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Review Article

**A REVIEW ON MEDICINAL PLANTS WITH POTENTIAL  
WOUND HEALING ACTIVITY****Sarita Prajapati\*, Diksha Singh**

Department of Pharmacology, SHEAT College of Pharmacy, Varanasi, U. P.

**Abstract:**

Wound healing is an integrated cellular and biochemical process of restoring normal structure functions of damaged tissue. Healing is a natural phenomenon by which body itself overcome the damaged to the tissue but the rate of healing is very slow and chance of microbial infection is high. Improvement in healing process can be accomplish either shorten the time required for healing or to minimize the undesired consequences. 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 present review attempt to highlight some herbs and medicinal plants proved to be scientifically used for the treatment of cuts and wounds as a wound healer.

**Keywords:** Wound, Wound healing activity, Angiogenesis, Wound healing plants

**Corresponding author:****Mrs. Sarita Prajapati,**

Department of Pharmacology,

SHEAT College of Pharmacy, Varanasi, U.P



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## INTRODUCTION

Wounds are the primary cause of physical injury. Diseases result from physical, chemical, microbial (or) immune (or) tissue disorders, often associated with dysfunction. According to the Medical Centre, a wound is a physical injury that causes damage (or tearing) of the skin, resulting in disruption of the body's physical and functional functions<sup>1</sup>.

Wound healing is the interaction of a combination of cellular and biochemical healing effects to restore process and function while restoring the strength of injured tissue. Includes cell-cell and cellmatrix interactions<sup>2</sup>; inflammation allows processes to occur in many overlapping phases and processes, including wound healing, tissue reepithelialisation, new repair, and angiogenesis and granulation tissue formation<sup>3</sup>.

There are many factors that can delay (or) slow the wound healing process, including bacterial infection, necrotic tissue, blood flow obstruction, lymphatic congestion, and diabetes can be improved<sup>4</sup>. In addition, painkillers are cheap, easily available and have few side effects. Despite the great success of allopathic medicine, the use of herbal medicines has become increasingly popular due to the dangers and side effects of allopathic medicine. Alkaloids, tannins, flavonoids, and phenolic chemicals are examples of bioactive secondary metabolites with interesting pharmacophores related to the effects of medicinal plants. Traditional medicine practices have expanded rapidly over the past few decades<sup>5</sup>.

Approximately 20% of modern allopathic medicines are derived from plants. Medicines made from plants are safer in the treatment of many diseases. Since traditional knowledge is lost for many reasons, it must be preserved for the benefit of future generations. There is greater demand for new, better medicines made from natural ingredients<sup>6</sup>.

Diseases such as stomach ache, wound healing, skin diseases, inflammation, itching, leprosy and sexually transmitted diseases can be treated and cured with herbs. Herbs are used to cleanse wounds, remove dead tissue, and provide a moist environment that supports optimal health. In folklore, many plants are used to heal burns, wounds and cuts.<sup>7</sup>

Antibacterial coagulants and wound cleansers are made from plant ingredients and are used in first aid. Treat plants with wounds. Treatment can be achieved through a variety of mechanisms, including modification of wound healing, reduction of bacterial count, improvement of collagen deposition, and stimulation of fibroblasts and fibroblasts<sup>8</sup>.

## Classification of wound

Wounds can be classified in number of ways, depending on healing time they can be acute or chronic

### Acute wounds

Acute pain is defined as disruption of the normal structure and function of tissue that has not recently been injured. Acute wound healing is a regulated series of cellular, humoral and molecular events that are activated during injury, resulting in a time-dependent but predictable pattern of tissue repair<sup>9</sup>

### Chronic wounds

Chronic wounds are defined as wounds that do not heal the body with appropriate and timely procedures before treatment and cannot function properly or cannot provide their anatomical functions and functions effectively.<sup>10</sup> According to the effect of the skin system, there will be external wounds that are only epidermal damage. Some cortical lesions damage the epidermis and deeper dermis, including blood vessels, sweat glands, and hair follicles. Full-thickness wounds occur when the underlying subcutaneous fat or deep tissue is damaged<sup>11</sup>.

### Process of wound healing

Process of wound healing may be considered as a dynamic process in which cellular and matrix components act together to re-establish the integrity of damaged tissue and replace lost tissue. Regardless of the source or the extent of tissue damage, under normal conditions the wound healing process occurs in predictable fashion in four stages: inflammation, migration, proliferation and maturation (remodelling). Wound Healing is considered to complete when the skin surface has reformed and has regained its tensile strength<sup>12</sup>.

### Stages of wound healing

#### Haemostasis and coagulation

In wound healing the platelets act as utility workers sealing off the damaged blood vessels. The blood vessels themselves constrict in response to injury, but this spasm ultimately relaxes. The platelets secrete vasoconstriction substances to this process but their prime role is to form a stable clot sealing the damaged vessel<sup>13</sup>.

#### Inflammation

Inflammation is the body's response to injury and includes cellular and vascular reactions. The release of histamine and many other cell-mediated factors into the wound causes vasodilation increased capillary permeability, and nociception stimulation. Protein-rich exudate, containing phagocytes and other materials, is released from the blood vessels into the wound, engulfing dead cells and bacterial debris<sup>14</sup>.

**Migration**

Growth factors in wound exudate promote the growth and migration of epithelial cells, fibroblasts, and keratinocytes to the injured area to replace damaged and lost tissue. These cells regenerate from the edges and grow rapidly from the wound underneath the dry bone. Epithelial thickening and basal cell proliferation<sup>15</sup>.

**Proliferation**

The proliferation Phase involves the development of new tissue and occurs simultaneously or just after the migration phase, lasting from 5 to 20 days. Granulation tissue is formed by infiltration of blood capillaries and lymphatic vessels into the wound and by the supporting collagen network synthesized by fibroblast. This process is known as granulation<sup>16</sup>.

**Maturation**

The final period of wound healing, also known as the adaptation period, involves constriction of the vascular structure and expansion of collagen fibers, which increases the tensile strength of the healing. Wound healing time generally ranges from 3 weeks to 2 years, and scar tensile strength returns to 70–90% of pre-injury tissue<sup>17</sup>.

**Commonly Used Medicinal Plants as Wound Healers****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. It can be seen as wild herb in dried parts of India. Today aloe vera gel is an active ingredient in hundreds of skin lotions, sun blocks and Cosmetics<sup>18</sup>. Aloe Vera is an excellent remedy for minor burns, cuts and sunburns. Both juice and aqueous extract from the leaves shows significant healing properties. It is also reported that it not only speeds up healing but also prevents injured surface from getting infected<sup>19</sup>.

Aloe Vera was studied for burn wounds by routine dressing by A. Vera extract every 3rd day in chemically produced burn on healing subjects. The wound healing time and bacteriological control was significantly in Aloe group<sup>20</sup>. 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 linking of newly synthesized collages. Beside wound healing effect, it is reported to have ulcer healing property (when taken internally) and protective action on skin.

**Ginkgo biloba**

It belongs to the family Ginkgoaceae and commonly known as Kew tree. It is widely planted in Korea and China. Propagation type includes seeds and

vegetative methods. Ginkgo biloba has found to have significant activity against both dead space and excision wound models in male rats. A 50 mg/kg of dose has significantly promoted the breaking strength and hydroxyproline content of granulation issue in dead space wounds and in case of excision wound model, it is found to shorten the epithelization period<sup>21</sup>. It is also reported that the activity of G.B. is due to its high amino acid content which absorbs rapidly in blood stream and in combination with vitamins; they provide essential nutrients to the wound area to promote healing. Beyond wound healing, it is used as an anti-inflammatory and antiallergic agent in ancient Chinese medicine<sup>22</sup>.

**Centella asiatica**

Centella asiatica is a small trailing herb bearing white to reddish flowers which normally grows widely in the wet places. Commonly it is known as Brahmi and it is propagated by seeds and vegetable propagation. Clinical studies of the formulation (ointment, cream & gels) of aqueous extracts of Centella asiatica reports that, when it is applied topically thrice daily for 24 days on open wound site<sup>23</sup>. The treated wound epithelized faster and the rate of wound contraction was higher as compared to control wound.

Gel formulation produce better results as compared to other two formulations. It is reported that the active constituents responsible for the activities of Centella asiatica are found to be asiaticosides and madicassoides<sup>24</sup>.

**Nelumba nucifera**

Nelumba nucifera belonging to family Nymphaeaceae is called as Kamal in Hindi and Lotus in English. It is perineal aquatic herb embedded in mud with large flower. It is commonly cultivated in ponds and swamps by using rhizomes for propagation. Nelumba nucifera is very common among natural and traditional healers. They collect leaves and rhizomes, dry them and burn to produce ash which acts as wound healer. But now it is reported that the methonolic extract of rhizomes of Nelumba nucifera in the formulation of ointment is effective in different types of wound model in rats<sup>25</sup>. The effect were studied on excision wound model, incision wound model and dead space wound model by using two different concentrations i.e. 5 % w/w & 10 % w/w ointment. The ointment in both the concentration responded significantly in all the wound models. Both the extract ointment shows the significant effect in respect with wound contracting activity, wound closer time, tensile strength, regeneration of tissue at the wound site and lysyl oxidase activity. The effects produced are comparable to that of standard drug<sup>26</sup>.

**St. John wort**

*Hypericum mysorensense* is a perennial flowering plant and has been long used in folk medicine it belongs to the family Hypericaceae and is commonly known as St. Johns Wort.

The flowering tops are commonly used as tea or fresh tincture. It is reported that the methanolic extract of *Hypericum mysorensense* produces wound healing in rats. The extract, in the form of ointment (5% w/w and 10% w/w of aerial part) was evaluated in excision and incision wound models in rat. Both the concentration of the ointment showed significant response in both type of wound when compared to the control<sup>27</sup>. The effect is comparable with standard drugs.

**Tulsi**

This extract is derived from the plant of *Ocimum sanctum* belonging to family Labiatae. It has been widely grown throughout the world and commonly cultivated in gardens.

Traditionally *Ocimum sanctum* is used in malarial fevers, gastric disorders and in hepatic infections. *Ocimum sanctum* leaves are also used in bronchitis, ringworm and other cutaneous diseases and earache. The leaves are used as a nerve tonic and to sharpen memory. *Ocimum sanctum* leaves are abundant in tannins like gallic acid, chlorogenic acid etc and also contain alkaloids, glycosides, and saponins along with the volatile oil<sup>28</sup>. The major active constituent of Holy basil leaves include urosolic acid. It contains 70% eugenol, carvenol and eugenol-methyl-ether.

**Eucalyptus**

It is also called Dinkum Oil. This oil is obtained by steam distillation of fresh leaves of *Eucalyptus globules* belonging to family Myrtaceae. It is indigenous to Australia and Tasmania. It is cultivated in United States, Spain, Portugal, and in India. It contains cineole, also known as eucalyptol. It also contains pinene, camphene, and phellandrene, citronellal, geranyl acetate. In skin care it can be used for burns, blisters, herpes, cuts, wounds, skin infections and insect bites. It can furthermore boost the immune system and is helpful in cases of chicken pox, colds, flu and measles. Oil is used as a counter irritant, an antiseptic, and expectorant. It is used to relieve cough and in chronic bronchitis in the form of inhalation<sup>29</sup>. It is ingredient of several liniments and ointments. Solution of eucalyptus oil is used as nasal drop.

**Bael**

It is also called a Bael fruits, Indian bael. It consists of unripe or ripe fruits of the plant known as *Aegle marmelos* belonging to family Rutaceae. It is indigenous to India and found in Myanmar and Sri Lanka. The pulp is red in colour with mucilaginous

and astringent taste. The chief constituent of drug is marmelosin which is furocoumarin<sup>30</sup>. The drug also contains carbohydrates, protein, volatile oil and tannins. The pulp also contains vitamin C and vitamin A. Two alkaloids Omethylhalfordinal and isopentylhalfordinol have been isolated from fruits. It is used as digestive, appetizer and also used in the treatment of diarrhea and dysentery. It is also a tonic and it has a wound healing properties.

**Myrobalan (Harde)**

It is also called Haritaki, chebulic myrobalan. It consists of dried, ripe, and fully matured fruits of *Terminalia Chebuli* belonging to family Combretaceae. It is found in sub-Himalayan tracks from Ravi to West Bengal, Assam and all forest in India. It is found growing at an altitude of 1800 m. It is not cultivated and fruits are collected from wild grown forest plants. It is a tree, 15 to 25 m in height, and 1.5 to 2.5 m in diameter. It has yellowishwhite flowers in the terminal spike. It contains hydrolysable tannins which upon hydrolysis yield chebulic acid and d-galloyl glucose. It also contains chebulagic, chebulinic, ellagic and gallic acids. It is used mainly as an astringent, laxative, stomachic and tonic, anthelmintic<sup>31</sup>. Fruit pulp used to cure bleeding. It is an ingredient of ayurvedic preparation 'Triphala'. It is also used in piles and external ulcers.

**Neem**

Alcoholic extract of neem is useful in eczema, ringworm and scabies. 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 margaric acid, glycerides of fatty acids, butyric acid and trace valeric acid<sup>32</sup>. Alcoholic extract of neem is useful in eczema, ringworm and scabies. Neem leaf extracts and oil from seeds has proven antimicrobial 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<sup>33</sup>.

**Turmeric**

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 accounts for as much as 90% of the total output of the world<sup>34</sup>.

*Curcuma longa* is the main species of commerce and is cultivated for its rhizomes in India, China and in Sri Lanka. India is the major grower with almost 80,000 hectares under the crop producing 1, 44,000

tonnes per annum. The plants are grown for 7 to 9 months after which the rhizomes are harvested, cooked, dried and then processed for powder, oleo-resin and curcumin. The extraction of powder is carried out by using solvents, water or both. It contains about 5% of volatile oil, resin. Starch grains and curcuminoids which is the chief constituents of curcumin, Volatile oil, content sesquiterpenes such as  $\alpha$  and  $\beta$  pinene,  $\alpha$ -phellandrene, camphor, zingiberene. It is used as a condiment or spices, and colouring agent, especially for ointments and creams. It is used for the detection of boric acid<sup>35</sup>. Traditionally it has been proved as anti-inflammatory, anticancer, antiseptic.

#### **Punica granatum L.**

Moreover, rats given cream containing *P. granatum* flower extract experienced faster wound healing on day 25 of the treatment than those given other treatments where the wound healing was accelerated by the *P. granatum* flower extract, which can also be utilized to treat burn injuries. According to mechanical (contraction rate, tensile strength), biochemical (raising of collagen, DNA, and protein synthesis) and extract assessments, pomegranate peel ointment considerably improved the wound contraction and time of epithelisation in excised wounded models over 10 days<sup>36</sup>.

#### **Green Tea**

More than two-thirds of the world's population drink tea, including green tea brewed from the leaves of the *Camellia sinensis* plant. One of the oldest and most widely consumed beverages worldwide, it is made from the *Camellia sinensis* (L.) plant (green tea) and is mostly grown in Japan, China, and Taiwan. Green tea has been demonstrated to have positive impacts on human health, including effects against cancer, obesity, diabetes, heart disease, infections, and neurological disorders<sup>37</sup>.

Numerous studies have been conducted on the health advantages of green tea, especially epigallocatechin gallate (EGCG); it is well recognized that these effects are mostly related to its polyphenols. The most prevalent component in tea leaves is EGCG, which is thought to have the major bioactivities. These bioactivities include free radical scavenging properties, antimicrobial, anti-inflammatory, and angiogenic effects that include a proper wound healing process and minimize the onset of infection<sup>38</sup>.

Episiotomy pain seems to be effectively reduced by green tea ointment, which helps to speed up wound healing. Moreover, animal experimentation and molecular mechanism studies have demonstrated that green tea polyphenols could speed up diabetic

rats' ability to heal wounds by modulating the PI3K/AKT signalling<sup>39</sup>.

#### **Blumea balsamifera.**

Endemic throughout the tropics and subtropics of Asia, *Blumea balsamifera* (also known as ngai camphor) is used widely as a traditional medicine. In the Philippines, *Blumea balsamifera* is known as sambong and is used as a diuretic. In Ayurveda, *Blumea balsamifera* is known as kakoranda and is used to treat fevers, coughs, aches, and rheumatism. Leaf extracts are directly applied to treat eczema, dermatitis, skin injury, bruises, beriberi, lumbago, menorrhagia, rheumatism, and skin injury<sup>40</sup>. Extracts from *Blumea balsamifera* demonstrate a variety of bioactivities; including antimalarial, antitumour, antifungal, and antiobesity properties. Pang et al. reported that oils from *Blumea balsamifera* improve wound healing in mice by promoting angiogenesis, perfusion, collagen deposition, formation of organised granulation tissue, reepithelialization, and wound closure.

#### **Astragalus propinquus and Rehmannia glutinosa.**

The root of *Astragalus propinquus* is a common TCM for the treatment of urinary retention and oedema. The root of *Rehmannia glutinosa* has been broadly used in hemorheology and diabetes-related diseases. A formulation combining the root of *Astragalus propinquus* and *Rehmannia glutinosa* was initially reported to be clinically effective for the treatment of diabetic foot ulcers<sup>41</sup>. This outcome has subsequently been corroborated in diabetic rats. Tam et al. reported that the root of *Astragalus propinquus* and *Rehmannia glutinosa* promote diabetic wound healing and postischemic neovascularization by improving angiogenesis and attenuating tissue oxidative stress in diabetic rats. Zhang et al. demonstrated that the root of *Astragalus propinquus* and *Rehmannia glutinosa* activate the TGF- $\beta$ 1 signalling pathway and stimulate increased deposition of ECM in human skin<sup>42</sup>.

#### **Ampelopsis japonica**

Growing throughout eastern Asia and eastern North America, the roots of *Ampelopsis japonica* are used as a traditional treatment for burns and ulcers, amongst other indications. Multiple pharmacological activities have been documented for *Ampelopsis japonica*, including neuroprotective, antimicrobial, and anticancer activities. Lee et al. demonstrated that ethanol extracts from dried roots of *Ampelopsis japonica* accelerated the healing of cutaneous scald injury in rats<sup>43</sup>. Tumour necrosis factor-alpha (TNF- $\alpha$ ) and TGF- $\beta$ 1 were observed to be elevated 2 days after injury and declined as healing progressed. In contrast, interleukin-10 (IL-10) was found to be elevated after 14 days, coincident with wound closure. When compared

with wounds treated with Vaseline® (petroleum jelly) or silver sulfadiazine, topical treatment with ethanolic *Ampelopsis japonica* improved reepithelization, granulation tissue formation, vascularization, and collagen deposition<sup>44</sup>.

### 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. *Cinnamomum cassia* is frequently formulated with other herbs; it is one of the seven botanical components of Shexiang Baoxin pill (SBP), a well-known 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. 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<sup>45</sup>. 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, and activates PI3K/AKT and MAPK signalling pathways, increasing VEGF expression, and stimulating angiogenesis in human umbilical vein endothelial cells. Cinnamaldehyde is also reported to improve wound healing in zebrafish<sup>46</sup>.

### CONCLUSION

We have surveyed and presented an overview of evidence that explains why many medicinal plants are used as traditional treatments for cutaneous wounds and clinical skin disorders. We provide these data in the belief that we still have much to learn from traditional practices, some of which undoubtedly could deliver novel reagents and therapies for today's therapeutic challenges. Notwithstanding, we recognise that modern medicine and drugs remain effectively inaccessible (and unaffordable) to the majority of the world's population. For this reason alone, traditional medicine continues to be the first line of treatment, indeed, frequently the only line of treatment for many. With greater understanding of traditional practices comes appreciation and 16 Evidence-Based Complementary and Alternative Medicine benefit to more of the world's peoples. We would like to see that this knowledge is not discarded by "modern medicine" but leveraged through investigation to benefit all.

### REFERENCES:

1. Nagori BP, Solanki R. Role of medicinal plants in wound healing. *Research Journal of Medicinal Plants*. 2011;5(4):392–405.

2. Strodtbeck F. Physiology of wound healing. *Newborn and Infant Nurse Reviews*. 2001;1(1):43–45.
3. Martin P. Wound healing – Aiming for perfect skin regeneration. *Science*. 1991;276(5309):75–81.
4. Chitra P, Sajithalal GB, Chandrakasan G. Influence Aloe Vera, on collagen turnover in healing of dermal wounds in rats. *Indian J Exp Biol*. 1998;36(9):896–901.
5. Barlanka M. *International Journal of Pharmacy*. 2013;3(1):241–246.
6. Bairy KL., Rao CM. Wound healing profile of *Ginkgo biloba*. *J Nat Rem*. 2001; 25-27.
7. Barua CC., Talukdar A., BaruaAG., Chakraborty A., Sarma RK., Bora RS. Evaluation of the wound healing activity of methanolic extract of *Azadirachta indica* (neem) and *tinospora cordifolia* (guduchi) in rats. *Pharmacologyonline*. 2010;1: 70-77.
8. Chitra P., Sajithalal GB., Chandrakasan G. Influence of Aloe vera on collagen turnover in healing of dermal wounds in rats. *Ind J of Exp Biol*. 1998;36:896-901.
9. Chitra V., Dharani Prasad P., Pavan Kumar K., Narayana RA. Wound Healing Activity of Alcoholic Extract of *Buchanania lanzan* in Albino Rats. *Int J ChemTech Res*. 2009; 1:1026-1031.
10. Choudhary GP. Wound healing activity of the ethanolic extract of *TerminaliaChebularetz*. *Int J Pharma Bio Sci*. 2011; 2: 48-52.
11. Dash GK., Murthy PN. Evaluation of *Argemone mexicana* Linn. Leaves for wound healing activity. *J Nat Prod Plant Resour*. 2011; 1: 46-56.
12. Deshpande SM.,Upadyaya RR. Chemical studies of *Jasminum auriculatum* (VAHL) leaves. *Curr Sci*, 1967;36:233-234.
13. Dewangan H., Bais M., Jaiswal V., Verma VK. Potential wound healing activity of the ethanolic extract of *Solanum xanthocarpum* Schrad and wendl leaves. *Pak J Pharm Sci*. 2012;25:189-194.
14. Diallo D., Paulser BS. Lilyiback THA and Michaelsen TE. Polysaccharides from the roots of *Entoda Africana* Guill. et Perr., Mimosaceae, with complement fixing activity. *J Ethnopharmacol*. 2001;74:159-171.
15. Dikshit A.,Dixit SN. Cedrus oil – a promising anti-fungal agent. *Indian Perfumer*, 1982;26:216-227.
16. Diwan PV., Tillo LD., Kulkarni DR. Steroid depressed wound healing and *Tridax procumbens*. *Indian J. Physiol. Pharmacol*, 1983;27:32- 36.
17. Esimone CO., Ibezim EC., Chah KF. The wound healing effect of herbal ointments formulated with *Napoleona imperialis*. *JOPHAS*. 2005;3:294 -299.

18. Falanga V. Growth factors and wound healing. *J Dermatol Surg Oncol*.1993;19:711-714. Garg VK., Paliwal SK. Wound-healing activity of ethanolic and aqueous extracts of *Ficus benghalensis*. *J Adv Pharm Technol Res*. 2011;2:110-114.
19. Ghosh PK., Gupta VB., Rathore MS., Hussain I. Woundhealing potential of aqueous and ethanolic extracts of *apamarga* leaves. *Int J Green Pharm*. 2011;5:12-15.
20. Grindlay D, Reynolds T. The Aloe vera phenomenon. A review of the properties and modern uses of the leaf parenchyma gel. *J Ethnopharmacol* 1986;16:117-151.
21. Heggens JP., Kucukcelibi A., Listengarten D., Stabenau, CJ., Ko F., Broemeling LD., Robson MC., Winters .D. Beneficial effect of Aloe on wound healing in an excision wound model. *J Alternative Complementary Med* 1996; 2: 271–277.
22. Hemalatha S., Subramanian N., Ravichandran V., Chinnaswamy K. Wound healing activity of *Indigofera enneaphylla* Linn. *Indian J Pharm Sci*. 2001;63:331-333.
23. Hemmati AA., Kalantari H., Jalali A., Rezai S., Zadeh HH. Healing effect of quince seed mucilage on T-2 toxin-induced dermal toxicity in rabbit. *Exp Toxicol Pathol*. 2012;64:181-186.
24. Hukkeri VT., Karadi RV., Akki KS., Savadi RV., Jaiprakash B., Kuppast J., Patil MB. Wound healing property of *Eucalyptus globulus* leaf extract. *Indian Drugs*. 2002; 39: 481–483.
25. Inngjerdigen K., Nergard CS., Diallo D., Mounkoro PP. An ethnopharmacological survey of plants used for wound healing in Dogonland, Mali, West Africa. *J Ethnopharmacology*. 2004; 92:233-244.
26. Ivanova A., Mikhova B., Najdenski H., Tsvetkova I., Kostova I. Antimicrobial and cytotoxic activity of *Ruta graveolens*. *Acta Pharm*. 2005;55:431-435.
27. Jain N., Jain R., Jain A., Jain DK., Chandel HS. Evaluation of wound-healing activity of *Acorus calamus* Linn. *Nat Prod Res*. 2010;24:534-541.
28. Jalalpure S., Agrawal N., Patil MB., Chinkode R., Tripathi A. Antimicrobial and wound healing activities of leaves of *Alternanthera sessilis* Linn. *Int J Green Chem*., 2008; 2: 141-144.
29. James O., Victoria AI. Excision and incision Wound Healing potential of *Saba florida* (benth) leaf extract in *Rattus norvegicus*. *Int J Pharm Biomed Res*. 2010;1:101-107.
30. Jaswanth A., Loganathan V., Manimaran, S., Rukmani, S. Wound healing activity of *Aegle marmelos*. *Indian J Pharma Sci*. 2001;63:41–44.
31. Karow JH., Abt HP., Frohling M., Ackermann H. Efficacy of *Arnica montana* D4 for healing of wounds after *Hallux valgus* surgery compared to diclofenac. *J Altern Complement Med*. 2008;14:17-25.
32. Kayser O., Kolodziej H. Antibacterial activity of extracts and constituents of *Pelargonium sidoides* and *Pelargonium reniforme*. *Planta Med*. 1997;63:508-510.
33. Khan M., Patil PA., Shobha JC. Influence of *Bryophyllum pinnatum* (Lam.) leaf extract on wound healing in albino rats. *J Nat Remedies*. 2004;4: 41–46.
34. Kishore GS., Kumar BS., Ramachandran S., Saravanan M., Sridhar SK. Antioxidant and wound healing properties of *Glycyrrhiza glabra* root extract. *Indian Drugs*. 2001;38: 355–357.
35. Kumar B, Vinaykumar M, Govindarajan R, Pushpangadan P, Ethanopharmacological approaches to wound healing exploring medicinal plants of India, *J Ethnopharmacol*, 2007;114:103-113.
36. Kumar S., Parmeshwaraiah S., Shivkumar HG. Evaluation of topical formulations of aqueous extract of *Centella asiatica* on open wounds in rats. *Ind J Exp Biol*.1998;36:569-572.
37. Lawrence, WT., Diegelmann, RF. Growth factors in wound healing, *Clin Dermatol*,1994; 12: 157-169.
38. Lazarus GS., Cooper DM., Knighton DR., Margolis DJ., Pecoraro RE., Rodeheave, G., Robson MC. Definitions and guidelines for assessment of wounds and evaluation of healing, *Arch Dermatol*, 1994; 130: 489-493
39. Lodhi S., Pawar RS., Jain AP., Singhai AK. Wound healing potential of *Tephrosia purpurea* (Linn.) Pers. in rats. *J Ethnopharmacology*. 2006;108: 204–210.
40. Lucena PL., RibasFilho JM., Mazza M., Czezko NG., Dietz UA., Correa Neto MA., Henriques GS., Santos OJ., Ceschin AP., Thiele ES. Evaluation of the areira (*Schinus terebinthifolius* Raddi) in the healing process of surgical incision in the bladder of rats. *Acta Cir Bras*. 2006; 21:46-51.
41. Mahmood K., Patil PK. Influence of *bryophyllum pinnatum* (lam.) Leaf extract on wound healing in albino rats. *Ind J Pharmacol*. 2002;34:101
42. Nguyen, DT. Orgill DP, Murphy GF. Chapter 4: The Pathophysiologic Basis for Wound Healing and Cutaneous Regeneration. *Biomaterials for Treating Skin Loss*. 2009:25-57.
43. Nirmala S., Karthiyayini T. Wound healing activity on the leaves of *achillea millefolium* l. By excision, incision, and dead space model on adult wistar albino rats *Int Res J Pharm*. 2011; 2: 240-245.
44. Oommen ST., Rao M., Raju CV. Effect of oil of *hydnocarpus* on wound healing. *Int J Lepr Other Mycobact Dis*. 1999;67:154-158. Park EHK., and Chun MJ. Wound healing activity of

- Opuntia ficus-indica*. *Fitoterapia*. 2001;72:165-167.
45. Patil DN., Kulkarni AR., Shahapurkar AA., Hatappakki BC. Natural Cumin Seeds for Wound Healing Activity in Albino Rats. *Int J Biolchem*. 2009;3:148-152
46. Shirwaikar A, Ghosh S, Rao PGM. Effect of *Gmelina arborea* Roxb. leaves on wound healing in rats. *J Natural Remedies*. 2002;3(1):45-48.