

A REVIEW OF HERBAL MEDICINE USED IN WOUND HEALING

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Abstract:

The main purpose of this review is to identify herbal medicines with great potential for treating minor wounds. The herbal medicine in wound healing for both traditional and nontraditional forms of the medicine dating back at least 5000 years. The herbs are minimal unwanted side effect. Based on medicine to prove efficacy of herbal medicines & focus on better understanding for their mechanism of actions, the more Scientist were increase on modern Scientific method and evidence. Quantitative human health benefit for herbal medicine is still rare or dispersed for limiting their proper valuation. The traditional medicinal plants are prepared by wound healing purposes covering a broad area of different skin related diseases. The herbal medicine in wound management involve disinfection, debridement & provision of a suitable environment for aiding the natural course of healing. Here we are report on some plants, which are used as wound healing agent in traditional medicine around the world.

Introduction:

A wound is a disruption of anatomical and cellular continuity of tissue caused by chemical, physical, thermal, microbial or immunological injury. The healing of wounds is a process involving a combination of cellular processes as well as biochemical reactions that result in re-establishment of the structural and functional integrity of the damaged tissue. Human skin is the largest organ in the body & represents, it is the first line of defense¹. The beside protection of the skin has 2 other main function, regular & sensation. The more specifically it provides protection from mechanical impact & pressure, it limits the influence for variations in the temperature. It fights micro organism infection, the restrict radiation effects & prevents entrance of chemical. Skin is the largest organ in the body. The skin plays an important role in several physiological processes, including regulation of the body temperature changes in peripheral circulation & fluid balance. It also involved in the synthesis of vitamin D for which it acts as a reservoir. The extensive network of nerve cells, the skin enables detection & relaying of changes in the environment {heat, cold and touch}. The damage of nerve cells is known as neuropathy and result in the loss of sensation in affected area. Because, here all mentioned & other function is preservation of the skin quality and maintain a healthy body.

A wound is defined as disruption of the cellular & anatomic continuity of a tissue and it may occur due to physical, chemical, microbial, thermal or immunological tissue trauma. The wound can compromise patients wellbeing, self image, working capacity & independence. The effective wound healing management is necessary for, not only the individual, but also the community levels.

Process of wound healing

The wound healing is a complex & dynamic process of replacing devitalized and missing cellular structure and tissue layer. It reflect in a set of biochemical events in a closely organized cascade to pair the damaged tissue⁶. The human adult wound healing is often divided into three phase; the proliferative phase, inflammatory phase and remodeling phase. The inflammatory phase is starts immediately after injury with the launch of hemostatic mechanisms to immediately stop bleeding⁷. Its characterized by vasoconstriction & platelet aggregation to induce the vasodilatation & phagocytosis, Hence, inflammation off the wound site. The proliferation phase is characterized by granulation, epithelialization, and wound contraction; fibroblasts form a collagen bed, followed by the formation of new capillaries. The during wound contraction and myofibroblasts decrease the size of the wound by gripping the wound edges & contracting using a mechanism that resembles the smooth muscle cells. When the cells role is close to complete, unneeded cells undergoes apoptosis⁸. The epithelialization involves proliferation of epithelial cells, which crawl a top the wound bed covering the new tissue. Finally remodeling phase takes place over a period of several month during in which the dermis responds to injuries with production of collagen & matrix proteins in attempt to return to its pre-injury phenotype. The main aim of the wound treatment is to either shorten the time required for wound healing or minimize the undesired consequences of the scarring.

Important activities in wound healing:

The various physiological events can significantly affect the course of wound healing. The most important are anti-inflammatory, analgesic, antimicrobial & antioxidant activities regardless of the exact underlying mechanism.

- Acute inflammatory response during the early stages of injury generates factors {cytokine & chemokine} that are the essential appropriate tissue growth and repair.
- The prolonged inflammation can prevent the wound for reaching the remodeling phase as well as matrix synthesis.




As a result delay in wound closure & pain sensation and beside the wound commonly appear leading to even more hindered healing process. The infections are known as one of the most important factors influencing efficiency of wound healing process. It's reported that a high percentage of wound related complications & hence costs in wound care, it can be directly linked with infected wounds. Reducing the bacterial load may be one of the most important necessary requirements for better wound healing, the wound infection {either secondary or primary by opportunistic micro-organisms} can be led to reduction of local inflammation & consequentially avoid tissue destruction. The ideal medicine for prevention of wound infection should act a anti-microbial & at the same time stimulate the body's natural immune activity without damage to



surrounding healthy tissues. The most of wounds induce sensation of pain relates to patient discomfort, the release of factors & often reduce the quality of life for patient.


The chronic pain lowers the patient's capability of wound healing, prolonging the overall recovery process. The suitable & effective pain management can lead to an earlier ambulation of adequate oxygenation, nutrition & stress reduction. They all mentioned the results in facilitation of wound healing process. While minimizing the risk for development of chronic pain as well as finally in lowered treatment cost¹. The neutrophil activates their so-called respiratory burst and produce free radicals. The evidence for the role of oxidants in the pathogenesis of many disease suggest that antioxidants, may be the therapeutic use in these conditions. hence, improve the efficiency of wound healing process.

Traditionally medical plants used in wound healing:

The many plants & their extracts have been used traditionally great potential for their management, treatment of wounds. The phytomedicine is affordable and it is minimal unwanted side effect. In the recent years, extensive research has been carried out in the area of wound healing process & management through medicinal plants¹. The review in the most important medicinal plants & their properties with awell known or proven effects on wound healing activity.

<p>TRIDAX PROCUMBENS</p> 	<p>Vernacular name: Botanical name: Tridax procumbens Family : Daisy family Tamil Name : Vettukaya Poonda Kannada : Jayanthi Malayalam : Chiravanak Sanskrit : Jayanthi Veda Hindi : Ghamra</p>	<p>Used parts: whole plant</p>	<p>Formulation: liquid dosage forms for cutaneous use.</p>
<p>Clinical evidence : animal and case studies¹.</p> <p>Side effect: Allergic reaction and photosensitivity after skin exposure¹.</p>			
<p>Description: As part of traditional medicine, the tridax procumbens has been used for wound healing, anti-coagulation, antifungal, and insect repellent in India. Its juice or extract from leaves is directly applied on wounds. Its leaf extract was used for infectious skin diseases in folk medicines.</p>			
<p>ALOE VERA</p> 	<p>Vernacular name: Botanical name :Aloe barbadensis miller Family : Asphodelaceae Tamil Name : Kathalai Kannada : Lolesara Malayalam : Kattar vazha Sanskrit : Gwar patha Hindi : Gheekumari</p>	<p>Used parts: Mucilage from inner leaf parts</p>	<p>Formulation: Gel and ointments for cutaneous use.</p>
<p>Clinical evidence : Animal and case studies¹⁵.</p> <p>Side effect: Hypersensitivity to aloe¹⁵.</p> <p>Description: It is used for medicinal purpose in several cultures for centuries. Especially in India, Greece, Egypt, Japan & China¹⁵. In 3500 years ago Egyptians already used aloe extract in treating burns, infection & parasites. The aloe gel was proven to aid wound healing in treating ulcers, burns by forming a protective coating in the affected areas, and speeding up the healing process. The various constituents stimulate wound healing & have anti-inflammatory activities.</p>			
<p>ACHILLA;</p> 	<p>Vernacular name: Botanical name: Ixodia achillaeoides Family : Asteraceae Tamil Name : Mountain daisy</p>	<p>Used parts: whole plant and flower</p>	<p>Formulation: liquid dosage forms for cutaneous use.</p>
<p>Clinical evidence : Animal and case studies¹.</p> <p>Side effect: The main side effect is Allergic reaction and photosensitivity after skin exposure¹.</p>			
<p>Description: It is used as a medicine by many cultures for hundreds of years¹¹. It has good antibacterial activity against Shigella dysenteriae¹². Moderate activity against Streptococcus pneumoniae, Clostridium perfringens & Candida albicans. It was also</p>			

	proven to have a significant anti-inflammatory effect {most through protease inhibition} ¹³⁻¹⁴		
<p>Centella Asiatica</p> 	<p>Vernacular name: Botanical name: Centella asiatica Family : Apiaceae Tamil Name : Vallarai Kannada : Brahmisoppu Malayalam : Kodabga Hindi : Brahmi</p>	<p>Used parts: Leaves of the plant</p>	<p>Formulation: Ointment, cuaneous powder as an adjuvant & cream.</p>
<p>Azadirachta Indica</p> 	<p>Vernacular name: Botanical name: Azadirachta indica Family : Maliaceae Tamil Name : Veppillai Kannada : Turakabevu Malayalam : Ariyaveppu Sanskrit : Pakvakrita Hindi : Neem</p>	<p>Used parts: Seed oil and bark</p>	<p>Formulation: liquid extract in organic solvents</p>
	<p>Clinical evidence : Animal, controlled case studies, clinical studies on small patient group¹¹.</p> <p>Side effect: Allergy to plant of apiaceae family¹¹.</p> <p>Description: It is used extensively in the treatment of leprosy & host of skin condition including different wounds. The experimentally induced open wounds in the rat. Aqueous extract of centella asiatica is increased collagen content & thickness of the epithelium. The ointment made from centella leaves are used to treat leg ulcers, Decubitus scabs, gangrene, fistula, traumatic defective scars and surgical wound, burns.</p> <p>Description: It has been used in india for over two millennia due to lots of pharmacological activities, particularly for skin disease. The liquid extract of neem posses anti-bacterial, anti-viral, anti-fungal and anti-inflammatory activities. It oil aids for maintain the skin elasticity⁶⁻⁹.</p>		
<p>Clinical evidence : animal and cell culures⁶⁻⁸.</p>	<p>Side effect: Possibly allergic in the high dose⁵.</p>		

<p>Ginko Biloba</p> 	<p>Vernacular name: Botanical name :Ginkgo biloba Family : Ginkgoaceae Tamil : Pasi maram Nepali : Bal kumari Kannada : Maidenhair Malayalam : Ginko biloba</p>	<p>Used parts: Green leaves</p>	<p>Formulation: liquid extract (tincture, fluid extract, glycerites).</p>
	<p>Description: Ginko biloba (Family: Ginkgoaceae).Extracts of leaves have been used therapeutically for centuries¹⁶. As a pharmacological agent, Ginkgo has a number of benefits including an increase in blood flow, antioxidant activity, effective membrane stabilization, improvement in cognition, and wound healing properties. Its preparations increase granulation tissue breaking strength and promote epithelisation without altering wound contraction¹⁷.</p>	<p>Clinical evidence : animal, cell cultures and case studies¹⁶.</p>	<p>Side effect: hypersensitive skin reaction¹⁶.</p>

A wound contraction is measured every fourth day until the wound was completely healed and expressed as a percentage of the healing area¹⁸. The percentage of wound contraction was calculated taking the initial size of wound as 100% by using the following formula,

(Initial wound area – Specific day wound area)

$$\% \text{ Wound contraction} = \frac{\text{Initial wound area} - \text{Specific day wound area}}{\text{Initial wound area}} \times 100$$

Epithelialization period was calculated as the number of days required for falling of the dead tissue remnants of the wound without any residual raw wound¹⁸. At the end of the study, All animals was anesthetized using ketamine & specimens for wound tissue was collected and preserved in the glass vial containing 10% formalin solution for histopathological examination¹⁸. Histopathological studies of tissue of the excision wound was performed on the 16thday & histopathological features of the tissue of all groups of animals¹⁸. The wound healings is an intricate process following damage to the skin and other soft tissues of the body. Wound healing

involves the dynamic process of multiple biochemical consequences towards restoration of the damaged cellular structure to its regular and original state¹⁸. A classical cascade of the wound healing involves three sequential and overlapping phases: It will inflammation, proliferation, and remodeling¹⁸.

The many herbals have good wound healing properties including *angelica sinensis* (family- apiaceae) whole herbal used in Chinese traditional medicine. It's isolate has been found to stimulate the wound healing¹⁹. The *avena* fruits (family; poaceae) are used on infected ulcer and wounds to facilitate wound healing¹⁹. The *calendula officinalis* (family; asteraceae) in suspension or tincture is used topically for reducing inflammation and control the bleeding²¹. The *cedrus deodara* (family; Pinaceae) leaves & bark having anti-inflammatory, astringent, antimicrobial & wound healing activities¹⁹. It is particularly very effective for treatment of infected wounds²². The *chromolaena odorata* (family; Asteraceae) aqueous extract of leaves have traditionally used in treatment of soft tissue & burn wounds²³. The liquid preparation enhances hemostatic activity, induces granulation, inhibits wound contraction and promotes reepithelialization, thus aiding in wound healing²³. The *commiphora myrrha* (family; Burseraceae) is one of old medicine, it is use recorded in the recipes from ancient Rome & in the texts of Hippocrates. It is also mentioned in both Bible and Koran²⁵. It has antibacterial, antifungal, anti-inflammatory, local anesthetic and analgesic activities. Now current reported cutaneous use of this tincture in topical application for the treatment of minor wounds, skin inflammation²⁵.

The *chamomilla recutita* (family; asteraceae) flower has been used in centuries as an anti-oxidant, antimicrobial, anti-inflammatory agent, mild astringent and wound healing properties²⁴. This contributes to wound drying & accelerates epithelisation²⁴. The *curcuma longa* (family; zingiberaceae) rhizomes having anti-inflammatory, analgesic, anti-bacterial, anti-fungal activities²⁷. The rhizomes juice is commonly used to fresh wounds, bruises & leech bites^{28,29}. The whole plant of *helianthus annuus* (family; asteraceae) ethanolic extract applied on the excised wound of rats led to significantly reduce the healing times³⁰. The ethanolic extract of *jasminum auriculatum* (family; Oleaceae) leaves, flowers was found to be promote wound healing and improved tensile strength in the early phases of healing³¹. The *Pterocarpus santalinus* (family; Fabaceae) ethanolic extract of its leaves, flower, stem bark has shown significant decrease in the period of epitheliasation & increase the rate of wound contraction²⁰. Mostly phytoconstituents of plant extract especially ethanol & aqueous extract of phytoconstituents are more wound healing activities it compared to other extract¹⁸.

Conclusion:

They promote the natural repair mechanism in a more potent way, which is why plants are more potent healers. According to this study, tribal people still use traditional medicines to treat wounds. In focused some medicinal plant (*tridax procumbens*, *aloe vera*, *achilla*, *centella asiatica*, *azadirachta indica*, *ginkgo biloba*, *angelica sinensis*, *avena* fruits, *calendula officinalis*,

cedrus deodara, chromolaena odorata, commiphora myrrha, chamomilla recutita, curcuma longa, helianthus annuus, jasminum auriculatum and Pterocarpus santalinus) because, they have better wound healing activity compare to other medicinal plants. The goal of the review is to identify medicinal plants that have already been reported. The focus is to provide information on the medicinal properties, vernacular name, used part of plants, clinical evidence, formulations and side effects.

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