



Vidhyayana - ISSN 2454-8596

An International Multidisciplinary Peer-Reviewed E-Journal

www.vidhyayanaejournal.org

Indexed in: ROAD & Google Scholar

HEALING HERBS: A REVIEW

Mahima Singh*

PhD scholar, Monark University At. & Post Vahelal, Naroda-Dahegam Road, Ta. Dascroi, Dist.

Ahmedabad-382330 (Gujarat) India

mahima79900@gmail.com



ABSTRACT

Considering the growing body of evidence supporting the therapeutic potential of phytochemicals, this review highlights how natural products from species such as *Curcuma longa*, honey, *Aloe vera*, *Hibiscus rosa*, and *Terminalia* influence the inflammatory microenvironment to promote wound healing. Plant-derived compounds play a crucial role in tissue repair due to their anti-inflammatory, antimicrobial, antibacterial, antifungal, and antioxidant properties. Over the years, a wide variety of plant products have been employed in traditional wound care. Bioactive constituents such as saponins, flavonoids, tannins, alkaloids, triterpenoids, glucosides, and fatty acids not only accelerate blood clotting and prevent infection but also enhance cellular proliferation, collagen deposition, and angiogenesis, all of which are essential for efficient wound closure. Wound healing is typically a complex and time-consuming process, yet the application of phytochemical-rich extracts has been shown to significantly accelerate tissue regeneration. Additionally, these natural compounds help modulate oxidative stress, stimulate growth factor production, and support remodelling of the extracellular matrix, further contributing to faster and higher-quality wound repair. The integration of these phytochemicals into modern therapeutic formulations offers promising avenues for the development of safe, effective, and cost-efficient wound care strategies.

Keywords: Wound, Healing, Phytochemicals, Alkaloids, Anti-inflammatory.

INTRODUCTION

Wounds develop when skin cells lose their structural integrity due to physical, chemical, thermal, infectious, or immunological damage. [1] Wound healing involves a sequence of biological events through which damaged tissue restores its structure and function [2], by sensing external conditions and maintaining physicochemical and thermal balance, the skin plays a crucial role in wound protection and survival. [3] Numerous plant-based products have been traditionally used in wound management. Herbal extracts aid in blood coagulation, prevent infection, and enhance the wound-healing process. Plant-derived compounds are therefore extensively identified and evaluated for their therapeutic potential in wound care [2]. Wound healing is a coordinated process involving multiple cell types and progresses through four stages: homeostasis, inflammation, proliferation, and remodelling, ultimately leading to scar formation. [4] Immediately following



cutaneous injury, homeostasis is initiated by platelet activation, leading to clot formation that serves as a temporary barrier to close the wound. [1]

Homeostasis

The homeostatic phase begins immediately after tissue injury and serves as the body's first defence against blood loss. During this stage, endothelial cells contribute to the adhesion and activation of platelets at the site of damage. Activated platelets not only initiate clot formation but also release signalling molecules that help regulate subsequent inflammatory processes. A fibrin-rich clot is rapidly generated, creating a protective barrier that seals the wound and limits haemorrhage. This initial phase is short-lived, typically lasting only a few minutes before the inflammatory stage commences.[4]

Inflammatory stage

In the early inflammatory phase of wound healing, injured blood vessels undergo vasoconstriction to minimize blood loss, while the leaked blood at the wound site becomes increasingly concentrated. Homeostasis is achieved through the activation of the coagulation cascade, which promotes the aggregation of platelets and the formation of a fibrin clot. This process is driven by the sequential activation of clotting factors, resulting in a stable network that helps control bleeding and provides a framework for subsequent tissue repair.[5]

Proliferative phase

During the proliferative stage of wound healing, fibroblasts become the dominant cell type and play a crucial role in tissue repair. The restoration of tissue structure and function begins with the formation of a temporary fibrin-rich scaffold, which is subsequently replaced by a more organized extracellular matrix containing collagen, fibronectin, and proteoglycans. Simultaneously, angiogenesis occurs, leading to the growth of new blood vessels that supply oxygen and nutrients to the healing tissue. Additional important events during this phase include the formation of granulation tissue and the migration and proliferation of epithelial cells across the wound bed, ultimately resulting in wound coverage and closure.[6]

Remodelling

The remodelling phase represents the final stage of wound healing, during which the epidermis is restored and scar tissue gradually matures. This prolonged process may continue for as long as two years. Throughout this period, collagen production and degradation remain carefully regulated to ensure proper restructuring of the extracellular matrix. As remodelling progresses, the initially deposited type III collagen is progressively replaced by the stronger type I collagen, leading to improved tissue strength and an architectural organization that closely resembles that of healthy, uninjured skin.[7]



Growing scientific research has highlighted the potential of topical phytochemicals in accelerating the repair of both acute and chronic wounds. As interest in natural and traditional medicine continues to expand across the world, plant-derived therapeutic agents are receiving increased attention for their healing properties. Although conventional synthetic treatments remain widely used, the demand for natural alternatives has encouraged further investigation into phytochemical-based wound care products. Numerous bioactive constituents obtained from plants, such as flavonoids, alkaloids, triterpenes, and related compounds, have



demonstrated promising effects on wound healing by supporting tissue regeneration and enhancing the body's natural repair mechanisms.[6]

MATERIALS AND METHODOLOGY

TABLE 1: PLANT AND THEIR RESPECTIVE COMPOUNDS IN THE HEALING OF WOUNDS.

Sr no.	Plant name	Common name	Plant part used	Compound	Bioactivity	Particular effect	Reference.
1.	<i>Aloe vera</i>	Aloe vera	Leaves	Polysaccharides, Phenolic compounds, Gibberellin.	Antimicrobial, Antiviral	Wound healing	[3]
2.	<i>Arnebia nobilis</i>	Chaff-flower, devil's horsewhip	Root	Arnebin-1	Anti-inflammatory	Allergic reaction	[9]
3.	<i>Atrium lappa</i>	Edible burdock, beggar's buttons.	Whole body	Tannins	Antimicrobial, Antiviral	Burns Rashes Boils	[3]
4.	<i>Bridelia ferruginea</i>	Kimi, Maren	Root and bulb	Saponins, Flavonoids, Tannins, Alkaloids, Triterpenoids.	Antioxidant	Burns, Rashes	[1]
5.	<i>Calendula officinalis</i>	Pot marigold, Scotch marigold	Flower	Glucoside	Antimicrobial Antifungal Antioxidant	Burns Wounds Dermatitis	[3]
6.	<i>Calotropis gigantea</i>	Crown flower, Madar	Flower	Alkaloids, Flavonoids,	Analgesic activity	Allergic reaction	[8]



7.	<i>Caryocar Brasiliense</i>	Souari Nut	Seeds	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
8.	<i>Caryocar Brasiliense</i>	Palm	Seeds	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
9.	<i>Cocus nucifera</i>	Coconut	Fruit	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
10.	<i>Commiphora myrrha</i>	Myrrh, African myrrh	Leaves and resins	Terpenes	Antibacterial Antioxidant Anti inflammatory	Wounds Burns Diabetes wounds	[3]
11.	<i>Cucurbita pepo</i>	Acorn squash,	Seeds	Essential oils Fatty acids	Anti-inflammatory Anti-bacterial Anti-oxidant	Wounds Skin infection	[12]
12.	<i>Cupresus semipervirens</i>	Italian cypress, pencil pine	Cones and berries	Essential oils	Anti-inflammatory	Wounds	[13]
13.	<i>Curcuma longa</i>	Turmeric	Rhizome	Curcuminoids Curcumin	Antibacterial Antioxidant Anti inflammatory	Wounds bleeding	[3], [1]
14.	<i>Elaeis guineensis</i>	Mustaka/Nagarmotha	Leaves	Tannins Saponin Alkaloidal Flavonoids Steroids	Antifungal antimicrobial	Rashes	[4]



				Reducing sugars Terpenoid			
15.	<i>Entada phaseoloids</i>	box bean, St. Thomas' bean	Stem and seeds	Tannins	Antibacterial Antioxidant	Aging	[3]
16.	<i>Eupatorium odoratum</i>	Christmas bush, Siam weed	Whole plant	Essential Oil flavonols and flavanones	Anti-inflammatory	Wounds Inflammation	[8]
17.	<i>Ficus racemosa</i>	Indian fig tree or Goolar fig	Leaves	Tannin, Wax, Saponin, Glucanolate	Anti-inflammatory	Wound healing	[8]
18.	<i>Glycine max</i>	Soyabean	Seed	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
19.	<i>Gossypium hirsutum</i>	Cotton	Seeds	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
20.	<i>Helianthus annuus</i>	Sunflower	Seed	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
21.	<i>Hibiscus rosa</i>	China rose, Shoe flower	Flower	Anthocyanin Flavonoids Polyphenolic acids	Antibacterial	Wound healing	[3]
22.	<i>Jatropha gossypifolia</i>	Bellyache bush, Black physicnut,	Leaves	Jatropheone Ricinoleic acid	Purgative Emmenagogues	Rashes	[8]



23.	<i>Juniperus phoenicea</i>	Arâr, Juniper	Berries	Essential oils	Anti-inflammatory	Skin infection	[13]
24.	<i>Lonicera japonica</i>	Japanese honeysuckle	Flowering aerial parts	Phenolic acids Bioflavonoids	Antibacterial Antioxidant Anti-inflammatory	Skin infections	[3]
25.	<i>Persea americana</i>	Avocado	Fruit	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
26.	<i>Picrorhiza kurroa</i>	Picrorhiza, Kutki, Kutka	Roots and rhizomes	Picroliv	Anti-inflammatory	Allergic reaction	[9]
27.	<i>Pinus sp.</i>	Pine	Stem Bark Roots	Flavonoids Steroids Terpenoids Procyanidins	Antibacterial antifungal Antioxidant Antirheumatics	Acne Rashes	[5]
28.	<i>Rhodiola imbricata</i>	Rose root, Golden root	Rhizome	Gallic acid p- tyrosol	Antimicrobial Antioxidant Anti-inflammatory	Skin diseases	[3]
29.	<i>Ricinus Communis</i>	Castor	Seeds	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
30.	<i>Ricinus Communis</i>	Olive	Fruit	Fatty acids	Antimicrobial Antioxidant Anti-inflammatory	Wounds Inflammation	[14]
31.	<i>Sanguisorba officinalis</i>	Great burnet	Roots	Tannins Triterpenoids Glycosides	Antiallergic Anti-inflammatory	Burns	[3]

32.	<i>Terminalia arjuna</i>	Arjun tree	Stem	Tannins Tannic acid	Antimicrobial Antioxidant Anti-inflammatory	Diabetic wounds burns	[1]
33.	<i>Terminalia catappa</i>	Tropical almond	Leaves	Tannin	Antibacterial, Hepatoprotective activity	Scabies, leprosy and other cutaneous diseases.	[15]
34.	<i>Terminalia catappa</i>	Tropical almond	Fruits	Ascorbic acid	Anti- inflammatory, Antibacterial.	Treat bronchitis and bowels problems.	[15]
35.	<i>Terminalia chebula</i>	Myrobalan, Hardad.	Stem	Chebolic acid	Anti-inflammatory	Diabetic wounds, burns	[1]
36. 1	<i>Terminalia sericea</i>	Cluster leaf, silver cluster-leaf	Bark	Chebulagic acid	Antimicrobial Antioxidant	Burns, rashes	[1]

RESULT AND DISCUSSION

Medicinal plants have gained considerable scientific interest as wound-healing agents owing to their diverse phytochemical constituents and therapeutic properties. Among them, species belonging to the genus *Terminalia*, especially *Terminalia arjuna* and *Terminalia chebula*, have been widely used in Ayurvedic medicine and have shown promising wound-healing effects in experimental studies, including rat excision wound models [1]. Studies have reported that extracts from these plants promote faster wound contraction and tissue repair when compared with untreated controls [2]. The beneficial effects of these extracts are largely attributed to bioactive compounds such as saponins, acemannan, and anthraquinone derivatives. These constituents influence various cellular activities, including fibroblast proliferation, cell adhesion, and gene



expression, while also providing antimicrobial protection against wound pathogens [3]. Terpenoids (isoprenoids) further support the healing process through their antimicrobial and astringent properties, which facilitate wound contraction and epithelial regeneration [4]. In addition, several phytochemical classes, including triterpenes, alkaloids, and flavonoids, contribute significantly to different stages of wound repair. Asiaticoside, an important compound isolated from *Centella asiatica*, has been shown to stimulate collagen synthesis and angiogenesis, both of which are essential for successful tissue regeneration [8]. Likewise, curcumin possesses remarkable wound-healing potential by promoting tissue remodelling and enhancing the formation of new blood vessels [9]. Plant-derived oils also play an important role in wound management. Oils rich in fatty acids, tocopherols, and phytosterols, such as pumpkin seed oil, have demonstrated notable wound-healing activity [12]. Similarly, topical formulations prepared from the aerial parts of *Juniperus oxycedrus* subsp. *oxycedrus* and *Juniperus phoenicea* have exhibited significant therapeutic effects in wound-healing studies [13]. The fatty acids present in these oils additionally provide emollient, anti-inflammatory, and protective benefits, helping to maintain skin hydration and restore the epidermal barrier [14]. Collectively, these plant-derived bioactive compounds act through multiple mechanisms to support wound healing, including the regulation of inflammation, stimulation of cellular proliferation, enhancement of collagen deposition, promotion of angiogenesis, and facilitation of tissue remodelling [3,4,8,9,12–14].

CONCLUSION

In this review, we have comprehensively summarized the available evidence supporting the use of medicinal plants as traditional therapeutic agents for the management of cutaneous wounds and various clinical skin disorders. Since ancient times, medicinal plants have served as the primary source of treatment for trauma, infections, burns, and other skin injuries, forming the foundation of traditional healthcare systems such as Ayurveda, Traditional Chinese Medicine, and other indigenous practices. Over the centuries, extensive empirical knowledge has been developed regarding the identification, extraction, and application of bioactive compounds derived from plants, which has significantly contributed to their continued relevance in modern therapeutics.



Recent scientific advancements have provided substantial validation for these traditional practices, demonstrating that plant-derived phytochemicals—including flavonoids, alkaloids, triterpenes, phenolic compounds, and essential oils—play a critical role in enhancing the wound-healing process. These compounds are known to accelerate wound contraction, promote collagen synthesis, stimulate angiogenesis, and facilitate epithelialization. Additionally, many of these phytoconstituents exhibit potent anti-inflammatory and antioxidant activities, which help in reducing oxidative stress and modulating inflammatory responses at the wound site. Their inherent antimicrobial properties further contribute to preventing infections, thereby creating an optimal environment for tissue repair and regeneration.

Moreover, the synergistic interactions among various plant metabolites often result in enhanced therapeutic efficacy compared to isolated compounds, highlighting the importance of whole plant extracts in wound management. The integration of traditional knowledge with modern pharmacological and molecular research has opened new avenues for understanding the mechanisms underlying plant-based wound healing. This interdisciplinary approach underscores the immense potential of phytochemicals as safe, cost-effective, and accessible alternatives or adjuncts to conventional synthetic drugs, which are often associated with side effects and high costs.

Furthermore, increasing interest in natural and sustainable healthcare solutions has driven the exploration of medicinal plants for the development of novel formulations such as herbal ointments, gels, and nanocarrier-based delivery systems. Continued research focusing on standardization, bioavailability, and clinical validation of these plant-based therapies is essential to ensure their efficacy and safety. In conclusion, medicinal plants represent a promising reservoir of bioactive compounds, and their systematic investigation may lead to the discovery of innovative therapeutics that enhance tissue repair, minimize complications, and improve overall clinical outcomes in wound care.



REFERENCES

1. Shah, A., & Amini-Nik, S. (2017). The role of phytochemicals in the inflammatory phase of wound healing. *International Journal of Molecular Sciences*, 18(5), 1068.
2. Thakur, R., Jain, N., Pathak, R., & Sandhu, S. S. (2011). Practices in wound healing studies of plants. Evidence-based complementary and alternative medicine, 2011.
3. Shedoeva, A., Leavesley, D., Upton, Z., & Fan, C. (2019). Wound healing and the use of medicinal plants. *Evidence-Based Complementary and Alternative Medicine*, 2019.
4. Fernández-Guarino, M., Naharro-Rodríguez, J., & Bacci, S. (2024). Disturbances in the skin homeostasis: Wound healing, an undefined process. *Cosmetics*, 11(3), 90.
5. Strodbeck, F. (2001). Physiology of wound healing. *Newborn and infant nursing reviews*, 1(1), 43-52.
6. Fitridge, R., & Thompson, M. (2011). *Mechanisms of vascular disease: a reference book for vascular specialists* (p. 587). University of Adelaide Press.
7. Singh, S., Young, A., & McNaught, C. E. (2017). The physiology of wound healing. *Surgery (Oxford)*, 35(9), 473-477.
8. Ayyanar, M., & Ignacimuthu, S. (2009). Herbal medicines for wound healing among tribal people in Southern India: Ethnobotanical and Scientific evidences. *International journal of Applied research in Natural products*, 2(3), 29-42.
9. Thangapazham, R. L., Sharad, S., & Maheshwari, R. K. (2016). Phytochemicals in wound healing. *Advances in wound care*, 5(5), 230-241.
10. Wound Healing Potential of Elaeis guineensis Jacq Leaves in an Infected Albino Rat Model
11. Süntar, I., Tumen, I., Ustün, O., Keleş, H., & Akkol, E. K. (2012). Appraisal on the wound healing and anti-inflammatory activities of the essential oils obtained from the cones and needles of Pinus species by in vivo and in vitro experimental models. *Journal of ethnopharmacology*, 139(2), 533-540.
12. Bardaa, S., Halima, N. B., Aloui, F., Mansour, R. B., Jabeur, H., Bouaziz, M., & Sahnoun, Z. (2016). Oil from pumpkin (Cucurbita pepo L.) seeds: evaluation of its functional properties on wound healing in rats. *Lipids in health and disease*, 15(1), 1-12.



13. Tumen, I., Süntar, I., Keleş, H., & Küpeli Akkol, E. (2012). A therapeutic approach for wound healing by using essential oils of Cupressus and Juniperus species growing in Turkey. Evidence-based complementary and alternative medicine, 2012.
14. Alves, A. Q., da Silva Jr, V. A., Góes, A. J. S., Silva, M. S., de Oliveira, G. G., Bastos, I. V. G. A., ... & Alves, A. J. (2019). The fatty acid composition of vegetable oils and their potential use in wound care. Advances in skin & wound care, 32(8), 1-8.
15. Mohale, D. S., Dewani, A. P., Chandewar, A. V., Khadse, C. D., Tripathi, A. S., & Agrawal, S. S. (2009). Brief review on medicinal potential of Terminalia catappa. *Journal of Herbal Medicine and Toxicology*, 3(1), 7-11.