

Pharmacognosy of Traditional Medicinal plant used for Wound Healing

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Abstract: *Wound healing is a sophisticated process that results in the repair of damaged tissues. Cutaneous wound healing is the process by which skin repairs itself. In the current times, different types of biopolymers are being researched for developing economical, sustainable, stable, and effective delivery system for the treatment of wound. A wound is a breakage in tissue continuity that can be produced by physical, chemical and thermal damage. It is a generally called as physical injury that cause opening and breaking of skin. Healing of chronic cutaneous wound is a big problem and it involves the restoration of continuity after wounding. Dermal fibroblasts migrate into the wound bed and proliferate, creating "granulation tissue" rich in extracellular matrix proteins and supporting the growth of new blood vessels. Ultimately, this is remodelled over an extended period, returning the injured tissue to a state similar to that before injury. India has a rich tradition of plant-based knowledge on healthcare system. Several herbs and medicinal plants proved to be a wound healers were identified and formulated for treatment and management of wounds. Various herbal products have been used in management and treatment of wounds over the years. The main objective of treating a wound is to either shorten the time required for healing process or to minimize the undue effects. Plants due to presence of various valuable active phytoconstituents have immense potential for management and treatment of wounds over the years.*

Keywords: 3D bioprinting; organ-on-a-chip; bionic tissue; bioink; cell culture

I. INTRODUCTION

wound that is caused by human, biological, immunological, microbial injury, or usually associated with lost function disrupted tissue condition. It can lead to pain, discomfort, inflammation, infection, and occasionally organ failure if the wound stays untreated.

In the process of wound healing, many medicinal plants have a very significant role. Plants are more effective healers because they inherently facilitate recovery mechanisms.

Defination of pharmacognosy and its importance in wound healing research

Pharmacognosy deals with the natural drug obtained from organisms such as most plants, microbes and animals. pharmacognosy is used by pharmaceutical complies to screen, characteries and produce new drugs for the treatment of human disease.

Overview of traditional medicinal plants in wound healing practices

A wound healer also minimizes demand of other drugs like antibiotics and also their probable side effects by their use. Wound may be defined as a disruption of the cellular and anatomic continuity of a tissue, with or without microbial infection and is produced due to any accident or cut with sharp edged things.

Roll of traditional medicinal plants in wound healing-

Wound healing process by promoting blood clotting, fighting against infection and accelerating wound healing. Medical treatment of wound includes administration of drugseither locally (topical) or systemically (oral or parenteral) in an attempt to aid wound repair (Savanth & Shah, 1998). Some of the physiological conditions with chronic diseases likediabetes, peripheral vascular disorders, or even aging result in the delayed wound healing.



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Different types of wound healing

- Primary
- Secondary
- Tertiary

Primary wound healing, also known as primary intention wound healing, is when doctors close a wound using staples, stitches, glues, or other forms of wound-closing processes. Secondary wound healing, also known as secondary intention wound healing, occurs when a wound that cannot be stitched causes a large amount of tissue loss. Tertiary wound healing, also known as healing by delayed primary closure, occurs when there is a need to delay the wound-closing process.

Classification of wound

Open wound

In this case blood escapes the body and bleeding is clearly visible. It is further classified as: Incised wound, Laceration or tear wound, Abrasions or superficial wounds, Puncture wounds, Penetration wounds and gunshot wounds (Strodtbeck et al 2001)

Closed wound

In closed wounds blood escapes the circulatory system but remains in the body. It includes Contusion or bruises, hematomas or blood tumor, Crush injury etc.

Acute wound

Acute wounds are usually caused by cuts or surgical incisions and complete the wound healing process within the expected time frame.

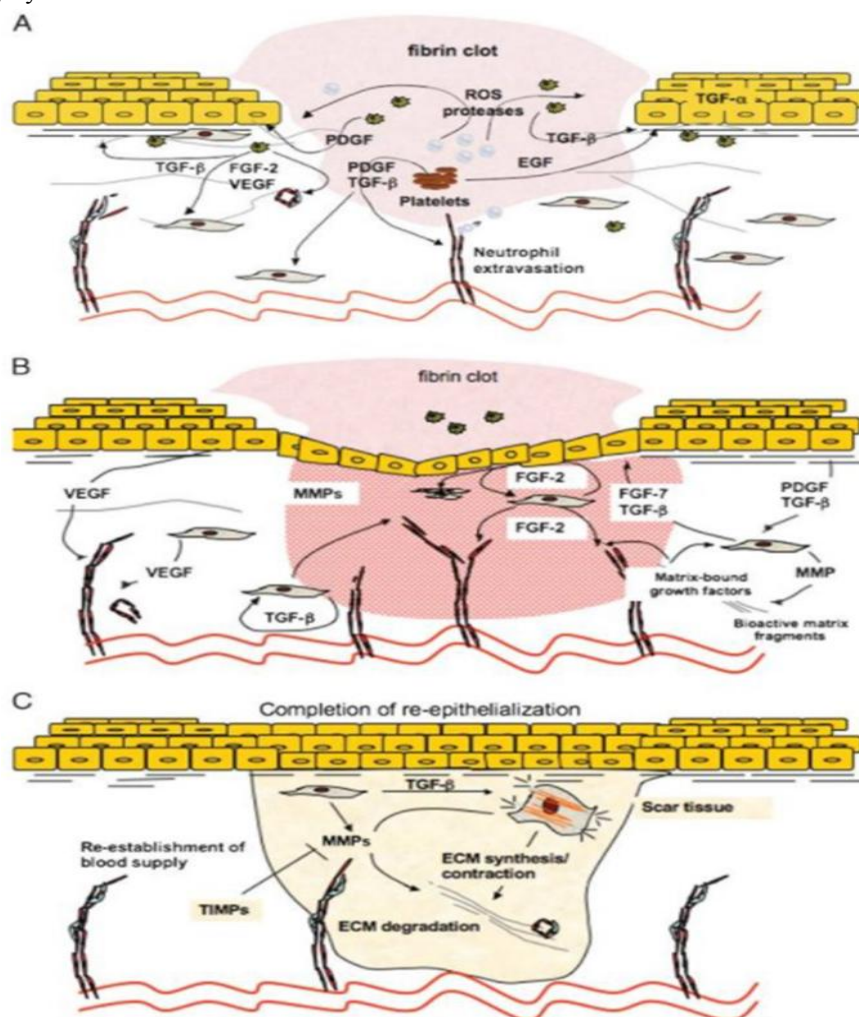
Chronic wound

chronic wounds either require a prolonged time to heal or recur frequently .

Mechanism of wound healing

Wound healing is a complex mechanism that can be categorized as an allergic response, propagation, and remodeling in three parallel phases. The inflammatory process initiates a proliferative wound repair response further characterized by vascular responses like blood coagulation and hemostasis. The remodeling process begins to restore structural integrity and functional competence to the tissue when the new tissue is established inside the wound. Inhibiting virulence factors as well as targeting microbial cells. As proven by in vitro experiments, medicinal plants produce a boundless quantity of secondary metabolites that have great antimicrobial activity. Wound healing processes tend to be strictly regulated at the wound site by various growth factors and cytokines released. Changes that interfere with regulated timely healing processes increase tissue damage and delay recovery.

The tissue has a granular texture (granulation tissue), due to the involvement of blood vessels. Eventually, inside the granulation tissue, differentiated fibroblastic cells (myofibroblasts) begin to remodel the extracellular matrix at about 1 to 2 weeks after injury.



Traditional use of medicinal plants in wound healing

1. Aloe vera

Applied to wounds for over 5000 years by Egyptians, Romans, indigenous peoples of Africa Asia, and the Americas, Aloe vera continues to be a first-line treatment for burns, ulcers, and surgical wounds. Acetone extracts from the leaves of Aloe vera exhibit stronger antimicrobial activity than alcohol and aqueous extracts. Gram-positive bacterial species appear to be more sensitive than Gram-negative species to Aloe vera. Aloe Vera commonly known as Kumari is a

perennial herb belonging to liliaceae family. It has short stem and shallow root system with large fleshy, rosettes sessile leaves.

The wound healing time and bacteriological control was significantly in Aloe group (Udupa et al., 1994). The working mechanism of Aloe Vera for wound healing is reported to be enhancing collages turnover rate and increased level of lysyl oxidase (responsible for cross inking Of newly synthesized collages (Chitra et al., 1998).



2. Camellia Sinensis

Green tea, an aqueous extract made from the leaves of *Camellia sinensis*, is revered throughout Asia for its reputed health benefits. Methanol extracts from *Camellia sinensis* reportedly increase fibroblast proliferation and collagen synthesis. Klass et al. found that EGCG suppresses TGF- β receptors by modifying TGF- β signalling, reducing MMP-1 and MMP-2 expression, and attenuating synthesis of collagen type 1 in human dermal fibroblasts. These properties suggest that EGCG is a potential antiscarring agent.



3. *Curcuma longa*

Curcumin, an active substance found in the root of *Curcuma longa* and a member of the ginger family, has long been used as a medicine and as food seasoning. Perhaps, it is therefore not unexpected that curcumin enhances fibroblast proliferation, granulation tissue formation, and collagen deposition in cutaneous wound healing.

It is also called Indian saffron, curcuma. It consists of dried as well as fresh rhizomes of the plant known as *curcuma longa* belonging to family zingiberaceae. It contains not less than 4% of volatile oil. India account for as much as 90% of the total output of the world.



4. *Hibiscus rosa-sinensis*

Hibiscus rosa-sinensis, or shoeblackplant, is an evergreen shrub native to tropical South Eastern Asia. The flowers of *Hibiscus rosa-sinensis* are edible. Traditional texts describe preparations of the leaves and flowers promote hair growth and prevent greying. Extracts from *Hibiscus rosa-sinensis* have also been found to have antibacterial.



5. *Azadirachta indica*

Neem leaf extracts and oil from seeds has proven anti-microbial effect. This keeps any wound or lesion free from secondary infections by microorganisms. Clinical studies have also revealed that neem inhibits inflammation as

effectively as cortisone acetate; this effect further accelerates wound healing. Neem oil contains margosic acid, glycerides of fatty acids, butyric acid and trace valeric acid.

All parts of the neem tree have been used traditionally for the treatment of numerous ailments for instance bark as analgesic, alternative and curative of fever; twig in cough, asthma, piles, tumor, intestinal worms, spermatorrhea, urinary disorder, diabetes; leaf in leprosy, eye problem, epistaxis, intestinal worms, anorexia, biliousness, skin ulcers, cancer; flower in bile suppression, elimination of intestinal worms, phlegm; fruit in piles, intestinal worms, urinary disorder, diabetes, wounds, epistaxis, phlegm, eye problem, leprosy, and seed in leprosy, intestinal worms, cancer; and oil in leprosy, intestinal worms, gum in scabies, wounds, ulcers, skin diseases, etc.



II. CONCLUSION

Medicinal plants have been the first line of treatment for trauma, infection, disease, and injury from prehistory. Over millennia, humans have learned to identify and transform the botanical resources from the immediate environment, and with the development of trade, as food and medicine.

There are a number of plants which are used traditionally used the tribal people of India are not been validated or such plants not been evaluated keeping the traditional unconventional claim in mind.

Considering the principle drawbacks, associated with synthetic compounds, plants which are the gift from nature having traditional knowledge, provides excellent raw material for the treatment of various diseases and disorders. PLE and geraniin possess significant wound-healing activity. PLE and geraniin increased hydroxyproline production, collagen production, tensile strength of wound tissues, and TGF- β_1 levels in wound bed and also exhibited good cytoprotective activity.

REFERENCES

- [1]. <https://www.hindawi.com/journals/ecam/2019/2684108/>
- [2]. <https://www.frontiersin.org/articles/10.3389/fphar.2018.00945/full>
- [3]. <https://www.frontiersin.org/articles/10.3389/fphar.2018.00945/full>
- [4]. <https://fjps.springeropen.com/articles/10.1186/s43094-021-00202>
- [5]. <https://jddtonline.info/index.php/jddt/article/view/1184>
- [6]. B Kumar M Vinaykumar R Govindarajan P Pushpangadan Ethnopharmacological approaches to wound healing exploring medicinal plants of India J Ethnopharmacology 2007 114 10313
- [7]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6778887/>
- [8]. <https://pubmed.ncbi.nlm.nih.gov/31662773/>
- [9]. <https://www.hindawi.com/journals/ecam/2019/2684108/>

- [10]. https://link.springer.com/chapter/10.1007/978-981-16-2677-7_6
- [11]. C Shenoy M B Patil Ravikumar Preliminary phytochemical investigation and wound healing activity of *Allium Cepalin* (Liliaceae) *Int J Pharm Pharm Sci* 200922
- [12]. <https://www.herbazest.com/wellness-articles/5-herbal-supplements-to-speed-up-wound-healing>
- [13]. <https://www.bing.com/search?q=methods+employed+in+pharmacognosy+in+wound+healling&qs=n&form=QBRE&sp=-1&lq=0&pq=methods+employed+in+pharmacognosy+in+wound+healling&sc=0-52&sk=&cvid=697190D873DA43248DD86F10D6217335&ghsh=0&ghacc=0&ghpl=&showconv=1>
- [14]. file:///C:/Users/samarth%20/Downloads/712_pdf%20(1).pdf
- [15]. <https://fjps.springeropen.com/articles/10.1186/s43094-021-00202-w#:~:text=Traditional%20use%20of%20medicinal%20plants,%2C%20ulcers%2C%20and%20surgical%20wounds>
- [16]. Mukherjee K, Rajesh Kumar M (2003) Evaluation of wound healing activity of some herbal formulations Published online in Wiley. *Inter Sci* 117:265–268. <https://doi.org/10.1002/ptr.93>
- [17]. https://www.researchgate.net/publication/337853646_Efficacy_and_Mechanism_of_Traditional_Medicinal_Plants_and_Bioactive_Compounds_against_Clinically_Important_Pathogens
- [18]. Garcia-Orue I., Gainza G., Gutierrez F. B., et al. Novel nanofibrous dressings containing rhEGF and Aloe vera for wound healing applications. *International Journal of Pharmaceutics*. 2017;523(2):556–566. doi: 10.1016/j.ijpharm.2016.11.006. [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [19]. Lawrence R., Tripathi P., Jeyakumar E. Isolation, purification and evaluation of antibacterial agents from Aloe vera. *Brazilian Journal of Microbiology*. 2009;40(4):906–915. doi: 10.1590/s1517-83822009000400023. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [20]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6778887/>
- [21]. Yang C. S., Chen G., Wu Q. Recent scientific studies of a traditional Chinese medicine, tea, on prevention of chronic diseases. *Journal of Traditional and Complementary Medicine*. 2014;4(1):17–23. doi: 10.4103/2225-4110.124326. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [22]. Er S., Dikmen M. *Camellia sinensis* increased apoptosis on U2OS osteosarcoma cells and wound healing potential on NIH3T3 fibroblast cells. *Cytotechnology*. 2017;69(6):901–914. doi: 10.1007/s10616-017-0105-4. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [23]. Klass B. R., Branford O. A., Grobelaar A. O., Rolfe K. J. The effect of epigallocatechin-3-gallate, a constituent of green tea, on transforming growth factor- β 1-stimulated wound contraction. *Wound Repair and Regeneration*. 2010;18(1):80–88. doi: 10.1111/j.1524-475x.2009.00552.x. [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [24]. Akbik D., Ghadiri M., Chrzanowski W., Rohanizadeh R. Curcumin as a wound healing agent. *Life Sciences*. 2014;116(1):1–7. doi: 10.1016/j.lfs.2014.08.016. [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [25]. Joe B., Vijaykumar M., Lokesh B. R. Biological properties of curcumin-cellular and molecular mechanisms of action. *Critical Reviews in Food Science and Nutrition*. 2004;44(2):97–111. doi: 10.1080/10408690490424702. [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [26]. https://www.google.com/search?sca_esv=568414926&q=aloe+vera&tbm=isch&source=lnms&sa=X&ved=2ahUKEwuwMi00ceBAxWnfPUHHcJQC-gQ0pQJegQICRAB&biw=1366&bih=619&dpr=1#imgrc=kDx7hMTB3DbyTM
- [27]. Adhirajan N., Ravi Kumar T., Shanmugasundaram N., Babu M. In vivo and in vitro evaluation of hair growth potential of *Hibiscus rosa-sinensis* Linn. *Journal of Ethnopharmacology*. 2003;88(2-3):235–239. doi: 10.1016/s0378-8741(03)00231-9. [PubMed] [CrossRef] [Google Scholar] [Ref list]
- [28]. Khan Z. A., Naqvi S. A., Mukhtar A., et al. Antioxidant and antibacterial activities of *Hibiscus Rosa-sinensis* Linn flower extracts. *Pakistan Journal of Pharmaceutical Sciences*. 2014;27(3):469–474. [PubMed] [Google Scholar] [Ref list]
- [29]. Bhaskar A., Nithya V. Evaluation of the wound-healing activity of *Hibiscus rosa sinensis* L (Malvaceae) in Wistar albino rats. *Indian Journal of Pharmacology*. 2012;44(6):694–698. doi: 10.4103/0253-7613.103252. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

- [30]. https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.hindustantimes.com%2Fweb-stories%2Famazing-health-benefits-of-hibiscus-5508&psig=AOvVaw2iyGnBbzAWE5rO9cK20174&ust=1695796646781000&source=images&cd=vfe&opi=89978449&ved=0CA4QjRxqFwoTCMiyq_rUx4EDFQAAAAAdAAAAABAD
- [31]. <https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.plantsguru.com%2Fneem&psig=AOvVaw3LRfxsEzQiVUcnCaiS8ZtX&ust=1695796868194000&source=images&cd=vfe&opi=89978449&ved=0CA4QjRxqFwoTCND8heTVx4EDFQAAAAAdAAAAABAD>
- [32]. Paul R, Prasad M, Sah NK. Anticancer biology of *Azadirachta indica* L (neem): a mini review. *Cancer Bio Ther.* 2011;12:467–6. [PubMed] [Google Scholar] [Ref list]
- [33]. An overview of medicinal plants as wound healers
https://www.japsonline.com/admin/php/uploads/712_pdf.pdf
- [34]. https://www.researchgate.net/publication/237474871_Medicinal_Plants_and_their_Role_in_Wound_Healing
- [35]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6778887/#sec2title>
- [36]. https://www.ncbi.nlm.nih.gov/core/lw/2.0/html/tileshop_pmc/tileshop_pmc_inline.html?title=Click%20on%20image%20to%20zoom&p=PMC3&id=3118986_ECAM2011-438056.001.jpg
- [37]. Practices in Wound Healing Studies of Plants - PMC - NCBI
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3118986/>