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WOUND HEALING HERBAL PLANTS AND THEIR USED

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ABSTRACT

Study of wound healing treatments among the tribal people of India are presented. We describe the active ingredients, bio activities, clinical uses, formulations, methods of preparation, and clinical value of 22 medical plant species, have been documented for their therapeutic use against wounds and related injuries such as cuts, burns, bruises caused by external injury, boils, sores, abscess and wounds created during delivery. Leaves were the most frequently utilized plant part and most herbal remedies are prepared as paste and applied externally. The present study suggested that further clinical experimentation is needed to scientifically evaluate these widely used herbal remedies for possible bioactive effects. Cutaneous wound healing is the process by which skin repairs itself. In humans, keratinocytes re-form a functional epidermis (re epithelialization) as rapidly as possible, closing the wound and re-establishing tissue homeostasis. Ultimately, this is remodelled over an extended period, returning the injured tissue to a state similar to that before injury. Indigenous and traditional medicines make extensive use of natural products and derivatives of natural products and provide more than half of all medicines consumed today throughout the world. Recognising the important role traditional medicine continues to play, we have undertaken an extensive survey of literature reporting the use of medical plants and plant-based products for cutaneous wounds. Several species stand out, including Cinnamomum cassia, Curcuma longa, and Aleo vera which are popular wound healing products used by several cultures and ethnic groups.

KEYWORDS: Cinnamomum cassia, Curcuma longa, and Aleo vera.

INTRODUCTION

Traditional wound management is limited by what is immediately at hand or can be acquired locally, such as water, soil, and plant and animal products, and is frequently complemented with ceremony and ritual as an added measure. For millions of people across Asia, Africa, the Middle East, and Latin America, traditional medicines derived from local plants, animals, and natural products are the mainstay of wound care; for some, it is the only source of wound care.

Wound healing is a process of filling up of gaps and maintains the anatomical structure and function. Tissue regeneration is the part of process of wound healing through which it restores the integrity of tissue layers. Wound healing a continuous process is delayed due to deficiency of certain vitamins, trace elements and proteins. In this article we have made an attempt to give an insight into the medicinal plant parts with potential wound healing properties that could prove beneficial in therapeutic practice. Research on wound healing agents is one of the developing areas in modern biomedical sciences. Many traditional practitioners, tribesmen, local Vaidas and mendicants across the world particularly in country like India with age old practices have valuable but oral information of many lesser-known hitherto unknown wild plants in use by them for treating wounds and burns.

Wounds have a serious negative impact on the health-care economy of a country, especially on the economy of developing countries where resources are poor and funding is very limited. It is presumed that about 80% of people living in developing countries use traditional medicines which are majorly prepared from medicinal plants to meet their primary health-care needs. Due to the large reservoir of medicinal plants and adequate traditional knowledge on wound healing, many people in Africa and other developing countries use medicinal plants in the treatment of wounds and related complications.

Wound healing is defined as a collection of complex process which comprises different compounds including soluble mediators, blood cells, extracellular matrix, and parenchymal cells. Wound healing is divided into stages including inflammation process, tissue formation, and tissue re-modelling. The inflammatory phase involves different stages such as platelet accumulation, coagulation, and leukocyte migration. Re-epithelialization, angiogenesis, fibroplasia, and wound contraction are stages for tissue formation. Remodelling phase may be lasted for 1 month, and the dermis may

respond to injury with the production of collagen and matrix proteins and then returns to its pre-injury phenotype. The different treatments are used in order to treat the wound healing. The different treatments have locally and systemically been used in order to help wound healing. The different agents are used in order to wound healing including antibiotics and antiseptics, desloughing agents.[5] Medicinal plants heal wound healing process by promoting blood clotting, fighting against infection and accelerating wound healing. It can be stated plants and chemical agents obtained from plants improve treatment and manage wound healing. Medicinal plants show wound healing effects by the different mechanisms, such as modulation in wound healing, decreasing bacterial count, improving collagen deposition, increasing fibroblasts and fibrocytes, etc. In this chapter, we will describe different mechanisms in medicinal plants.

List of the Medicinal plants used for Wound healing.

Sr. No	Botanical Name	Synonyms	Part Used
1	*Andrographis paniculata*	Chiretta	Leaves
2	*Aegle marmelos L*	Beal	Leaves
3	*Anethum graveolens*	Dill	Fruit
4	*Aloe vera (L.)*	Korphad	Leaves
5	*Allium sativum*	Lasun	Bulb
6	*Angelica sinensis*	Dang gui	Whole Plant
7	*Azadirachta indica*	Neem	Whole plant
8	*Baswellia sacra*	Ru xiang	Resin
9	*Cinnamomum cassia*	Dalchini	Bark
10	*Curcuma longa*	Haldi	Rhizome
11	*Commiphora myrrha*	Mo Yao	Leave & Resin
12	*Centella asiatica*	Bramhi	Aerial parts
13	*Hibiscus rosasinesis*	Jaswad	Flower
14	*Eucalyptus globulus*	Nilgiri	Leaves
15	*Ligusticum striatum*	Chuan Xiang	Rhizome
16	*Polygonum cuspidatum*	Hu zhang	Roots
17	*Rosemary officinalis*		Leaves
18	*Rheum officinale*	Rhubarb	Roots
19	*Salia miltiorrhiza*	Danshen	Leaves
20	*Sanguisorba officinalis*	Di Yu	Roots
21	*Stemona tuberosa*	Wild asparagus	Roots
22	*Zanthoxylum bungeanum*	Hau Jiao	Seeds oil

***1. Andrographis paniculate*: -** Andrographis paniculate, also known as green chiretta, is used in China, India, and south east Asian countries as a traditional treatment for fever, snake bite, dysentery, infections, wounds, and itchiness.[1] Extracts from Andrographis paniculata exhibit antioxidant, anti-inflammatory, anticancer, antimicrobial, antiviral, antimalarial, and hepatoprotective activities. In one study, wound closure in rats was observed to be significantly enhanced after treatment with a 10% aqueous leaf extract of Andrographis paniculata.[2] Animals treated with Andrographis paniculata exhibited reduced inflammation, reduced scarring, increased angiogenesis, and an increased number of collagen fibres in healed wounds.[2] Andrographolide, a bicyclic 4 Evidence-Based Complementary and Alternative Medicine diterpenoid isolated from the leaves of Andrographis paniculata, has been formally evaluated in clinical trials and shown to have positive effects on several autoimmune disorders.

***2. Aegle marmelos:* -** Bael which is so called Aegle marmelos which is belonging to family Rutaceae. It contains carbohydrates, protein, volatile oil, tannins, vitamin C and vitamin A. two alkaloids Omethylhalfordional and isopentylhalfordinol. It is traditionally used to treat wound healing properties.[3]

***3. Anethum graveolens:* -** Anethum graveolens L. (dill) (Apiaceae) is known as one of the most popular medicinal plants in all over world. *Anethum graveolens* is known to have some properties such as antimicrobial, antidiabetic and anti-inflammatory that can improve wound healing.[4] Some compounds including cis-carvone, limonene, α-phellandrene, and anethofuran are major compounds in dill essential oil.[5] Alpha-phellandrene is other major compounds in dill essential oil which may decrease bacterial growth and colonization and is to be beneficial in infected wounds.[6]

***4. 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.[7] Aloe vera contains many natural bioactive compounds, including pyrocatechol, saponins, acemannan, anthraquinones, glycosides, oleic acid, phytol, as well as simple and complex water-soluble polysaccharides. 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.[8] Compounds with known antimicrobial activity are saponins, acemannan, and anthraquinone derivatives. Acemannan, a major mucopolysaccharide (mesoglycan) from Aloe vera, is a potent stimulator of macrophage and T-cell activity and induces the transcription of pro inflammatory mRNAs.[9] Mesoglycan moieties bind and capture endogenous mitogen inhibitors and reactive oxygen species and promote phagocytosis. Coincidently, glycans stabilize secreted cytokines, growth factors, and other bioactive, prolonging their activity. Topically applied acemannan has been reported to significantly reduce the time to wound closure in a rat wound healing model, acting via cyclin D1 and AKT/mTOR signal pathways.[10] Aloe vera glycans are also reported to significantly improve de novo formation of granulation tissue by an unknown mechanism.

5. Allium sativum: **-** Allium sativum L. (Amaryllidaceae) is a member of the lily family which contains high levels of alliin, allyl cysteine, allyl disulphide, and allicin and has powerful antioxidant agents.[11] Farah pour et al.[12] have shown that topical administration of Allium sativum accelerated wound healing because of its preliminary impact on mast-cell distribution and increased collagen synthesis and up-regulated angiogenesis, and improved the healing process by increasing the intra-cytoplasmic carbohydrate ratio.

6. Angelica sinensis: **-** The dried root of Angelica sinensis is widely used in TCM prescriptions for the management of female maladies, inflammation, headaches, mild anaemia, fatigue, and hypertension. Angelica sinensis possesses pharmacological activities including anti- inflammatory, anticancer, antioxidant effects, and immune modulator. Extracts from Angelica sinensis have been shown to activate an antiapoptotic pathway and enhance cell proliferation, collagen secretion, and cell mobility in human skin fibroblasts.[13] Extracts have also been shown to stimulate glycolysis and calcium fluxes, increasing cell viability during tissue repair. The role of Angelica sinensis in angiogenesis remains unclear, with several studies reporting contradictory effects of Angelica sinensis on de novo blood vessel growth. An aqueous extract of Angelica sinensis was reported to promote blood vessel growth via activation of JNK1/2 and p38 phosphorylation, resulting in enhanced VEGF expression. In contrast, n-butylidene phthalide, a bioactive isolated from Angelica sinensis, inhibits cell cycle progression, induces apoptosis, and attenuates angiogenesis.[14]

7. Azadirachta indica: **-** Neem leaf extracts and essential oil from seeds are known to have antimicrobial effect which may be beneficial in the infected wounds. In addition, it can be stated that neem maintains wound and lesion free from secondary infections through reducing bacterial population. Clinical studies have shown that neem extract prevents inflammation and subsequently increases wound healing.[15] Neem leaf extracts and oil from seeds show antimicrobial effect which is mainly attributed to its compounds including Margo sic acid, glycerides of fatty acids, butyric acid and trace valeric acid.[16]

8. Boswellia sacra: **-** It has also been reported that the boswellic acid acetate extracted from frankincense induces apoptosis and differentiation in melanoma and fibrosarcoma cells.[17] It is a key component of ANBP, a TCM consisting of pulverised Agrimonia eupatoria (A), Nelumbo nucifera (N), Boswellia sacra (B), and pollen from Typha angustifoliae (P). ANBP stimulates Smad-dependent pathways in the TGF-β1 signalling cascade. Using a rabbit ear model of hypertrophic scarring, Hou et al. demonstrated that ANBP moderates' inflammation and accelerates the growth of organized granulation tissue and re-epithelialization, events that reduce scar formation.[18] Intriguingly, ANBP was also noted to attenuate collagen biosynthesis and accelerate the maturation of the collagen extracellular matrix, contributing to reduced scarring and improved skin tissue repair. Recently, Hou et al. further demonstrated that ANBP reduced the time of wound closure in diabetic mice via direct effects on neovascularization.[19]

9. Cinnamomum cassia: **-** Cinnamomum cassia is a commonly used spice and flavouring agent, and the bark of Cinnamomum cassia is also used to increase blood circulation and as an analgesic.[20] Cinnamomum cassia is frequently formulated with other herbs; it is one of the seven botanical components of Shexiang Baoxin pill (SBP), a wellknown TCM prescribed for chest pain and discomfort associated with coronary artery disease. SBP is currently the subject of a randomized double-blinded clinical trial for the treatment of coronary artery disease not amenable to revascularization.[21] Attention is also focussed on SBP anti-inflammatory and anticancer activities, as well as its impact on hypertension, insulin resistance, and noninsulin- dependent diabetes mellitus.[22] In vitro and in vivo studies indicate that cinnamaldehyde, a bioactive component from Cinnamomum cassia, is a natural insecticide, is an antimicrobial, antidiabetic, antilipidemic, anti-inflammatory, and neuroprotective agent[23], and activates PI3K/AKT and MAPK signalling pathways, increasing VEGF expression, and stimulating angiogenesis in human umbilical vein endothelial cells.[20] Cinnamaldehyde is also reported to improve wound healing in zebrafish.[20]

10. 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.[24] Practitioners of traditional Ayurveda medicine use curcumin to treat inflammation, respiratory disorders, liver disorders, and diabetes.[25] In traditional Chinese medicine, curcumin is a favoured treatment for

abdominal pain. Having widespread use for centuries by diverse ethnic groups, curcumin is one of the most extensively studied nutraceuticals. This highly pleiotropic molecule has been demonstrated to interact with key cellular pathways at transcription, translation, and posttranslational levels. Target pathways include proinflammatory cytokines, apoptosis, NF–κB, cyclooxygenase2, 5-LOX, STAT3, C-reactive protein, prostaglandin E2, prostate-specific antigen, cell adhesion molecules, phosphorylase kinase, transforming growth factor-β, triglycerides, ET-1, creatinine, heme oxygenase-1, AST, and ALT.[26] The subject of more than 100 clinical trials, in vivo studies, have largely focused on curcumin as a treatment for epithelial cancers. Experimental findings from these in vivo studies and in vitro experiments indicate curcumin elicits most of its beneficial effects via altering the pericellular and extracellular matrix.[25] Perhaps, it is therefore not unexpected that curcumin enhances fibroblast proliferation, granulation tissue formation, and collagen deposition in cutaneous wound healing.[27]

11. Commiphora myrrha: **-** Medicinal applications of myrrh include the treatment of gastrointestinal diseases, fractures, arthritis, obesity, parasitic infections, and as an anticoagulant.[28] Myrrh has been used topically to clean wounds, reduce oedema, and provide pain relief (analgesia). Myrrh is commonly used in combination with other ingredients. Galehdari et al. showed that the combination of myrrh, Adiantum capillus-veneris, Aloe vera, and Lawsonia inermis, significantly improved wound healing in diabetic mice.[29] The short- term application of myrrh effectively reduces pain and controls the recurrence of mouth ulcers in humans. In common with several other herbal preparations described here, myrrh is found to modify the expression of TGF-β1 and VEGF in mouse dermal fibroblasts in vitro, suggesting a common mechanism of action.[30]

12. Centella asiatica: **-** Centella asiatica, also known as Asiatic pennywort, has been used to promote wound healing for eons.[31] Extracts from the aerial parts of Centella asiatica are reported to improve the healing of chronic ulcers in Sprague-Dawley rats in terms of width, depth, and length. Wounds associated with acute radiation dermatitis in rats were observed to heal earlier when treated with extracts from Centella asiatica compared to the no-treatment control group. Asiaticoside isolated from Centella asiatica has been found to enhance collagen deposition and epithelialization in a punch wound model in the guinea pig.[32] Triterpenes isolated from Centella asiatica elevate collagen remodelling and glycosaminoglycan synthesis in a rat wound model.[33] Furthermore, oral administration of madecassoside from Centella asiatica was shown to facilitate collagen synthesis and angiogenesis in a mouse wound model.[34]

13. Eucalyptus globulus: **-** Eucalyptus is also known as dinkum oil and is belonging to family myrtaceae. eucalyptus contains some compounds such as cineole which is also known as eucalyptol. it not only contains cineole but contains other compounds such as pinene, camphene, and phellandrene, citronellal, geranyl acetate. it is traditionally used for skin care including burns, blisters, herpes, cuts, wounds, skin infections and insect bites.[35]

14. 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.[36] Alcoholic extracts of Hibiscus rosa-sinensis flowers are claimed to provide women with control of their fertility. Extracts from Hibiscus rosa-sinensis have also been found to have antibacterial and wound healing properties.[37] They attenuate inflammation, enhance fibroblast proliferation, and collagen deposition, as well as upregulate VEGF and TGF-β1 expression in rat excisional wounds.[38]

15. Ligusticum striatum: **-** The rhizome of Ligusticum striatum is another one of the 50 fundamental herbs used in TCM. It has a long history of use support cardiovascular and cerebrovascular well-being. It is commonly indicated for the treatment and prevention of ischemic disorders, menstrual disorders, and headache. Thus far, about 174 chemical components have been isolated from Ligusticum striatum, among which phthalide lactones and alkaloids are the most numerous, pharmacologically active species.[39] It has been reported that essential oils from Ligusticum striatum inhibit dermal scarring in the rabbit ear scar model.[40]

16. Polygonum cuspidatum: **-** The root of Polygonum cuspidatum is usually formulated with several other ingredients and is most commonly prescribed for treating coughs, hepatitis, jaundice, amenorrhea, leucorrhea, arthralgia, burns, and snake bite. A diversity of compounds has been isolated from Polygonum cuspidatum, dominated by resveratrol, polydatin, and anthraquinones and are presumed to be responsible for Polygonum cuspidatum's anti-inflammatory, estrogenic, antitumour, antiaging, neuroprotective, and cardioprotective activities.[41] In one recent in vivo study examining wound healing in rats, extracts of Polygonum cuspidatum were found to increase TGF-β1 expression and to significantly improve wound healing in terms of reepithelization, granulation tissue formation, collagen synthesis, and angiogenesis.[42] Novel anthraquinones isolated from Polygonum cuspidatum have been verified to inhibit tyrosinase, the rate-limiting enzyme controlling the synthesis of melanin that gives colour to skin.

17. Rosemary officinalis: **-** Rosemary is belonging to the mint family which is known to have antioxidant properties because of its compounds including carnosic acid, carnosol, rosmarinic acid, diterpene, triterpenoid, phenolic acid and flavonoids. It is also known to have anti- inflammatory and anti-microbial properties[43]

which may promote wound healing. In addition, its essential oil contains major levels of terpenoids, limonene, 1, 8-cineol, carnosic acid, rosemarinic acid and α-pinene, that can reduce inflammatory phase and can accelerate the healing process by promoting the proliferation stage.[44] Abu-Al-Basal[45] reported that rosmarinus aqueous extract accelerates wound healing by closure of the wound area and full- thickness epidermal regeneration and organization in diabetic BALB/c mice. Nejati et al.[46] have reported that topical application of rosemary ointment significantly decreased inflammatory cells, increased fibroblast migration and also increased wound contraction in wound healing in infected rat model.

18. Rheum officinale: - Rheum officinale, also known as Chinese rhubarb, is one of the best known traditional herbal medicines with pharmacological activities. Extracts from the roots of Rheum officinale have strong antibacterial[47], antioxidative, anti-inflammatory, and haemostatic effects, validating its widespread use for constipation, chronic liver and kidney diseases, and skin lesions. Using a rat excisional wound model, Tang et al. found healing was stimulated via TGF-β1-related pathways. The nature of the active component responsible for this activity is not clear. Emodin [1,3,8-trihydroxy-6-methyl-anthraquinone], an anthraquinone derived from the roots of Rheum officinale, has been shown to act as a ligand for PPAR-c and interact with HSP90 and androgen receptors, in part explaining its therapeutic benefit for chronic diseases. Experimental evidence also indicates a direct association of emodin with NF- κB, AP-1, and STAT3, known regulators of proinflammatory cytokine and mitogenic kinase pathways.[48]

19. Salvia miltiorrhiza: - The root of the perennial plant Salvia miltiorrhiza (also known as red sage) is highly valued in TCM and used to treat cerebrovascular and cardiovascular diseases, such as stroke, coronary heart disease, and hyperlipidemia. To date, Salvia miltiorrhiza has been demonstrated to reduce ischemia and necrosis and to improve the survival of skin flaps after mastectomy.[49] Salvianolic acids isolated from Salvia miltiorrhiza have potent antioxidative capabilities due to their polyphenolic structure. Although hepatoprotective, neuroprotective, antimicrobial, anti-inflammatory, and anticancer activities have been reported, the greatest clinical benefit of salvianolic acids appears to be cardiovascular protection, via the promotion of cardiac angiogenesis and inhibition of ischemia and hypoxia during myocardial injury.[50] Water-soluble extracts from Salvia miltiorrhiza, containing danshensu (DSU) and salvianolic acid B (SAB), have been shown to enhance the proliferation of fibroblasts and increase collagen synthesis.[51] Salvianolic acid B is also a potent antagonist of epithelial-to-mesenchymal transition, necessary for wound closure.[52] In contrast, cryptotanshinone, a lipid-soluble terpenoid isolated from Salvia miltiorrhiza, has been demonstrated to downregulate the expression of COL1A1, COL3A1, and α-SMA in hypertrophic scar-derived fibroblasts (HSF), as well as reduce HSF migration and HSF contraction, thus ameliorating fibrosis and scarring.[53]

20. Sanguisorba officinalis: - Sanguisorba officinalis, a member of the family Rosaceae and commonly known as great burnet, is widely distributed in the cooler northern districts of Asia, Europe, and North America. Roots of this plant are a potent haemostatic[54], with antioxidant, immunomodulatory, anti-inflammatory, and antiallergy properties. The traditional use of Sanguisorba officinalis is to control bleeding disorders. It is also applied to heal scalds, burns, allergic skin diseases, urticaria, eczema, and allergic dermatitis. Aqueous extracts made from the root of Sanguisorba officinalis suppress mast cell degranulation, as well as inhibit activation of STAT-1, Jak-2, p38, and JNK pathways and release of inflammatory cytokines.[55] In mouse studies, the oral administration of polysaccharides isolated from Sanguisorba officinalis is claimed to stimulate wound contraction, reduce the time required for reepithelization (wound closure), increase collagen synthesis, and improve angiogenesis.[56] Administration of the polysaccharide extract also resulted in elevated IL-1β and VEGF in mice.[56]

21. Stemona tuberosa: - Stemona tuberosa is another of the 50 fundamental herbs used in TCM. It has strong insecticidal activity, the foundation property for its traditional use in treating impetigo, scabies, louse, lice, and ticks. It is also used as a mosquito repellent and preservative to protect stored cereals from insects. In traditional medicine, it is used to treat coughs and lung infections. Alkaloid and stilbenoid isolated from the root of Stemona tuberosa are reported to have anti-inflammatory and antibacterial[57] effects, while the dehydrotocopherol derivatives have been found to scavenge oxygen and free radicals. Tocopherols isolated from the root of Stemona tuberosa increase cell proliferation in the mouse fibroblast NIH3T3 cells, suggesting the potential use of these compounds as wound healing agents.[58]

22. Zanthoxylum bungeanum: - Zanthoxylum bungeanum is a flowering plant belonging to the Rutaceae family, native to eastern provinces of China. It yields important food ingredients such as sichuan pepper. Over 140 compounds have been isolated from Zanthoxylum bungeanum, including alkaloids, terpenoids, flavonoids, and free fatty acids, eliciting a wide variety of biological responses, including analgesic, anticancer, antioxidant, anti- inflammatory, antibacterial, antifungal, and antiasthma properties. Zanthoxylum bungeanum are known in traditional Western folk medicine as “toothache trees,” useful for treating pruritus (itch) and chronic pain. The pericarp from the fruit berry is commonly used to formulate TCM oils, powders, tinctures, elixirs, and pills. Extracts from Zanthoxylum bungeanum are also prescribed for skin infections,

including acne, eczema, scalds, and wound healing.[59] One unique property of fruit husk extracts from Zanthoxylum bungeanum is as a lifting agent for skin wrinkles. When applied topically to skin, subcutaneous muscles are relaxed, reducing skin wrinkles, thus has attracted the attention of cosmetic manufacturers. Another interesting property reportedly associated with essential oils of Zanthoxylum bungeanum is the capacity to enhance percutaneous drug delivery.[60]

DISCUSSION

Skin is the largest organ and continuous exposure to UVR leads to different pathological and dermatological conditions. UVR acts as a mediator to activate several signaling cascades for various cellular responses. The increase in consciousness about the carcinogenic and photoaging effects of UVR and socio-economic improvement of the society has resulted in the increased demand for herbal skincare products, especially sunscreen products. Currently, cosmetics, are more preferred over synthetic molecule or chemical substances due to safety issues related to dermal toxicity. The research on the use of herbal products is steadily increasing to overcome the occurrence of harmful effects associated with sunscreen products using inorganic filters. Herbal products have always been used traditionally for the treatment of various skin ailments. There is a need to develop new herbal formulations that are safe and efficient. The listed herbal products in this paper have shown skin beneficial effects against UVR induced skin disorders in various experimental models which recapitulate the same in humans. It is requisite for the development of such herbal skincare products possessing strong therapeutic potential for the treatment of UVB-induced skin disorders and a better quality of life. A lot has been done in the last decade for the safety and efficacy of herbal products for discussing more active natural products for skincare.

CONCLUSION

The present study revealed that traditional medicines are still in common use by the Indians. Thus, the study ascertains the value of a great number of plants used in Indian's medicine especially in wound healing which could be of considerable interest in the development of new drugs. There is obviously much still unknown information about plants to treat various ailments including wounds. So far, very few studies have been carried out on a particular compound which confers the wound healing activity such as, Aloe vera, Cinnamomum cassia and Curcuma longa. These studies were done on the basis of their use in traditional medicine. Comprehensive evaluation on the plants with wound healing activity on the basis of traditional medicine may possibly give new compounds that could be used as prominent drugs in wound healing therapy. This study evidently points out that, instead of trying to identify the active components of herbs through massive collection of plants from natural sources, it is better to start investigating the efficacy of the natural product from the traditional use.

Abbreviations

a.k.a.: Also known as
AKT: Protein kinase B
ANBP: Agrimonia eupatoria (A), Nelumbo nucifera (N), Boswellia sacra (B), and pollen from Typha angustifoliae (P)
AST: Aspartate aminotransferase
***α*-SMA**: Alpha smooth muscle actin
IL-1β: Interleukin-1 beta
JNK: c-Jun N-terminal kinase
MAPK: Mitogen-activated protein kinase
NF–κB: Nuclear factor-kappa B
PI3K: Phosphatidylinositol-4,5-bisphosphate 3-kinase
STAT3: Signal transducer and activator of transcription 3 **TGF-β1**: Transforming growth factor-beta1
VEGF: Vascular endothelial growth factor
5-LOX: Arachidonate 5-lipoxygenase.

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