Journal of Advanced Zoology

ISSN: 0253-7214
*Volume **44** Issue **S-5 Year 2023** Page **1978:1984***

Synthesis of (1-(2-((5-(4-Substitutedphenyl) Furan/Thiophen-2-Yl) Methylene) Hydrazineyl)-3-(4-Hydroxyphenyl)-1-Oxopropan-2-Yl)-4-(1H-Indol-3-Yl) Butanamide and It's Pharmacological Studies

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Article History

Received: 06 June 2023
Revised: 05 Sept 2023
Accepted: 06 Nov 2023

Abstract

A series of (1-(2-((5-(4-substitutedphenyl) furan/thiophen-2-yl) methylene) hydrazineyl)-3-(4-hydroxyphenyl)-1-oxopropan-2-yl)-4-(1H-indol-3-yl) butanamide is synthesised and screened for antinflammatory activity by using Dexamethasone as a standard drug. Among the Screened derivatives bromine substituted and methyl substituted derivatives showed higher activity than other derivatives.

Keywords: *Hydrazone, Heterocyclic compound, Indole-tyrosine.*

1. Introduction

The essential class of chemicals known as hydrazines and their derivatives has found extensive application in organic synthesis. [1,2] Although hydrazines have historically been utilised as reagents for the derivatization and characterisation of carbonyl compounds, the N-N bond has been a crucial structural motif in a number of bioactive drugs in recent years. Particularly, peptidomimetics and heterocycles containing N-N bonds are becoming more and more common in commercial use as agricultural and medicinal agents.[3,4] Hydrazide-hydrazones have been more significant recently because of their wide range of biological activities, which include antibacterial, antifungal, anticonvulsant, anti-inflammatory, antimalarial, and antituberculosis effects.[5-17] In order to produce new hydrazide-hydrazones with a broad range of medicinal uses, we report here on the synthesis of many hydrazide-hydrazones, their application in a number of heterocyclic transformations, and their assessment as anti-inflammatory agents.[18-21]

Experimental section:

An Electrothermal melting point instrument (Electrothermal 9100) was used to find the uncorrected melting points. A Pye Unicam SP-1000 spectrophotometer was used to record the infrared spectra of KBr discs. The 1H-NMR and 13C-NMR spectra, which were obtained using a Varian EM-390-200 MHz instrument with $CDCl_3$ as the solvent and TMS as the internal standard, show chemical changes. The analytical data was given by Mysore University's Microanalytical Data Unit.

General procedure for the Synthesis of compound (3)

The chemical solution DCM (10 mL/g) was combined with 2.0 g of indole-3-butyric acid (0.0098 mol). The agitated solution was then cooled to 0 °C, and more EDCI (2.26 g, 0.0118 mmol) and Et3N (2.05 mL, 0.0147 mol) were added while the temperature was being maintained. HOBt (1.50 g, 0.0098 mol) was added to the reaction mixture and stirred for ten minutes. Next, tyrosine methyl ester hydrochloride (2.27 g, 0.0098 mmol) and Et3N (2.05 mL, 0.0147 mol) were progressively added in DCM (10 mL/g) medium. TLC was utilised to track the reaction's development after it was finished. After adding Et3N, keep the stirring condition overnight at room temperature and maintained at a pH of 8, to get a Compound. methyl-2-(4-(1H-indol-3-yl)-butanamido-3-(4-hydroxyphenyl) propanoate

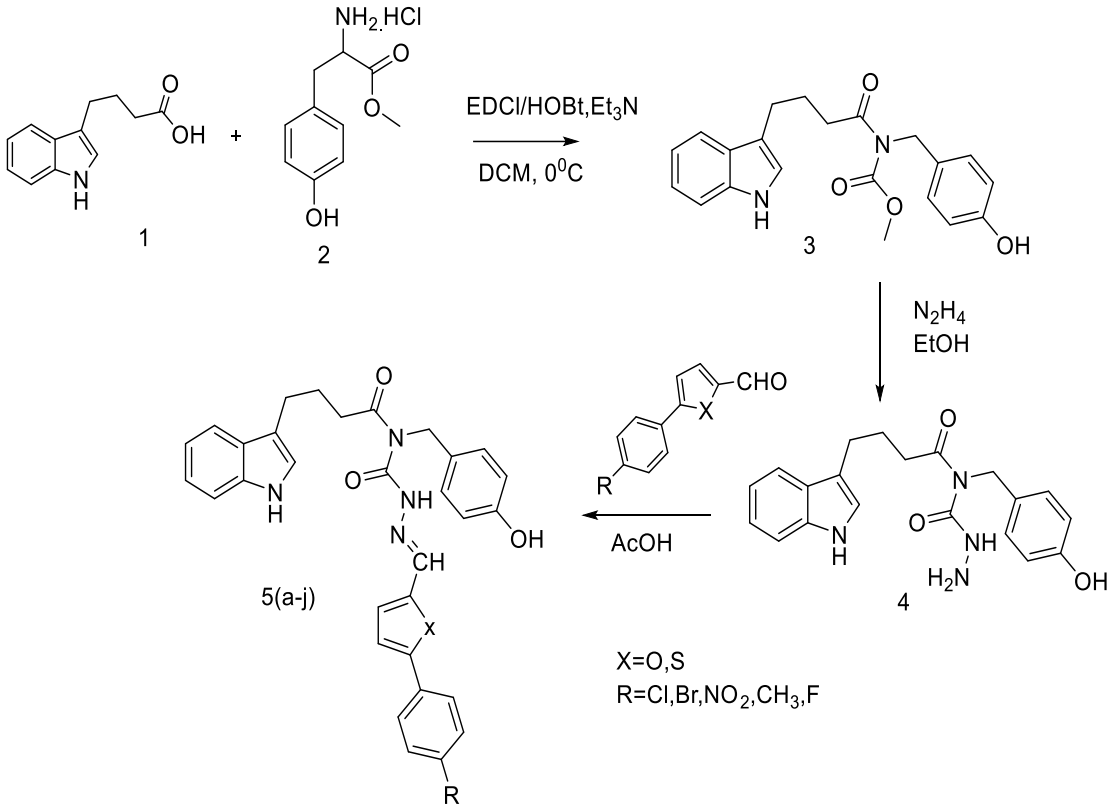
General procedure for the Synthesis of compound (4)

The methyl 2,4(1H-indol-3-yl) butanamido-3(4-hydroxyphenyl) propanoate (3) (3.4 g, 0.0079mol) is blended with the hydrazine hydrate (3.80 mL, 0.0799 mol) in a 30 mL ethanol medium. The reaction

mixture was refluxed for 16 hours in an alcoholic medium, and TLC was used to track the reaction's progress. The solvent was extracted at decreased pressure, and the precipitate was chilled by adding ice-cold water. It was then filtered, cleaned with cold water, and recrystallized to produce the desired product. N-(3(4-hydroxyphenyl)-1-hydrazinyl)1H-indol-3-yl-1-oxopropan-2-yl-4However, butanamide. (4)

General procedure for the compound (5)

4-(1H-indol-3-yl)-(1-hydrazinyl-3-(4-hydroxyphenyl)-1-oxopropan-2-yl)Substituted aldehyde (146 mg, 0.525 mmol) was added to butanamide (200 mg, 0.525 mmol) in ethanol (10 mL/g of the compound). The reaction was refluxed for 7–8 hours in an acetic acid medium, and TLC was used to track its progression. The solvent was removed under reduced pressure, chilled, and then precipitate was obtained by adding ice-cold water. The precipitate was then filtered, cleaned with water, and separated from the ethanol.



Scheme: Synthesis of (1-(2-((5-(4-substitutedphenyl)furan /thiophen-2-yl)methylene)hydrazineyl)-3-(4-hydroxyphenyl)-1-oxopropan-2-yl)-4-(1H-indol-3-yl)butanamide

Table:01 Characterisation data of Synthesised Compounds

R	X	%yield	Melting Point ^{0}C	Elemental Analysis		
				C	H	N
Cl	O	75%	142	67.08 (67.06)	4.90 (4.89)	10.09 (10.08)
CH_3	O	70%	145	71.89 (71.86)	5.66 (5.65)	10.48 (10.47)
Br	O	66%	146	62.11 (62.09)	4.54 (4.53)	9.35 (9.34)
NO_2	O	72%	139	65.83 (65.82)	4.81 (4.80)	12.38 (12.37)
F	O	73%	138	69.13 (69.12)	5.05 (5.04)	10.40 (10.39)
Cl	S	69%	137	65.20 (65.19)	4.77 (4.76)	9.81 (9.80)
CH_3	S	68%	132	69.80 (69.79)	5.49 (5.48)	10.17 (10.16)
Br	S	63%	120	60.49 (60.48)	4.42 (4.41)	9.10 (9.09)

NO_2	S	55%	135	64.01 (64.00)	4.68 (4.67)	12.04 (12.03)
F	S	58%	140	67.13 (67.12)	4.91 (4.90)	10.10 (10.09)

Spectral information for Synthetic Compounds

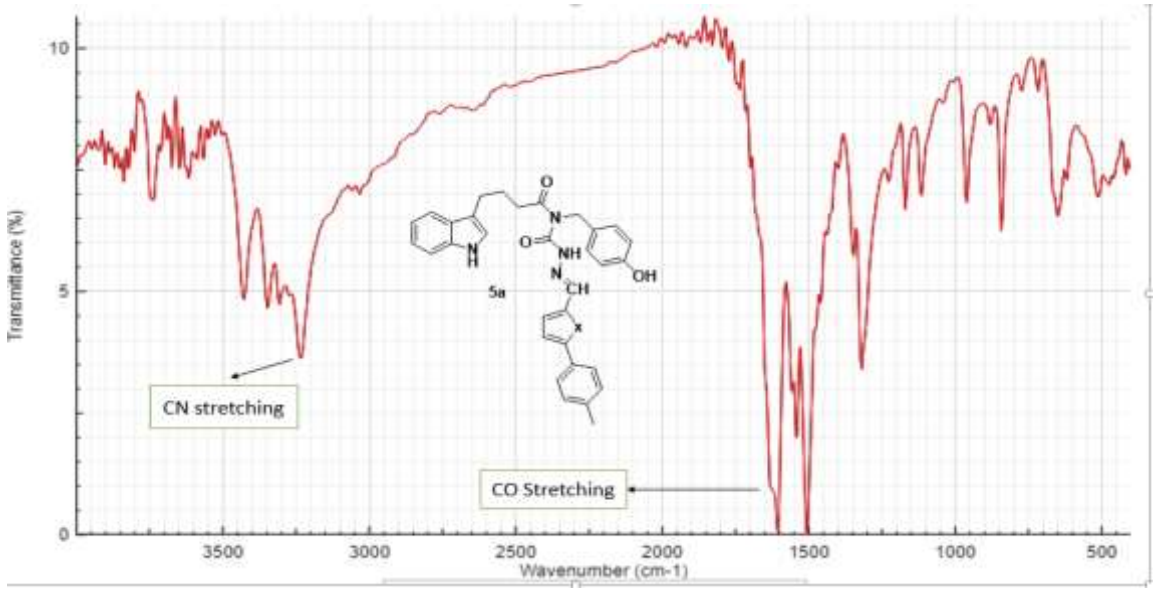
Compound 5a

^{1}H NMR($CDCl_3$): δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.55-6.78 (3H, 6.60 (d, *J* = 3.5 Hz), 6.72 (d, *J* = 8.2, Hz)), 6.91-7.20 (5H), 6.98 (d, *J* = 8.0 Hz), 7.07 (d, *J* = 8.0 Hz), 7.05 (d, *J* = 3.5 Hz), 7.14 (d, *J* = 8.2 Hz)), 7.27-7.42 (2H, 7.33 (d, *J* = 8.0 Hz), 7.37 (t, *J* = 0.5 Hz)), 7.56-7.72 (5H, 7.62 (d, *J* = 8.0 Hz), 7.64 (d, *J* = 8.7 Hz), 7.66 (d, *J* = 8.7, Hz)), 8.09 (1H, s).

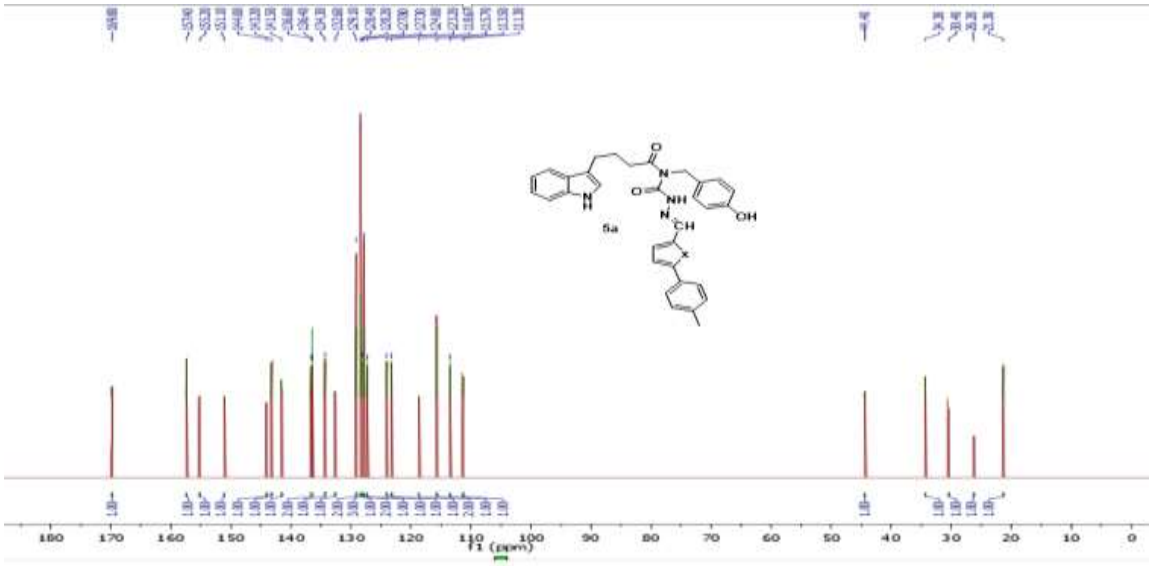
^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 107.9 (1C, s), 111.3 (1C, s), 112.6 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 127.3 (1C, s), 127.4 (2C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 128.7 (2C, s), 129.1 (1C, s), 133.7 (1C, s), 134.8 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 150.1 (1C, s), 155.1-155.3 (2C, 155.2 (s), 155.2 (s)), 157.4 (1C, s), 169.8 (1C, s).

IR (KBr, Cm^{-1}):1600(-CO- stretching),3100(-NH- stretching)

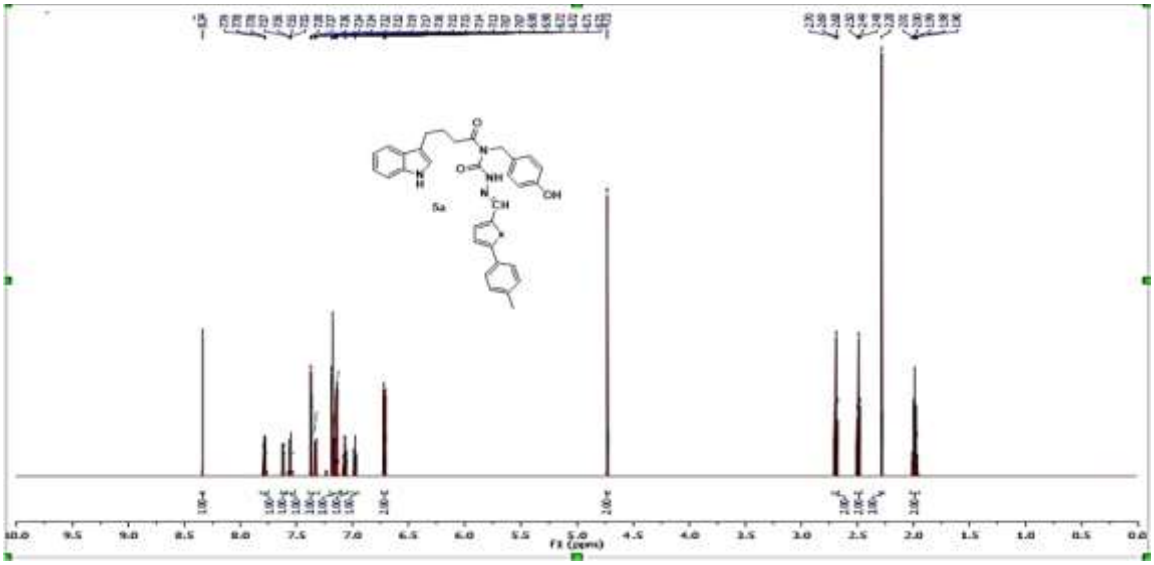
Mass Spectra 5a:m/z:518



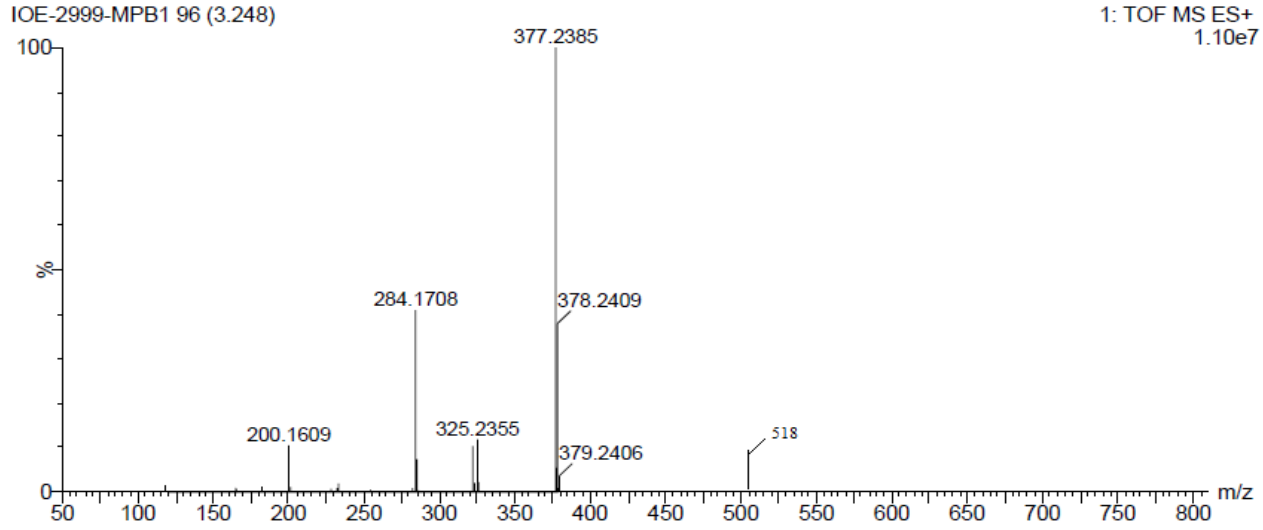
IR spectra of Compound 5a



C13 spectra of Compound 5a



1HNMR spectra of Compound 5a



Mass spectra of Compound 5a

Compound 5b

^{1}H NMR: δ 1.97 (2H, quint, *J* = 7.4 Hz), 2.26 (3H, s), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.60 (1H, d, *J* = 3.5 Hz), 6.72 (2H, d, *J* = 8.2Hz), 6.91-7.42 (9H, 6.98 (d, *J* = 8.0, Hz), 7.00 (d, *J* = 3.5 Hz), 7.07 (d, *J* = 8.0Hz), 7.14 (d, *J* = 8.2,Hz), 7.24 (d, *J* = 8.2Hz), 7.32 (t, *J* = 8.0Hz), 7.37 (t, *J* = 0.5 Hz)), 7.56-7.72 (3H, 7.62 (d, *J* = 8.0Hz), 7.66 (d, *J* = 8.2Hz)), 8.07 (1H, s).

^{13}C NMR: δ 21.3 (1C, s), 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 107.9 (1C, s), 111.3 (1C, s), 112.6 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 126.9 (2C, s), 127.3 (1C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 129.0-129.2 (3C, 129.1 (s), 129.1 (s)), 134.8 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 141.5 (1C, s), 150.1 (1C, s), 155.1-155.3 (2C, 155.2 (s), 155.2 (s)), 157.4 (1C, s), 169.8 (1C, s).

IR (KBr, Cm^{-1}): 1602(-CO- stretching),3108(-NH- stretching)

Compound 5c

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.55 (1H, d, *J* = 3.5 Hz), 6.72 (2H, d, *J* = 8.2Hz), 6.91-7.20 (5H, 6.98 (d, *J* = 8.0, Hz), 7.05 (d, *J* = 3.5 Hz), 7.07 (d, *J* = 8.0, Hz), 7.14 (d, *J* = 8.2,Hz)), 7.27-7.42 (2H), 7.33 (t, *J* = 8.0Hz), 7.37 (t, *J* = 0.5 Hz)), 7.56-7.79 (5H, 7.62 (d, *J* = 8.0Hz), 7.64 (d, *J* = 8.6Hz), 7.73 (d, *J* = 8.6, Hz)), 8.08 (1H, s).

^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 107.9 (1C, s), 111.3 (1C, s), 112.6 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 118.7 (1C, s), 122.3 (1C, s), 123.2 (1C, s), 126.6 (2C, s), 127.3

(1C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 129.1 (1C, s), 131.7 (2C, s), 134.8 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 150.1 (1C, s), 155.1-155.3 (2C, 155.2 (s), 155.2 (s)), 157.4 (1C, s), 169.8 (1C, s).

IR (KBr, Cm^{-1}): 1610(-CO- stretching),3110(-NH- stretching)

Compound 5d:

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.49 (1H, d, *J* = 3.5 Hz), 6.72 (2H, d, *J* = 8.2, Hz), 6.91-7.20 (5H, 6.98 (d, *J* = 8.0, Hz), 7.05 (d, *J* = 3.5 Hz), 7.07 (d, *J* = 8.0,Hz), 7.14 (d, *J* = 8.2,Hz)), 7.27-7.68 (7H, 7.33 (t, *J* = 8.0,Hz), 7.37 (t, *J* = 0.5 Hz), 7.48 (d, *J* = 8.9 Hz), 7.51 (d, *J* = 8.9 Hz), 7.62 (t, *J* = 8.0,Hz)), 8.08 (1H, s).

^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 107.9 (1C, s), 111.3 (1C, s), 112.6 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 117.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 126.0 (2C, s), 127.3 (1C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 129.1 (1C, s), 134.8 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 139.5 (1C, s), 150.1 (1C, s), 155.1-155.3 (2C, 155.2 (s), 155.2 (s)), 157.4 (1C, s), 169.8 (1C, s)

IR (KBr, Cm^{-1}): 1600(-CO- stretching),3100(-NH- stretching)

Compound 5e

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.55 (1H, d, *J* = 3.5 Hz), 6.72 (2H, d, *J* = 8.2,Hz), 6.91-7.21 (7H), 6.98 (d, *J* = 8.0Hz), 7.07 (d, *J* = 8.0, Hz), 7.06 (d, *J* = 3.5 Hz), 7.14 (d, *J* = 8.2Hz), 7.14 (d, *J* = 8.8,Hz)), 7.27-7.42 (2H, 7.33 (t, *J* = 8.0,Hz), 7.37 (t, *J* = 0.5 Hz)), 7.62 (1H, t, *J* = 8.0, Hz), 7.86 (2H, d, *J* = 8.8, Hz), 8.09 (1H, s).

^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 107.9 (1C, s), 111.3 (1C, s), 112.6 (1C, s), 113.5 (1C, s), 115.4 (2C, s), 115.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 124.9 (2C, s), 127.3 (1C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 129.1 (1C, s), 134.8 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 150.1 (1C, s), 155.1-155.3 (2C, 155.2 (s), 155.2 (s)), 157.4 (1C, s), 162.5 (1C, s), 169.8 (1C, s)

Compound 5f

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.72 (2H, d, *J* = 8.2 Hz), 6.91-7.43 (8H, 6.98 (d, *J* = 8.0 Hz), 7.07 (d, *J* = 8.0 Hz), 7.14 (d, *J* = 8.2 Hz), 7.21 (d, *J* = 8.7 Hz), 7.33 (d, *J* = 8.0 Hz), 7.37 (d, *J* = 8.7 Hz), 7.37 (t, *J* = 0.5 Hz)), 7.46-7.68 (5H, 7.52 (d, *J* = 8.9 Hz), 7.53 (d, *J* = 8.9 Hz), 7.62 (t, *J* = 8.0 Hz)), 8.34 (1H, s).

^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 111.3 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 124.0 (1C, s), 127.3 (1C, s), 127.6 (2C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 128.7 (2C, s), 132.6 (1C, s), 133.7 (1C, s), 134.3 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 143.2 (1C, s), 144.0 (1C, s), 151.1 (1C, s), 155.2 (1C, s), 157.4 (1C, s), 169.8 (1C, s)

Compound 5g

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.28 (3H, s), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.72 (2H, d, *J* = 8.2Hz), 6.91-7.24 (7H, 6.98 (d, *J* = 8.0Hz), 7.07 (d, *J* = 8.0Hz), 7.14 (d, *J* = 8.2Hz), 7.17 (d, *J* = 8.2Hz), 7.18 (d, *J* = 8.6 Hz)), 7.27-7.43 (3H, 7.33 (t, *J* = 8.0Hz), 7.37 (d, *J* = 8.6 Hz), 7.37 (t, *J* = 0.5 Hz)), 7.56-7.73 (3H, 7.62 (t, *J* = 8.0 Hz), 7.67 (d, *J* = 8.2Hz)), 8.34 (1H, s)

^{13}C NMR: δ 21.3 (1C, s), 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 111.3 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 124.0 (1C, s), 127.3 (1C, s), 127.8 (2C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 129.1 (2C, s), 132.6 (1C, s), 134.3 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 141.5 (1C, s), 143.2 (1C, s), 144.0 (1C, s), 151.1 (1C, s), 155.2 (1C, s), 157.4 (1C, s), 169.8 (1C, s).

Compound 5h

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.72 (2H, d, *J* = 8.2, Hz), 6.91-7.43 (10H, 6.98 (d, *J* = 8.0, Hz), 7.07 (d, *J* = 8.0, Hz), 7.14 (d, *J* = 8.2, Hz), 7.21 (d, *J* = 8.6 Hz), 7.32 (d, *J* = 8.6 Hz), 7.33 (t, *J* = 8.0Hz), 7.37 (d, *J* = 8.8, Hz), 7.37 (t, *J* = 0.5 Hz)), 7.50-7.68 (3H, 7.56 (d, *J* = 8.8Hz), 7.62 (t, *J* = 8.0Hz)), 8.32 (1H, s).

^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 111.3 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 118.7 (1C, s), 122.3 (1C, s), 123.2 (1C, s), 124.0 (1C, s), 127.3 (1C, s), 127.9 (2C, s), 128.2

(1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 131.7 (2C, s), 132.6 (1C, s), 134.3 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 143.2 (1C, s), 144.0 (1C, s), 151.1 (1C, s), 155.2 (1C, s), 157.4 (1C, s), 169.8 (1C, s).

Compound 5i

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.72 (2H, d, *J* = 8.2Hz), 6.91-7.20 (5H, 6.98 (d, *J* = 8.0Hz), 7.07 (d, *J* = 8.0Hz), 7.12 (d, *J* = 8.6 Hz), 7.14 (d, *J* = 8.2Hz)), 7.27-7.54 (7H, 7.33 (t, *J* = 8.0Hz), 7.35 (d, *J* = 8.4Hz), 7.37 (t, *J* = 0.5 Hz), 7.45 (d, *J* = 8.6 Hz), 7.48 (d, *J* = 8.4Hz)), 7.62 (1H, t, *J* = 8.0 Hz), 8.29 (1H, s)

^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 111.3 (1C, s), 113.5 (1C, s), 115.7 (2C, s), 117.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 124.0 (1C, s), 127.3 (1C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 128.6 (2C, s), 132.6 (1C, s), 134.3 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 139.5 (1C, s), 143.2 (1C, s), 144.0 (1C, s), 151.1 (1C, s), 155.2 (1C, s), 157.4 (1C, s), 169.8 (1C, s).

Compound 5j

^{1}H NMR: δ 1.99 (2H, quint, *J* = 7.4 Hz), 2.49 (2H, t, *J* = 7.4 Hz), 2.69 (2H, t, *J* = 7.4 Hz), 4.73 (2H, s), 6.72 (2H, d, *J* = 8.2Hz), 6.91-7.42 (10H, 6.98 (d, *J* = 8.0Hz), 7.07 (d, *J* = 8.0Hz), 7.11 (d, *J* = 8.9, Hz), 7.14 (d, *J* = 8.2Hz), 7.21 (d, *J* = 8.6 Hz), 7.33 (d, *J* = 8.6 Hz), 7.33 (t, *J* = 8.0Hz), 7.37 (t, *J* = 0.5 Hz)), 7.54-7.68 (3H, 7.61 (d, *J* = 8.9Hz), 7.62 (t, *J* = 8.0Hz)), 8.33 (1H, s).

^{13}C NMR: δ 26.2 (1C, s), 30.4 (1C, s), 34.3 (1C, s), 44.4 (1C, s), 111.3 (1C, s), 113.5 (1C, s), 115.4 (2C, s), 115.7 (2C, s), 118.7 (1C, s), 123.2 (1C, s), 124.0 (1C, s), 127.3 (1C, s), 127.8 (2C, s), 128.2 (1C, s), 128.3-128.5 (3C, 128.4 (s), 128.4 (s)), 132.6 (1C, s), 134.3 (1C, s), 136.4 (1C, s), 136.6 (1C, s), 143.2 (1C, s), 144.0 (1C, s), 151.1 (1C, s), 155.2 (1C, s), 157.4 (1C, s), 162.5 (1C, s), 169.8 (1C, s)

Pharmacological activity

As a reaction of the immune system, inflammation influences several enzymatic and cellular functions that aid in protecting the body against various types of invasive infections. The synthesised hydrazine hybrids' anti-inflammatory properties were assessed by measuring how much less nitric oxide was produced by LPS-stimulated mice macrophages. Short-lived and secreted by a range of cells in response to various pathogenic stimuli is hydrazone. In addition to acting as a vasodilator, platelet inhibitor, and inhibitor of neutrophil adhesion, hydrazone has modulatory action in a range of inflammatory diseases. As a result, hydrazone helps to shield the immune system from infections and other stressors.

The anti-inflammatory assay involves inducing inflammation reactions in macrophage cultures by a simulated microbial infection. Macrophages in the culture medium produce a significant amount of hydrazone in response to the microbial infection. Compounds with anti-inflammatory activity can decrease inflammatory processes, which in turn causes the release of hydrazone in the culture medium. The ratio of each compound's anti-inflammatory activity to cell viability is used to assess its anti-inflammatory potential. Table 02 reports the anti-inflammatory assay results. In order to calculate anti-inflammatory ratios, the IC50 values for cell viability were also evaluated.

Using dexamethasone as a reference, all substances were investigated in three categories to assess their anti-inflammatory effect. Compared to the reference chemical dexamethasone, which has an anti-inflammatory ratio of 32, compounds 5b and 5c demonstrated stronger action, with anti-inflammatory ratio values of 38 and 62, respectively. These substances are hence powerful hydrazone inhibitors. Other studied compounds with modest action similar to dexamethasone are 5d and 5e, which had anti-inflammatory ratios of 26 and 25, respectively. Table summarises the IC50 values and anti-inflammatory ratios of all drugs tested against hydra zones.

Entry	IC50 hydrazone release (µM)	IC50-cell viability (µM)	Anti-inflammatory ratio	IC50 (mM) ± Std. HepG2
5a	35.41 ± 2.04	256.83 ± 12.14	7	0.26 ± 0.02
5b	**13.04 ± 2.47**	**> 500**	**> 38**	**0.48 ± 0.04**
5c	**7.92 ± 1.07**	**> 500**	**> 62**	**0.51 ± 0.01**
5d	10.67 ± 1.22	267.48 ± 11.65	26	0.24 ± 0.02
5e	20.88 ± 3.21	> 500	> 25	0.56 ± 0.03
5f	9.90 ± 2.18	147.25 ± 1.65	14	0.13 ± 0.02
5g	57.45 ± 2.34	114.15 ± 1.66	2	0.14 ± 0.00
5h	60.41 ± 8.34	323.39 ± 12.14	5	0.43 ± 0.00
5i	91.88 ± 2.64	264.17 ± 8.74	3	0.41 ± 0.05

Dexamethasone	5.01 ± 1.32	159.1 ± 26.34	32	-

4. Conclusion

It A series of (1-(2-((5-(4-substitutedphenyl) furan /thiophen-2-yl) methylene) hydrazineyl)-3-(4-hydroxyphenyl)-1-oxopropan-2-yl)-4-(1H-indol-3-yl) butanamide derivatives were synthesised, it was Confirmed by 1HNMR C13NMR and IR analysis and it was screened for anti-inflammatory activity by using dexamethasone as a standard drug. Derivatives containing methyl and Bromo substituents demonstrated strongest action when compared to other derivatives

Conflicts of Interest

There is no conflict of interest.

References:

1. Rallas, S.; Gulerman, N.; Erdeniz, H. Synthesis and antimicrobial activity of some new hydrazones of 4-fluorobenzoic acid hydrazide and 3-acetyl-2,5- disubstituted-1,3,4-oxadiazolines. Farmaco **2002**, 57, 171–174.
2. Gursoy, A.; Terzioglu, N.; Otuk, G. Synthesis of some new hydrazide-hydrazones, thiosemicarbazides and thiazolidinones as possible antimicrobials. Eur. J. Med. Chem. **1997**, 32, 753–757.
3. Vicini, P.; Zani, F.; Cozzini, P.; Doytchinova, I. Hydrazones of 1,2-benzisothiazole hydrazides: synthesis, antimicrobial activity and QSAR investigations. Eur. J. Med. Chem. **2002**, 37, 553–564.
4. Mamolo, M.G.; Falagiani, V.; Zampieri, D.; Vio, L.; Banfo, E. Synthesis and antimycobacterial activity of [5-(pyridin-2-yl)-1,3,4-thiadiazol-2-ylthio]acetic acid arylidene-hydrazide derivatives. IIFARMACO **2001**, 56, 587–592.
5. Rahman, V.M.; Mukhtar, S.; Ansari, W.H.; Lemiere, G. Synthesis, stereochemistry and biological activity of some novel long alkyl chain substituted thiazolidin-4-ones and thiazan-4-one from 10-undecenoic acid hydrazide. Eur. J. Med. Chem. **2005**, 40, 173–184.
6. Dimmock, J.R.; Vashishtha, S.C.; Stables, J.P. Anticonvulsant properties of various acetylhydrazones, oxamoylhydrazones and semicarbazones derived from aromatic and unsaturated carbonyl compounds. Eur. J. Med. Chem. **2000**, 35, 241–248.
7. Yapia, R.; La Mara, M.P.; Massieu, G.H. Modifications of brain glutamate decarboxylase activity by pyridoxal phosphate-β-glutamyl hydrazone. Biochem. Pharmacol. **1967**, 16, 1211–1218.
8. Sava, G.; Perissin, L.; Lassiani, L.; Zabucchi, G. Antiinflammatory action of hydrosoluble dimethyl-triazenes on the carrageen induced edema in guinea pigs. Chem. Biol. Interact. **1985**, 53, 37–43.
9. Xia, Y.L; Chuan-Dong, F.; Zhao, B.X.; Zhao, J.; Shin, D.S.; Miaom, J.Y. Synthesis and structure-activity relationships of novel 1-arylmethyl-3-aryl-1H- pyrazole-5-carbohydrazide hydrazone derivatives as potential agents A549 lung cancer cells. Eur. J. Med. Chem. **2008**, 43, 2347–2353.
10. Melnyk, P.; Leroux, V.; Serghergert, C.; Grellier, P. Design, synthesis and in vitro antimalarial activity of an acylhydrazone library. Bioorg. Med. Chem. Lett. **2006**, 16, 31–35.
11. Ajani, O.O.; Obafemi, C.A.; Nwinyi, O.C.; Akinpelu, D.A. Microwave assisted synthesis and antimicrobial activity of 2- quinoxalinone-3-hydrazone derivatives. Bioorg. Med. Chem. **2010**, 18, 214–221.
12. Zheng, L.W.; Wu, L.L.; Zhao, B.X.; Dong, W.L.; Miao, Y.J. Synthesis of novel substituted pyrazole-5-carbohydrazide hydrazone derivatives and discovery of a potent apoptosis inducer in A549 lung cancer cells. Bioorg. Med. Chem. **2009**, 17, 1957–1962.
13. Bhagavan, N.V. Medical Biochemistry; Elsevier Science B.V.: Amsterdam, The Netherlands, 2002; Volume 17, pp. 331–363.
14. Saulnier, M.G.; Velaprthi, U.; Zimmermann, K. Progress In Heterocyclic Synthesis; Gribble, G., Ed.; Elsevier Science B.V.: Amsterdam, The Netherlands, 2005; Volume 16, pp. 228–271.
15. Short, E.I. Studies on the inactivation of isonicotinyl acid hydrazide in normal subjects and tuberculous patients. Tubercle **1962**, 43, 33–42.
16. Holdiness, M.R. A review of blood dyecrasias induced by the antituberculosis drugs. Tubercle **1987**, 68, 301–309.
17. Faroumadi, A.; Kiano, Z.; Soltani, F. Antituberculosis agents VIII: Synthesis and in vitro antimycobacterial activity of alkyl a-[5-(5-nitro-2-thienyl)-1,3,4- thiadiazole-2-ylthio]acetates. Farmaco **2003**, 58, 1073–1076.
18. Bokharev, V.V.; Ghidaspov, A.A.; Peresedova, E.V. Reaction of potassium salts of 2- amino-4-methoxy-6-dinitro-methyl-1,3,5-triazines with N_2O_4. Chem. Heterocycl. Comp. **2006**, 42, 1096–1106.
19. Fernando, R.P.; Maia, P.I.; Leite, S.R.; Deflon, V.M.; Batista, A.A.; Sato, D.N.; Franzblau, S.G.; Leite, C.Q. Thiosemicarbazones, semicarbazones, dithiocarbazates and hydrazide/hydrazone: Anti – Mycobacterium tuberculosis activity and cytotoxicity. Eur. J. Med. Chem. **2010**, 45, 1898–1905.
20. Brzozowski, Z; Czewski, F.S. Synthesis and antitumor activity of novel 2- amino-4-(3,5,5-trimethyl-2-pyrazolino)-1,3,5-triazine derivatives. Eur. J. Med. Chem. **2002**, 37, 709–720.
21. Sherif, A., Rostom. Polysubstituted pyrazoles, part 6. Synthesis of some 1-(4-chlorophenyl)-4-hydroxy-1H-pyrazol-3-carbonyl derivatives linked to nitrogenous heterocyclic ring systems as potential antitumor agents. Bioorg. Med. Chem. **2010**, 18, 2767–2776.