protection	Recovery/Death
AA	50	93	148	87.52%	Recovery
	100	104	52		
	200	122	26		
AB	50	84	119	82.63%	Recovery
	100	98	90		
	200	114	46		
AC	50	86	183	84.16%	Recovery
	100	100	103		
	200	127	41		

Compounds	Doses (mg/kg)	Onset of Convulsions (sec)	Duration of Convulsions (sec)	Avg. % Protection	Recovery/Death
AC1	50	82	139	76.35%	Recovery
	100	91	89		
	200	107	53		
AC2	50	81	119	75.63%	Recovery
	100	90	80		
	200	106	66		
AC3	50	63	163	66.38%	Recovery
	100	79	101		
	200	96	63		
AC4	50	58	142	59.10%	Recovery
	100	70	99		
	200	88	73		
AC5	50	69	150	66.10%	Recovery
	100	78	91		
	200	96	52		
AC6	50	72	148	71.56%	Recovery
	100	85	84		
	200	107	50		
AC7	50	65	165	67.50%	Recovery
	100	80	89		
	200	101	39		
AC8	50	70	172	62.88%	Recovery
	100	75	105		
	200	99	38		
AC9	50	58	187	63.57%	Recovery
	100	75	104		
	200	105	46		
Std. Phenytoin	100	119	11	100	Recovery

RESULTS AND DISCUSSION

The Novel substituted syntheses 1-[3-(4-aminophenyl)-3-oxo propanoyl]- Derivatives of 5,5-diphenylimidazolidine-2,4-dione(AC1) from AC2 to AC11 were produced in accordance with scheme 1B. The necessary 1-[3-(4-aminophenyl)-3-oxop ropanoyl]1, Acetyl-5,5-Diphenylimidazolidine-2,4-Dione was combined with 5,5-diphenylimidazolidine-2,4-dione (AC1) to create the compound. Add 15 mL of glacial acetic acid and 1 g of 4-amino benzoic acid. Flux the reaction mixture for 3 hr at a temperature of 80 to 100°C. By adding 5 mL of crushed ice water, the reaction mixture is cooled. Collect the result after filtering the reaction mixture. 1-[3-(4-aminophenyl)-3-oxopropanoyl]5,5-dip henylimidazolidine-2,4-dione(AC1) reacts with various reagents to produce various products. The newly synthesized 1-[3-(4-aminophenyl)-3-oxopropanoyl]- 5,5-diphenylimidazolidine -2,4-dione(AC1) derivatives were subjected to anticonvulsant screening by using standard model Strychnine Induced Convulsion. Compound AC7 and AC8 containing aromatic group, showed less protection against induced seizures at lower dose level (30 mg/kg). The results of Anticonvulsant Activity testing of the prepared compounds were shown in Table 3 and Figure 2.

CONCLUSION

In the Central Instrumentation Facility, FTIR, NMR spectroscopy, and MS were used to confirm the structures of synthesized chemicals Pune University; Savitribai Phule; and Pune. Wistar rats weighing 150–200 g were used to test the biological effects of anti-convulsant. In this study, derivatives

demonstrated more potent anticonvulsant effects against various convulsion kinds. It was discovered that some of the synthesized chemicals have strong anti-convulsant properties. When compared to other 5,5- diphenylimidazolidine-2,4-dione derivatives, synthetic molecules were more active. Hence, the compound 5,5-diphenylimidazolidine-2,4-dione (AB);1-acetyl-5,5-diphenylimidazolidine-2,4-dione (AC);1-[3-(4-hydroxy-2-[2-oxo-4(phenylamino)ethyl]butanedioica cid)-3-oxopropanoyl]-5,5- diphenylimidazolidine-2,4-dione (AC5); 1-[3-(4-oxo-4-(oxo(4-phenylamino)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC6); 1-[3-(4-(phenyl amino)benzoic acid)-3-oxopropanoyl]-5,5-diphenylimidazolidine-2,4-dione (AC7) gives strong anti convulsant effects against phenytoin drug.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

FTIR: Fourier transform infrared spectroscopy; **NMR:** spectroscopy Nuclear magnetic spectroscopy; **MS:** Mass spectroscopy; **KBr:** Potassium Bromide; **% yield:** Percentage yields; **M.P.:** Melting point; **mg/kg:** Milligram/ kilograms; **sec:** seconds; **δ:** Chemical shift; **Mol.Wt:** Molecular Weight; **gm:** Gram.

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