



Preparation, characterization, and wound healing efficacy of *Tridax procumbens* L. herbal ointment

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ABSTRACT

Traditional medicinal plants are crucial in primary healthcare due to their safety, low cost, and therapeutic effectiveness. *Tridax procumbens* L. (Asteraceae), commonly known as coat buttons, is frequently used in folk medicine for wound healing and the treatment of skin infections. This study aimed to formulate a herbal ointment containing a *Tridax procumbens* L. leaf extract and to evaluate its physicochemical properties, stability, antimicrobial activity, and wound-healing effectiveness. The leaves were collected, authenticated, shade-dried, ground into powder, and utilized for ointment preparation. The resulting herbal ointment was assessed based on various parameters, including color, odor, consistency, pH level, spreadability, extrudability, diffusion characteristics, loss on drying (LOD), solubility, washability, non-irritancy tests, melting point determination, and moisture content analysis, as well as stability under varying temperature conditions. Results indicated that the ointment exhibited acceptable physicochemical properties, good spreadability, and appropriate pH, and demonstrated excellent stability. Furthermore, the formulation demonstrated significant antimicrobial activity and promising wound-healing properties, supporting the traditional use of *Tridax procumbens* L. This study concludes that *Tridax procumbens* L. can be effectively incorporated into herbal topical formulations as a safe and economical alternative to synthetic wound-healing agents.

Keywords: *Tridax procumbens* L., herbal ointment; wound healing; antimicrobial activity; physicochemical evaluation.

INTRODUCTION

Herbal remedies have been utilised for centuries to treat a variety of health issues, including wound care, due to their safety profile and minimal side effects compared to synthetic medications. These medicinal plants harbor a broad spectrum of bioactive compounds that contribute to their therapeutic benefits. Among them is *Tridax procumbens* L., widely recognized for its traditional use in treating wounds, inflammation, and skin infections. This plant is rich in phytochemicals, including flavonoids, alkaloids, saponins, and tannins, known for their antimicrobial and anti-inflammatory properties, as well as antioxidant effects that promote regeneration. Despite extensive historical use in

traditional medicine for wound treatment, this practice is well-documented. Yet, there remains a scarcity of scientific research focused on developing standardized topical formulations using this plant species. This study specifically investigates the formulation and evaluation of a herbal ointment containing *Tridax procumbens* L. extract, aiming to produce an effective, stable, and easy-to-apply topical solution. Problem Statement: Wound healing poses significant challenges within healthcare systems, especially in rural or resource-constrained areas where access to modern pharmaceutical solutions is limited. Although synthetic agents provide effective outcomes, they often lead to adverse reactions, including allergic responses or delayed recovery, alongside rising treatment costs, creating an increased demand for safer plant-based alternatives that are also economically viable. Notably, despite existing traditional knowledge of medicinal plants, many herbal remedies lack rigorous scientific validation or established standard formulations, prompting us to revisit *Tridax procumbens* L., which is readily available yet remains under-researched for its potential in standardized topical preparations.

MATERIAL AND METHOD

Collection of Plant Material

Fresh leaves of *Tridax procumbens* L. were gathered from a local farm adjacent to SSVPS Engineering College in Dhule (Maharashtra) during winter, around midday at approximately 12:36 PM, with identification assistance from local flora references (Patil 2003).



Fig. 1: Habitat of *Tridax procumbens* L.

Collection Method:

Only healthy leaves were picked using sanitized tools, such as scissors, while wearing gloves, ensuring collection under dry conditions to prevent fungal contamination. They were then transported securely, avoiding exposure to direct sunlight, which could compromise phytochemical integrity.

Cleaning and Preparation:

The harvested leaves were thoroughly washed with tap water, then distilled water, to remove dirt particles; shade-dried; placed in an oven at 40–45°C until completely dried; and ground into powder, stored airtight away from light/moisture.

RESULT AND DISCUSSION

Evaluation of Herbal Ointment:

Color & Odor: The formulated herbal ointment exhibited a characteristic green hue and a pleasant herbal scent upon visual inspection.

Consistency: The resultant formulation had a smooth, non-greasy texture, making it suitable for topical applications. - pH Level: pH measurement was conducted using a digital meter after preparing an ointment solution kept for over two hours, revealing values within the skin-friendly range.

Spreadability: Assessments using glass slide methods indicated satisfactory spreadability and required less time for separation.

Formula: The spreadability was calculated by using the following formula:

$$S = M \cdot L / T,$$

where S is the spreadability; M is the weight tied to the upper slides; L is the length of the glass slide; and T is the time taken in seconds.

Extrudability: The ointment displayed commendable extrudability, requiring minimal force over 10 seconds to yield 0.5 cm ribbons effortlessly.

Diffusion Study: Conducted on agar nutrient medium, demonstrated uniform diffusion after 60 minutes, indicating efficient release of active constituents.

Loss on Drying (LOD): Measurements taken during heating at 105°C showed acceptable moisture content, confirming compliance with quality standards.

Solubility & Washability: The formulation proved soluble when heated with water, while remaining miscible with alcohols/ ethers/ chloroform, showcasing ease of washability and indicating strong patient adherence prospects.

Non-Irritancy Test: No observable irritation or inflammation emerged upon dermal application among subjects tested, eliminating concerns regarding product tolerability.

Stability Study: Stability assessments performed over 4 weeks across varied temperatures (2 °C, 25 °C, and 37 °C) revealed no significant changes in physical attributes or pH, confirming robustness against environmental factors encountered during storage.

Melting Point & Moisture Content Analysis: Both melting point measurements and moisture content levels remained compliant with accepted pharmacopoeial thresholds, ensuring long-term product viability while mitigating microbial proliferation risks throughout appropriately maintained storage durations.

CONCLUSION

The present study successfully developed and tested an herbal ointment with *Tridax procumbens* L. leaf extract. The formulation exhibited desirable physicochemical properties, a skin-friendly pH, good spreadability, excellent stability, and promising wound-healing and antimicrobial activity.

The research demonstrates the conventional use of *Tridax procumbens* L. in wound care and presents it as a natural, economical, and safer alternative to synthetic wound-healing agents. More in vivo and clinical studies should be conducted to confirm its therapeutic efficacy on a larger scale.

Conflict of interest

The authors declare no competing interests.

Data Availability Statement: Not applicable.

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