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# FORMULATION OF WOUND HEALING SPRAY LOADED WITH HERBAL EXTRACT MARIGOLD (TAGETES)

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**Abstract:**

*Wound healing spray loaded with herbal extract marigold (tagetes) was formulated. Marigold (Tagetes erecta), Turmeric (Curcuma longa), Neem (Azadirachta indica) extract was used. Turmeric gives a yellow hue naturally. Hibiscus gives a red tint color and Vitamin E to last longer preservation without refrigeration. The pH of formulation was determined by digital pH meter and 6.8-7.4 pH was ideal for skin application. The formulation was observed at room temperature for 30 days. Uniform distribution checked visually. Viscosity of the formulated wound healing spray was obtained using a Brookfield viscometer 23 (millipascal-seconds) at 25°C. Formulation was stable (Observed, no change in color, odor, consistency and pH after 30 days.)*

***KEYWORDS:*** *Wound healing, spray, herbal, extract, marigold,*

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## INTRODUCTION:

A wound is a break or opening in the skin. Your skin protects your body from germs[1]. When the skin is broken, even during surgery, germs can enter and cause infection[2]. Wounds often occur because of an accident or injury[3]. Wounds, whether acute or chronic, impair skin integrity and function[4]. Delayed healing can lead to infections and complications[5]. Herbal remedies, rich in phytochemicals like flavonoids, tannins, alkaloids, and terpenoids, promote wound healing through antimicrobial, anti-inflammatory, antioxidant, and tissue-regenerative effects[6].

There is an urgent need for interventions that improve healing time, prevent amputations and recurrent ulceration in patients with diabetes-related foot wounds[7]. In this randomized, open-label trial, participants were randomized to receive an application of non-cultured autologous skin cells ("spray-on" skin; recell) or standard care interventions for large (>6 $cm^2$), adequately vascularized wounds[8]. The primary outcome was complete healing at 6 months, determined by assessors blinded to the intervention[9]. Spray-on skin resulted in high rates of complete healing at 6 months in patients with large diabetes-related foot wounds, but was not significantly better than standard care[10].

## MATERIALS AND METHOD:

**Key Medicinal Plants:** Marigold (*Tagetes erecta*), Turmeric (*Curcuma longa*), Neem (*Azadirachta indica*)

**Formulation of Wound Healing Spray Solution:**

**Herbal extracts (active ingredients):** Choose herbs with antiseptic, antibacterial, and wound-healing properties

- **Neem (*Azadirachta indica*):** antibacterial, antifungal
- **Turmeric (*Curcuma longa*):** anti-inflammatory, antiseptic
- **Marigold (*Tagetes erecta*):** wound healing, Skin Care
- **Colorant (optional but traditional):** Turmeric gives a yellow hue naturally. Madder root or hibiscus could give a red tint.
- **Preservative:** Vitamin E to last longer preservation without refrigeration.

**Table No. 1: Formulation of Wound Healing Spray Solution**

| S. No. | Ingredients | Quantity |
|---|---|---|
| 1 | Marigold tincture | 10 ml |
| 2 | Turmeric extract | 5 ml |
| 3 | Neem tincture | 5 ml |
| 4 | Vitamin E | 3 ml |
| 5 | Ethanol (70 %) | 10 ml |
| 6 | Distilled water | q. s to 100 ml |

**Evaluation Parameters**

- **Determination of pH:** The pH of formulation was determined by digital pH meter and 6.8-7.4 pH was ideal for skin application.
- **Stability testing:** The formulation was observed at room temperature for 30 days.
- **Sprayability:** Uniform distribution checked visually
- **Viscosity:** The viscosity of the formulated wound healing spray was obtained using a Brookfield viscometer and at 25°C. This ideal viscosity range was required for a spray ensuring suitable for atomization.

**Phytochemical Evaluation of Spray Solution:**

Phytochemical screening is the qualitative analysis of plant extracts to detect the presence of various bioactive compounds (phytochemicals) that have therapeutic and physiological activity.

**Plant material:** plant extracts

**Solvents:** Methanol, Ethanol, Distilled Water, Chloroform

**Reagents:** Mayer's reagent (for alkaloids), Ferric chloride (for phenols & tannins), Lead acetate, Acetic anhydride, Sulfuric acid, Sodium hydroxide, Ammonia, Chloroform

**Table No. 2: Phytochemical Tests and Procedures**

| Phytochemical | Test Name | Procedure | Positive Result |
|---|---|---|---|
| Alkaloids | Mayer's Test | Add Mayer's reagent to extract | Cream/white ppt |
| | Wagner's Test | Add Wagner's reagent | Reddish-brown ppt |
| Flavonoids | Alkaline Reagent Test | Add NaOH to extract, then dilute acid | Yellow turns colorless |
| | Lead Acetate Test | Add lead acetate to extract | Yellow ppt |
| Tannins | Ferric Chloride Test | Add $FeCl_3$ to extract | Blue-black or green ppt |
| Saponins | Froth Test | Shake extract with water | Persistent foam |
| Phenols | Ferric Chloride Test | Add $FeCl_3$ to extract | Blue or black color |
| Glycosides | Keller-Kiliani Test | Add glacial acetic acid + $FeCl_3$ + $H_2SO_4$ | Brown ring at interface |

## RESULT AND DISCUSSION:

**Evaluation of Wound Healing Spray Solution**

| S. No. | Evaluation parameters | Observation |
|---|---|---|
| 1 | pH | 7.1 |
| 2 | Stability | Stable (Observed, no change in color, odor, consistency and pH after 30 days.) |
| 3 | Sprayability | Uniform |
| 4 | Viscosity | 23 (millipascal-seconds) |

**Phytochemical Evaluation of Spray Solution**

**Table No. : Phytochemical Screening of Neem Leaf,Turmeric, Marigold Extract Solution**

| S. No. | Phytochemical | Test | Result |
|---|---|---|---|
| 1 | Alkaloids | Mayer's | +ve |
| 2 | Flavonoids | Alkaline Reagent | +ve |
| 3 | Tannins | Ferric Chloride | +ve |
| 4 | Saponins | Froth Test | +ve |
| 5 | Phenols | $FeCl_3$ Test | +ve |
| 6 | Glycosides | Keller-Kiliani | +ve |

## CONCLUSION:

Globally, severe lesions have a substantial effect on overall well-being for individuals. The successful management of wounds relies on the intricate interplay among specific cell varieties, receptor sites on cells, the matrix outside cells, and therapeutic interventions. The intricate composition of skin tissue presents a challenge in formulating an ideal medication capable of promoting rapid and effective healing. Addressing wound healing, an enduring clinical challenge since ancient times, remains a complex task in effective wound treatment. The process entails various group of cells, the matrix outside cells, and the influence of soluble signaling molecules like stimulatory factors and cell-signaling proteins. Considerable research has centered on wound management, with a notable focus on innovating healing methodologies and advancing techniques for treating both sudden and lingering wounds, particularly within the framework of traditional Indian medicines (herbal) practices. Investigators are actively investigating novel formulations, bandages, and compositions incorporating healing plants to create economical, effective, and durable, and sustainable delivery systems for the treatment of wounds. The integration of nanotechnology and the availability of novel materials are enhancing the effectiveness and patient-centric nature of wound management.

## CONFLICTS OF INTERESTS

There are no any conflicts of interests.

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