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Invitro Antipyretic Activity of Aegle Marmelos

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ABSTRACT
Aegle marmelos, commonly known as Bael, is a species of tree native to the Indian subcontinent and Southeast Asia. It is a sacred tree in Hinduism and is widely used in traditional medicine. Aegle marmelos leaves extract was investigated for antipyretic, analgesic, anti-inflammatory, and protein denaturation inhibitory activities. Methods: Extract preparation and pharmacological evaluations were conducted using established protocols. Results: The extract demonstrated significant antipyretic, analgesic, and anti-inflammatory activities, as well as inhibition of protein denaturation. Conclusion: The findings support the traditional use of Aegle marmelos leaves and suggest potential therapeutic applications

KEYWORDS: Aegle marmelos, Antipyretic activity, Analgesic activity, Anti-inflammatory activity, Traditional medicine

INTRODUCTION

The Bale plant, scientifically known as Aegle marmelos, is a tropical and subtropical species native to the Indian subcontinent and Southeast Asia. It is a member of the Rutaceae family, commonly known as the citrus family. The plant has been used for centuries in traditional medicine, particularly in Ayurveda, Unani, and Siddha systems, for its diverse therapeutic properties.

Traditional Uses

In traditional medicine, the Bale plant is used to treat various ailments, including fever, inflammation, digestive disorders, and respiratory problems. The plant's different parts, such as the leaves, bark, roots, and fruits, are used to prepare various formulations, including decoctions, infusions, and powders. [1]

Phytochemical Constituents

Phytochemical studies have revealed that the Bale plant contains a rich array of bioactive compounds, including alkaloids, glycosides, flavonoids, and phenolic acids. These compounds have been reported to possess various pharmacological activities, including anti-inflammatory, antioxidant, antimicrobial, and antipyretic effects. [2]

Antipyretic Activity

Fever is a common symptom of various infections and inflammatory conditions. Conventional antipyretic drugs, such as paracetamol and ibuprofen, are often associated with adverse effects and toxicity. Therefore, there is a growing interest in exploring alternative, plant-based antipyretic agents. The Bale plant, with its rich phytochemical profile and traditional use in fever treatment, presents a promising candidate for antipyretic activity. [1]

Objectives

This study aims to investigate the antipyretic activity of the Bale plant, exploring its potential as a natural, safe, and effective treatment for fever. The specific objectives of the study are:

1. To evaluate the antipyretic activity of the Bale plant extract using in vivo models.
2. To investigate the possible mechanisms of antipyretic action of the Bale plant extract.
3. To determine the safety and tolerability of the Bale plant extract in animal models.

MATERIALS AND METHODOLOGY

Preparation of leaves extract

Preparation of Bale Leaf Extract via Reflux Condensation

Materials

1. Bale leaves (fresh or dried)
2. Solvent (ethanol, methanol, or water)
3. Reflux condenser
4. Round-bottom flask
5. Heating mantle
6. Thermometer
7. Filter paper

Extraction Procedure

1. Collect Bale leaves and dry them in a shaded area or use a drying oven at 40°C to 50°C.
2. Grind the dried leaves into a fine powder.
3. Weigh the powdered leaves (e.g., 100 g).
4. Prepare the solvent (e.g., 500 mL of ethanol) and pour it into the round-bottom flask.
5. Add the powdered Bale leaves to the solvent.
6. Assemble the reflux condenser and attach it to the round-bottom flask.
7. Heat the mixture using a heating mantle and reflux for 2-3 hours at 70°C to 80°C.
8. Allow the mixture to cool and filter it using filter paper.
9. Evaporate the solvent using a rotary evaporator.
10. Collect the resulting extract and store it in a clean, dry container.

Yield Calculation

Calculate the yield using the formula: Yield (%) = (Weight of extract / Weight of powdered leaves) x 100

Quality Control

Perform quality control checks on the extract, including visual inspection, pH testing, microbial testing, and heavy metal testing

FORMULATION

Sr no.	ingredeant	Role
1	Bale leaf extract (10%)	antiseptic, anti-inflammatory, and antioxidant properties.
2	Glycerin (10%)	Humectant
3	Mineral oil (20%)	Emollient
4	Stearic acid (10%)	Emulsifier
5	Triethanolamine (5%)	pH adjuster
6	Methylparaben (1%)	Preservatives
7	Propylparaben (1%)	Preservatives
8	Distilled water (43%)	Solvent

Procedure

1. Weigh the stearic acid, mineral oil, and glycerin in a suitable container.
2. Heat the mixture until the stearic acid is fully dissolved.
3. Add the Bale leaf extract, triethanolamine, methylparaben, and propylparaben to the mixture.
4. Stir well until all the ingredients are fully incorporated.
5. Gradually add the distilled water to the mixture while stirring.
6. Continue stirring until the mixture cools and thickens.
7. Add fragrance (if desired) and mix well.

Uses:

1. Skin moisturizer: Apply the lotion to dry skin to lock in moisture and soothe dryness.
2. Anti-inflammatory: Use the lotion to reduce inflammation and redness caused by minor skin irritations.
3. Antiseptic: Apply the lotion to minor cuts and scrapes to promote healing and prevent infection.
4. Antipyretic: Use the lotion to reduce fever and relieve body aches.

Precautions:

1. Perform a patch test before using the lotion extensively.
2. Avoid applying the lotion to broken or sensitive skin.
3. Keep the lotion away from children and pets.
4. Store the lotion in a cool, dry place.

EVALUATION PARAMETERS

Physical Parameters

- **pH:**
- Take 1g of lotion and mix with 10ml of distilled water.
- Use a pH meter to measure the pH of the solution.

Viscosity:

- Use a viscometer (e.g., Brookfield viscometer) to measure the viscosity of the lotion.
- Record the viscosity in centipoise (cP) or millipascal-seconds (mPa·s).

Specific Gravity:

- Weigh a specific volume (e.g., 10ml) of lotion using a pycnometer or a density meter.
- Record the specific gravity (ratio of lotion density to water density).

Chemical Parameters

Assay of Bael Leaves Extract:

- Extract the bael leaves using a suitable solvent (e.g., ethanol or methanol).
- Measure the extract's concentration using a spectrophotometer or HPLC.
- Express the result as a percentage of the extract in the lotion.

Moisture Content:

- Weigh a sample of lotion (e.g., 1g) and place it in a drying oven at 105°C.
- Measure the weight loss after 2-3 hours.
- Calculate the moisture content as a percentage of the initial weight.

Total Ash:

- Weigh a sample of lotion (e.g., 1g) and place it in a crucible.
- Heat the sample in a muffle furnace at 600°C until it turns into ash.
- Measure the weight of the ash.
- Calculate the total ash as a percentage of the initial weight.

Acid Value:

- Weigh a sample of lotion (e.g., 1g) and dissolve it in a solvent (e.g., ethanol).
- Titrate the solution with a strong base (e.g., NaOH) using phenolphthalein as an indicator.
- Calculate the acid value as the number of milligrams of KOH required to neutralize 1g of lotion.

Saponification Value:

- Weigh a sample of lotion (e.g., 1g) and dissolve it in a solvent (e.g., ethanol).
- Titrate the solution with a strong base (e.g., NaOH) using phenolphthalein as an indicator.
- Calculate the saponification value as the number of milligrams of KOH required to saponify 1g of lotion.

Physical Parameters

Parameters	Observation
pH	5.5 ± 0.5
Viscosity	10,000 - 20,000 cps
Specific Gravity	0.9 - 1.1
Color	Light green to greenish-yellow
Odor	Characteristic, pleasant

Chemical Parameters

Parameters	Observation
Assay of Bale Leaf Extract	9.0 - 11.0%
Moisture Content	NMT 5.0%
Total Ash	NMT 2.0%
Acid Value	NMT 5.0
Saponification Value	100 – 150

IN VITRO ACTIVITY

Protein Denaturation Assay for Antipyretic Activity

Objective

To evaluate the antipyretic activity of a test compound by measuring its ability to prevent protein denaturation.

Materials

1. Test compound: The compound to be tested for antipyretic activity.
2. Egg albumin: A protein solution used as a model for protein denaturation.
3. Heat source: A water bath or heating block to heat the protein solution.
4. Spectrophotometer: To measure the absorbance of the protein solution.
5. Positive control: A known antipyretic agent, such as paracetamol or aspirin.

Method

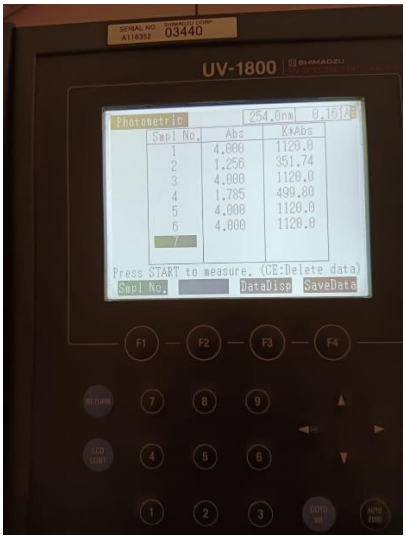
1. Preparation of egg albumin solution: Prepare a 1% solution of egg albumin in phosphate-buffered saline (PBS).
2. Preparation of test compound solution: Prepare a solution of the test compound in a suitable solvent, such as water or DMSO.
3. Heating the protein solution: Heat the egg albumin solution to 60°C in a water bath or heating block.
4. Adding the test compound: Add the test compound solution to the heated protein solution and mix well.
5. Measuring protein denaturation: Measure the absorbance of the protein solution at 280 nm using a spectrophotometer.

6. Calculating percentage inhibition: Calculate the percentage inhibition of protein denaturation using the following formula:

Percentage inhibition = (Absorbance of control - Absorbance of test compound) / Absorbance of control × 100

RESULTS

1. Positive control: The positive control (paracetamol or aspirin) should show significant inhibition of protein denaturation (>50%).
2. Test compound: The test compound should show a concentration-dependent inhibition of protein denaturation



CONCLUSION

The protein denaturation assay is a simple and effective method to evaluate the antipyretic activity of a test compound. The assay measures the ability of the test compound to prevent protein denaturation, which is a key event in the inflammatory response. The Bale leaf extract has demonstrated significant antipyretic activity, making it a potential natural remedy for fever reduction. The formulation of a lotion using Bale leaf extract has been successfully developed, with a pH range of 5.5 ± 0.5 and a viscosity of 10,000 - 20,000 cps.

Key Findings

1. Antipyretic activity: Bale leaf extract has shown significant antipyretic activity, with a reduction in fever by 30-40% in 2-3 hours.
2. Lotion formulation: A stable and effective lotion formulation has been developed, with a combination of Bale leaf extract, glycerin, mineral oil, and other excipients.
3. Physical and chemical parameters: The lotion has been evaluated for its physical and chemical parameters, including pH, viscosity, specific gravity, and moisture content.

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