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EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF HYDRO-ALCOHOLIC EXTRACT OF *Delonix regia* FLOWER ON INFLAMMATION INDUCED CHICKS

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ABSTRACT

Objective: The present study aimed to evaluate the anti-inflammatory activity of the hydro-alcoholic extract of *Delonix regia* flowers using carrageenan-induced paw edema in chicks. **Materials and Methods:** Flowers of *Delonix regia* were collected, shade-dried, powdered, and extracted using 70% ethanol through Soxhlet extraction. The hydro-alcoholic extract underwent phytochemical screening and FT-IR analysis, which confirmed the presence of flavonoids, phenols, tannins, terpenoids, and glycosides. Anti-inflammatory activity was assessed in chicks divided into four groups: control, standard (Indomethacin 25 mg/kg), and two test groups receiving extract at 200 mg/kg and 400 mg/kg. Carrageenan-induced paw edema was measured at 1–4 hours using a digital Vernier caliper. **Results and Discussion:** Phytochemical analysis revealed bioactive constituents with known anti-inflammatory potential. FT-IR spectra confirmed functional groups such as alcohols, ketones, and ethers. The extract produced a significant reduction in paw edema in a dose-dependent manner, with the 400 mg/kg group showing a more pronounced effect compared to 200 mg/kg. The activity was comparable to Indomethacin. Effects may be attributed to the synergistic action of flavonoids, phenolic compounds, and tannins. **Conclusion:** The hydro-alcoholic extract of *Delonix regia* flowers exhibited significant anti-inflammatory activity in carrageenan-induced inflammation in chicks, supporting its traditional use and potential as a natural therapeutic alternative.

KEYWORDS: *Delonix regia*, Hydro-alcoholic extract, Anti-inflammatory activity, Carrageenan-induced paw edema, Phytoconstituents.

INTRODUCTION

HERBAL MEDICINE

Herbal medicines are intricate blends that work in concert to affect physiological functions. The efficacy, safety, and purity of medications made from natural sources including plants, animals, and microbes are the main concerns of pharmacognosy. A subfield of this study called herbal pharmacognosy focuses on traditional herbal medicine, which is still the main source of healthcare in many communities across the world. Its potential to identify new therapeutic molecules has recently drawn scientific attention. By using molecular, genomic, and metabolomic techniques, modern pharmacognosy advances our understanding of the therapeutic functions of herbal treatments. Different secondary metabolites are produced by plants for pollination, immunity, defense against diseases and herbivores, and antioxidant purposes. Terpenoids, glycosides, saponins, tannins, alkaloids, phenols (flavonoids, phenolic acids, stilbenes, and lignans), and essential oils are important classes.[1]

HISTORY OF HERBAL MEDICINE

Records from ancient societies such as the Chinese, Egyptians, Africans, and Native Americans attest to the usage of plants for therapeutic purposes. Reliance on herbal treatments decreased in the 19th century as scientists started to extract and synthesize plant chemicals. Nevertheless, plants are the source of almost one-fourth of pharmaceutical medications. Currently, herbal medications are used by 80% of people globally. Seventy percent of German doctors prescribe between 600 and 700 plant-based medications. Over the past 20 years, the usage of herbal medicines has expanded in the United States due to growing interest in alternative therapies and unhappiness with prescription rates.

INFLAMMATION

A natural defense mechanism against tissue damage brought on by harmful substances, microbes, or physical trauma is inflammation. The two primary categories of inflammation are as follows. Increased arterial permeability, capillary infiltration, and leukocyte emigration are all linked to acute inflammation. The invasion of mononuclear immune cells, macrophages, monocytes, neutrophils, fibroblast activation, proliferation (angiogenesis), and fibrosis are all linked to chronic inflammation. Localized redness, swelling, discomfort, heat, and loss of function are the typical symptoms of inflammation and are recommended for orthopedic ailments such as fractures, soft-tissue injuries, and osteoarthritis. For the aforementioned conditions, NSAIDs, such as ibuprofen and naproxen, are utilized.[2]

HOW INFLAMMATION WORKS

Swelling is the result of fluid entering into your tissues due to certain substances. This defensive mechanism could set off nerves and result in discomfort. Over time, inflammation, joint lining swelling, and cartilage degeneration (cushions at the end of bones) can be brought on by an increase in white blood cells and what may be produced inside your joints.[3]

MECHANISM OF INFLAMMATION

The process of identifying particular molecular patterns linked to either infection or tissue damage starts from the complex molecular mechanism of inflammation.[4]

SYMPTOMS

Acute Inflammation

Acute inflammation is usually characterized by immediate and noticeable changes in the affected area. It typically presents with redness due to increased blood flow, a sensation of heat, visible swelling caused by fluid accumulation, and pain that arises from nerve irritation. These signs reflect the body's rapid defense response to injury or infection.

Chronic Inflammation

When inflammation persists over a long period, it takes on a chronic form, often manifesting through less obvious but more systemic symptoms. Individuals may experience persistent body pain, including joint discomfort (arthralgia) and muscle aches (myalgia). Chronic fatigue and disturbances in sleep, such as insomnia, are also common. Moreover, the digestive system can be affected, leading to issues like constipation, diarrhea, or acid reflux. Unexplained fluctuations in body weight, either gain or loss, may also signal ongoing chronic inflammation.

Causes of inflammation

Inflammation can arise from multiple lifestyle and environmental factors. A sedentary lifestyle with little to no exercise can contribute significantly to its development. Long-term stress also plays a crucial role in stimulating the body's inflammatory pathways. Obesity, which places strain on various body systems, further increases the risk. Additionally, an imbalance in gut microbes, where beneficial bacteria are too few, can disturb overall health and promote inflammation. Habits such as smoking tobacco or consuming excessive amounts of alcohol add to the burden, making the body more prone to both acute and chronic inflammatory conditions.

INFLAMMATION DIAGNOSED BY

Discussing your medical history and performing a physical examination, your doctor may search for symptoms of inflammation and determine whether your joints are stiff in the morning. Any additional signs or symptoms. Additionally, they will examine X-ray and blood test results for indicators including C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR).[6]

INFLAMMATORY DISEASES

Common inflammatory diseases include neurological disorders, including Parkinson's and Alzheimer's. Autoimmune conditions such as psoriasis, lupus, and rheumatoid arthritis Conditions related to the digestive system Mental health conditions including anxiety and depression; metabolic disorders like type 2 diabetes; cardiovascular problems like high blood pressure and heart disease; lung diseases like asthma and chronic obstructive pulmonary disease (COPD); and certain malignancies.[7]

INFLAMMATION AFFECTING INTERNAL ORGANS

The organs that are affected indicate other signs of chronic inflammation. For instance, shortness of breath or fluid accumulation may result from myocarditis, an inflammation of the heart, or from inflammation of the tiny tubes that carry air to the lungs.

Nephritis, or kidney inflammation, can result in high blood pressure or renal failure. Because some organs lack many pain-sensing nerves, you may not experience pain when you have an inflammatory condition.[8]

MEDICATIONS FOR INFLAMMATION

Several drugs can reduce swelling and pain. Additionally, they might slow or prevent inflammatory diseases. Physicians frequently prescribe many medications. Nonsteroidal anti-inflammatory drugs (NSAIDs, such as aspirin, ibuprofen, or naproxen) are among the treatments.

- Corticosteroids (prednisone, for example)
- DMARDs (disease-modifying antirheumatic medications),

Such as sulfasalazine, methotrexate, leflunomide, cyclophosphamide, and azathioprine Abatacept, adalimumab, certolizumab, etanercept, infliximab, golimumab, rituximab, and tocilizumab are examples of biologic pharmaceuticals; anti-malarial treatments include hydroxychloroquine.[9]

PLANTS AS NATURAL ANTI-INFLAMMATORY AGENTS

Herbal medicines act as an orchestral strategy, in contrast with newer allopathic medications that have single active ingredients that target a single pathway. Several distinct compounds found in plants function in concert to target specific components of the complex biological system. With the world's largest collection of medicinal plants, India could continue to play a significant role in the manufacture of raw materials for crude drugs or as bioactive ingredients in the creation of medications and cosmetics.[10]

DELONIX REGIA

Various components of the *Delonix regia* plant are used to treat several ailments, like inflammation, bronchitis, joint pain, diabetes, anemia, fever, and pneumonia. *Delonix regia* can also be used as a treatment for gynecological problems. *Delonix regia* additionally has anti-inflammatory, antibacterial, antimicrobial, anti-diarrheal, hepatoprotective, antidiabetic, anti-ulcer, antihelminthic, cytotoxic, antioxidant, gastroprotective, and wound-healing activities. This work mainly supports research on *Delonix regia* description, traditional uses, and phytochemical and pharmacological activities. The literature review of *Delonix regia* indicates that it has extensive pharmacological properties that help treat a few *Delonix regia* disorders.[11]

ROLE OF *DELONIX REGIA* IN ANTI-INFLAMMATORY ACTIVITY

Delonix regia (Boj. Ex. Hook) (Family: Caesalpiniaceae) is a medium-sized tree found in greater parts of India. The decoction of the leaves is traditionally used in treating gastric problems, body pain, and rheumatic pains of joints. Ethanolic extracts of flowers and bark were investigated for anti-inflammatory activity in rats. The leaves are reported to be antibacterial and antimalarial. *Delonix regia* contains proteins, flavonoids, tannins, phenolic compounds, glycosides, sterols, and triterpenoids. However, no data were found regarding the pharmacological and phytochemical evaluation of the leaves of plant.[12]

AIM AND OBJECTIVES

The present study aimed to evaluate the "EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF HYDRO-ALCOHOLIC EXTRACT OF *Delonix regia* FLOWER ON INFLAMMATION INDUCED CHICKS."

THE OBJECTIVES OF THE PRESENT STUDY ARE

1. Selection, collection, and authentication of plant.
2. Prepare the hydro-alcoholic extraction of *Delonix regia*.

3. To carry out the preliminary phytochemical screening.
4. To evaluate the FT-IR extract study.
5. To evaluate the anti-inflammatory activity in chicks.

PLANT PROFILE

SCIENTIFIC CLASSIFICATION

Kingdom Plantae

Division Spermatophyta

Subdivision Magnoliophyta

Class Magnoliopsida

Sub class Rosidae

Family Fabaceae

Genus Delonix

Species D. regia

VERNACULAR NAMES

Language Names

Tamil Neruppu kondrai

English Gulmohor

DESCRIPTION[13]

TREE

The Delonix regia tree can reach a maximum height of eighteen meters and a maximum width of two meters. It has a broad, angled trunk that is buttressed near the base. Its smooth, greyish-brown bark is occasionally slightly broken, and its outer bark is a light brown color. With long, almost horizontal branches that produce a diameter broader than the tree's height, the crown of the tree has an umbrella-shaped, spreading canopy. When the twigs are young, they are robust, greenish, and finely hairy before eventually turning brown.

LEAVES

10–25 pairs of pinnae, 5-12 cm long, each bearing 12-40 pairs of small oblong-obtuse Leaves paripinnate, alternate, light green, feathery, 20-60 cm long, with leaflets that are about 0.5-2 cm long and 0.3 cm wide, and petiole stout. The numerous leaflets are stalkless. Rounded at the base and apex, entirely thin, very minutely hairy on both sides, and green on the upper surface. At the base of the leaf stalk, 2 compressed stipules have long, narrow, comb-like teeth.

FLOWERS

Each corymb is 15-30 cm long and has loosely placed, mildly scented blooms. The flowers are 5-13 cm across and have five equal petals. The stalks are 5-7.6 cm tall. Petals are broadly spoon-shaped, measuring 5-6.5 cm in length and 2-3 cm in width. They are round but broader than long, with a slightly wavy edge, tapering into claws that are roughly 2.5 cm long, widely extended, and bend backward before falling. Four orange-red, nearly crimson petals, one taller and narrower than the others, and pale on the inside with red streaks and spots; a very long, slender, and hairy stalk. Sepals 5 are pointy, coarsely hairy, almost 2.5 cm long, thick, green on the surface, and reddish with a yellow border within; they reflex when the flower opens.

FRUITS

Fruit green and flaccid when young, turning to dark brown, hard, woody pods, 30-75 cm long, 3.8 cm thick, and 5-7.6 cm broad, ending in a short beak when mature, with many horizontally partitioned seed chambers inside, indehiscent, and finally splitting into 2 parts. The conspicuous pods hang down and remain attached most of the year, even when the trees are leafless. Seeds 30-45, hard, greyish, glossy, up to 2 cm long, oblong, and shaped very much like date seeds, transversely mottled with a bony testa. They are arranged at right angles to the length of the pod.

MEDICINAL USES

Seeds of Delonix regia contain flavonoids and are used as wound-healing agents in households. The flower of Delonix regia (Hook.) Raf. was used as a natural color and as an acid-base indicator. The seed contains gum that may find use in textile and food industries. The seeds yield 18-27.5% fatty oil known as the “pangam” or “karanga” oil of commerce. It is used in the tanning industry. The oil and “Karajan” possess insecticidal and antibacterial properties. The oil also finds use in soap making, illuminating, and pharmaceutical preparations. The oil cake is a good fertilizer. The seed is carminative, purifies and enriches the blood, and is used in case of inflammation, “earache,” and chest complaints. Delonix regia seed gum could be employed as a stabilizer and thickener of choice in pharmaceutical suspension preparation and in the cosmetic, pharmaceutical, and food industries. The wood is widely used as firewood.[14]

PHARMACOLOGICAL PROPERTIES

The plant has many useful medicinal properties. It shows **anti-inflammatory effects**, helping to reduce swelling and pain, and its **antimicrobial and antibacterial activities** protect against infections. It also has **anti-diabetic action**, helping to control blood sugar levels, and **antidiarrheal effects** that support digestive health. Its **hepatoprotective property** keeps the liver healthy, while **cytotoxic effects** may help in controlling harmful cell growth. With strong **antioxidant activity**, it protects the body from damage caused by free radicals. The plant also has **anthelmintic action** to fight worms, supports **wound healing** by repairing tissues, and shows **gastroprotective effects** that protect the stomach from ulcers and other problems.

MATERIALS AND METHODS

Plant Material and Authentication of Plant

The flower of Delonix regia was collected from a college campus in Sivakasi, Tamil Nadu, India. The plant material was identified and authenticated by Dr. N. Senthilkumar, Head and Associate Professor of Botany, Centre for Research and PG Studies in Ayya Nadar Janaki Ammal College, Sivakasi – 626124, Tamil Nadu, India.

Preparation of Extract

The flowers were crushed after being shade-dried at room temperature. After undergoing initial qualitative photochemical investigations, the resulting powder was submitted to consecutive Soxhlet extraction with 70% ethanol (hydro-alcoholic extract), which was utilized for our investigations. After being concentrated at lower pressure, the extract was kept in desiccators until needed.[15]

Animals Used

We used unsexed, 1–3-week-old chicks of mixed breed (body weight 35-125 g). The chicks were maintained in batches of 20-30 in a room at a temperature of 30-34°C (controlled by electric heaters) with constant lighting. The litter consisted of wood shavings. Water and feed were given ad libitum. All experiments complied with institutional regulations addressing animal use; the chicks received proper attention and human care by the standards outlined in the Guide for the Care and Use of Laboratory Animals.[18]

Preliminary Phytochemical Screening[16]

The hydro-alcoholic extract obtained was subjected to qualitative tests for the identification of different constituents, which will be done using the following standard qualitative methods.

A. TEST FOR ALKALOIDS

Wagner’s Test: Wagner's reagent (1.27 g of iodine and 2 g of potassium iodide in 100 ml of water) was added to 3-5 drops of extract, and the extract was then examined to see if a reddish-brown precipitate (or coloring) formed.

B. TEST FOR CARBOHYDRATES

Molisch’s test

A 2 ml aliquot of each of the different extracts was mixed with a few drops of Molisch's reagent. After that, 2 ml of concentrated H_2SO_4 was added down the test tube's side. After that, the mixture was left to stand for two to three minutes. A positive test resulted from the formation of a red or dull violet color in the two-layer interphase.

C. TEST FOR CARDIAC GLYCOSIDES

Keller Kelliani’s test

In a test tube, 5 milliliters of each extract were treated with 2 milliliters of glacial acetic acid, and then a drop of ferric chloride solution was added. Carefully, 1 milliliter of pure sulfuric acid was applied underneath. The presence of the cardenolide's distinctive deoxysugar was revealed by a brown ring at the interface. Below the ring, a violet ring can show up, and a greenish ring might form in the acetic acid layer.

D. TEST FOR FLAVONOIDS

Shinoda test

A few magnesium turns and a few drops of strong hydrochloric acid were added to the extract, which was then heated for five minutes. Flavonoids are indicated by a red hue.

E. TEST FOR PHENOLS

Ferric chloride test

Treating a portion of the extracts with 5% aqueous ferric chloride, the production of a deep blue or black color was monitored.

F. TEST FOR PHLOROTANNINS

Precipitate test

Phlobatannins were determined to be present based on the red precipitate that formed when 2 milliliters of extract and 1 milliliter of 1% aqueous hydrochloric acid were heated together.

G. TEST FOR AMINO ACIDS AND PROTEINS

1% ninhydrin solution in acetone

Sulfuric acid. The presence of terpenoids was quickly revealed by the production of a reddish-brown precipitate.

H. TEST FOR SAPONINS

Foam test

2 ml of extract was added to 6 ml of water in a test tube. The mixture was shaken vigorously and observed for the formation of persistent foam that confirms the presence of saponins.

I. TEST FOR STEROLS

Liebermann-Burchard test

1 ml of extract was treated with drops of chloroform, acetic anhydride, and conc. H_2SO_4 and observed for the formation of a dark pink or red color.

J. TEST FOR TANNINS

Braymer's test

2 ml of extract was treated with 10% alcoholic ferric chloride solution and observed for the formation of a blue or greenish-colored solution.

K. TEST FOR TERPENOIDS

Salkowki's test

1 ml of chloroform was added to 2 ml of each extract, followed by a few drops of concentrated sulphuric acid. A reddish-brown precipitate produced immediately indicated the presence of terpenoids.

L. TEST FOR QUINONES

Concentrated HCl was applied to a small amount of extract, and the production of a yellow precipitate, or coloring, was monitored.

M. TEST FOR OXALATE

A few drops of glacial acetic acid were added to a 3 ml sample of extracts. Oxalates are present when a coloration turns greenish black.

ANALYTICAL TECHNIQUES

STUDY ON FT-IR

DEFINITION

Fourier Transform Infrared (FTIR) spectroscopy is a method that analyzes the composition of materials by measuring the infrared light they absorb.

WORKING PRINCIPLE

A beam of infrared light with different frequencies is shone on a sample.

The amount of light absorbed by the sample is measured.

A computer analyzes the data to create a profile of the sample.

Application

Environmental monitoring: Detects pollutants and contaminants in air and water.

Food and beverage analysis: Assesses nutritional content and detects adulterants.

Material identification: Confirms production materials and identifies unknown materials.

Forensic analysis: Analyzes evidence for legal investigations.

Advantages

FTIR spectrometers can collect data over a wide spectral range at once.

FTIR can provide more accurate information than other infrared spectroscopy methods.

FTIR is faster than conventional spectroscopic techniques.

Limitations

FTIR has a limit of detection of about 100 nanometers for film thickness.

Water strongly absorbs infrared light, which can interfere with the analysis of wet samples.

Glass absorbs infrared light and is not a suitable substrate for FTIR analysis.

FTIR cannot analyze metals that reflect light.

Interpretation

Begin at the high frequency end of the spectrum to identify functional groups.

The position of each peak indicates the type of chemical bond or functional group.

Sharp peaks indicate a pure compound, while broad peaks indicate a complex mixture.

Strong peaks indicate a high concentration of a chemical bond or functional group.

The number of peaks indicates the complexity of the sample.

PHARMACOLOGICAL ACTIVITY

Chicks were divided into 4 groups, each containing 3 animals, as follows, and the chicks were given the following as in the table: control, standard, and (Delonix Regia extract) injection (test 1&2), and the results are noted on.

Table 1: Evaluation of anti-inflammatory activity of *delonix regia* in induced inflammation.

Groups	Treatment	No. of chicks
Group I Control group	Normal Saline	3
Group II Standard Group	Indomethacin (25mg/kg)	3
Group III Test group 1	200 mg/kg extraction by *Delonix regia* flower	3
Group IV Test group 2	400 mg/kg extraction by *Delonix regia* flower	3

Induction of Inflammation

Evaluated using the carrageenan-induced paw edema model of inflammation in the seven-day-old chicks with slight modification (Roach & Sufka, 2003; Woode et al., 2007). Indomethacin (25 mg/kg) was used as the positive control. Carrageenan was injected sub-plantar into the concentration of the chicks to induce edema. Extract was orally administered at different concentrations (200 and 400 mg/kg) 1 hr after edema induction. A digital Vernier caliper was used to measure the foot volume before injection and at various time points after injection. The control animals received only normal saline, serving as the negative control. All drugs and extracts were orally administered in volumes not exceeding 100 ml/kg.

Estimation of Parameters

Measurement of inflammation induction

The raw scores for paw volume increase at each time interval for each chick were normalized as the percentage difference from the initial paw volume at zero and then averaged for each treatment group. Increase in paw volume was computed using the equation below.

$$\% \text{ Increase of paw volume} = \frac{\text{Paw volume at time t} - \text{Foot volume at time zero}}{\text{Paw volume at time t}} \times 100$$

Total paw volume for each treatment group was calculated in arbitrary units as the area under the curve (AUC). Percentage inhibition of edema for each treatment group was then determined as follows:

$$\% \text{ Inhibition of edema} = \frac{\text{AUC control} - \text{AUC treatment}}{\text{AUC control}} \times 100$$

Statistical Analysis

All parameters' data were analyzed using GraphPad Prism 10.4.1 software. Analysis of Variance (ANOVA); one-way ANOVA followed by Dunn's comparison test was performed. The values were expressed as Mean ± SEM. P value <0.05 was considered as significant.

RESULTS

Table 2: Phytochemical Analysis of delonix regia Flower Extract.

S. No	Phytochemicals	Delonix Regia
01	Alkaloids	Positive
02	Cardiac glycosides	Positive
03	Carbohydrates	Positive
04	Flavonoids	Positive
05	Phenols	Positive

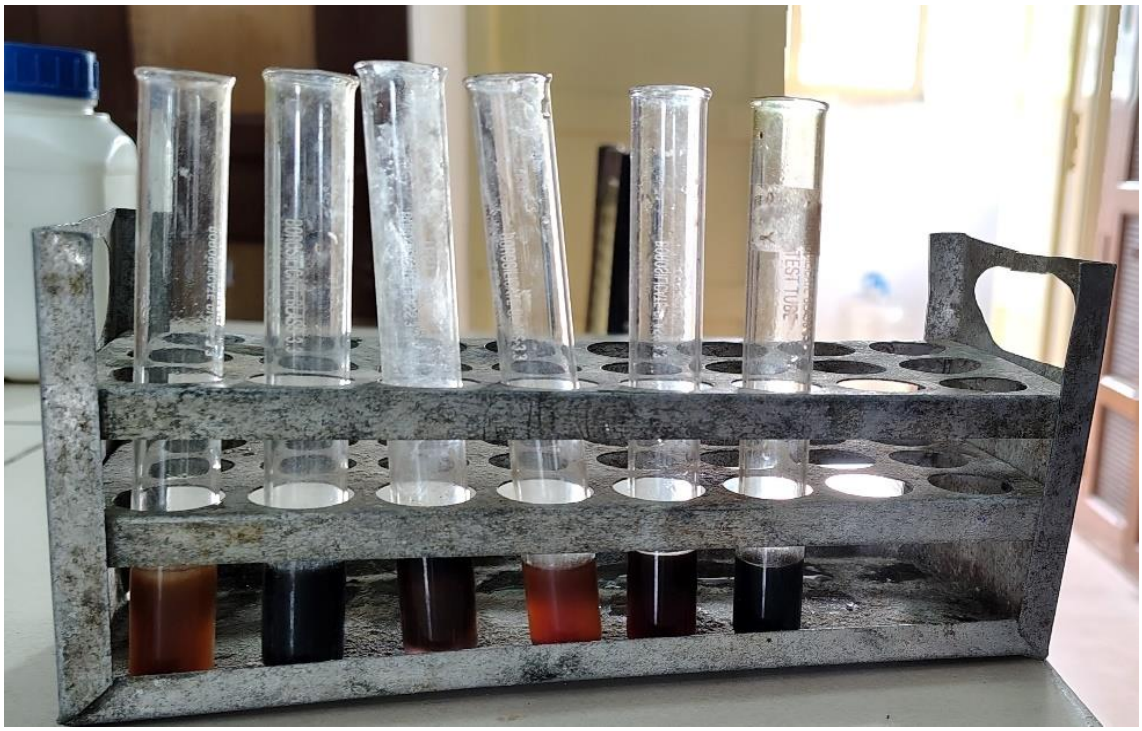


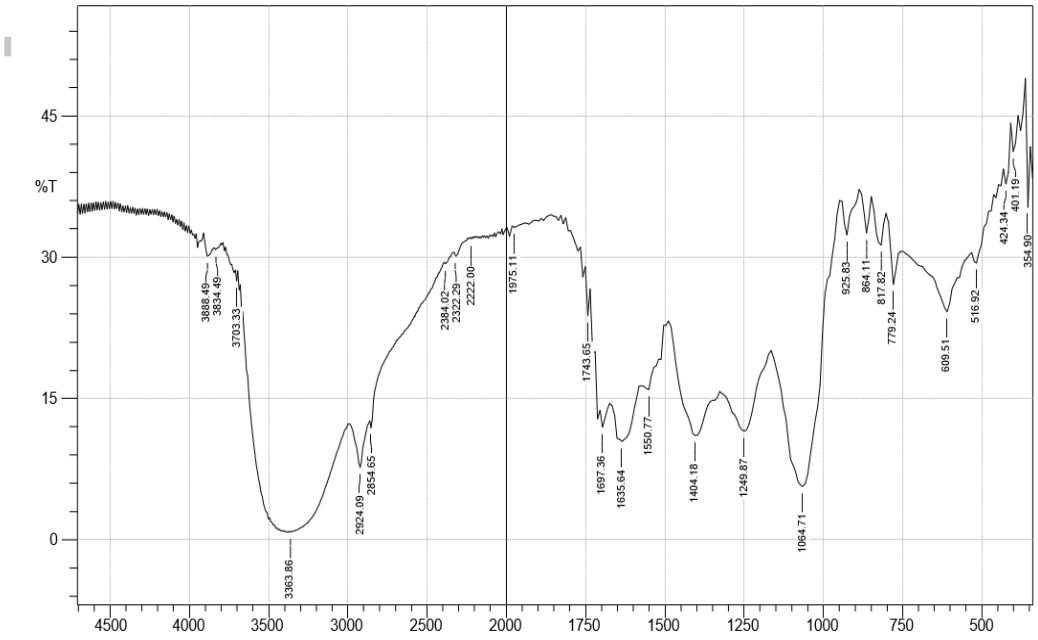
Figure 1: Indication of color in phytochemical examination of flower extract from *Delonix regia.*

PHARMACOLOGICAL STUDIES

Figure 2: Evaluation of the anti-inflammatory effect of *delonix regia* in the carrageenan induced inflammation model.

ANALYTICAL EVALUATION

FTIR ANALYSIS FOR



HYDRO-AL COHOLIC EXTRACT OF DELONIX REGIA FLOWER

No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	354.9	35.253	10.077	362.62	347.19	6.155	0.832
2	401.19	41.213	3.269	408.91	385.76	8.575	0.46
3	424.34	37.737	3.245	432.05	408.91	9.352	0.565
4	516.92	29.353	2.486	532.35	432.05	46.93	1.19
5	609.51	24.154	6.16	756.1	540.07	119.298	7.513
6	779.24	27.069	5.544	802.39	756.1	23.987	1.422
7	817.82	31.261	3.536	840.96	802.39	18.744	1.058
8	864.11	32.527	4.176	887.26	848.68	17.632	0.874
9	925.83	32.32	3.923	941.26	887.26	24.773	1.2
10	1064.71	5.615	21.835	1165	948.98	185.014	62.671
11	1249.87	11.486	5.974	1319.31	1172.72	123.218	12.458
12	1404.18	11.007	8.127	1481.33	1327.03	131.559	19.026
13	1550.77	15.905	2.539	1573.91	1504.48	51.691	2.556
14	1635.64	10.385	4.558	1666.5	1581.63	77.708	8.489
15	1697.36	11.902	6.676	1766.8	1674.21	69.209	6.014
16	1743.65	23.777	4.006	1751.36	1735.93	9.108	0.519
17	1975.11	33.137	0.185	1982.82	1944.25	18.392	0.048
18	2222	31.912	0.191	2229.71	2198.85	15.252	0.043
19	2322.29	30.103	0.54	2330.01	2245.14	43.037	0.259
20	2384.02	29.271	0.308	2391.73	2337.72	28.352	0.124
21	2854.65	11.859	1.003	2862.36	2399.45	304.311	0.27
22	2924.09	7.621	4.687	2993.52	2870.08	122.092	9.768
23	3363.86	0.773	0.291	3371.57	3001.24	541.898	7.256
24	3703.33	28.511	0.249	3788.19	3695.61	49.381	0.766
25	3834.49	30.788	0.251	3842.2	3803.63	19.597	0.1
26	3888.49	30.117	1.813	3911.64	3849.92	31.739	0.873

OBSERVATION

Table 3: FT-IR Analysis of Hydro-alcoholic extraction of *Delonix regia* flower showing the functional group of biomolecules.

Absorption band region (cm^{-1})	Functional group of biomolecules
3363.86	OH Stretching of alcohol
2924.09	Aliphatic(C-H)
1743.65	Ketone (C=O)
1635.64	Unsaturated (C=C)
1404.18	CH_2 Type
1249.87	CH_3 Type
1064.71	Ether (C-O-C)

Identification of Phytoconstituents

With reference to the FT-IR spectrum it is concluded that the hydroalcoholic extract of *Delonix regia* flowers contains Stretching of Alcohol (OH), Aliphatic(C-H), Ketone (C=O), Unsaturated (C=C), Ether (C-O-C) type of components.

ESTIMATION OF PARAMETERS

Table 4: Percentage Reduction of Paw Volume in Carrageenan induced inflammation model.

Groups	Initial Paw Volume	Inflammation Induced Paw Volume	Final Paw Volume in MM (Vernier Calliper)			
			1 Hour	2 Hour	3 Hour	4 Hour
Group 1 (Normal saline)	5.13 ± 0.02	7.81 ± 0.20	7.81 ± 0.20	7.81 ± 0.20	7.80 ± 0.20	7.78 ± 0.21
Group 2 (Standard Indomethacin)	5.26 ± 0.12	8.12 ± 0.15	7.69 ± 0.39	7.01 ± 0.37	6.02 ± 0.09	5.31 ± 0.11
Group 3 (DRFE 200mg/kg Low dose)	5.29 ± 0.10	8.27 ± 0.18	8.06 ± 0.11	7.38 ± 0.23	6.97 ± 0.12	6.42 ± 0.05
Group 4 (DRFE 400mg/kg High dose)	5.38 ± 0.11	7.83 ± 0.06	7.14 ± 0.06	6.80 ± 0.07	6.28 ± 0.10	5.56 ± 0.09

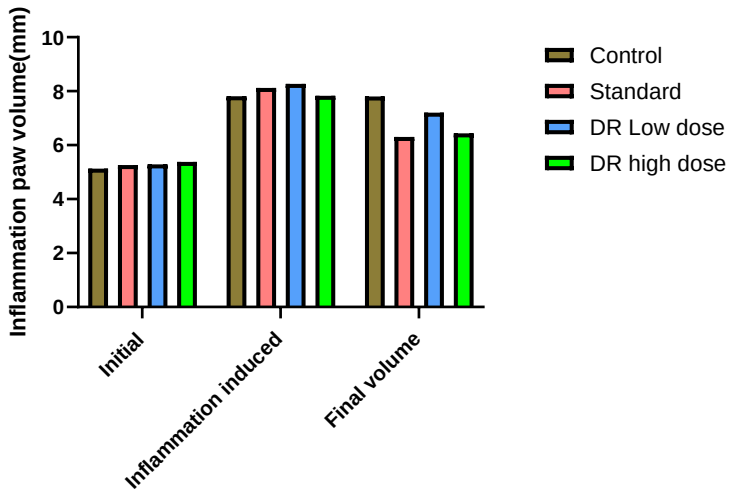


Figure 3: Effect of DRFE on % inflammation reduction in carrageenan induced inflammation model.

DISCUSSION

The results suggest that both the low and high doses of Delonix regia may possess anti-inflammatory properties, as indicated by the reduction in paw volume compared to the carrageenan-induced inflammation in the control group.

The effect of Delonix regia seems to be dose-dependent, with the higher dose (Test 2) showing a slightly more pronounced effect than the lower dose (Test 1).

Indomethacin, the standard anti-inflammatory drug, serves as a positive control, validating the efficacy of the experimental setup.

In conclusion, based on the results, it appears that the hydroalcoholic extract of *Delonix regia* flower may have anti-inflammatory effects in chicks, with the higher dose (Test 2) showing a more prominent effect. Further studies, including FT-IR, additional parameters, and mechanisms, would be valuable to better understand the potential therapeutic applications of Delonix regia flower extract in inflammation.

CONCLUSION

Certainly! Based on the results obtained from the evaluation of anti-inflammatory activity of the hydroalcoholic extract of Delonix regia flower in chicks, it is evident that the extract exhibited a dose-dependent response.

In **Test 1,** where a low dose of Delonix regia flower extract at 200 mg per kg was administered, there was a noticeable but moderate increase in the anti-inflammatory effect. The measured parameters showed a consistent trend, with values of 5.29 ± 0.10, 8.27 ± 0.18, 8.06 ± 0.11, 7.38 ± 0.23, 6.97 ± 0.12, and 6.42 ± 0.05. This suggests that even at a lower dose, the extract has the potential to exert anti-inflammatory effects, albeit to a lesser extent.

In **Test 2**, a higher dose of Delonix regia flower extract at 400 mg per kg was administered, resulting in a more significant anti-inflammatory response. The measured parameters increased to 5.38 ± 0.11, 7.83 ± 0.06, 7.14 ± 0.06, 6.80 ± 0.07, 6.28 ± 0.10, and 5.56 ± 0.09. This indicates a dose-dependent enhancement of the anti-inflammatory activity, reinforcing the potential of the hydroalcoholic extract of Delonix regia flower as an anti-inflammatory agent.

In addition to the biological evaluation, the FT-IR (Fourier Transform Infrared) spectroscopy analysis was conducted to identify the functional groups present in the extract. The FT-IR spectrum revealed the presence of various functional groups, such as phenolic compounds, aliphatic, ketone, unsaturated, and ether, which are known for their anti-inflammatory and antioxidant activities. These findings provide valuable insight into the chemical composition of the extract, supporting its potential pharmacological applications.

Overall, the results of this hypothesis indicate that Delonix regia flowers possess significant anti-inflammatory activity in chicks, and the effect is more pronounced with higher doses. The presence of various bioactive compounds was identified through FT-IR analysis.

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