International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

A Comprehensive Review of 20 Herbal Drugs for Wound Healing

Shivaji Pandurang Payghan[1], Mayuri N. Shrikhande[2], Bachal Rushikesh Gajanan[3], Shingare Rahul Dnyaneshwar[4]
Arihant College of Pharmacy, Ahmednagar, Maharashtra, India

Submitted: 15-02-2023 Accepted: 25-02-2023

ABSTRACT:
This review article describes the pathophysiology of wounds and more than 20 natural medicines used in wound healing. A wound is a disruption of the biological, structural, and functional stability of soft tissue. The wound healing process can be exacerbated by diseases such as diabetes, burns, and microbial infections. Key steps involved are haemostasis, inflammation, proliferation, and maturation. It uses a variety of active ingredients to prevent microbial growth, control inflammation, promote proliferation and remodeling, and ultimately accelerate the wound healing and repair process. Various herbal medicines of plant origin exhibit excellent pharmacological activity at different stages of wound healing. These drugs are used in their raw form or as extracts, depending on the type, wound and prescription. This overview highlights the wound-healing potential of various plants with detailed information. Herbs have been an integral part of both traditional and non-traditional medicine for at least 5000 years. The continued popularity of herbal medicines can be explained by the perception that herbs cause minimal unwanted side effects. However, information on the quantitative benefits of herbal medicines for human health is still lacking or scattered, which limits the proper evaluation. Preparations from traditional medicinal plants are often used to heal wounds and cover various skin ailments. Herbal medicine in wound management involves disinfection, debridement, and providing an appropriate environment to support the natural healing process. Here we report on 20 plants used around the world to heal wounds in traditional medicine. Therefore, the aim of this review is to review herbal medicines that have a high potential for effective treatment of minor injuries.

Keywords: Wound, Wound healing, Herbal extract, herbal treatment.

I. INTRODUCTION:

The relationship between humans and plants was established in ancient civilizations and is one of the most enduring relationships. In the past, medicines were mainly derived from plants, in simple form from various plants. Partial or complex forms as raw extracts or mixtures. A considerable number of medicines are now derived from it. A highly effective plant in the treatment of several life-threatening diseases. Most of the orphaned connections Botanical is an active ingredient or chemical compound that specifically occurs in this medicinal plant or subsequent medicinal plants Fix it. Nearly 25% of remedies in developing countries are either herbal or herbal Derivatives and their medicinal uses are well known to indigenous peoples in rural areas of many countries. Our ancestors' discovery of the healing power of plants was the result of many traces and errors. The effectiveness of medicinal plant therapies is based on hundreds and thousands of years of empirical evidence. It is surprising even after many false attributions of the plant's therapeutic properties. Due to poor hygiene, wound infections are one of the most common diseases in developing countries. A wound is a physical injury that results in an opening or rupture of the skin, or a rupture of the epithelium. Compromises the integrity of the skin and may involve disruption of the underlying normal tissue structure and function. They arise from bruises, hematomas, lacerations or abrasions. Therefore, the appropriate method Healing is essential to restore skin and physiological condition. Wound healing begins at that moment. It causes and prolongs damage depending on the speed at which the four stages of hemostasis and inflammation are completed. Depending on the degree of damage, it is divided into growth phase, growth phase, and remodeling phase, and finally Appearance and strength of healed tissue. Metabolic disorders, disease states interfere with re generation.

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

Wound: A wound is defined as a disruption of the biological, structural, and functional stability of soft tissue. It can be caused by natural, chemical, thermal, microbial, or immunological damage to tissue. When the skin is cut or punctured, it is commonly called an open wound; when blunt pressure causes trauma, it is called a closed wound; burns are caused by fire, heat, radiation, chemicals, electricity, or sunlight. is triggered.

Acute wound: Acute wounds are skin injuries that occur unexpectedly as a result of accidents or surgeries. Complete healing is expected in 8 to 12 weeks, depending on the size, intensity, and severity of the injury.

Chronic wounds: Chronic wounds are slow-healing, recurring tissue injuries that do not heal for more than 12 weeks. A propensity factor to cause an imbalance between patient immunity and wound bioburden. Chronic wounds are a common consequence of pressure ulcers, leg ulcers, venous insufficiency ulcers, and ischemic wounds.

Decubitus ulcers: It leads to damage to the integrity of the skin and is also known as tension pain.

Leg ulcers: Also known as diabetic foot ulcers. Changes in diabetes affect neuropathy and disease.

Venous insufficiency ulcers: It causes severe venous insufficiency ulcers. Ischemic Wound: This is because much less oxygen reaches the affected part of the body.

Pathophysiology Of Wound Healing:

The process of wound healing is described by a series of overlays Events involving inflammatory factors and pathways, resident cells, recruited cells at the site of injury, growth factors, and other signals. This process is generally categorized into four major stages: hemostasis /coagulation, inflammation, proliferation/migration, and remodeling/maturation. Each phase consists of a series of complex interactions between many cell types, lineage elements, growth factors and extracellular matrix.

Mechanism of Wound Healing:

Response to surgical or traumatic injury Induction is immediate and no damaged tissue or wound It then goes through three phases to bring the finale repair:

1. **The Inflammatory Phase**
2. **The Fibroblastic Phase**
3. **The Remodelling Phases**

The Inflammatory Phase Prepares the Area for Healing Cause swelling and fix the wound, it is painful and restricts movement. The fiber plasticity phase reconstructs the structure, the transformation stage gives the final shape.

1. The Inflammatory Phase:

The inflammatory phase begins shortly thereafter Injuries that usually last 24 to 48 hours In some cases, it lasts up to 2 weeks. Phase initiates hemostatic mechanisms and immediately stops blood loss at the wound site. This phase is characterized by: Vasoconstriction and platelet aggregation to induce blood coagulation and subsequent vasodilation and Phagocytosis that causes inflammation at the wound site.

2. Fibroblastic Phase:

The second stage of wound healing is the fibrogenic stage, which lasts up to 2 days to 3 weeks after the inflammatory stage. This phase consists of three steps granulation, contraction and epithelialization. In the granulation step fibroblasts form a bed of collagen, New capillaries are formed. fibroblasts are Various substances essential for wound healing, including glycosaminoglycans and collagen. inseam of Shrink Wound edges shrinks to reduce defects. In the third step epithelial tissue is formed at the wound site.

3. The Remodeling Phase:

This stage lasts from 3 weeks to 2 years. At this stage, new collagen is formed. Tissue tensile strength is increased by intermolecular cross-linking of collagen through vitamin C-dependent hydroxylation. scars are flattened, Scar tissue becomes 80% as strong as the original tissue. Since then, the wound-healing activity of plants has been I looked it up in folklore. Many Ayurvedic herbal plants have one. It plays a very important role in wound healing. Plants are more powerful healers because they naturally enhance repair mechanisms. extensive research performed in the field of wound healing Management with medicinal plants. Herbal medicine in wound care includes disinfection, debridement Provides a moist environment to facilitate the establishment of an environment conducive to natural forms of healing processes.

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

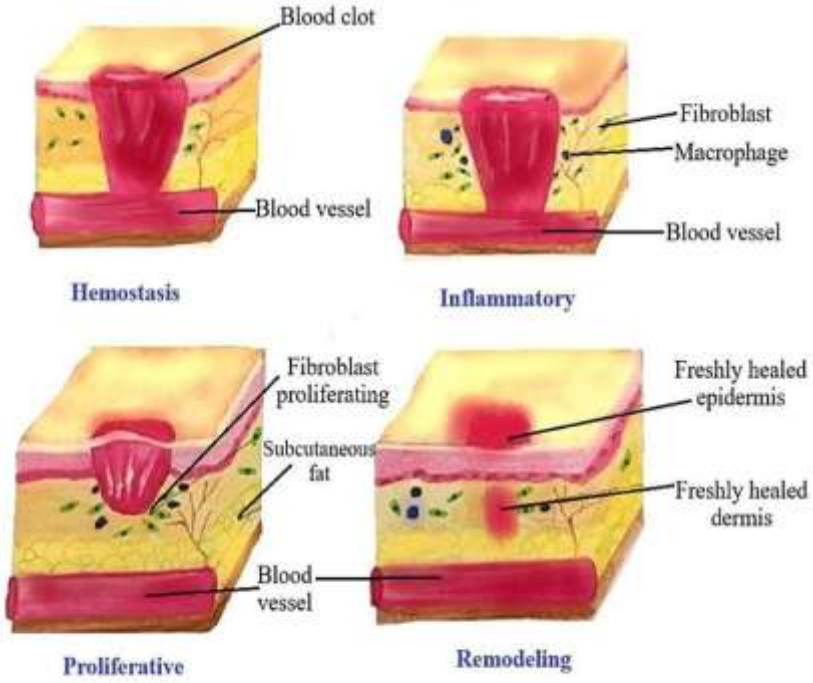

Figure 1: Stages of wound healing

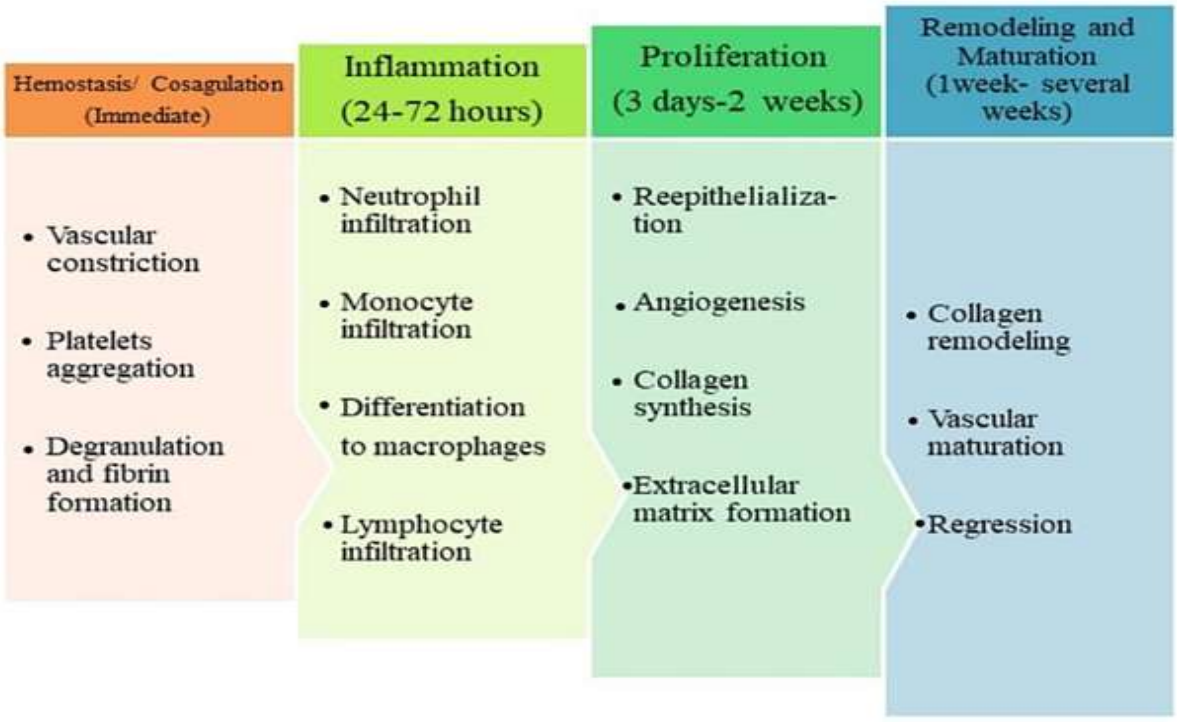

Figure 2: Phases with cellular and biophysical events

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

Role Of Herbal Medicinal Plants In Wound Healing:

Nature has been a source of medicine for thousands of years, and herbal systems continue to play an important role in primary health care in 80% of the world's underdeveloped and developing countries. Many plants and their extracts have traditionally been used in the management and treatment of wounds due to their great potential. Natural substances induce healing and tissue regeneration through several interrelated mechanisms. So-called phytomedicines are affordable and usually cause minimal unwanted side effects. However, growing awareness of their activities, potential and potential safety concerns, has led to the need for scientific standardization, validation, and systematic safety assessment before their efficient introduction into wound care. pointing out. Extensive research has been carried out in recent years in the field of wound healing and treatment with medicinal plants.

The following overview describes the most important medicinal plants and their properties have a known or proven effect on wound Healing:

1. Aloe Vera:

•Scientific Name: Aloe Barbadensis Miller

•Family: Liliaceae

Aloe barbadensis is a plant from the family Liliaceae. Aloe contains anthraquinones, glycosides, pyrocatechol, saponins, acemannan, monounsaturated fatty acid, phytol, and water-soluble polysaccharides. Acemannan is a major mucopolysaccharide in Aloe, which is a powerful booster for macrophage and T-cell (T lymphocyte) interest. Additionally, they induce the transcription of pro-inflammatory mRNAs. Aloe Vera prompts wound healing and stops inflammation. Since mannose-6-phosphate is the major sugar in the Aloe gel.

2. Amla:

•Scientific Name: Phyllanthus emblica

•Family: Euphorbiaceae

Amla consists of dried and fresh fruits pericarp of plant Emblica officinalis from the family Euphorbiaceae. Amla is a rich dietary source of vitamin C, minerals, amino acids, and phenolic compounds. It mainly contains tannins, flavonoids that exhibit antioxidant activity. It shows potent antimicrobial, anti-diabetic, antitussive, adaptogenic, antioxidant, antitumor, radioprotective, antiulcerogenic, analgesic, wound healing, antipyretic and -inflammatory activities .

3.Banana:

•Scientific Name: Bana Paradisiaca

•Family: Musaceae

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

Musa paradisiaca plant belonging to the family Musaceae commonly called plantain. Musa shows ulcer protective, antibacterial, antimicrobial, wound healing, antioxidant and mutagenic effects . Musa paradisiaca was reported to have ulcer healing activity by its predominant effects on mucosal defensive factors promoting mucosal cell proliferation and enhanced deoxyribonucleic acid (DNA) synthesis without any carcinogenic and mutagenic effect. Musa paradisiaca contains glycosides, tannins, alkaloids, saponins, flavonoids, and phenols.l

4.Datura:
•Scientific Name: Datura Metal
•Family: Solanaceae

Datura alba Nees (Solanaceae) is popular in the world for its uses in asthma, muscle spasm, hemorrhoids, skin ulcers, whooping cough . The active constituents in Datura are scopolamine, atropine, hyoscyamine, withanolides, and withanolide compounds. It shows antitumor, cytotoxic, anti-inflammatory, antibacterial, hepatoprotective, sedative, cytostatic, and immunosuppressive activity.

5. Haldi / Turmeric:
•Scientific Name : Curcumin (Curcuma longa)
•Family: Zingiberaceae

The rhizome of Curcuma longa consists of curcumin from the family Zingiberaceae. It shows anti-inflammatory, antioxidant, antiprotozoal, antibacterial, antineoplastic properties. The anti-inflammatory ability of turmeric is due to curcumin. Target pathways consist of pro-inflammatory cytokines, apoptosis, cyclooxygenase-2 (COX-2s), prostaglandin E2, prostate-specific antigen, cellular adhesion molecules, phosphorylase kinase, transforming growth factor-β (TGF-β), triglycerides, creatinine, and heme oxygenase-1 . Curcumin promotes fibroblast proliferation, granulation tissue development, collagen synthesis in cutaneous wound healing.

6.Mango:
•Scientific Name : Mangifera Indica
•Family: Anacardiaceae.

Mangifera indica L. plant belonging to the family Anacardiaceae. Mangiferin is a polyphenolic antioxidant and glucosyl xanthone is a strong antioxidant, immunomodulatory, cardio toner. Mango shows wound healing, antidegenerative, and antidiabetic activities.

7. Dalchinni/ Cinnamon:
•Scientific Name : Cinnamomum cassia / Cinnamomum zeylanicum
•Family: Lauraceae

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

The bark of Cinnamomum cassia plants belonging to the family Lauraceae. It is used to increase blood circulation. It contains cinnamaldehyde, a bioactive element that has insecticide, antimicrobial, antidiabetic, antilipidemic, anti-inflammatory, and wound healing . It turns on mitogen-activated protein kinase (MAPK) signaling pathways, increasing vascular endothelial growth factor (VEGF) expression and stimulating angiogenesis in endothelial cells.

8.Garlic:
•Scientific Name : Allium Sativum
•Family: Amaryllis

Allium sativum L. plant from the Amaryllis family has been recognized as a precious spice and a popular remedy for several ailments . Allicin the active component of garlic has antimicrobial and anti-inflammatory properties . Garlic aqueous extracts increase the rate of wound healing and reduce infection. Garlic shows hepatoprotective, anthelmintics, anti-inflammatory, antioxidant, antifungal, and wound healing activities.

9.Neem:
•Scientific Name : Azadirachta Indica
•Family: Meliaceae

Azadirachta indica (Meliaceae), commonly known as neem is the most useful traditional medicinal plant indigenous to India. Neem oil and the bark and leaf extracts have beentherapeutically used to control leprosy, intestinal helminthiasis, respiratory disorders, and constipation. It possesses anti-inflammatory, anticarcinogenic, antiulcer, antioxidant, immunomodulatory, antifungal, antibacterial, antiviral, antimalarial, antimutagenic, and antihyperglycemic properties . Neem oil is used to control numerous skin infections. It contains various phytoconstituents such as alkaloids, triterpenoids, glycosides, limonoids, flavonoids, fatty acids, and steroids. Active compounds nimbin, nimbidin, and nimbidol in neem, those help in the wound healing process.

10.Vinca:
•Scientific Name: Catharanthus roseus /Vinca Rosea
•Family: Apocynaceae

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

Catharanthus roseus is referred to as Vinca rosea. The principal alkaloid is vincamine, which is a semi-synthetic derivative broadly referred to as vinpocetine. It shows vasodilation, blood thinning, hypoglycemic, wound healing, and memory-improving activities.

11.Cilantro/ Chinese parsley/Coriander:
•Scientific Name: Coriandrum Sativum
•Family: Umbelliferae

Coriandrum sativum herb belongs to the family Umbelliferae. The volatile oil contains carvone, geraniol, limonene, borneol, camphor, elemol, and linalool. Citronellol essential oil in coriander is a superb antiseptic. Additionally, have antimicrobial and healing effects.

12.Tulsi:
•Scientific Name: Ocimum Sanctum
•Family: Lamiaceae

Ocimum sanctum from the family Lamiaceae is found entirely in parts of India. Tulsi leaves consist of tannins like gallic acid, chlorogenic acid and comprise alkaloids, glycosides, and saponins along with the volatile oil. The main active component of basil leaves is ursolic acid . It consists of 70% eugenol, carvel, and eugenol-methyl-ether . Tulsi performs a key role in the wound healing process by being actively involved in antibody production, hypersensitivity reaction. The leaves of tulsi contain volatile oil, which consists of copaene, caryophyllene, limonene, borneol, polyphenolic compounds such as rosmarinic acid, apigenin, cirsimaritin, isothymusin, flavonoids such as orientin, vicenin, and aromatic compounds like methyl chavicol, methyl eugenol which is responsible for wound healing.

13.Carrot:
•Scientific Name: Daucus Carota
•Family: Apiaceae

Daucus carota L. is a crop of the Apiaceae family. Carrot is a root vegetable with carotenoids, flavonoids, vitamins, and minerals. Carrots have a mixture of three flavonoids: kaempferol, quercetin, and luteolin. It lowers cholesterol and cardiovascular disease risk, anti-hypertensive, antioxidants, anticarcinogens, immune enhancers, anti-diabetic, hepatoprotective, wound healing activity.

14.Clove bud:
•Scientific Name: Syzygium aromaticum
•Family: Myrtaceae

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

Syzygium aromaticum (Eugenia caryophyllata L.) is a plant belonging to the family Myrtaceae . Cloves have antibacterial, antifungal, antioxidant, analgesic, anesthetic, and wound healing. Eugenol, eugenol acetate, and β-caryophyllene are major components that are responsible for their therapeutic effects.

15.China rose:

•Scientific Name : Hibiscus rosa- Sinensis
•Family : Malvaceae

Hibiscus rosa-Sinensis is a perennial ornamental plant of the family Malvaceae . Hibiscus rosa-Sinensis has antibacterial, antioxidant, and wound healing properties. It reduces inflammation; enhances fibroblast proliferation and collagen deposition in rat excisional wounds.

16.Safflower:

•Scientific Name : Carthamus Tinctorius
•Family: Asteraceae

Carthamus tinctorius is regarded as a safflower. It shows anticoagulation, thromboprophylaxis, antioxidation, antihypoxic, vasodilation, immune modulation, antiaging, antifatigue, anti-inflammation, anti-hepatic fibrosis, anticancer, and analgesia. The seed oil has to stop melanogenesis in B16 cancer cells, making it skin whitening. Hydroxysafflor yellow A the main water-soluble monomer pigments which protect in opposition to cerebral and myocardial ischemia. It acts as an antioxidant, anti-inflammatory. Topically improves diabetic wound healing, selling neovascularization, reepithelialization, and granulation tissue formation in streptozotocin-triggered diabetic rats.

17.Green tea:

•Scientific Name: Camellia Sinensis
•Family: Theaceae

The leaves of the Camellia sinensis plant from the family Theaceae. An aqueous leaves extract of green tea is an honor for fitness aid in Asia. It has antioxidant, anti-inflammatory, antimicrobial, anticarcinogenic, antiaging, antiobesity, cardioprotective, and neuroprotective activity . It contains the polyphenolic compound catechin which shows pharmacological activities.

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 2090-2099 www.ijprajournal.com ISSN: 2249-7781

The most important catechin, (-)-epigallocatechin-3-gallate (EGCG), stimulates the proliferation and differentiation of keratinocytes. EGCG suppresses TGF-β receptors via converting TGF-β signaling, lowering Matrix metalloproteinase-1 (MMP-1) and Matrix metalloproteinase-2 (MMP-2).

18. Cumin:

•Scientific Name : Cuminum Cyminum
•Family: Apiaceae

Cuminum cyminum is the plant belonging to the family Apiaceae and is commonly referred to as Cumin, Jeera. Cuminum cyminum shows antiplatelet aggregation, hypotensive, antimicrobial, insecticidal, anti-inflammatory, contraceptive, analgesic, antioxidant, anticancer, and antidiabetic. Antioxidant activity of essential oils become evaluated Via 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay.

19. Heena:

•Scientific Name: Lawsonia Inermis
•Family: Lythraceae

Lawsonia inermis is commonly referred to as heena. It consists of flavonoids, coumarins, triterpenoids, steroids, and xanthones. Heena shows cytotoxic, hypoglycaemic, antimicrobial, antibacterial, wound healing, antioxidant, anti-inflammatory, analgesic, and antipyretic activity.

20. Rainbow wood:

•Scientific Name: Eucalyptus deglupta
•Family: Fabaceae

Caesalpinia sappan is belonging to the legume family Fabaceae. Rainbow wood is reduced edema and pain. Homo-iso-flavonoids extracted from rainbow wood. It has antiallergic and anti-inflammatory activities. The extract of rainbow prompts fibroblast proliferation, transfer, and collagen formation enhances wound healing.

II. CONCLUSION:

Many plants have great potential for therapeutic applications in wound care as they promote the skin's natural repair mechanisms. As we become more familiar with herbal extracts and isolates and apply commonly accepted scientific methods to study plants and their extracts from a physiological and pharmacological point of view, herbs used to treat wounds. The number of products continues to grow. Clinical evidence of the therapeutic effects of herbal products has led to the investigation of many other herbs for their therapeutic role, either curative or preventive. The aim should be to isolate and identify a specific active compound from a compound, which may also reveal compounds with greater therapeutic value. Combining knowledge can yield new drugs for wound healing with greatly reduced unwanted side effects.

REFERENCES:

1) Dan MM, Sarmah P, Vana DR, Dattatreya A. Wound healing: concepts and updates in herbal medicine. Int J Med Res Health Sci. 2018 Jan 1;7(1):170-81.

2) Alam G, Singh MP, Singh A. Wound healing potential of some medicinal plants. International journal of Pharmaceutical sciences Review and Research. 2011 Jul;9(1):136-45.

3) Maver T, Maver U, Stana Kleinschek K, Smrke DM, Kreft S. A review of herbal medicines in wound healing. International journal of dermatology. 2015 Jul;54(7):740-51.

4) Sharma A, Khanna S, Kaur G, Singh I. Medicinal plants and their components for wound healing applications. Future Journal of Pharmaceutical Sciences. 2021 Dec;7(1):1-3.

5) Thangapazham RL, Sharad S, Maheshwari RK. Phytochemicals in wound healing. Advances in wound care. 2016 May 1;5(5):230-41.

6) Khanam S. A systematic review on wound healing and its promising medicinal plants. IP International Journal of Comprehensive and Advanced Pharmacology. 2021 Jan 15;5(4):170-6.

7) Farahpour MR. Medicinal plants in wound healing. Wound Heal. Curr. Perspect. 2019 May 10;2019:33-47.

8) Sumitra M, Manikandan P, Suguna L. Efficacy of Butea monosperma on dermal wound healing in rats. The International Journal of Biochemistry & Cell Biology. 2005 Mar 1;37(3):566-73.

9) Heggers JP, Kucukcelebi A, Listengarten D, Stabenau J, Ko F, Broemeling LD, Robson MC, Winters WD. Beneficial effect of Aloe on wound healing in an excisional wound model. The Journal of Alternative and Complementary Medicine. 1996 Jun 1;2(2):271-7.

10) Chatterjee, Poulomi, Bodhisattwa Chakraborty and Subhangkar Nandy. "Aloe vera plant: Review with significant pharmacological activities." Mintage Journal of Pharmaceutical and Medical Sciences, Vol. 2, No. 3, 2013, pp. 21-24.

11) Chatterjee P, Chakraborty B, Nandy S. Aloe vera plant: Review with significant pharmacological activities. Mintage J. Pharm. Med. Sci. 2013;1:21-4.

12) Prakash PA, Gupta N. Therapeutic uses of Ocimum sanctum Linn (Tulsi) with a note on eugenol and its pharmacological actions: a short review. Indian journal of physiology and pharmacology. 2005 Apr 1;49(2):125.

13) Tejada S, Manayi A, Daglia M, F Nabavi S, Sureda A, Hajheydari Z, Gortzi O, Pazoki-Toroudi H, M Nabavi S. Wound healing effects of curcumin: A short review. Current pharmaceutical biotechnology. 2016 Sep 1;17(11):1002-7.

14) Kiran K, Asad M. Wound healing activity of Sesamum indicum L seed and oil in rats.

15) Krishnan P. The scientific study of herbal wound healing therapies: Current state of play. Current Anaesthesia & Critical Care. 2006 Jan 1;17(1-2):21-7.

16) Pierce GF. Inflammation in nonhealing diabetic wounds: the space-time continuum does matter. The American journal of pathology. 2001 Aug 1;159(2):399-403.

17) Gupta N, Jain U. Prominent wound healing properties of indigenous medicines. Journal of Natural Pharmaceuticals. 2010 Jan 1;1(1):2.

18) Singh S, Jangde R, Daharwal SJ. An updated review on herbal drug in wound healing. Research Journal of Pharmacy and Technology. 2019 Jun 1;12(6):3089-97.

19) Alam, G., Singh, M.P. and Singh, A., 2011. Wound healing potential of some medicinal plants. International journal of Pharmaceutical sciences Review and Research, 9(1), pp.136-145.

20) Gwarzo, I.D., Mohd Bohari, S.P., Abdul Wahab, R. and Zia, A., 2022. Recent advances and future prospects in topical creams from medicinal plants to expedite wound healing: a review. Biotechnology & Biotechnological Equipment, 36(1), pp.81-93.