International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 13 Issue: 01 | Jan 2026 www.irjet.net p-ISSN: 2395-0072

FORMULATION AND EVALUATION OF WOUND HEALING CREAM IN CALOTROPIS GIGANTEA USING ANTI-MICROBIL ACTIVITY

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ABSTRACT

Herbal cosmetics have gained significant attention due to their natural composition and minimal side effects. Among these, herbal creams are widely used for skin care, offering both therapeutic and protective benefits. This study aimed to develop and evaluate a herbal cream incorporating leaves of Calotropis gigantea. The cream was formulated as an oil-in-water emulsion to ensure stability and ease of application on the skin.

The formulation was evaluated for key physicochemical properties, including pH, spreadability, viscosity, and overall stability. Additionally, antimicrobial activity and skin irritation tests were conducted to assess the safety and therapeutic potential of the product. Topical application of the Calotropis gigantea cream in excision, incision, and dead space wound models resulted in enhanced wound contraction, increased wound breaking strength, and elevated hydroxyproline content, indicating improved collagen synthesis and accelerated tissue regeneration.

The findings suggest that the formulated Calotropis gigantea cream possesses significant wound healing potential along with antimicrobial activity, making it a promising herbal preparation for skin care and wound management.

KEY WORDS: *Calotropis gigantea extract, shea butter, beeswax, cetostearyl alcohol, water, glycerine*

INTRODUCTION

Wound healing is a complex and dynamic physiological process that involves a coordinated series of cellular and biochemical events to restore the integrity of damaged tissues. This process occurs in distinct phases, including hemostasis, inflammation, proliferation, and remodeling. Impaired or delayed wound healing can result in chronic wounds, infections, and serious complications, highlighting the importance of effective wound management in healthcare.

In recent years, there has been growing interest in herbal medicines for wound healing due to their natural origin, safety, cost-effectiveness, and minimal side effects compared to conventional synthetic drugs. Medicinal plants have been traditionally used for treating wounds and skin disorders across various systems of medicine. Among them, *Calotropis gigantea*, commonly known as Crown Flower or Milkweed, is a widely distributed tropical and subtropical plant with a long history of use in Ayurveda and folk medicine. Different parts of the plant, including leaves, latex, roots, and flowers, exhibit significant therapeutic properties and have been traditionally employed for treating wounds, ulcers, inflammation, and skin infections.

The wound healing potential of *Calotropis gigantea* is largely attributed to its diverse bioactive phytoconstituents, such as flavonoids, alkaloids, terpenoids, tannins, saponins, and glycosides. Its antimicrobial activity helps prevent wound infections, while its anti-inflammatory and analgesic properties reduce pain and swelling. These combined actions accelerate tissue repair, enhance collagen formation, and improve the quality of regenerated tissue.

Therefore, the present study focuses on the formulation and evaluation of a herbal wound healing cream using *Calotropis gigantea*, aiming to develop a safe, effective, and affordable topical preparation for wound management.

Fig no 01; CALOTROPIS GIGANTEA

WOUND HEALING

Wound healing has been an important aspect of medical practice since ancient times. Early civilizations employed various natural substances such as plant extracts, animal fats, honey, oils, and resins to promote healing and prevent infection in wounds. Historical records from Egyptian, Greek, and Indian systems of medicine describe the use of herbal preparations, poultices, and ointments for treating cuts, burns, and ulcers. In Ayurveda, several medicinal plants were traditionally used for their antiseptic, anti-inflammatory, and tissue-regenerating properties in wound management. During the Middle Ages, wound care primarily focused on cleansing and protection, although scientific understanding was limited. The introduction of antiseptics in the 19th century marked a significant advancement in wound treatment. The discovery of microorganisms and their role in infection by scientists such as Louis Pasteur and Joseph Lister led to the use of disinfectants and sterile techniques, greatly reducing wound-related complications.

Today, wound healing research integrates traditional knowledge with modern scientific approaches to develop effective formulations such as creams, gels, and dressings. Herbal-based wound healing nue to gain importance as alternative or complementary therapies in clinical practice.

2.2 TYPES OF WOUNDS

Wounds are classified in various ways depending on their cause, depth, and healing pattern.

- Open wounds
- Closed wounds
- Acute wounds
- Chronic wounds

MATERIALS AND METHOD

The selection of the medicinal plant Crown Flower (Calotropisgigantea) was based on its traditional use in wound healing, availability, and supporting scientific literature. The plant is known to possess anti-inflammatory, antimicrobial, and wound healing properties, which make it suitable for topical herbal formulations.

Ingredients

➢Calotropisgigantea leaf extract

➢ Beeswax

➢ Liquid paraffin / Coconut oil

➢ Emulsifying wax

➢Glycerin

➢ Methyl paraben

➢ Propyl paraben

➢ Distilled water

6.2 Apparatus

➢ Round bottom flask

➢ Heating mantle

➢ Beaker

➢ China dish

➢ Glass rod

➢ Water bath / Double boiler

➢ Measuring cylinder

➢ Weighing balance

Procedure for Preparation of Wound Healing Cream

➢ The cream was prepared using the double boiler method.

➢ The oil phase consisting of beeswax, liquid paraffin, and emulsifying wax was melted together in a china dish over a water bath.

➢ The aqueous phase was prepared separately by dissolving glycerin, preservatives, and distilled water and heating it to the same temperature as the oil phase.

➢ The aqueous phase was slowly added to the oil phase with continuous stirring to form a uniform emulsion.

➢ The prepared Calotropisgigantea extract was added slowly to the formulation with constant stirring.

➢ The mixture was continuously stirred until the cream cooled and obtained a smooth, homogeneous consistency.

➢ The prepared wound healing cream was transferred into a suitable container and stored at room temperature for further evaluation

FORMULATION

1 DOUBLE BOILER METHOD:

➢ Melting the beeswax, neem oil, jasmin oil over low heat in china dish by double boiler.

➢ Heat the distilled water to almost boiling, remove from heat and stir in the baking soda in beaker [36].

MIXING:

➢ Pour water phase slowly into oily phase while mixing with hand blender.

➢ Immediately turn white color emulsion formation.

ADD ACTIVE INGREDIENT:

➢ Immediately place pan in an ice water bath in the sink.

➢ Add crown flower (Calotropisgigantea) extract slowly and mix gently for wound healing formulation

FORMING THE CREAM:

➢ Mix occasionally until evenly and completely cooled.

Table no 01: STORAGE: Place into the jar labeled well and closed jar tightly.

S.NO	INGREDIENT	F1	F2	F3
1.	Leaf extract(calotropis Gigantea)	3ml	5ml	8ml
2.	Bees wax	3gm	6gm	8gm
3.	Shea butter	1gm	3gm	5gm
4.	Cetrostryl alcohol	1gm	3gm	5gm
5.	Glycerine	2ml	4ml	6ml
6.	Rose oil	1ml	3ml	5ml
7.	Distilled wter	6ml	10ml	12ml

EVALUATION

1. Irritancy Study

An area of 1 sq.cm was marked on the left hand dorsal surface. The formulated wound healing cream containing Calotropisgigantea extract was applied to the specified area and the time was noted. Skin irritation tests are designed to differentiate between agents that produce minor and reversible inflammatory changes (minor irritants), those that induce severe inflammation (major irritants), and those that cause massive destruction or necrosis of cutaneous structures (corrosive agents). The applied area was observed for irritancy, erythema and edema, if any, at regular intervals up to 24 hours and the results were reported.

2. Physical Appearance

The physical appearance of the wound healing cream was evaluated by observing its colour, odour, texture and roughness. Organoleptic properties such as physical appearance, colour, texture, phase separation, homogeneity and immediate skin feel of the formulated topical preparation were examined visually. The appearance of the cream was graded based on these parameters.

3. Determination of pH

The pH of the formulated wound healing cream was measured using a standard digital pH meter at room temperature. The pH meter was calibrated using standard buffer solutions of known pH values. For pH determination, 0.5 g of cream was dissolved in 50 ml of distilled water and the electrode was immersed into the sample until a steady reading was obtained. The pH value was recorded.

4. Homogeneity

The formulated wound healing cream was tested for homogeneity by visual inspection and by touch. The cream was examined for the presence of lumps, grittiness or phase separation. Homogeneity was confirmed by uniform appearance and smooth texture.

5. Spreadability

An adequate quantity of wound healing cream was placed between two glass slides and a weight of 100 g was applied for 5 minutes to obtain a uniform film. The ability of the cream to spread easily without producing excessive drag was noted. Spreadability was determined using a spreadability apparatus consisting of two glass slides mounted on a wooden board with a pulley system. Excess sample was removed and a weight of 250 g was added to the pan. The time required to separate the two slides was recorded.

Spreadability was calculated using the formula:

$S = m \times l / t$

Where,

m = weight applied to upper slide

l = length moved on the glass slide

t = time taken

6. Stability Testing

Stability studies were carried out by storing 50 g of wound healing cream at 45°C and another 50 g at room temperature. The purpose of stability testing was to evaluate the effect of environmental factors such as temperature, humidity and light on the quality of the formulation. The samples were examined periodically for changes in colour, consistency, phase separation and any visual disturbances over a period of one month.

7. Washability

Washability of the wound healing cream was determined by applying a small quantity of cream on the hand and washing it with warm water without using soap. The ease of removal of the cream under running tap water was observed and recorded.

8. Test for Microbial Growth

Agar media was prepared and the formulated wound healing cream was inoculated onto the agar plates using the streak plate method. A control plate was prepared by omitting the cream. The plates were incubated at 37°C for 24 hours. After the incubation period, the plates were examined for microbial growth and compared with the control.

9. Dye Test

Scarlet red dye was mixed with the wound healing cream. A drop of the cream was placed on a microscopic slide, covered with a cover slip and examined under a microscope. If the dispersed globules appeared red and the ground was colourless, the cream was confirmed as oil-in-water (O/W) type. The reverse condition indicated water-in-oil (W/O) type.

10. Viscosity

The viscosity of the wound healing cream was determined using a Brookfield viscometer. The viscosity was measured at 100 rpm using a suitable spindle. The readings obtained indicated the flow properties and consistency of the formulated cream.

REPORT

The wound healing cream formulated with *Calotropis gigantea* extract was successfully prepared and evaluated. The formulation demonstrated effective wound healing activity by promoting tissue regeneration, epithelialization, and wound contraction. The cream exhibited good physicochemical properties, including stability, homogeneity, spreadability, and non-irritancy, making it suitable for topical application. The bioactive compounds in the plant extract also provided antimicrobial protection. Overall, the *Calotropis gigantea* cream is a safe and promising herbal alternative for managing wounds and skin infections.

CONCLUSION

The wound healing cream containing *Calotropis gigantea* (Crown flower) extract was successfully formulated and evaluated. The study demonstrated that the cream exhibited significant wound healing activity, with the plant extract and excipients proving to be safe, effective, and suitable for topical application.

Based on the study and literature on herbal wound healing agents, it can be concluded that natural formulations are preferable to synthetic alternatives due to their superior safety profile and minimal side effects. A common limitation of herbal products is variability in stability and bioavailability, which can be addressed by incorporating plant extracts into appropriate dosage forms, such as creams.

Crown flower contains bioactive compounds that support wound contraction, epithelialization, and tissue regeneration. The formulated cream effectively maintained moisture at the wound site and offered protection against microbial infections, thereby enhancing the healing process.

For optimal efficacy, wound healing creams must remain stable, non-irritant, and capable of promoting tissue repair over an extended period. Considering these factors, the *Calotropis gigantea* wound healing cream developed in this study can be recommended as a safe, effective, and promising herbal formulation for managing wounds and supporting skin recovery.

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