

TRADITIONALLY USED MEDICINAL PLANTS FOR WOUND HEALING IN THIRUVALLUR DISTRICT, TAMIL NADU, INDIA

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ABSTRACT

The present study aims to enumerate the ethno-medicinal uses of plants by the Irular communities residing around the Thiruvallur district. The medicinal use of (49) plants belonging to 39 families was identified and recorded by the tribes, along with their botanical identities and methods of drug preparation. The drugs administered locally to heal wounds, including antibiotics, antiseptics, etc., and the necessary information related to the traditional medicinal plants were highlighted in this paper. Wound healing activity is a cellular and biochemical process for restoring the original structure and functions of damaged tissue. The wound may occur from a physical, chemical, thermal, microbial, or immunological insult to the tissues. Various parts of the plants have been in use for several years in tribal communities, traditionally for treating many diseases like skin, colic, sores, cancer, etc. Due to their minimal side effects. The natural agents present in the plants induce wound healing and regeneration from tissue loss by multiple mechanisms. Plant extracts have immense potential for the treatment of wound healing activity. In this review, we focused on the wound healing activity with the pharmacological process of medicinal plants.

Keywords: Medicinal plant, Wound healing, Traditional, Regeneration

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INTRODUCTION

The medicinal plant was used to treat a wide range of illnesses and accounts for a sizable amount of the global pharma industry based on the knowledge of different traditional medicines such as Ayurveda, Siddha, and Unani. India has a wide variety of traditions in medicine. Since India is rich in biodiversity of plant resources, about 5000 species were utilized in the Indian system of folk medicines [1-4]. During the last few decades, there has been an increasing interest in medicinal plants and their traditional use [5-9]. People have in-depth knowledge about medicinal plants from their ancestors through problem-solving attempts in rural India [10]. Countries with a lower standard of living adopt therapeutic plants as their backbone. Hence, indigenous medicines are in great demand throughout the world as a source of emergency health care and in zero hours, owing to their qualities of biological and pharmacological activity and cost-effectiveness [11]. For thousands of years, the natural sources of medicinal treatments from plant-based systems have played an endless role in the primary health care of 80% of the world's developing and developed countries [12]. Ancient people used different parts of the plant-leaf bark, stem, root, etc.-to treat and prevent many ailments [13]. Wound infections are common in developing countries because of poor hygienic conditions [14]. In this context, wounds are physical injuries that result in an opening or breaking of the skin. A technique for wound healing is essential for the restoration of disrupted anatomical continuity and disturbed function of the skin [15]. Three main stages comprise the healing process: the inflammatory phase, the proliferating phase, and the remodeling phase, which eventually determines the strength and presence of the mended tissue [16]. Wound healing starts by replacing the damaged tissue with new tissue. Many biochemical steps take place to repair it. The healing process involves many steps involving coagulation, inflammation, granulation tissue formation, matrix formation, remodeling of connective tissue, and collagenization [17]. In the modern biomedical sciences, research on wound healing agents is one of the developing areas. Many traditional practitioners globally, especially in countries like India and China, have priceless information on several predominantly known and unknown wild plants for treating

wounds [18]. The potential of Traditional medical practices, which have been practiced for centuries in Africa and Asia, to treat disorders related to wound healing is being studied scientifically [19]. Herbal medicines in wound healing involve disinfection, debridement, and providing a suitable environment for the natural wound healing process [20]. Healing involved continuous interactions between cells and the cell matrix that allowed the process to proceed in three overlapping phases: the inflammatory phase (0–3d), cellular proliferation or proliferative phase (3–12 d), and remodeling phase (3–6 mo) [21, 22], used for medicinal plants in wound healers. The literature survey depicts that raw materials for drugs used in altered conditions of wounds such as ulcers, maggots, syphilitic ulcers, septic wounds, cellulitis, cumulative ulcers, diabetic carbuncle, and other related disorders were from natural resources. More than 70% of wound healing pharma products are plant-based, 20% are mineral-based, and the remaining contain animal products as their ingredients. Plant-based materials are used as first aid, coagulants, antiseptics, wound wash, and removal of pus in infected areas [23]. Several species, including *Centella Asiatica*, *Curcuma longa*, *Paeonia*, and *Suffruticose*, are popular wound healing products used by several cultures and ethnic groups. The popularity and evidence of continued use indicate that there are still lessons to be learned from traditional practice. Natural products and their derivatives are undescribed, unexplored combinations and compounds that would have a place in the contemporary therapeutic inventory [24]. The present study focused on the medicinal plants for wound healing in Thiruvallur dist. by gathering information from the localities. The pharmacological processes of medicinal plants.

Study area and ethnobotanical survey

Thiruvallur quarter, geographically latitude 12° 15 and #39; N and 13° 15 and #39; N, longitude 79° 15 and #39; E, and 80° 20E, is bounded by the Bay of Bengal in the east, the Vellore quarter of Tamil Nadu and Chittoor, the Nellore quarter of Andhra Pradesh on the west, and the Kanchipuram quarter in the south. The littoral region of this quarter is substantially flat, while some areas in Pallipattu and Tiruttani taluks are undulated and indeed hilly. The

soil types generally in this quarter are red-calcareous and littoral alluvial. Sandy soil mixed with soda pop or other alkali is also set up. The soil set up in the littoral region is of the erinaceous type suitable for the Casuarina tree. The average downfall of the quarter is 1104.4 mm, of which the northeast thunderstorm contributes to the tune of 690 mm. The average maximum temperature endured this quarter is 37.9 °C, and the minimum is 18.5 °C. This quarter exhibits both civic and pastoral characteristics. The total mortal pool deals with husbandry; this quarter is one of the fastest-developing sections of Tamil Nadu in terms of industries. The information was collected through group conversations and interviews with gardeners and other people. A field note was assigned for each factory account and given with the following details: binomial name, family, original name, part used, and remedial uses.

Traditional healers (Local)

Information was compiled about the traditional drugs used for crack-healing action in the Thiruvallur district. Traditional healers with practical knowledge of drugs were canvassed 25, using questionnaires, interviews, and conversations in their original dialect. Indigenous medicament used for promoting crack heal was gathered from the folk healers and senior citizens and endured

individuals rehearsing native drugs. The knowledge of medicinal plants among the people of this district leans on beliefs and compliances. This knowledge has been passed on from generation to generation but vanishes instantly.

Plants

Sidacordifolia l. Moringaoleifera l. lantana camera l. Aloe vera, Acalypha indica, Centella asiatica, Catharanthus roseus, Anisomeles malabarica l, Gymnema sylvestre, Eclipta alba l, and Hemidesmus indicas. The information on these plants was collected by group discussions and interviews with gardeners and local people. A field note was assigned for each plant material and documented with the following details binomial name, family, local name, parts used, and therapeutic uses.

Table 1 represents a list of plant parts utilized in the preliminary work, A total of 49 plant species have been found in wound healing treatment in this place, and a comprehensive list will be completed in survey and sampling. We have depicted enormously used plants in the traditional medicine of India which have ethnobotanical references, supporting oral information from local tribes and Vaidas. Even though traditional medicines offer a safe and inexpensive approach to treating wounds and burns, they have not received adequate attention.

Table 1: Medicinal plants with wound healing activity

Plant name	Family	Vernacular name	Part use
<i>Abrusprecatorius linn</i>	Fabaceae	Kunri	Seeds
<i>Acacia arabicaWilld</i>	Mimosaceae	Karuvelam	Leaf, Bark
<i>Acalyphaindica</i>	Euphorbiaceae	Kuppaimeni	Leaf
<i>Achyranthusaspera linn</i>	Amaranthaceae	Naayuruvi	Whole plant
<i>Acoruscalamus linn</i>	Araceae	Vasambu	Root
<i>AdathodavasicaNees</i>	Acanthaceae	Aadaathodai	Leaf
<i>Aeglemarmelos</i>	Rutaceae	Vilvam	Leaf, Stem
<i>Aloe vera linn.</i>	Liliaceae	Katralai	Leaf
<i>Anisomelesmalabarica (L.) R. Br. Ex. Sims</i>	Lamiaceae	Paemiratti	Stem
<i>Annonasquamosa linn.</i>	Annonaceae	Sitapzhalam	Root, leaf
<i>Azadirachtaindica A. Juss.</i>	Meliaceae	Vemmpu	Leaf
<i>Bambusabambos (L.) Voss.</i>	Poaceae	Moongil	Stem, Root
<i>Bauhinia purpurea linn.</i>	Caesalpeniaceae	Mandarai	Flower, Fruit
<i>Blepharismaderaspatensis (L.) Roth.</i>	Acanthaceae	Vettukaayapachilai	Leaf
<i>Calotropisgigantea (Linn.) R. Br. ex Ait</i>	Asclepiadaceae	Erukku	Leaf
<i>Catharanthusroseus l. G. Don</i>	Apocynaceae	Nithyakalyani	Leaf
<i>Centellaasiatica (Linn.) Urban.</i>	Apiaceae	Vallaarai	Whole Plant
<i>Citrus medica linn.</i>	Rutaceae	Narthankai	Fruit
<i>Cocciniaindica Wanda.</i>	Cucurbitaceae	Kovvai	Whole Plant
<i>Cynodondactylon Pers.</i>	Poaceae	Arugampullu	Whole plant
<i>Daturametel linn.</i>	Solanaceae	Oomatthai	Whole Plant, leaf
<i>Dolichosbiflorus linn.</i>	Fabaceae	Kollu	Whole Plant, seeds
<i>Eclipta alba (Linn.) Hassk.</i>	Asteraceae	Karisalaankanni	Whole Plant
<i>EmlicaofficinalisGaertn.</i>	Euphorbiaceae	Nellikkaai	Fruit
<i>Erythrinaindica lam.</i>	Fabaceae	Kaliyanamurunkkai	Stem, Seed, leaf
<i>Euphorbia hirta linn.</i>	Euphorbiaceae	Ammanphachharisi	Leaf
<i>Ficusbenghalensis linn.</i>	Moraceae	Alamaram	Bark, leaf, Seed
<i>Ficusreligiosa linn.</i>	Moraceae	Araasamaram	Whole Plant
<i>Gymnemasylvestre R. Br.</i>	Asclepiadaceae	Shirukurinjan	Leaf
<i>Hemidesmusindicus (L.) R. Br.</i>	Asclepiadaceae	Nannaari	Root
<i>Jatropha curcus linn.</i>	Euphorbiaceae	Kattuummanaku	Leaf
<i>Lantana camara linn.</i>	Verbenaceae	Unnicheddi	Whole Plant
<i>Madhukaindica J F Gmel.</i>	Sapotaceae	Ielupai	Whole Plant
<i>Meliaazedarach linn.</i>	Meliaceae	Malaivemmpu	Leaf
<i>Mimosa pudica linn.</i>	Mimosaceae	Thottasurungi	Whole Plant
<i>Moringaoleifera lam.</i>	Moringaceae	Murungai	Whole Plant
<i>Murryyakoenginii (Linn.) Spreng.</i>	Rutaceae	Karuveppilai	Whole Plant, leaf
<i>Musa paradisiaca linn.</i>	Musaceae	Vaazhai	Whole Plant
<i>Neriumindicum Mill.</i>	Apocynaceae	Arali	Root
<i>PlectranthuscoleoidesBenth.</i>	Lamiaceae	Omavallchedi	Leaf
<i>Pongamiaglabra Vent.</i>	Fabaceae	Pungam	Leaf, Seeds
<i>Portulacaquadrifida linn.</i>	Portulacaceae	Serupasalaikeerai	Leaf
<i>Psidiumguajava linn.</i>	Myrtaceae	Koyya	Leaf, Fruit
<i>Sidacordifolia (Linn)</i>	Malvaceae	Nillathuthi	Root
<i>Solanumnigrum l.</i>	Solanaceae	Manathakkali	Leaf
<i>Syzygiumcuminii (Linn.) Skeels</i>	Myrtaceae	Naval	Stem, Seeds
<i>Vitexnegundo linn.</i>	Verbenaceae	Nochi	Leaf
<i>Tridoxprostrata l.</i>	Asteraceae	Vettukayapundu	Leaf
<i>RhinacanthuscommunisNees</i>	Acanthaceae	Naagamalli	Root, leaf, Seeds

Most of these studies involve erratic screening of plants or extracts for healing activity, while some of the plants enumerated

in table No. 1 have been pharmacologically validated for their venture, viz. (Plate 1).



Aloe Vera



Acalypha indica



Centella asiatica



Catharanthus roseus



Anisomeles malabarica L.



Gymnema sylvestre



Ecliptaalba L.



Hemidesmusindicus L.



Lantana camera L.



Moringaoleifera L.



Sidacordifolia L.

Plate 1: Plant species selected for review

Local traditional healers use different parts of plants viz., root, stem, leaf, flower, fruit, seed, rhizome, tuber, bark, pulp, latex, and gums/resin as a source of medicine. Distribution analysis of many plant parts used for wound healing and bioactive principle revealed that plant parts viz., Flower (1), Fruit 4, leaf 25, Root 8, Seed 7, Stem 6, Whole plant 14.

Family wise distribution analysis of the plants used by the tribal healers revealed that medicinal plant species were distributed across 39 families viz., *Acanthaceae* 3, *Amaranthaceae* 1, *Annonaceae* (1), *Apiaceae* (1), *Apocynaceae* (2), *Araceae* (1), *Asclepiadaceae* (3), *Asteraceae* (2), *Caesalpeniaceae* (1), *Cucurbitaceae* (1), *Euphorbiaceae* (4), *Fabaceae* (4), *lamiaceae* (2), *liliaceae* (1), *Malvaceae* (1), *Meliaceae* (2), *Mimosaceae* (2), *Moraceae* (2), *Moringaceae* (1), *Musaceae* (1), *Myrtaceae* (2), *Poaceae* (2), *Portulacaceae* (1), *Rutaceae* (2), *Sapotaceae* (1), *Solanaceae* (2), *Verbenaceae* (2). Most of the remedies were obtained from plants belonging to families followed by *Euphorbiaceae* (4), *Fabaceae* (4), *Acanthaceae* (3), *Asclepiadaceae* (3), *Apocynaceae* (2), *Asteraceae* (2), *lamiaceae* (2), *Meliaceae* (2), *Mimosaceae* (2), *Moraceae* (2), *Myrtaceae* (2), *Poaceae* (2), *Rutaceae* (2), *Solanaceae* (2), and *Verbenaceae* (2). In the study, 11 families were represented by a single species (table 2) and (fig. 1).

Local people are using leaves (26) to cure various diseases, followed by whole plants (14), roots (7), seeds (7), flowers (1), fruit (4), bark (2), and stem (2). The most enormously used plant part in the preparation of medicine for various ailments is the leaf (52%) it is crushed to extract the juice and applied, followed by the whole plant (28%), root (14%), seed (14%), fruit (8%), flower (2%), bark (4%) and stem (8%) (fig. 2).

Table 2: Family-wise distributions of plants

Family	Number of plants
<i>Fabaceae</i>	4
<i>Mimosaceae</i>	2
<i>Euphorbiaceae</i>	4
<i>Amaranthaceae</i>	1
<i>Araceae</i>	1
<i>Acanthaceae</i>	3
<i>Rutaceae</i>	3
<i>Liliaceae</i>	1
<i>Lamiaceae</i>	2
<i>Annonaceae</i>	1
<i>Meliaceae</i>	2
<i>Poaceae</i>	2
<i>Caesalpeniaceae</i>	1
<i>Asclepiadaceae</i>	3
<i>Apocynaceae</i>	2
<i>Apiaceae</i>	1
<i>Cucurbitaceae</i>	1
<i>Solanaceae</i>	2
<i>Asteraceae</i>	2
<i>Moraceae</i>	2
<i>Verbenaceae</i>	2
<i>Moringaceae</i>	1
<i>Sapotaceae</i>	1
<i>Musaceae</i>	1
<i>Portulacaceae</i>	1
<i>Myrtaceae</i>	2
<i>Malvaceae</i>	1

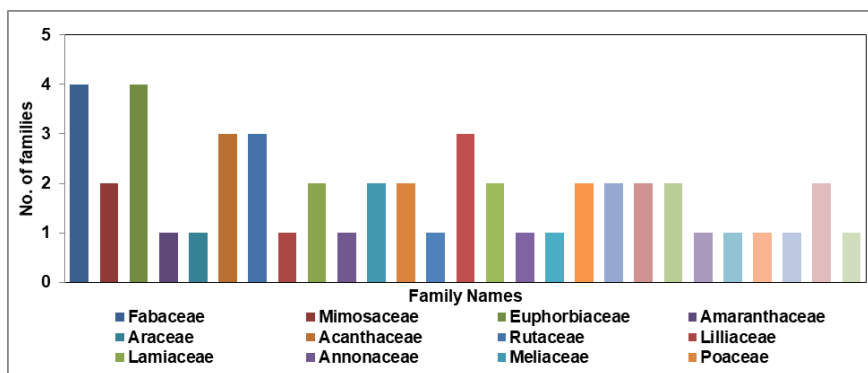


Fig. 1: Percentage distribution analysis of remedies obtained from different plant parts

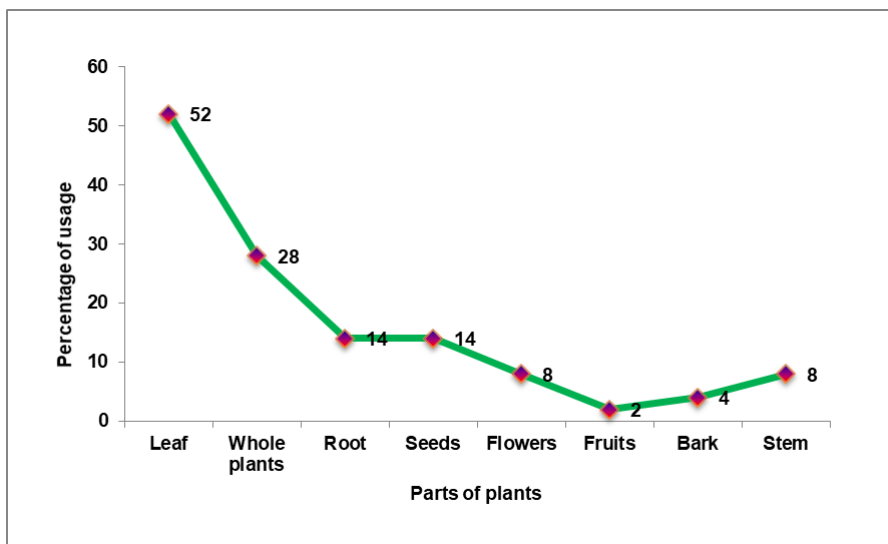


Fig. 2: Family-wise distributions of ethnomedicinal plants used by people in Thiruvallur district

Traditional knowledge of herbal medicine is disappearing which should be conserved and will give the baseline information for the chemist to discover new drugs. This is one of the steps taken towards documenting treasures of indigenous knowledge on the wound-healing property of medicinal plants. There is an urgent need for the proper collection of medicinal plants from the Thiruvallur district.

In ancient times, phytotherapy has been able to treat cutaneous wounds efficiently, reduce the onset of infections, and minimize the usage of antibiotics that cause critical antibiotic resistance. In diverse animal experimental models, secondary plant metabolites or active chemicals are the active agents that stimulate the process of wound repair. The most significant and specific examples include Asiatic acid, Madecassic acid, and Asiaticoside from *Centella Asiatica* [26-28] curcumin from *Curcuma longa*. There are a remarkable number of wound-healing botanicals that are widely used in the Northern Hemisphere, including *Achiella millefolium*, *Aloe vera*, *Althaea officinalis*, *Calendula officinalis*, *Matricaria chamomilla*, *Curcuma longa*, *Eucalyptus*, *Jobba*, *plantain*, *pine*, *green tea*, *pomegranate*, and *Inula* [29]. Some studies have advocated for a combination of honey wound dressings alongside antibiotics in instances where sepsis is a concern. Combination therapy resulted in a synergistic response in scenarios where antibiotic resistance was previously observed [30, 31] (Jenkin et al., 2012, liu et al., 2015).

Phytochemical content is to resolve their remedial features in wound repair, plant-derived substances were considered for their wound-healing activity as flavonols, flavanones, isoflavones, flavanols, flavonolignans, proanthocyanidins [32], cardiac glycosides, saponins, steroids, and tannins [33], β -glucans [34], bromelain [35], curcumin [36]. Quercetin and rutin are flavonoids with strong antioxidant, antimicrobial, and anti-inflammatory effects but limited water solubility. It was revealed that incorporating quercetin and rutin into polycaprolactone and chitosan oligosaccharides to form a new bioactive electrospun nanofiber membrane exhibited superior efficacy among all nanofiber membranes for burn injuries [37]. It was disclosed that different botanicals and medicinal plants are widely used as a topical treatment for wound repairing, such as *aloe vera*, *banana leaves* [38], *turmeric*, *Centella Asiatica*, *Rosmarinus officinalis*, and *Calendula officinalis* [39].

Natural products such as plant extracts and other plant-derived products and their phytochemicals assist in managing inflammatory diseases, exert antimicrobial effects, and might aid skin tissue regeneration [40, 41]. The wound itself is a rupture of the epithelial integrity of the skin that might be caused by violence or trauma. The rupture of epithelial integrity is trailed by disruption of the structure and function of underlying normal tissue [42]. They could remove oxidative stress and lower inflammation [43]. The wound-repairing ability of different plant extracts and their actives is proven in wound-curing animal models. Such plants improved collagen deposition, the proliferation of epithelial cells, and angiogenesis in diabetic and nondiabetic animal models [44]. Different types of plants are widely used in managing wounds and injuries from previous scientific research [45]. This process occurs through stimulating autolytic debridement, inducing an osmotic response, drawing water from the cells, and subsequently increasing the hydration at the wound site; this hydration needs to soften the slough at the wound site, and along with the denaturation of fibrin, it allows the slough to detach [46]. Observing nature and perception of their traditional knowledge about medicinal properties pave the way for treating diseases [47]. A combination of many parts of the same plant or parts from different plants or collective species of plants was used in wound healing, as cited [48]. Many herbs and plants were utilized as medicine in dietary forms. There is an increased awareness of using traditional plants to cure ailments. Due to the cost and side effects of other drugs, there is an urge for documentation of the medicinal plants with indigenous knowledge [49]. With the help of local communities with diverse knowledge of this data, the user-friendly database can be preserved and used for future generations.

CONCLUSION

Traditional medicinal plants are used by the public today because they have no side effects or chemical basis. The majority of these

plants are utilized as the raw material for drugs. Wound healing is a biological process that starts with trauma and soar formation. The present review revealed that nature provides a vast number of plants that show significant wound-healing activity.

Several parts of the plant have interesting anticancer, antimicrobial, antioxidant, anti-inflammatory, immunomodulatory, and anti-malarial properties. Consequently, further studies on this plant should be considered for research in photochemistry, wound healing, antimicrobial activity, antioxidants, pharmacology, and use in pest control.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

The authors declare no conflict of interest

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