International Journal of Current Innovations in Advanced Research

(International Multidisciplinary Tri-annual Research Journal)

Content Available at www.ijciar.com ISSN (O) 2636-6282 ISSN (P) 2659-1553

PREPARATION AND EVALUATION OF WOUND HEALING HERBAL OINTMENT

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DOI: https://doi.org/10.47957/ijciar.v8i2.196

Received: 25 Mar 2025 Revised: 14 Apr 2025 Accepted: 28 May 2025

Abstract

The use of herbal medicines for wound healing has been widely recognized in traditional practices and modern studies. Wound healing is a complex biological process that involves the restoration of tissue integrity following injury. The use of topical ointments in wound care is a common therapeutic approach to accelerate healing, reduce infection, and minimize scarring. This study explores the formulation and efficacy of a herbal wound healing ointment composed of natural ingredients with antimicrobial, anti-inflammatory, antioxidant and regenerative properties. This research focuses on the formulation of a herbal wound healing ointment, combining a range of bioactive herbs such as Neem, Hibiscus, Chamomile, Aloevera, Turmeric and extraction of mangifera indica. The ointment exhibited significant improvement in wound healing parameters, including faster epithelial growth, reduced inflammation, and prevention of infection compared to standard treatments. This study supports the potential of this herbal ointment as an effective, natural alternative for treating wounds, particularly in minor burns, cuts, and abrasions. The findings suggest that the herbal ointment offers a safe and effective alternative to conventional treatments, with a focus on natural ingredients that are gentle on the skin and free from synthetic chemicals.

Keywords: Herbal ointment, Wound healing, Anti inflammatory, Tissue repair, Skin regeneration, Extract, Topical herbal treatment.

Introduction

Skin

The skin is the largest organ in the body, covering its entire external surface. The skin phas 3 layers-the epidermis, dermis, and hypodermis, which have different anatomical structures and functions. The skin's structure comprises an intricate network that serves as the body's initial barrier against pathogens, ultraviolet (UV) light, chemicals, and mechanical injury. This organ also regulates temperature and the amount of water released into the environment [1].

Functions of Skin

- ✓ Protection
- ✓ Secretion
- ✓ Sensation
- ✓ Heat regulation
- ✓ Excretion
- ✓ Absorption [2].

Wound

Wounds are defined as physical, chemical or thermal injuries that outcome in an opening or breaking in the reliability of the skin or the interruption of anatomical and functional integrity of living tissues. Wound healing is the process of renovate that follows injury to the skin and other soft tissues [3]. The wound recovery is a complicated technique which mainly aims to restore the structural and useful integrity of the wounded tissue [4]. Different therapeutics,

through oral or parental routes are utilized to treat the wound. However, systemic administration of a drug can result in many untoward effects. The agents which help in the acceleration of wound healing are desirable to debride dead cell or tissue, minimize microbial infection and enhance wound closure and wound healing [5].

Types of Wounds

1. Acute wounds
2. Chronic wounds
3. Traumatic wounds
4. Surgical wounds
5. Open wound [6]

Phases of wound healing

Normal wound healing process comprises following four distinct overlapping phases:

1. Hemostasis
2. Inflammation
3. Proliferation
4. Maturation and Remodeling

1.Hemostasis

At the time of surgical incision, vascular injury occurs on a macro- or microvascular scale. The immediate response of the body is to prevent exsanguination and promote haemostasis.

Inflammation

The inflammatory phase is the immediate response to the trauma and sets about preparing the groundwork for the remaining two phases. The wound swells and there is the inevitable bleeding which is a primary mechanism through which debris and toxins can be removed.

3.Proliferation

This occurs over the course of four different processes:

- **Epithelialization:** This is the process of creating new skin tissue in the various layers of damaged skin.
- **Angiogenesis:** This is the creation of new blood vessels in the area of the wound healing.
- **Collagen formation:** This is the building up of strength in the tissue of the wound.
- **Contraction:** This is the reduction and eventual closing of the wound size and area.

4.Remodeling

This phase involves a balance between synthesis and degradation, as the collagen and other proteins deposited in the wound become increasingly well organized [7].

Different Types of Herbs

1.Echinacea - It is commonly used to treat common cold, flu , and slow healing wound.
2.Slippery elm bark - To reduce the wound inflammation and promote healing.
3.Curcuma longa - Speed up the healing of minor cuts and burns when applied topically and also used to make masks and ointments to reduce skin irritation and reduces.
4.Wadelia trilobata - To treat minor cuts, wound and burn and also used to treat reduce swelling and skin irritation.
5.Centella asiatica - Wound healing , promotes tissue repair and speed up the healing of cuts, burn, wounds and reduces the stretch marks and improve skin elasticity[8].

Signs and symptoms of wound

An infected wound may look different from a wound that's healing normally. These changes usually show up in the first couple of weeks. Signs and symptoms of a wound infection typically include:

- Flushed, swollen, or warm skin near the wound
- Worsening pain
- Clear fluid or pus collecting in the wound
- Blisters or sores
- Fever
- Swollen lymph nodes [9].

Treatment of Wound

✓ Wound care involves every stage of wound management. This includes diagnosing wound type, considering factors that affect wound healing, and the proper treatments for wound management.

✓ Once the wound is diagnosed and all factors are considered, the treatment facility can determine the best treatment options. Depending on the wound severity, you may need more care and attention for your wounds [10].

Materials and Methods

- Neem leaf powder: 0.6 grams
- Chamomie powder:0.6 grams
- Hibiscus petal powder:0.9 grams
- Turmeric powder:0.9 grams
- Aloe vera gel:0.9 grams
- Mangifera indica extraction:0.6 grams
- Bees wax:3 grams
- Almond oil:4 milli litre
- Rose warer:2 milli litre
- Ethanol:1.5 milli litre

Extraction of Mangifera Indica

Soxhlet extraction

1. Sample Preparation

- Collect fresh mango leaves.
- Wash and dry them at room temperature or in an oven (40–50°C).
- Grind the dried material into a fine powder using a mechanical grinder.

2. Loading the Soxhlet Apparatus

- Weigh 10–50g of the dried powder and place it inside a thimble made of filter paper.
- Insert the thimble into the Soxhlet extractor.

3. Choosing the Solvent

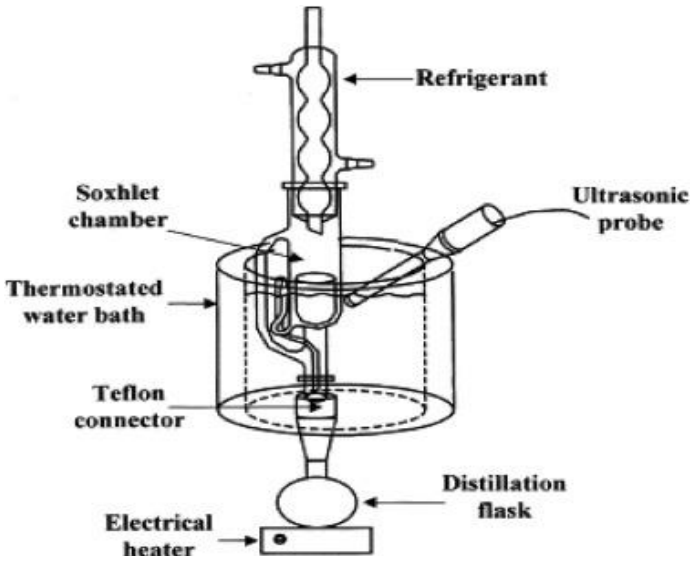
- Ethanol → Extracts polyphenols, flavonoids, and alkaloids.
- Pour 250–500 mL of the solvent into the round-bottom flask.

4. Extraction Process

- Assemble the Soxhlet apparatus with a condenser on top.
- Heat the solvent at 40–70°C, depending on its boiling point.
- The solvent evaporates, condenses, and repeatedly washes over the plant material, dissolving bioactive compounds.
- The process continues for 6–24 hours, depending on the desired yield

5. Solvent Recovery & Concentration

- After extraction, remove the solvent using a rotary evaporator or by evaporation at low temperatures.
- The concentrated extract can be dried further under vacuum or freeze-dried [11].



Step-by-Step Preparation

1. Melt the Base Ingredients

- In a double boiler (or a heat-safe bowl over simmering water), melt beeswax on low heat.
- Once melted, add almond oil, while stirring.

2. Incorporate Herbal Extracts

- Once fully melted, remove from heat and add extracted mangiferra residue followed by add aloe vera gel, turmeric powder, neem powder, and chamomile powder, hibiscus powder.
- Stir well to ensure even distribution.
- And finally add required quantity of rose water and ethanol to it .
- Allow the mixture to cool slightly (but not solidify).
- Pour the liquid mixture into a sterilized small container.
- Let it cool and solidify at room temperature for a few hours.
- Keep in a clean, dry container with a lid.
- Store in a cool, dark place and use within 3–6 months.

Evaluation of Herbal Ointment

- Color and Odour
- Consistency
- PH
- Spreadability
- Extrudability
- Loss on drying
- Washability
- Solubility
- Stability study
- Viscosity
- Organoleptic characteristics
- Non irritancy test [12].

Results and Discussion

Herbal wound healing ointment was prepared from natural ingredient like aloe vera, turmeric, chamomile, neem, magnifera indica and hibuscus and other ingredients and was evaluated.

Table: 01 Preparation of natural ingredients evaluation

SL NO	PARAMETES	OBSERVATION
1.	Colour	Dark Green
2.	Odour	Pleasant
3.	Smoothness	Smooth
4.	Appearance	Creamy texture

Evaluation Result

Table: 02 natural ingredients Examination Results

SL.NO	PARAMETERS	OBSERVATION
1.	PH Determination	5.5
2.	Viscosity	2800 Centipoise
3.	Spredability	Good and Uniform
4.	Washability	Easy removal
5.	Irritancy	No irritation reaction
6.	Stability	Stable
7.	SPF	30

The study attempted to develop herbal wound healing ointment using different herbs of neem leaf powder, hibiscus petals powder, chamomile powder, aloe vera gel, turmeric powder and using extract of magnifera indica. The formulated herbal wound healing oitment was successfully evaluated using different standard parameters. Herbal wound healing ointment is highly recommended and mostly preferable than synthetic wound healing ointment because it is safe and does not cause any skin irritation.

Conclusion

The result of the present study offers pharmacological evidence to support the traditional use of Magnifera indica leaves extract for the healing of wounds.In herbal ointment from combined of aloe vera, neem leaves powder, termeric, hibiscus powder and chamomile powder is an acceptable quality and physically stable. The ointment is effective for wound healing as it exhibits better wound healing properties compared to other treatments used in this study. The formulation and evaluation of a herbal ointment utilizing the above combination have shown promising results in enhancing wound healing in accelerating the wound healing process. The synergistic properties of Neem and Aloe Vera have contributed to their combined therapeutic effects, including anti-inflammatory, antimicrobial, and wound repairing activities. Furthermore, the herbal ointment offers a safe and natural alternative to conventional wound healing agents, potentially minimizing adverse effects commonly associated with synthetic compounds. However, this preparation of herbal ointment was showing therapeutic effect on the wounds and its reduces the inflammation caused by the wound and also repairs the skin.

Funding

Nil

Acknowledgement

Authors are thankful to the principal and Management of P.R.R. Memorial College of Pharmacy.

Conflict of Interest

Not Declared

Informed Consent and Ethical Statement

Not applicable

Author Contribution

All authors are contributed equally.

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