



## FORMULATION AND EVALUATION OF WOUND HEALING OINTMENT USING CALOTROPIS GIGANTEA FLOWER EXTRACT

Sujal A. Jaiswal<sup>1</sup>, Kuldeep S. Kanadje\*<sup>2</sup>, Aarti G. Kewat<sup>3</sup>, Ayusha N. Jivrag<sup>4</sup>,  
Dr. D. K. Vir<sup>5</sup>

Student<sup>1,3,4</sup>, Assistant Professor M. Pharm. Pharmaceutics<sup>2</sup>, Principal<sup>5</sup>

Shree Goraksha College of Pharmacy & Research Center, Khamgaon,

Tq. Phulambri, Dist. Chhatrapati Sambhajnagar.

Article Received on 05 March 2026,

Article Revised on 25 March 2026,

Article Published on 01 April 2026

<https://doi.org/10.5281/zenodo.19692273>

### \*Corresponding Author

**Kuldeep S. Kanadje**

Assistant Professor M. Pharm.  
Pharmaceutics, Shree Goraksha  
College of Pharmacy & Research  
Center, Khamgaon, Tq. Phulambri,  
Dist. Chhatrapati Sambhajnagar.



**How To Cite This Article:** Sujal A. Jaiswal<sup>1</sup>, Kuldeep S. Kanadje\*<sup>2</sup>, Aarti G. Kewat<sup>3</sup>, Ayusha N. Jivrag<sup>4</sup>, Dr. D. K. Vir<sup>5</sup> (2026). Formulation and Evaluation of Wound Healing Ointment Using Calotropis Gigantea Flower Extract. World Journal of Pharmacy and Pharmaceutical Sciences, 15(4), 1639–1649.

This work is licensed under Creative Commons Attribution 4.0 International license.

### ABSTRACT

Wound healing is a natural biological process that involves tissue regeneration and repair. Herbal medicines play an important role in wound management due to their safety, effectiveness, and minimal side effects. The present research project was undertaken to formulate and evaluate a wound healing ointment using Calotropis gigantea flower extract, a plant widely used in traditional medicine for its anti-inflammatory, antimicrobial, and healing properties. The flowers of Calotropis gigantea were collected, authenticated, shade-dried, and extracted using a suitable solvent. The obtained extract was incorporated into a simple ointment base to prepare herbal wound healing ointment formulations. The formulated ointments were evaluated for organoleptic properties, pH, homogeneity, spreadability, viscosity, extrudability, skin irritation, and stability studies. The wound healing activity was evaluated using an experimental wound

model, and parameters such as percentage wound contraction and epithelialization period were observed. The formulation containing 3 gigantea flower extract showed enhanced wound healing activity when compared with the control formulation. No signs of skin irritation were observed, indicating the safety of the formulation. The results of the study suggest that Calotropis gigantea flower extract possesses significant wound healing potential

and can be successfully formulated into a stable herbal ointment. The developed formulation may be considered a cost-effective and natural alternative for wound management.

**KEYWORDS:** *Calotropis gigantea*, Herbal ointment, Flower extract.

## INTRODUCTION

Wound healing is a dynamic and well-coordinated biological process that restores the integrity of damaged skin and underlying tissues. It involves a series of overlapping phases such as inflammation, proliferation, collagen synthesis, angiogenesis, epithelialization, and tissue remodeling. Any delay or interruption in these processes may lead to chronic wounds, infection, and prolonged healing time. Although several synthetic wound healing agents are available, their use is often associated with limitations such as adverse effects, high cost, and risk of microbial resistance.<sup>[1]</sup>

Herbal medicines have gained renewed interest in wound management due to their biocompatibility, cost-effectiveness, and minimal side effects. Medicinal plants are rich sources of bioactive compounds like flavonoids, alkaloids, terpenoids, tannins, and phenolic compounds, which are known to promote wound healing by enhancing collagen formation, reducing inflammation, and preventing microbial growth.<sup>[2]</sup>

*Calotropis gigantea*, a medicinal plant widely distributed in tropical regions, has been traditionally used in Ayurveda and folk medicine for the treatment of wounds, skin infections, inflammation, and ulcers. The flowers of *Calotropis gigantea* are reported to possess antiinflammatory, antimicrobial, antioxidant, and tissue regenerative properties, which make them suitable candidates for wound healing applications. Despite its traditional use, scientific formulation of flower extract into a stable topical dosage form remains limited.<sup>[3]</sup>

An ointment is a preferred topical dosage form for wound healing due to its occlusive nature, which maintains moisture at the wound site, enhances drug penetration, and promotes faster epithelialization. Formulating herbal extracts into an ointment base improves patient compliance, stability, and therapeutic effectiveness.<sup>[4]</sup>

## Plant Profile ·



Fig. No. 1: Calotropis Gigantea Flowers.

- ★ **Synonyms:** *Asclepias gigantea*.
- ★ **Botanical Name:** *Calotropis gigantea*.
- ★ **Common Names:** Giant Milkweed, Crown Flower.
- ★ **Chemical Constituents:** Cardiac glycosides, Flavonoids, Cellulose, Digitoxigenin, Sterol.

Table No 1: Taxonomy.

| Sr. No | Kingdom  | Plantae             |
|--------|----------|---------------------|
| 1.     | Phylum   | Angiosperms         |
| 2.     | Subclass | Asterids            |
| 3.     | Class    | Eudicots            |
| 4.     | Oder     | Gentianales         |
| 5.     | Family   | Apocynaceae         |
| 6.     | Genus    | Calotropis          |
| 7.     | Species  | Calotropis gigantea |

Evaluation of *Calotropis Gigantea*

## Macroscopic / Organoleptic Evolution

- **Colour:** lavender, purple, or white.
- ★ **Odour:** characteristic.
- ★ **Taste:** slightly bitter taste.
- ★ **Shape:** star-shaped and actinomorphic.
- ★ **Size :** 2.5 – 4 cm in diameter
- ★ **Texture :** thick, fleshy, and waxy

### Formulation Preparation

**Table No. 3: The Ointment was prepared using following constituents.**

| Sr. No | Ingredients                        | Use                               | Components (for 30gm) |
|--------|------------------------------------|-----------------------------------|-----------------------|
| 1.     | Calotropis gigantea flower extract | Active ingredient (wound healing) | 3 g                   |
| 2.     | White soft paraffin                | Ointment base, emollient          | 18 g                  |
| 3.     | Hard paraffin                      | Stiffening agent                  | 3 g                   |
| 4.     | Cetostearyl alcohol                | Emulsifying & stabilizing agent   | 3 g                   |
| 5.     | Beeswax                            | Thickening agent                  | 3 g                   |

### Extraction Methods

#### Preparation and Extraction of Calotropis Gigantea Flower Powder Extract

Fresh flowers of *Calotropis gigantea* were collected and authenticated.



The flowers were washed thoroughly with distilled water to remove dust and impurities.



Cleaned flowers were shade-dried at room temperature until completely dry.



The dried flowers were crushed and powdered using a mechanical grinder.



The powder was passed through a sieve to obtain uniform particle size.



A weighed quantity of the flower powder was transferred into a clean, dry conical flask.



Sufficient quantity of ethanol (or methanol) was added to completely immerse the powder.



The mixture was kept aside for 48–72 hours with occasional shaking (maceration method).



After extraction, the mixture was filtered using muslin cloth followed by filter paper.



The filtrate was concentrated by evaporation on a water bath to remove the solvent.



The concentrated extract was dried to obtain a semisolid mass.



The dried extract was stored in an airtight container at 4 °C until further use in ointment formulation.



**Fig No. 2: Calotropis Gigantea Flower Extraction.**

### Method of preparation

All the required ingredients were accurately weighed according to the formulation.



Hard paraffin, beeswax, and cetostearyl alcohol were taken in a porcelain dish.



These ingredients were melted on a water bath in decreasing order of their melting points.



White soft paraffin was added to the molten mixture and stirred continuously to form a uniform ointment base.



The ointment base was allowed to cool slightly to a semi-solid state.



The required quantity of Calotropis gigantea flower extract was added gradually to the base.



The mixture was stirred continuously to ensure uniform distribution of the extract.



The ointment was triturated using a mortar and pestle to obtain a smooth, homogeneous mass.



The prepared ointment was allowed to cool completely at room temperature.



Finally, the ointment was transferred into a clean, dry, and well-labeled container for further evaluation.

### Determination of Evaluation Parameters

#### 1. Physical Appearance

The prepared ointment was visually inspected for color, odor, texture, and consistency to ensure uniformity and absence of grittiness.

(a) **Colour:** Light yellow to pale green

(b) **Odor:** Mild, characteristic herbal odor; non-irritating and acceptable



**Fig. No. 3: Colour**

(c) **State:** Smooth, homogeneous, and non-gritty in nature



**Fig. No. 4: State.**

(d) **Consistency:** Semi-solid with good spreadability and acceptable firmness.



**Fig. No. 5: Consistency.**

## 2. Homogeneity

A small quantity of ointment was pressed between fingers and observed for smoothness and uniform distribution of the extract.

## 3. PH Determination

One gram of ointment was dispersed in distilled water and the pH was measured using a calibrated digital pH meter.



**Fig. No. 6: PH Meter.**

## 4. Spreadability

A fixed amount of ointment was placed between two glass slides. A known weight was applied, and the time taken for the upper slide to move was recorded. Spreadability was calculated using the **formula:  $S = M \times L / T$**

Where:

S = Spreadability

M = Weight applied (in grams)

L = Length moved by the slide (in cm)

T = Time taken (in seconds)



**Fig. No. 7: Spreadability.**

#### **5. Viscosity**

The viscosity of the ointment was determined using a Brookfield viscometer at a suitable spindle and speed.

#### **6. Extrudability**

The ointment was filled into a collapsible tube. The amount of ointment extruded on application of constant pressure was measured.

#### **7. Loss on Drying**

A known quantity of ointment was weighed and heated at a specified temperature. The percentage weight loss was calculated.

#### **8. Irritancy Test**

The ointment was applied on a small area of skin and observed for redness, edema, or irritation.



**Fig. No. 8: Irritancy test.**

#### **9. Stability Studies**

The formulation was stored at different temperature conditions and evaluated periodically for changes in physical appearance and consistency.

## 10. Wound Healing Activity

The wound healing effect was evaluated using suitable experimental wound models by measuring wound contraction and epithelialization time.

## 11. Filling



**Fig. No. 9: Filling.**

## RESULT AND DISCUSSION

The wound healing ointment formulated using *Calotropis gigantea* flower extract showed satisfactory physical and pharmaceutical characteristics. The prepared ointment was smooth, homogeneous, and free from grittiness. It exhibited acceptable pH suitable for topical application and showed good spreadability and consistency. Stability studies indicated no significant changes in color, odor, or texture during the study period. In wound healing evaluation, the formulation demonstrated a noticeable reduction in wound size, indicating effective wound contraction and faster healing compared to the control. These results confirm that the formulated ointment possesses promising wound healing activity.

The wound healing activity observed in the formulated ointment may be attributed to the presence of bioactive constituents in *Calotropis gigantea* flowers, such as flavonoids, tannins, and glycosides, which are known for their anti-inflammatory, antimicrobial, and antioxidant properties. These compounds promote tissue regeneration, collagen synthesis, and protection against microbial infection at the wound site. The base used in the formulation provided good occlusive properties, which helped in maintaining moisture and enhancing the healing process. The satisfactory physicochemical properties of the ointment ensured patient acceptability and effective drug delivery, supporting its suitability for topical wound treatment.

## CONCLUSION

The present study concludes that *Calotropis gigantea* flower extract can be successfully formulated into a stable and effective wound healing ointment. The formulated ointment showed good physical characteristics and significant wound healing activity. Thus, *Calotropis gigantea* flower extract has potential as a natural and economical alternative for wound management. Further studies, including clinical evaluation and long-term stability studies, are recommended to confirm its therapeutic efficacy and safety.

## Future Prospective

The future scope of the formulation and evaluation of wound healing ointment using *Calotropis gigantea* flower extract is promising. Further studies can be carried out to standardize the extract and identify the active phytoconstituents responsible for wound healing activity. Pre-clinical and clinical trials may be conducted to establish its safety, efficacy, and suitable dosage in humans. Stability and toxicity studies can help in determining shelf life and long-term safety of the formulation. The ointment can also be developed into other dosage forms such as creams, gels, or sprays to improve patient compliance. With proper validation and regulatory approval, this herbal formulation has good potential for commercialization as a safe, effective, and economical wound healing product.

## REFERENCE

1. Ashish Kumar Netam, Jhakeshwar Prasad, Trilochan Satpathy. (2019). Wound healing and herbal agents: *Moringa oleifera* and *Aloe vera*. *International Journal of Pharmaceutical Research*, 11(2): 120–126.
2. U Breijyeh & Rafik Karaman. (2024). Phytomedicine and emerging drug-resistant infections: Role of plant-derived compounds. *Phytomedicine*, 112: 154615.
3. Dnyaneshwar D. Kokane, Rahul Y. More, Mandar B. Kale, Minakshi N. Nehete, Prachi C. Mehendale. (2009). Traditional use of *Mimosa pudica* in skin disorders. *Journal of Ethnopharmacology*, 124(3): 453–458.
4. B. Shivananda Nayak, Joel Kanhai, David Malcolm Milne. (2011). Evaluation of *Carapa guianensis* leaves for antibacterial and wound healing activity in rats. *Journal of Ethnopharmacology*, 137(1): 420–425.
5. Tanuj Kanchan, Alok Atreya. (2016). Ethnobotanical uses of *Calotropis gigantea*: Latex and fiber applications in folklore medicine. *Journal of Traditional Medicine*, 32(4): 233–239.

6. N. Rajendran, P. Gnanaraj, S. S. Ramya. (2018). Pharmacological and phytochemical aspects of *Calotropis gigantea* in wound healing. *Asian Journal of Pharmaceutical and Clinical Research*, 11(5): 101–107.
7. K. Jain, R. K. Tiwari. (2017). Topical herbal formulations: Advances and wound healing applications. *Journal of Applied Pharmaceutical Science*, 7(9): 150–159.
8. P. K. Sahoo, M. N. Panda. (2016). Evaluation of herbal ointments for topical application: Standardization and efficacy studies. *International Journal of Pharmaceutical Sciences and Research*, 7(10): 4064–4072.
9. .R. D. Kirtikar, B. D. Basu. (2005). *Indian Medicinal Plants*. Dehradun: International Book Distributors, III: 1234–1237.
10. Kokate C.K., Purohit A.P., Gokhale S.B. *Pharmacognosy*. 55<sup>th</sup> ed. Pune: Nirali Prakashan; 2018.
11. Khandelwal K.R. *Practical Pharmacognosy: Techniques and Experiments*. 25<sup>th</sup> ed. Pune: Nirali Prakashan; 2019.
12. Trease G.E., Evans W.C. *Pharmacognosy*. 16<sup>th</sup> ed. London: Saunders Elsevier; 2009.
13. Nayak B.S., Kanhai J., Milne D.M. Evaluation of wound healing activity of *Carapa guianensis* leaf extract. *Journal of Ethnopharmacology*, 2011; 134(2): 332–337.
14. Kokane D.D., More R.Y., Kale M.B., Nehete M.N., Mehendale P.C. Evaluation of wound healing activity of *Mimosa pudica*. *Journal of Ethnopharmacology*. 2009; 124(2): 311–315.
15. Breijyeh Z., Karaman R. Comprehensive review on phytomedicine and herbal drug resistance. *Phytomedicine*. 2024; 118: 155–168.
16. Lodhi S., Pawar R.S., Jain A.P., Singhai A.K. Wound healing potential of medicinal plants: A review. *Journal of Pharmacy Research*. 2009; 2(6): 1–6.
17. Indian Pharmacopoeia Commission. *Indian Pharmacopoeia*. Government of India, Ghaziabad; 2018.
18. Kumar B., Vijayakumar M., Govindarajan R., Pushpangadan P. Ethnopharmacological approaches to wound healing. *Journal of Ethnopharmacology*. 2007; 114(2): 103–113.
19. Patel R.P., Patel M.M. Formulation and evaluation of herbal ointment for wound healing. *International Journal of Pharmaceutical Sciences Review and Research*, 2011; 6(1): 78–83.
20. Shariff Z.U. *Modern Herbal Therapy for Common Ailments*. Nature Pharmacy Series, 2001; 1: 9–84.