



**International Journal of Biology, Pharmacy  
and Allied Sciences (IJBPAS)**

*'A Bridge Between Laboratory and Reader'*

[www.ijbpas.com](http://www.ijbpas.com)

---

---

**ETHNOBOTANY OF WOUND HEALING PLANTS BY THE KANI TRIBALS OF  
SOUTHERN WESTERN GHATS OF KANNIYAKUMARI DISTRICT- TAMIL NADU**

**PUSHPAKARANI R AND NATARAJAN S\***

Department of Plant Biology and Plant Biotechnology (Gill Research Institute) Gurunanak

College Vellacheri, Chennai-42

\*Corresponding Author: E Mail: [killainatarajan@yahoo.in](mailto:killainatarajan@yahoo.in)

**ABSTRACT**

Wound are physical injuries that result in an opening or break of the skin, Present paper deals with the herbal remedies for wound healing in kaniyakumari district, Tamil Nadu. An ethnobotanical survey was carried out among the ethnic groups (Kani/Kaniyakaran) in this area and traditionally used 33 plant species belonging to 24 families are described under this study. In This communication, the informations gathered from the tribal were compared with already existing literature on ethnobotany of India. The documented ethnomedicinal plants are used for wound healings either singly or in combination with other drugs. The medicinal plants used by kanis are arranged alphabetically followed by the Botanical name, Family name, Voucher specimen no, Local name, Part used, mode of application and major chemical constituents for all plants are discussed.

**Keywords: Ethnobotany, Kani Tribals, Medicinal Plants, Wound Healing**

**INTRODUCTION**

Ethnobotany tries to study the relationship between human and nature. Ethnic people are highly knowledgeable about the plants and their medicinal values and this knowledge is passed through oral communication from generation to generation, who live in remote

villages and forest. Traditional folk medicines are mostly undocumented which has been handed from one generation to another. Large section of the Indian population still rely on traditional herbal medicines. Today, a substantial number of drugs are developed

from plants which are active against a number of diseases. The majority of these involve the isolation of the active ingredient (chemical compound) found in a particular medicinal plant and its subsequent modification.

Research on wound healing agents is one of the developing areas in modern biomedical sciences and many traditional practitioners across the world particularly in countries like India and China have valuable information of many lesser-known hitherto unknown wild plants for treating wounds and burns [1]. Traditional forms of medicine practiced for centuries in Africa and Asia are being scientifically investigated for their potential in the treatment of wounds related disorders [2]. Some of the commonly available drugs used in the healing of wounds are, NSAIDs ibuprofen (non-steroidal anti-inflammatory drug), colchicines, corticosteroids, antiplatelets (aspirin), anticoagulants (heparin), warfarin and vasoconstrictors e.g., nicotine, cocaine and adrenaline [3]. Our preliminary survey among the Kani tribals in Kanyakumari district demonstrated that wounds were one of the major problems among these tribals and they prepared herbal medicines to heal wound and other diseases. Although some ethnobotanical studies have been accomplished in and around kanyakumari forest among the tribal people

by some earlier researchers [4-6]. No systematic ethnotherapeutic studies have been undertaken to assess the traditional management of wounds. The present study was performed with the aim of producing an inventory of the plants used by traditional healers in Kanyakumari forest to document the traditional therapies practiced for various wound and related injury conditions along with major active compounds and related pharmacological activities of each wound healing plant.

## **METHODOLOGY**

### **Study Area and Ethnic People**

The study was conducted during 2012 (25 days) and in 2013 (25 days) by the researcher, guide and Survey team of Department of Plant biology and Biotechnology, Gurunanak College Vellacheri, Chennai, to collect information about medicinal plants used by traditional healers in the southern Western Ghats of Kanyakumati district, Tamil Nadu. The district lies between  $77^{\circ} 15'$  and  $77^{\circ} 36'$  of the eastern longitudes and  $8^{\circ} 03'$  and  $8^{\circ} 35'$  of the northern latitudes. The District is bound by Tirunelveli District on the North and East, by South East Gulf of Mannar by South and the South West the boundaries are the Indian Ocean and the Arabian Sea by West and North West is bounded by Kerala.

The rich forests of this district form the catchment area for more than 7 rivers and 9 dams, and form the back-bone of the irrigation network and provide drinking water for Kanyakumari, Tirunelveli and Tuticorin districts in south Tamil Nadu. The ethnomedicinal information was gathered from the indigenous people of the study area called Kani or Kanikaran, one of the oldest groups of the branch of ethnic people in South India. They reside in remote and inaccessible forest areas and practice indigenous phototherapy to treat common ailments. During the course of exploration of ethnomedicinal plants information has been gathered from the healers inhabiting the forest areas who have sound knowledge of herbal remedies. For many decades, the tribal community has a traditionally self managed system of folk medicine and primary healthcare mainly based on herbal remedies.

In kanniyakumari the kani tribals inhabited the villages of konjanr, kodayar, Kodithurai or Kani kudiiruppu, Keeripari, olakiaruvi, veerapuli and Mramalai, The knowledge about medicinal plants is rather specialized and is limited to a few members in the community who are recognized as 'Vaidhyar' (also known as medicine men, informant and traditional healer). Traditional healers commonly begin their training as children or

teenagers working as assistants to their mothers, fathers and to other relatives who are recognized healers. After having trained for a number of years, the apprentice will be ceremonially granted the authority to use a given treatment. This individual will be recognized by others in their culture as having mystical power to heal, as well as having the power to train others in the use of medicinal plants.

### **Data Collection**

The ethnomedicinal information was collected through general conversations with traditional healers and questionnaires were used to gather their knowledge. Details of medicinal plants used, mode of treatment, methods of preparation and types of administration were documented by interacting with them as well as through direct observations. The information got from the tribals was recorded in field notebooks and compared with the previously reported literatures [7, 8]. The collected plants were identified by the local people with their vernacular names, photographed and sample specimens were collected for the preparation of herbarium. The Flora of Presidency of Madras [9] and The Flora of Tamil Nadu Carnatic [10] were used to ascertain the nomenclature. The voucher specimens were deposited in the herbarium at Department of

---

Plant biology and Plant Biotechnology, Gurunanak College Vellacheri, Chennai,

## RESULTS

With regards to the families with wound healing plants, Euphorbiaceae is reported with the highest number of species (3 species) followed by Acanthaceae, Rubiaceae, Papilionaceae (2 species) and other 20 families with one species each. Twenty one species of plants are herbs, 5 species are shrubs, 7 species are trees, small tree, climbers, tendrils climbers, climbing shrub and leafless shrubs are each one plant species respectively. Leaves were found to be the most frequently used plant parts for 18 preparations followed by stem latex (4), whole plant extract (3), fruit (2), root(2) and others such as flowers , stem bark.

Most of the ethnobotanical studies confirmed that the leaves are the major portion of the plant used for the treatment of diseases. The reasons why leaves are used mostly is that they are easily accessible and are active in photosynthesis and production of metabolites [11]. The methods of preparation fall in two categories, viz.; plant parts apply as paste, juice extracted from the various fresh parts of the plant, plant parts used to prepare extract in the combination of water and powder made from dried material. Majority of the remedies

reported in the present study for wound healing were applied externally.

Kanyakumari forests have a variety of medicinal plants which are used by the Kani tribals for their primary healthcare. The present study identified that the traditional healers used 33 species of ethnomedicinal plants (distributed in 29 genera belonging to 24 families) to treat wounds and related injuries such as cuts, burns, bruises caused by external injury, boils, sores, abscess, and wounds created during delivery. Of this, *Acalypha indica*, and *Wrightia tinctoria* R.Br are commonly used by the tribal people in the healing of wounds; medicinal properties and major chemical constituents of these plants have also been provided (**Table 1**). Each plant used to treat wounds was cross referenced with the published literature.

## DISCUSSION

The study of ethnomedical systems and herbal medicines as therapeutic agents is of a paramount importance in addressing health problems of traditional communities and third world countries as well as industrialized societies. Previous reports on the ethnobotany of kanyakumari district and adjoining areas are an evidence for the presence of numerous ethnomedicinal plants used by the Kani tribals [4-6, 12]. Our study revealed that, wounds are one of the major problems among the Kani

people, due to their life in the forest. While entering into the forests they get injured. The traditional healers residing among them treat such wounds. In Indian traditional medicine, the species of the following genera are commonly used to treat wound and related injuries; *Abutilon*, *Achyranthes*, *Acorus*, *Aegle*, *Aerva*, *Aloe*, *Azadirachta*, *Bambusa*, *Bidens*, *Boerhaavia*, *Butea*, *Caesalpinia*, *Calotropis*, *Carissa*, *Cassia*, *Cucumis*, *Curcuma*, *Cynodon*, *Datura*, *Dodonea*, *Eclipta*, *Euphorbia*, *Ficus*, *Hyptis*, *Lantana*, *Leucas*, *Morinda*, *Ocimum*, *Opuntia*, *Pavetta*, *Pergularia*, *Plumbago*, *Pongamia*, *Sida*, *Smilax*, *Terminalia*, *Tridax*, *Vitex* and *Zizyphus* [7]. [1, 13], reported that about 163 species of plants were used as wound healing plants in Indian systems of medicine such as Ayurveda, Siddha, Unani and folk medicine. Kani tribals in kaniyakumari forest are also frequently using the leaves of *Ficus racemosa*, root of *Mirbilis jalapa* and stem latex of *Tylophora indica* in the treatment of wounds. According to various traditional medicinal practices throughout the world, wounds have been treated mostly topically with different medicinal herbs or with their extracts solely or in combination with some other plant parts. Kani tribals also prepare medicines in a combination of several plant parts and they believe that combination of

different plant parts cures diseases rapidly. Faced with increasing burden on health care, wound healers are examining all possible resources for solutions. The plants such as *Tridax procumbens*, *Trigonella foenum-graecum*, *Leucas lavandulaefolia*, *Aloe vera* and *Calotropis procera* [14], *Heliotropium indicum*, *Plumbago zeylanica* and *Acalypha indica* [15], *Cassia fistula* [16], *Hypericum japonicum*, *Hypericum perforatum*, *Hypericum lydium*, *Hypericum papuanum*, and *Hypericum perforatum* [17], *Cissus quadrangularis*, *Guiera senegalensis* and *Butyrospermum parkii* [18], *Napoleona imperialis*, *Ocimum gratissimum* and *Ageratum conyzoides* [19] have long been used both orally and topically for healing of wounds and burns in the folk medicine by the tribal communities of various countries. Of the 33 plant species reported by Kani tribals for wound healing, the plants such as *Acalypha indica*, *Adhatoda zeylanica*, *Aloe vera*, *Aristolochia bracteata*, *Calotropis gigantean*, *Datura fastuosa*, *Ficus racemosa*, *Ocimum tenuiflorum*, *Pongamia pinnata*, and *Terminalia arjuna* were investigated experimentally by various researchers in wounded animals. These studies showed significant wound healing activity and these plants were selected for wound healing study

based on their use in traditional medicine (Table 2).

### Role of Plant Compounds in Wound Healing

The process of wound healing is promoted by several natural products which are composed of active principles like triterpenes, alkaloids, flavonoids and biomolecules [20]. Asiaticoside from *Centella asiatica* [21],  $\beta$ -sitosterol [2] and glycoprotein [22] from the gel of *Aloe vera*, oleanolic acid from *Anredra diffusa* [23], quercetin, isorhamnetin and kaempferol from *Hippophae rhamnoides* [24], curcumin from *Curcuma longa* [25], proanthocyanidins and resveratrol from *Vitis vinifera* [26], acylated iridoid glycosides from *Scrophularia nodosa* [27], phenolic acids from *Chromolaena odorata* [28], (+)-epi- $\alpha$ -bisabolol from *Peperomia galioides* [29], fukinolic acid and cimicifugic acids from *Cimicifuga* sps. (Kusano *et al.*, 2001) and Xyloglucan from *Tamarindus indicus* [30] are some of the important plant derived wound healing compounds which were tested in animal models. [31], stated that polysaccharides are also partly responsible for the process of wound healing; for example, arabinogalactans from the root of *Angelica acutiloba*, acidic heteroglycans from the leaves of *Panax ginseng*, acemannan from the gel of *Aloe vera* and general polysaccharides

from the leaves of *Plantago major* are reported to have wound healing activity. Many traditional remedies are based on systematic observations and methodologies and have been time-tested but for many of them, scientific evidence is lacking and there are only few prospective randomized controlled trials that have proved the clinical efficacy of these traditional wound healing agents [32]. [1] stated that the major problem with pharmacological validation of the wound healing plants was that the exact mechanism of the healing process of wound was not clearly understood; hence most of the researchers restricted the screening of plants to simple healing of wounds and did not go into details. The validation by scientific method of the usefulness of various plant species could form the basis for their use as alternative treatments or when conventional therapy by Western medicine is unavailable.

### ACKNOWLEDGEMENTS

The authors are grateful to Correspondent, principal and Staff of Department of Plant biology and Plant Biotechnology, Gurunanak College, Vellacheri, Chennai, for providing facilities and also thanks to Principal Chief Conservator of forest, Tamil Nadu, District forest officer, Kaniyakumari District, For permitting them to conduct survey. The authors express sincere thanks to Kani tribals

in the study area for revealing their medico Ethnobotanical-knowledge.

## REFERENCES

- [1] Kumar B, Vijayakumar M, Govindarajan R and Pushpangadan P, An Ethnopharmacological approaches to wound healing – Exploring medicinal plants of India, *J. Ethnopharmacol.*, 114, 2007, 103-113.
- [2] Krishnan P, The scientific study of herbal wound healing therapies: Current state of play, *Curr. Anaes. Crit. Care*, 17, 2006, 21-27.
- [3] Grey JE and Harding KG, ABC of wound healing, Wiley Blackwell, 2006, Pp. 42.
- [4] Jeeva S, Kiruba S, Mishra BP, Venugopal N, Das SM, Sukumaran S, Regini GS, Kingston C, Kavitha A, Raj AD and Laloo RC, Weeds of Kanyakumari district and their value in rural life, *Indian J. Trad. Know*, 5, 2006, 501-509.
- [5] Kingston C, Jeeva S, Jeeva GM, Kiruba S, Mishra BP and Kannan D, Indigenous knowledge of using medicinal plants in treating skin diseases in Kanyakumari district, Southern India, *Ind. J. Trad. Knowl.*, 8 (2), 2009, 196-200.
- [6] Kingston C, Mishra BP, Nisha BS, Jeeva S, Livingstone C and Laloo RC, Diversity and distribution of economically important plants in traditional homegardens of Kanyakumari district, Tamil Nadu, southern peninsular India, *J. Nat. Con.*, 18, 2006, 41-54.
- [7] Jain SK, Dictionary of Indian Folk Medicine and Ethnobotany, Deep publications, Paschim Vihar, New Delhi, 1991.
- [8] Viswanathan MB, Ethnobotanically important plants. In: Tamil Nadu biodiversity strategy and action plan – Forest Biodiversity, (Ed. R. Annamalai) Tamil Nadu Forest Department, Government of India, Chennai, 2004, 170 – 231.
- [9] Gamble JS, The Flora of the Presidency of Madras, Adlard & son, LTD, London, 1935.
- [10] Matthew KM, The Flora of the Tamil Nadu Carnatic. The Rapinat Herbarium, St Joseph's College, Tiruchirapalli, India 1983.
- [11] Ghorbani A, Studies on pharmaceutical ethnobotany in the region of Turkmen Sahra, north of Iran (Part 1): general results, *J. Ethnopharmacol.*, 102, 2005, 58-68.

- [12] Henry AN and Swaminathan M, Observation on the vegetation of Kanyakumari district, Tamil Nadu, Bull. Bot. Surv. India, 23, 1981, 135-139.
- [13] Biswas TK and Mukherjee B, Plant Medicines of Indian Origin for Wound Healing Activity: A Review, Lower Extr Wounds, 2, 2003, 25-39.
- [14] Rasik AM, Raghubir R, Gupta A, Shukla A, Dubey MP, Srivastava S, Jain HK and Kulshrestha DK, Healing potential of *Calotropis procera* on dermal wounds in Guinea pigs, J. Ethnopharmacol., 68, 1999, 261-266.
- [15] Suresh Reddy J, Rao PR and Reddy MS, Wound healing effects of *Heliotropium indicum*, *Plumbago zeylanicum* and *Acalypha indica* in rats, J. Ethnopharmacol., 79, 2002, 249-251.
- [16] Senthil Kumar M, Sripriya R, Vijaya Raghavan H and Sehgal P, Wound Healing Potential of *Cassia fistula* on Infected Albino Rat Model, J. Surg. Res., 131, 2006, 283-289.
- [17] Ozturk N, Korkmaz S and Ozturk Y, Wound-healing activity of St. John's Wort (*Hypericum perforatum* L.) on chicken embryonic fibroblasts, J. Ethnopharmacol., 111, 2007, 33-39.
- [18] Inngjerdingen K, Nergard CS, Diallo D, Mounkoro PP and Paulsen BS, An Ethnopharmacological survey of plants used for wound healing in Dogonland, Mali, West Africa, J. Ethnopharmacol., 92, 2004, 233-244.
- [19] Chah KF, Eze CA, Emuelosi CE and Esimone CO, Antibacterial and wound healing properties of methanolic extracts of some Nigerian medicinal plants, J. Ethnopharmacol., 104, 2006, 164-167.
- [20] Sumitra M, Manikandana P and Suguna L, Efficacy of *Butea monosperma* on dermal wound healing in rats, Int. J. Biochem Cell Biol., 37, 2005, 566-573
- [21] Shukla A, Rasik AM, Jain GK, Shankar R, Kulshrestha DK and Dhawan BN, In vitro and in vivo wound healing activity of asiaticoside isolated from *Centella asiatica*, J. Ethnopharmacol., 65, 1999, 1-11.
- [22] Choi SW, Son BW, Son YS, Park YI, Lee SK and Chung MH, The wound-healing effect of a glycoprotein fraction isolated from *Aloe vera*, Brit. J. Dermatol., 145, 2001, 535-545.

- [23] Letts MG, Villegas LF, Marcalo A, Vaisberg AJ and Hammond GB, In vivo wound healing activity of olanolic acid derived from the acid hydrolysis of *Androdera diffusa*, J. Nat. Prod., 69, 2006, 978-979.
- [24] Fu SC, Hui CW, Li LC, Cheuk YC, Qin L, Gao J and Chan KM, Total flavones of *Hippophae rhamnoides* promote early restoration of ultimate stress of healing patellar tendon in a rat model, Med. Eng. Phy., 27, 2005, 313- 321.
- [25] Jagetia GC and Rajanikant GK, Role of curcumin, a naturally occurring phenolic compound of turmeric in accelerating the repair of excision wound, in mice whole body exposed to various doses of gamma-radiation, J. Surg. Res., 120, 2004, 127-138.
- [26] Khanna S, Venojarvi M, Roy S, Sharma N, Trikha P, Bagchi D, Bagchi M and Sen CK, Dermal wound healing properties of redox-active grape seed proanthocyanidins, Free Rad. Biol. Med., 15, 2002, 1089-1096.
- [27] Stevenson PC, Simmonds MS, Sampson J, Houghton PJ and Grice P, Wound healing activity of acylated iridoid glycosides from *Scrophularia nodosa*, Phytother Res., 16, 2002, 33-35.
- [28] Phan TT, Wang L, See P, Grayer RJ, Chan SY and Lee ST, Phenolic compounds of *Chromolaena odorata* protect cultured skin cells from oxidative damage: implication for cutaneous, Biol. Pharm. Bull., 24, 2001, 1373-1379.
- [29] Villegas LF, Marcalo A, Martin J, Fernandez ID, Maldonado H, Vaisberg AJ and Hammond GB, (+)-epi- Alpha-bisabolol [correction of bisbolol] is the wound healing principle of *Peperomia galioides*: investigation of the in vivo wound-healing activity of related terpenoids, Nat. Prod., 64, 2001, 1357-1359.
- [30] Burgalassi S, Raimondi L, Pirisino R, Banchelli G, Boldrini E and Saettone MF, Effect of xyloglucan (tamarind seed polysaccharide) on conjunctival cell adhesion to laminin and on corneal epithelium wound healing, Eur. J. Ophthalmol., 10, 2000, 71-76.
- [31] Diallo D, Sogn C, Samake FB, Paulsen BS, Michaelsen TE and Keita A, Wound healing plants in Mali, the Bamako region. An ethnobotanical survey and complement fixation of water extracts

- from selected plants, Pharm. Biol., 40, 2002, 117-128.
- [32] Khalil EA, Afifi FU and Al-Hussai M, Evaluation of the wound healing effect of some Jordanian traditional medicinal plants formulated in Pluronic F127 using mice (*Mus musculus*), J. Ethnopharmacol., 109: 2007, 104-112.
- [33] Subhashini S, Kantha D and Arunachalam, Investigations on the phytochemical activities and wound healing properties of *Adhatoda vasica* leave in Swiss albino mice, Afr. J. Plant Sci., 4 (12), 2010, 467-479.
- [34] Shirwaikar A, Somashekar AP, Udupa AL, Udupa SL and Somashekar S, Wound healing studies of *Aristolochia bracteolata* Lam. with supportive action of antioxidant enzymes, Phytomed., 10 (6-7), 2003, 558-62.
- [35] Pathak AK and Argal A, Analgesic activity of *Calotropis gigantea* flower, Fitoterapia, 78, 2007, 40-42.
- [36] Vimal A, Suseela L, and Vadivu R, "Wound healing activity of ethanolic extract of aerial parts of *Datura fastuosa* Linn on Wistar albino rats," J. Pharm. Res., 2 (3), 2009, 410-412.
- [37] Sharma S and Sikarwar MS, Wound healing activity of ethanolic extract of leaves of *Eclipta alba*, Pharmacog. Magazine, 4 (3), 2008, 108-111.
- [38] Shetty S, Udupa S and Udupa L, "Evaluation of antioxidant and wound healing effects of alcoholic and aqueous extract of *Ocimum sanctum* Linn in rats," Evidence-Based Complementary and Alternative Med., 5 (1), 2008, 95-101.
- [39] Srinivasan K, Muruganandan S, Lal J, Chandra S, Tandan SK and Raviprakash V, Evaluation of anti-inflammatory activity of *Pongamia pinnata* leaves in rats, J. Ethnopharmacol., 78, 2001, 151-157.
- [40] Chaudhari M and Mengi S, Evaluation of phytoconstituents of *Terminalia arjuna* for wound healing activity in Rats, Phytother. Res., 20, 2006, 799-805.

Table 1: Medicinal Plants and Their Wound Healing Properties Used by Kani Tribals in Kaniyakumati District

S. No	Botanical Name/ Family Name/ Voucher Specimen Number	Local Name	Part used, Mode of Application.	Major chemical constituents
1	<i>Acalypha indica</i> L. / Euphorbiaceae/GNC CH-9904	Kuppaimani	Leaves made in to paste with turmeric powder applied on wound.	Kaempferol, acalyphamide, amides, quinine, cynogenic glycoside.
2	<i>Achyranthes aspera</i> L./ Amranthaceae/ GNC CH -8979	Nayuruvi	Leaf past mixed with calcium externally applied on wound.	Achyranthine, betain, ecdysterone, oleanolic acid, tannin, glycoside.
3	<i>Adhatoda zeylanica</i> Medic./ Acantaceae/ GNC CH -	Adathoda	Paste of tender leaves applied on wound	Quinazoline, vasicine, vasicinone, trypsin,
4	<i>Aloe vera</i> (L.) Burm.f./Liliaceae/ GNC CH -	Karthali	Leaves gel externally apply on wound	Anthraquinone glycoslde (Aloin),
5	<i>Alstonia scholaris</i> (L.) R.Br./ Apocynaceae/ GNC CH -9968	Elilaipalai	Latex externally apply on chronic wound	Alstovenine, vincadiformine, monosmine oxidase.
6	<i>Andrographis paniculata</i> (Burn.f)/ Acanthaceae / GNC CH -8931	Nila vembu	Leaf extract externally applied on skin rashes	Andrographolide, deoxyandrographolide, diterpenes.
7	<i>Aristolochia bracteata</i> Retz./ Aristolochiaceae/ GNC CH - 9037	Karuda kodi	Leaves are made in to paste applied on scabies wound	Aristolochic acids, aristolactams.
8	<i>Azadiracta indica</i> A.Juss./ Meliaceae/ GNC CH -	Vambu	Leaves made in to paste with turmeric powder applied on cut injuries.	Tetranortriterpenoids, aza diractin.
9	<i>Calotropis gigantea</i> R.Br./ Euphorbiaceae/ GNC CH -8883	Erruku	Latex applied on Dog bite (rabies) wound to cure.	Alkaloids, glycosides, akudarin, $\beta$ -amyrin, stigmasterol.
10	<i>Cassia alata</i> L. (Burm.f) wall ex Ness/ Papilionaceae/ GNC CH -8930	Semai agathi	Powder of fruits mixed with neem oil externally applied on diabetic wound.	Rhein, emodin, aloe-emodin, anthroquinone,
11	<i>Cissus quadrangularis</i> L. / Vitaceae/ GNC CH -9067	Pirandai	Plant extract externally applied on burning injury.	Phytogenic sterol, ketosterol, sitosterol, $\alpha$ -amyrine, $\alpha$ -amyrone.
12	<i>Coccinia grandis</i> (L.) J. Voigt/ Cucurbitaceae/ GNC CH -9949	Kovai	Leaf paste externally applied on wounds and cut injuries.	$\beta$ -amyrin, lupeolcucurbitacin.
13	<i>Croton tiglium</i> L. / Euphorbiaceae/ GNC CH - 8946	Nervalam	Seed oil externally applied on wounds.	Phorbol esters, toxic albuminosa substances, crotolin.
14	<i>Cuscuta reflexa</i> Roxb./Cuscutaceae/ GNC CH - 8973/	Ottuchedi	Plant extract applied on burn injuries.	Amarbelin, kaemferol, cuscutin, cuscutatin, $\beta$ -

				sitosterol, luteotin. Hyoscine, hyoscyamine,
15	<i>Datura fastusa</i> L./ Solanaceae/ GNC CH - 9942	Karuoomathai	Roasted leaves banded on wound as tincture.	
16	<i>Eclipta prostrata</i> L./ Asteraceae / GNC CH - 8989	Karisalnkanni	Plant extract applied on wounds as tincture.	Galactosamine, thiophene avetylens,
17	<i>Euphorbia hirta</i> L./Euphorbiaceae/ GNC CH -8947	Amman pachiarasi	Latex and leaf paste externally applied on cut injuries.	Terpens, anthocyanins, steroids, shikimic acids, cholin, euphorbians.
18	<i>Ficus racemosa</i> L. /Moraceae/ GNC CH - 10131	Athi	Aqueous extract of bark applied on wounds.	Glucol, $\beta$ -sitosterol, lupeolacetate, friedelin, phytosterol.
19	<i>Leucas aspera</i> (Wild.) Link /Lamiaceae GNC CH - 8992	Thumbai	Leaves are made into paste with calcium and externally applied on wounds.	Oleanolic acids, urosolic acids, $\beta$ -sitosterol, triterpenoids, leucolactone.
20	<i>Mimosa pudica</i> L. /Mimosaceae/ GNC CH -9091	Thotal vadi	Leaves are made into paste and externally applied on cut injuries.	Mimosine, turgorin, gallic acid.C-glycosylflavones.
21	<i>Mirabilis jalapa</i> L./Nyctraginaceae/ GNC CH - 8894	Anthimalli	Root past externally applied on cut injuries.	Triterpenes, $\alpha$ -amyrines, mirabilis antiviral protein.
22	<i>Moringa pterygosperma</i> Gaertn./ Moringaceae/ GNC CH -10021	Murungai	Root paste used as banded medicine for wound.	Spirochin, pterygospermin, nitril glycoside, niazirin,
23	<i>Ocimum tenuiflorum</i> L./ Lamiaceae/ GNC CH -10039	Neelathulasi	Leaf extract applied on wound.	Essential oil, Citral, eugenol, flavonoids, thymol, aesculetin,
24	<i>Plumbago zeylanica</i> L. / Plumbaginaceae / GNC CH - 8977	Kodiveli	Leaves made in to paste with neem oil externally applied on diabetic wound.	Napthoquinone, plumbagin,
25	<i>Pongamia pinnata</i> (L.) Pierre. /Papilionaceae/ GNC CH - 9075	Pongan	Seed oil apply on chronic wounds.	Flavons, furanoflavanoids, chromenoflavones,chrome nochalcons, coumarones, sterols, karanjin, pongamol, pongapin, kanjone.
26	<i>Catunaregam spinosa</i> (Thunb.) Tirvengadam./ Rubiaceae/ GNC CH - 8879	Karai	Fruit past applied on wounds.	Isoflavonoids, terpenoids, tannins, stilbenes, pterostilbene, liguiritigens
27	<i>Ricinus communis</i> L. / Euphorbiaceae/ GNC CH -9018	Amanakku	paste of tender leaves externally applied on wounds.	Albumin, recin, ricinine, rianoleic acid, steric acid,

				oleic acid, linoleic acids, dihydroxy steric acids, ricinoleic acids.
28	<i>Rubia manjiuth</i> Roxb.ex Fleming/ Rubiaceae/ GNC CH - 9023	Manjeti	Crushed flower paste apply on wound.	Anthraquinones, glycosides, purpurin, munjistin, xanthopurpurin, glycosides,
29	<i>Terminalia arjuna</i> (Roxb.ex DC.)W&S. / Combretaceae/ GNC CH -9083	Arjuna	Leaves are made in to paste with coconut oil and used as banded medicine for chronic wounds.	Sikimic acids, gallic acids, triacontanoic acids, palmatic acids, $\beta$ -sitosterol, daucosterol, chebulic acids.
30	<i>Tinospora cordifolia</i> (Willd.) Hook/ Minispermaceae/ GNC CH -9099	Senthil	Leaf paste externally applied on wounds.	Berberine, columbin, chasmanthin, palmarin, tinosporol.
31	<i>Tribulus terrestris</i> L./ Zygophyllaceae/ GNC CH -9951	Nerunji	Leaves are made in to paste with neem oil and externally applied on wounds.	Saponins, sapogenin, chlorogenin, ruscogenin, flavonoids, rутain, quercetain, kaempferol, tribuloside.
32	<i>Tylophora indica</i> (Burm.f) Merr./ Asclepiadaceae/ GNC CH -9909	Velaipalai	Latex externally applied on cut injuries.	Tylophorine, flavonoid kaempferol, $\alpha$ and $\beta$ -amyrin, $\beta$ -sitosterol, Kaempferol,
33	<i>Wrightia tinctoria</i> R.Br./ Apocynaceae/ GNC CH -8880	Veppalai	1. Leaves are soaked on coconut oil for one month and applied on chronic wounds. 2. The latex externally applied for delivery wounds.	Conessine, conessine dehydrate, hollarrhins, kurchicine, sitosterol, lupeol, $\alpha$ -amyrin.

Table 2: Pharmacological Action of the Plants/Parts on Wounds Healing

S. No	Botanical Name	Wound & related therapies practiced in folk medicine	Plant part, extracts and animal models used	Studied wound healing / related activity
1	<i>Acalypha indica</i> L.	Skin diseases and Wound healing	Alcoholic extract of whole plant in excision and incision rat models.	Wound healing activity [15].
2	<i>Adhatoda zeylanica</i> Medic.	Wound healing properties and Asthma	Phytochemical activities of leaves wound healing in Swiss albino mice	Wound healing activity [33]
3	<i>Aloe vera</i> (L.) Burm.f.	Skin diseases and Wound healing	Crude extract of Plant in rates	The wound-healing effect of a glycoprotein [22]
4	<i>Aristolochia indica</i> L.	Wound healing and skin diseases	The ethanol extract of the shade-dried leaves wound healing in rats	Wound healing activity [34]
5	<i>Calotropis gigantean</i> (L.) R. Br.	Earache, Wound healing toothache and headache, sprain, stiff joints and pains	Ethanol extract of the flowers in acetic acid induced writhing and hot plate test in mice.	Analgesic activity [35]
6	<i>Datura fastuosa</i> L.	Wound healing and asthma	Ethanol extract of aerial parts of on Wistar albino rats	Wound healing activity [36]
7	<i>Euphorbia hirta</i> L.	Wound healing activity	Ethanol extract of leaves in rats.	Wound healing activity [37]
8	<i>Ocimum tenuiflorum</i> L.	Wound healing and cough	Alcoholic and aqueous extract of leaves in rates	Wound healing activity [38]
9	<i>Pongamia pinnata</i> (L.) Pierre.	Wounds, inflammations, piles, ulcers and rheumatism	Ethanol extract of leaves in acute, subacute and chronic models of inflammation in rats.	Anti-inflammatory and ulcerogenic effect [39]
10	<i>Terminalia arjuna</i> (Roxb.ex DC.)W&A.	Wound healing and teeth ache	Photochemical constituents for wound healing	Wound healing activities [40]