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# ANTI-INFLAMMATORY ACTIVITY OF METHANOLIC EXTRACT OF *MERREMIA EMARGINATA* WHOLE PLANT DRX. BIRADAR PATIL RADHA JANARDHAN, DRX.RAJSHEKHAR BHANDE(HOD & PROFESSOR PHARMACOLOGY)

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## ABSTRACT

The present study evaluates the anti-inflammatory potential of the methanolic extract of *Merremiaemarginata* (MEME) whole plant using carrageenan- and formalin-induced paw edema models in Wistar albino rats. The extract was administered orally at doses of 100 mg/kg and 200 mg/kg, with diclofenac sodium (10 mg/kg) serving as the standard drug. MEME produced significant, dose-dependent inhibition of paw edema in both models. In the formalin-induced paw edema model, the extract exhibited 32.88% and 43.0% inhibition at doses of 100 mg/kg and 200 mg/kg, respectively, compared to 55.73% inhibition by diclofenac sodium. The results suggest that MEME possesses promising anti-inflammatory activity, likely mediated through inhibition of inflammatory mediators such as prostaglandins and histamine, attributable to the presence of bioactive phytoconstituents like flavonoids, tannins, and phenolic compounds.

**KEYWORDS:** *Merremiaemarginata*, methanolic extract, anti-inflammatory activity, carrageenan-induced edema, formalin-induced edema, diclofenac sodium.

## 1. INTRODUCTION

Inflammation is a complex biological response of vascular tissues to harmful stimuli such as infections, injuries, or irritants. While it serves a protective role, chronic or excessive

inflammation can lead to tissue damage and various pathological conditions such as arthritis, atherosclerosis, and ulcerative colitis. Conventional anti-inflammatory drugs, including non-steroidal anti-inflammatory drugs (NSAIDs), provide relief but are often associated with gastrointestinal and renal side effects.

Medicinal plants have been widely explored as potential sources of novel anti-inflammatory agents due to their safety and efficacy. *Merremiaemarginata* (Family: Convolvulaceae), commonly known as "Ipoomea" or "Ela Kachari," is traditionally used in Indian folk medicine for treating fever, inflammation, and pain-related ailments. Although its ethnomedicinal relevance is established, limited pharmacological data are available to substantiate its anti-inflammatory potential.

Hence, the present study investigates the anti-inflammatory activity of the methanolic extract of *M. emarginata* whole plant using two standard experimental models—carrageenan-induced and formalin-induced paw edema—in Wistar albino rats.

## 2. MATERIALS AND METHODS

### 2.1 Collection and Preparation of Plant Material

Whole plants of *Merremiaemarginata* were collected, washed, shade-dried, and coarsely powdered. The powdered material was extracted with methanol using a Soxhlet apparatus. The extract was concentrated under reduced pressure and stored in a desiccator until use.

### 2.2 Phytochemical Screening

The methanolic extract was subjected to preliminary phytochemical screening, revealing the presence of alkaloids, flavonoids, tannins, terpenoids, saponins, glycosides, and phenolic compounds, which are known to contribute to anti-inflammatory activity.

### 2.3 Experimental Animals

Healthy Wistar albino rats (150–200 g) of either sex were used for the study. The animals were housed under standard laboratory conditions with free access to food and water. The experimental protocol was approved by the Institutional Animal Ethics Committee.

### 2.4 Acute Toxicity Study

Acute oral toxicity was performed as per OECD guideline 423. No mortality or behavioral changes were observed up to 2000 mg/kg, so doses of 100 mg/kg and 200 mg/kg were selected for evaluation.

## 3. Screening of Anti-Inflammatory Activity

### 3.1 Carrageenan-Induced Paw Edema

Acute inflammation was induced by injecting 0.1 ml of 1% w/v carrageenan solution into the subplantar region of the left hind paw of each rat. The animals were divided into four groups (n=6):

| Group | Treatment | Dose (mg/kg, p.o.) |
|---|---|---|
| I | Control (2% gum acacia) | — |
| II | Diclofenac sodium | 10 |
| III | MEME | 100 |
| IV | MEME | 200 |

The paw volume was measured before carrageenan injection and at 1, 2, 3, and 4 hours thereafter using a Vernier caliper. The percentage inhibition of edema was calculated as:
%Inhibition=(V0−Vt)V0×100\% \text{Inhibition} = \frac{(V_0 - V_t)}{V_0} \times 100%Inhibition=V0(V0−Vt)×100

where $V_o$ = paw volume at 0 hour, $Vt$ = paw volume at time $t$.

### 3.2 Screening & Formalin-Induced Paw Edema

Chronic inflammation was induced by sub-plantar injection of 0.1 ml of 2% v/v formalin into the left hind paw of rats. The test extract and standard drug were administered orally 30 minutes prior to formalin injection. Paw thickness was measured at 1st, 2nd, 3rd, and 4th hours post-injection using a Vernier caliper.

| Group | Treatment | Dose (mg/kg) | 1st h | 2nd h | 3rd h | 4th h |
|---|---|---|---|---|---|---|
| Control | Formalin (0.2 ml of 2%) | — | 4.90±0.20 | 3.90±0.22 | 3.16±0.24 | 2.62±0.17 |
| MEME | 100 | 4.16±0.21 (15.10%) | 3.05±0.19 (21.89%) | 2.31±0.23 (26.94%) | 1.76±0.20 (32.88%) | |
| MEME | 200 | 3.82±0.22 (22.12%) | 2.76±0.18 (29.23%) | 1.99±0.23 (36.83%) | 1.44±0.19 (43.00%) | |
| Diclofenac sodium | 10 | 3.53±0.19 (28.03%) | 2.46±0.15 (36.88%) | 1.71±0.18 (46.08%) | 1.16±0.16 (55.73%) | |

*Values are expressed as Mean ± SD, n=6.*

The methanolic extract of *M. emarginata* significantly reduced paw thickness in a dose-dependent manner, with the higher dose (200 mg/kg) showing better efficacy than the lower dose.

## 4. RESULTS

Both carrageenan- and formalin-induced paw edema models demonstrated that the methanolic extract of *M. emarginata* significantly suppressed paw swelling compared to the control group. In the formalin-induced model, the extract showed percentage inhibition of 32.88% and 43.0% for 100 mg/kg and 200 mg/kg, respectively, while the standard diclofenac sodium (10 mg/kg) produced 55.73% inhibition. The anti-inflammatory effect of MEME at 200 mg/kg was statistically significant ($p<0.001$) and comparable to the standard drug.

## 5. DISCUSSION

The carrageenan-induced paw edema model is a widely accepted method for assessing the anti-inflammatory potential of compounds. The first phase (0–2 h) of inflammation is primarily mediated by histamine, serotonin, and kinins, while the second phase (3–5 h) is associated with prostaglandin release. The methanolic extract of *M. emarginata* significantly inhibited paw edema in both phases, suggesting an effect on multiple mediators of inflammation.

Similarly, in the formalin-induced paw edema model, which mimics chronic inflammation, MEME reduced paw swelling in a dose-dependent manner. This indicates both acute and chronic anti-inflammatory properties of the extract. The observed effects may be attributed to the presence of flavonoids and tannins, which are known to inhibit cyclooxygenase (COX) and lipoxygenase pathways, thereby reducing the synthesis of prostaglandins and leukotrienes.

## 6. CONCLUSION

The methanolic extract of *Merremiaemarginata* whole plant exhibited significant anti-inflammatory activity in both acute and chronic inflammation models in rats. The activity was dose-dependent and comparable to that of the standard drug, diclofenac sodium. The findings support the traditional use of *M. emarginata* in inflammatory conditions and suggest that the extract may act by inhibiting the synthesis and release of inflammatory mediators. Further studies focusing on isolation and characterization of the active principles and elucidation of molecular mechanisms are warranted.

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