A Review on Formulation of Polyherbal (W/O) Ghee Cream for Wound Healing

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Abstract— **The biological process of wound healing is intricate and dynamic, involving epithelium repair, inflammation management, and tissue regeneration. Despite the availability of several synthetic wound-healing agents, prolonged use of these agents frequently results in negative side effects, including allergic responses, inflammation, and delayed healing. Therefore, topical formulations based on herbs are becoming more popular because of their multi-targeted pharmacological effects, safety, and biocompatibility.**
This review focuses on the development and rationale of a polyherbal water-in-oil (W/O) ghee-based cream containing Azadirachta indica (Neem), Ocimum sanctum (Tulsi), Aloe barbadensis (Aloe vera), Cynodon dactylon (Durva), and Withania somnifera (Ashwagandha). The formulation employs ghee as a natural base, providing emollient, antimicrobial, and wound-healing properties, while beeswax serves as a natural emulsifier. A literature search reveals that although individual herbs and ghee-based formulations have been studied, this exact combination in a ghee-based W/O cream remains novel. The proposed formulation offers a holistic, chemical-free, and traditional yet scientifically supported approach to wound management.

Index Terms— **polyherbal cream, ashwagandha, durva, neem, tulsi, aloe vera, ghee, wound healing, and herbal formulation.**

I. INTRODUCTION

The first line of defense against viruses, environmental irritants, and physical injuries is the skin. A wound results from any interruption in its continuity, which sets off a series of cellular and molecular processes meant to restore the tissue. Managing wounds remains a clinical problem, particularly when dealing with diabetic ulcers, infections, or persistent wounds [1]. Although they may offer short-term respite, traditional wound care products like synthetic lotions and antibiotic ointments can have negative side effects like resistance, dryness, or allergic reactions [2]. Herbal and Ayurvedic preparations, on the other hand, provide multifaceted, compassionate treatment with a lower danger of harm [3]. Natural phytoconstituents with antioxidant, antibacterial, and tissue-regenerative qualities, including alkaloids, flavonoids, terpenoids, phenolic acids, and saponins, are found in herbal medications [4].

The purpose and possible effectiveness of an Ayurvedic polyherbal cream containing ashwagandha, tulsi, aloe vera, turmeric, and neem are examined in this review. Through synergistic mechanisms, the combination is intended to target several stages of wound healing [1].

WOUND: Anatomical, cellular, and functional integrity of living tissue can be lost or broken as a result of wounds, which are inevitable events in life [5]. A loss or interruption of the cellular, anatomical, or functional continuity of the deep skin tissue or the living tissues may be referred to as a wound [6]. Wound healing is defined as a complex process occurring by the regeneration or reconstruction of damaged tissue [7].

II. TYPES OF WOUNDS

Wounds can be classified in several ways, depending on healing time. They can be acute or chronic.

1. Acute Wound: An acute wound is defined as the traumatic loss of normal structure and function to recently uninjured tissue. Those wounds that heal in a short period of time.
2. Chronic Wound: Chronic wounds are defined as wounds that have not healed through the regular phases and have instead entered a state of

pathologic inflammation. These wounds either take a long time to heal or keep coming back [8].

Wound Healing: The process of wound healing involves cellular and biochemical integration to restore the injured tissue's normal structural functions. The complex process by which the skin, organ, or tissue heals itself following damage is known as wound healing or wound repair. Tissue repair and regeneration are part of the intricate, well-coordinated series of biochemical and cellular processes that make up wound healing.

Normal Wound Healing Process: The dynamic process of wound healing replaces lost tissue and repairs damaged tissue by interacting with matrix and cellular components. Coordination of several processes, including coagulation, inflammation, and connective tissue proliferation, is necessary for the complex process of normal wound healing.

1. Hemostasis: Hemostasis is the process of promptly following an injury and stopping bleeding by creating platelets. It included vascular constriction, platelet aggregation, and the formation of fibrin.
2. Inflammation: It lasts for 4-6 days. It involves a hemostatic mechanism to prevent blood loss from the site of the wound.
3. Proliferation: It starts after inflammation, which lasts for 5-21 days. It involves the formation of granulation tissue, angiogenesis, and re-epithelialization.
4. Remodelling: This phase lasts for 3 weeks to 2 years. It involves the synthesis of collagen and scar formation [9].

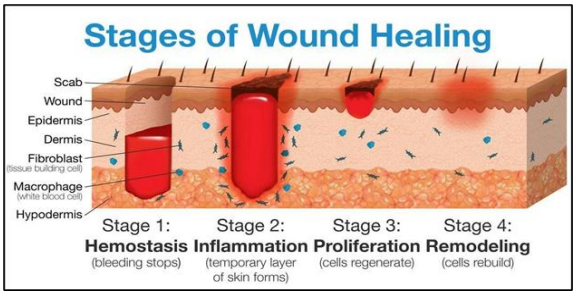

Fig 1: Stages Of Wound Healing [10]

Delays in any of these stages due to infection, oxidative stress, or poor vascularisation can impede proper healing. Herbal agents support each stage by reducing inflammation, neutralising free radicals, promoting fibroblast proliferation, and enhancing epithelialization [9].

III. HERBAL INGREDIENTS USED IN FORMULATION

I. Neem (Azadirachta indica):

Fig 2: Neem (Azadirachta Indica)

Neem is a well-known Ayurvedic plant valued for its strong antimicrobial and anti-inflammatory properties. Rich in compounds like azadirachtin and nimbidin, it helps cleanse wounds, prevent infection, and soothe irritation. Neem also supports collagen formation and promotes faster tissue repair.

Roles:

a) Promotes wound healing
b) Prevents microbial infection
c) Reduces redness and itching
d) Supports collagen formation [13]

II. Tulsi (Ocimum sanctum)

Fig 3: Tulsi (Ocimum Sanctum)

Tulsi, also known as Holy Basil, is a sacred plant in India widely used in traditional medicine for its therapeutic and spiritual significance. It contains eugenol, ursolic acid, and rosmarinic acid, which possess antioxidant and anti-inflammatory properties. Tulsi helps purify the skin and promotes tissue regeneration.

Roles:
a) Acts as an antiseptic and antimicrobial agent
b) Reduces inflammation and redness
c) Promotes faster wound contraction
d) Enhances collagen synthesis [14]

III. Aloe Vera (Aloe Barbadensis Miller)

Fig 4: Aloe Vera (Aloe barbadensis Miller)

Aloe vera is a succulent plant known for its cooling and soothing effects on the skin. Its gel contains polysaccharides, glycoproteins, vitamins, and amino acids that help retain moisture and support tissue repair. It is widely used for burns, wounds, and skin irritation due to its natural healing and hydrating properties.
Roles:
a) Promotes epithelialization and wound closure
b) Provides soothing and cooling effects
c) Reduces inflammation and pain
d) Moisturises and nourishes damaged tissue [15]

IV. METHOD OF PREPARATION

Step 1: Preparation of Herbal Decoction (Aqueous Phase):
1) Take 5 g mixture of Neem, Tulsi, Durva, and Ashwagandha powders.
2) 3Add 100 mL of distilled water and boil gently for 10–15 minutes.
3) Filter through muslin cloth to obtain a clear herbal decoction.
4) Use 15 mL of this filtrate as the aqueous phase for the cream.

Step 2: Preparation of Oil Phase:
1) In a clean beaker, take ghee (25 g) and beeswax (3 g).
2) Heat gently over a water bath at 60–65°C until both melt completely.
3) Add Aloe vera gel (2 g) and stir slowly until a uniform oily base form.
4) Maintain this temperature until emulsification (do not overheat).

Step 3: Emulsion Formation (W/O Type):
1) Keep the oil phase (ghee + beeswax + aloe) hot (~60°C).
2) Warm the herbal decoction to the same temperature (~60°C).
3) Slowly add the aqueous phase (decoction) into the oil phase with continuous stirring (use a glass rod or a magnetic stirrer).
4) Continue stirring for 10–15 minutes until a uniform emulsion forms.
5) As the mixture cools, it will begin to thicken into a cream-like texture.

Step 4: Addition of Rosemary Essential Oil:
1) Allow the cream to cool below 40°C.
2) Add 1–2 drops of rosemary essential oil and mix thoroughly.
3) Ensure uniform distribution and smooth consistency.

Step 5: Storage:
1) Transfer the prepared cream into a sterile, wide-mouth glass jar or ointment container.
2) Label properly: “Polyherbal W/O Ghee Cream for Wound Healing.”
3) Store in a refrigerator (below 10°C) to maintain freshness.
4) Shelf life: ~10–15 days under refrigeration [19].

V. DISCUSSION

The formulated polyherbal cream exhibited a smooth, homogeneous, and non-greasy texture with good spreadability and a pleasant odor. The pH was within the skin-compatible range, indicating suitability for topical application. The use of rose water as the aqueous phase provided mild toning and soothing effects, while coconut oil and beeswax offered emollient and protective properties.
Neem extract, aloe vera, and honey together contribute to the antimicrobial, anti-inflammatory, and wound-healing properties, supporting synergistic activity. The cream remained stable without phase separation or discoloration during storage, confirming its physical stability.

VI. CONCLUSION

The developed polyherbal W/O ghee-free cream demonstrated excellent physicochemical characteristics and good stability. The combination of neem, aloe vera, and honey in a rose-water base provides a natural, safe, and effective formulation for wound healing.

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