



# Evaluation of *in vitro* anti-inflammatory and antibacterial properties of tuberous roots of *Mirabilis jalapa* (Sinhala name: Hendirikka)

D. S. H. S Peiris<sup>1</sup>, D. T. K Fernando<sup>1</sup>, S. P. N. N. Senadeera<sup>2</sup>, C. B. Ranaweera<sup>1</sup>

<sup>1</sup>Department of Medical Laboratory Sciences, Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University, Sri Lanka.

<sup>2</sup>Department of Medical Laboratory Sciences, Faculty of Health Sciences, The Open University of Sri Lanka.

## Abstract

Background: The Four-o'clock plant, also known as *Mirabilis jalapa* Linn. (Sinhala name: Hendirikka), is a well-known ornamental plant that is also prized for its folklore remedies all over the world. It has been discovered that this plant has a wealth of pharmacological and ethnomedicinal properties. The objective of the current study was to evaluate the anti-inflammatory and antibacterial properties of aqueous and few solvent (hexane, dichloromethane, and methanol) extracts of *M. jalapa* tuberous roots in order to support traditional folk remedies with scientific evidence.

Method: Two models, the Human Red Blood Cell (HRBC) Membrane Stabilization assay and the Egg Albumin Denaturation Inhibition assay were used to assess the anti-inflammatory activity. The antibacterial activity was tested using the most commonly isolated wound pathogens (*Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus aureus*) by both disc and well diffusion methods.

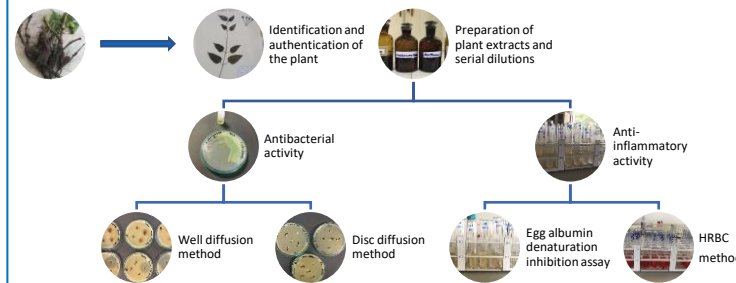
Results: In contrast to antibacterial action, our investigation found that anti-inflammatory activity was significantly more potent. The methanol extract demonstrated the strongest anti-inflammatory potency in the egg albumin denaturation inhibition assay (IC<sub>50</sub> = 137.8 g/mL), whereas the aqueous extract demonstrated the maximum potency in the HRBC technique (IC<sub>50</sub> = 197.4 g/mL). All four extracts showed no discernible antibacterial efficacy. The dichloromethane extract, however, demonstrated the highest antibacterial activity against *S. aureus* with an inhibitory zone of 15.33 mm ± 0.33 mm at a concentration of 400 mg/mL.

Conclusion: The results of this study show that *M. jalapa*'s tuberous roots have promising anti-inflammatory properties but poor antibacterial efficacy against the selected wound pathogens.

## Introduction

Medicinal plants are widely used in the development of novel anti-inflammatory and antibacterial drugs. They are found to be rich in various valuable secondary metabolites that are responsible for exhibiting many ethnomedicinal and pharmacological properties.

## Methodology



## Results and discussion

*Mirabilis jalapa* tuberous roots exhibited a significant anti-inflammatory potential. However, the aqueous extract showed the highest anti-inflammatory activity in the HRBC stabilization method, and in the egg albumin denaturation inhibition assay, the highest activity was shown by the methanolic extract. There was no significant antibacterial potential shown against the selected pathogens.

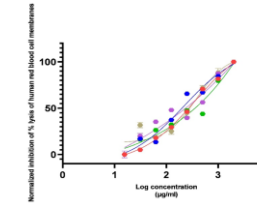


Figure 1: Dose-response curve for HRBC membrane stabilization method

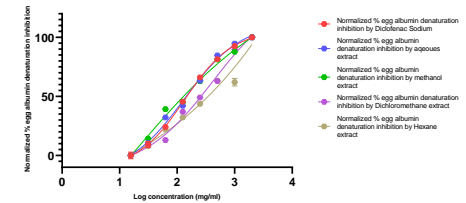


Figure 2: Dose-response curve for egg albumin denaturation method

Table 1: A summary of anti-inflammatory activity results of *Mirabilis jalapa* tuberous root extracts

Methodology	Extract	IC <sub>50</sub> (µg/ml)
Egg albumin denaturation inhibition assay	Aqueous	146.4
	Methanol	137.9
	Dichloromethane	243.7
	Hexane	306.7
Positive control	Diclofenac Sodium	150.8
Human red blood cell membrane stabilization assay	Aqueous	197.4
	Methanol	294.9
	Dichloromethane	208.9
	Hexane	237.0
Positive control	Diclofenac Sodium	258.7

## Conclusion

Aqueous and organic solvent (methanol, dichloromethane, and hexane) extracts of *Mirabilis jalapa* tuberous roots possess significant anti-inflammatory activity while having no significant antibacterial activity.

## Reference

- Traditional Medicines of Plant Origin Used for the Treatment of Inflammatory Disorders in Pakistan (2018): A Review. *Journal of Traditional Chinese Medicine*, 38(4), pp.636–656.
- In vitro effects of aqueous extracts of five Sri Lankan medicinal plants on human erythrocyte membrane stabilization activity (2015)
- Mirabilis jalapa* Linn: A folklore ayurvedic medicinal plant in Sri Lanka (2022).