WOUND HEALING POTENTIAL OF MEDICINAL PLANTS FROM PERIYAKOMBAI HILL AREA, NAMAKKAL DISTRICT, TAMIL NADU

[1*] Keerthiga M., [2]Marimuthu. C and [3]Anand .S.P.
[1]Department of Botany, Nehru Memorial College (Autonomous), Puthanampatti - 07
[2 & 3] Department of Botany, National College (Autonomous), Tiruchirappalli - 01

Abstract

The herbal medicines occupy distinct position right from primitive period to the present-daytime. The utilization of biologically diverse plant resources for various ailments is the lifelong struggle of human race. This paper documents the traditional knowledge of medicinal plants that are in use by the indigenous *Malayali* tribes residing in few isolated pockets of south India. The present study was done through structured questionnaires in consultations with the tribal practitioners and has resulted in the documentation of 41 medicinal plants belonging to 23 families and 40 genera. For curing wounds, the use of aboveground plant parts was higher (73.80%) than the underground plant parts (26.20%). Of the aboveground plant parts, leaf, stem, bark, fruits, seed and flowers. Different underground plant forms such as root, tuber and rhizome were also found to be in use by the *Malayali* tribe as a medicine. The study shows a high degree of ethnobotanical novelty and the use of plants among the *Malayali* reflects the revival of interest in traditional folk medicine.

Key Words: Wound Healing, Medicinal Plants, *Malayali* tribes, Kolli Hills.

1. Introduction

Wounds are physical injuries that results in an opening and break of the skin that cause disturbance in the normal skin anatomy and function. The process of wound healing consist of integrated cellular or biochemical events leading to the building of structural and functional integrity with regain of strength of injured tissues (Benbow, 2011). Current estimation indicate about 6 million people are suffering from chronic wounds worldwide (Kumar *et al*., 2007). The prevalence of chronic wounds in the community was reported as 4.5 per 1000 population, whereas an acute wound was about 10.5 per 1000 populations (Gupta *et al*., 2004).

Alternative sources as wound healing medicines like herbal medicines will become as an key components in healthcare industry for both humans and animals particularly in developing countries. These traditional medicines will fill the gap because of antibiotic criss and decrease in new medicines development in the last few decades, increasing costs, drug resistance, and side effects of modern pharmaceuticals . Although most of the bacterial infections can be managed using conventional antibiotics, there are several reports of multi-drug resistant bacteria (Nolff et al., 2016). Plant products are potential agents for wound healing and largely preferred because of their widespread availability and effectiveness as crude preparations. The herbal medicines for wound healing are very cheap and affordable and are safe as hypersensitive reactions (Vekatanarayana *et al*., 2010). The medicinal plants and has a rich tradition of plant-based knowledge on healthcare. Nearly 2000 of natural drugs have reported various pharmacological activities, out of these 1600 are from plant origin (Mukherjee, 2008 and Sandhya *et al*., 2011).

More than 70% of wound healing pharma products are of plant based, 20% are mineral based, and the remaining contain animal products as their base material. The plant based materials are used as first aid, antiseptic, coagulants, wound wash (extraction of pus), for infected wounds (Barreto et al., 2014). Biswas and Mukherjee, (2003) reviewed wound healing plants and described 164 plant species as novel source for obtaining bioactive substances with potential wound healing activity. Therefore, attempts to document wound healing activity of plants offers immense scope for researchers engaged in validation of the traditional claims and development of safe and effective drugs for cuts and wounds.

Malayali's are predominant hill tribes of Vattal Hills, Dharmapuri, Tamilnadu. Tribes of this community are familiar with local herbs and hold a vibrant knowledge base with regard to the use of the local plants to cure various ailments (Ramya *et al*., 2008). Their reliance on herbs for medicine has prompted the present investigation. In this study, an attempt is made to enumerate the medicinal plants used by the *Malayali's* as remedies for wound healing. This paper is an outcome of an attempt to collect and document information about ethnomedicinal plant species used in wound healing used by the tribal community.

2. Material and methods

2.1 Study area

Tamil Nadu is situated in southern end of India, East of Kerala and South of Andhra Pradesh and Karnataka states. The area of investigation Periyakombai hill area is located in Namakkal district, Tamil Nadu and has latitudinal and longitudinal range of 11º41 N latitude 78º40 E longitude respectively. There was hilly terrain with an altitude ranging from 400 – 1100m. The maximum temperature ranges between 22º C - 27º C and maximum between 7º C - 12º C. The average annual rainfall is around 120 cm. The highest peak of the hills is 1000m.

2.2 Data Collection

The ethnomedical data were recorded following the standard procedures like participatory field research methods such as semi- structured interviews, field inspection, field observation and participation in social life events of *Malayali* tribals. Frequent survey trips were undertaken during the periods of study to cover various seasons and stages of the plants.

The Ethno medical information were collected from 13 traditional herbal practitioners and elders of the tribal community who are well versed about the plants, their local names, parts used, and treatment of ailments (Sanjay *et al*., 2002). They also know about the preparation of medicine, mode of administration, dosage and storing of medicinal plant and medicine.

Plants were confirmed with the help of floras (Harshbergar 1896 and Jain 1995) and their identities were confirmed with the help of the Botanical Survey of India, Southern Region, Coimbatore. Herbarium specimens were prepared for the study plants and are deposited in the herbarium of the Department of Botany, National College (Autonomous), Tiruchirappalli, Tamil Nadu, India.

2.3 Statistical analysis:

The data was accessed on Microsoft Excel work sheets to summarize the various proportions like habit and plant parts used for medicinal plants used in the study area.

3. Results and discussion

The present study includes information on 41 plants belonging to 40 genera and 23 families used by *Malayali* tribe of Periyakombai area of Tamil Nadu for the treatment of cuts and wounds during the period of 2015 - 2016 (Table 1).

Habit based classification of plants used revealed that maximum remedies were obtained from Herb (14) followed by Shrub (9) > Tree (9) and Climber (9) respectively, indicating that more than 33.33% of the remedies were obtained from the Herbs followed by Tree 21.42% > Shrub 21.42% and Climber 21.42% were shown in figure 1**.** Different parts of medicinal plants viz., root, stem, leaf, flower, fruit, seed, rhizome, tuber, bark and latex were used as source of medicine by the local traditional healers. Distribution analysis of plant parts used as source of wound healing bioactive principle revealed that plant parts viz., Flower (2), Fruit (1), Leaves (20), Root (8), Seed (2), Stem (1), Whole plant (5), Bark (5), Latex (3), Tuber (2) and Rhizome (1). Percentage analysis of the plant part used were in following order Leaves (50%) > Root (19.04%) > Whole plant (11.90%) > Seed (4.76%) > Flower (4.76%) > Tuber (4.76%) > Rhizome (2.38%) > Fruit (2.38%) > Stem (2.38%) > Bark (11.90%) were shown in figure 2. Further, most of the remedies for wound healing were obtained from the leaves followed by Root. However, plant products viz., latex (7.14%) was in variably used as source of herbal drug to promote healing of wounds. Maximum numbers of remedies used for promoting wound healing were invariably used as external applicants, only few were

taken orally. Similarly there are many reports have been supported our studies by the usage of documented medicinal plants by kuruma tribes of kerala (Thomas et al., 2014), by Irula tribes of Karamadai ranges (Swamynathan and Kalaichelvi 2016) and by Kani tribals in Tirunelveli hills (Ayyanar and Ignacimuthu 2011).

Interestingly, most of the remedies used to promote wound healing were derived from single plant. However, sometimes combination of two parts of the same plant/ two or more plants has been documented. Besides, method of preparation and administration of medicine varied significantly depending on the plant species and plant part used. Most of the formulations used were in the form of paste (prepared by grinding the plant material). Very rarely, animal products were used in the formulations prepared for external application. Animal products (such as milk or urine) also served as an ingredient in the preparation. The paste is applied over the affected part of the body. Alternatively, juice extracted from fresh plant material or powder form of dry plant material was also used. These traditional method of treatment based on medicinal plants are still an important part of their life.

The survey indicated that the study area was rich in medicinal plants useful to treat a wide spectrum of human ailments. The study also revealed that the tribal people of the area possess good knowledge of crude herbal drugs. Such studies may produce valuable information for phytochemists and pharmacologists to develop new drugs for various human ailments. The present study observes that the younger generation takes no interest for preserving the traditional skills and technology. This situation highlights the need for complete recording of their empirical knowledge for the benefit of the future generations.

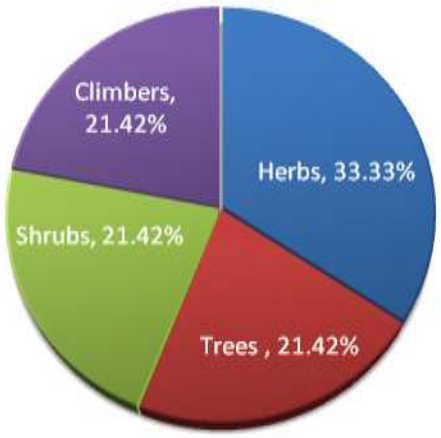

Figure 1: Plant distribution under different habits

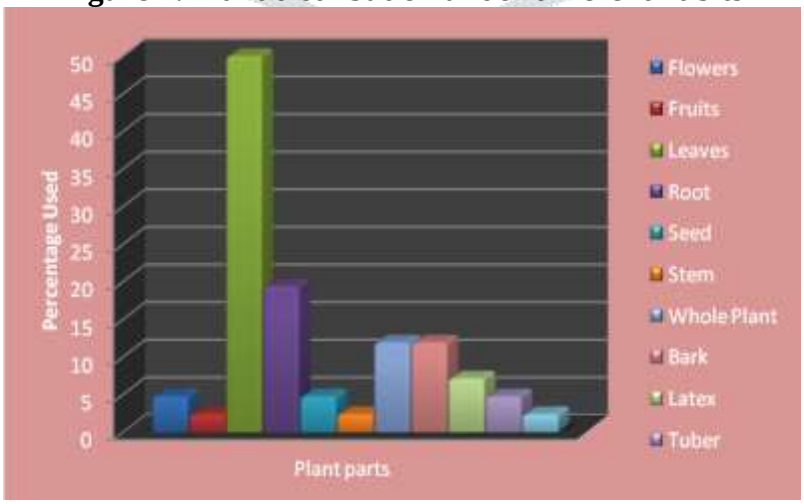

Figure 2: Percentage of Plant part utilization

Table 1: Wound healing plants used by *Malayali* tribals of Periyakombai hill

Botanical Name	Family	Common Name(Tamil)	Habit	Plant parts used	Mode of Preparation
Acacia leucophloea (Roxb.) Willd.	Mimosaceae	Velvelamaram	Tree	Stem bark	Paste of fresh stem bark is applied topically to treat cuts and wounds.
Acalypha indica L.	Euphorbiaceae	Kuppaimeni	Herb	Leaves	Leaf of this plant is ground into a paste and taken orally along with the leaf paste of *Mimosa pudica*, *Azadirachta indica* and flowers of *Albizzia lebbeck* to treat skin diseases (itching) and wounds. Dosage: Once a day for 3 days.
Aegle marmelos Correa ex Roxb	Rutaceae	Vilvam	Tree	Bark	Leaves are grind into paste along with black pepper, slightly heated and applied on the wounds.
Aloe vera Linn.	Liliaceae	Kathalai	Herb	Leaves	Fresh leaf paste is applied twice a day on wounds.
Annona squamosa L.	Annonaceae	Sitaphalam	Tree	Dried leaves, seed	Root paste for external application. Root bark decoction orally.
Azadirachta indica A. Juss.	Meliaceae	Vembu	Tree	Leaves, bark and fruits	Leaf paste for cuts and wounds.
Blepharis maderaspatensis (L.)	Acanthaceae	Pappadak-kodi	Herb	Leaves	Juice extracted from the leaf is heated with gingelly oil and applied topically on affected places to heal wounds.
Boerhavia diffusa Linn.	Nyctaginaceae	Mookkirattathai	Herb	Whole plant	Aerial plant parts juice directly applied on the wounds.
Calotropis gigantea (L.)	Asclepidaceae	Erukku	Shrub	Stem latex	Few drops of the stem latex are used to treat wounds created by thorns in heels and to remove the thorns from heel.
Caralluma umbellata Haw.	Asclepiadaceae	Anaikkallimulai	Herb	Whole plant	The tender stems are burnt in direct fire and eaten for five days regularly in empty stomach for ulcer problem.
Cocculus hirsutus (L.)	Menispermaceae	Kattukodi	Climber	Whole plant	Leaf paste was applied directly to wounds.
Commelina benghalensis L.	Commelinaceae	Kattukkananakoli	Herb	Stem	Juice extracted from the stem is mixed with the stem juice of *Canna indica* and fruits of *Areca catechu*. The mixture is applied topically on affected places to heal wounds.
Cryptolepis buchananii Roem & Schul.	Asclepiadaceae	Paalkodi	Herb	Latex	The milky latex is applied topically to treat wounds and lip cracks.
Curcuma domestica Valeton	Zingiberaceae	Manjal	Herb	Rhizome	Rhizome is grind into paste and mixed with mustard oil and applied on the wounds.
Cyclea peltata L.	Menispermaceae	Patakkilanku	Climber	Tubers	Tubers were applied externally to burn wounds.
Datura metel Linn.	Solanaceae	Oomathai	Herb	Whole plant	Latex of the leaves was applied on the wound.
Euphorbia hirta L.	Euphorbiaceae	Paal chedi	Herb	Leaves and latex	Fresh latex is applied topically on affected places to heal wounds. Also leaf of this plant, *Acalypha indica*, *Commelina bengalensis*, *Cissampelos pareira* and *Begonia fallox* are mixed and ground into a paste and the mixture thus obtained is

					applied topically on affected places to heal wounds.
Ficus bengalensis L.	Moraceae	Aalamaram	Tree	Leaves	Leaf powder is mixed with coconut oil and applied topically on affected places to treat wounds. Dosage: Once a day for 3 days.
Ficus racemosa L.	Moraceae	Atthimaram	Tree	Stem bark	Stem bark of this plant, stem barks of *Syzygium cumini* and *Punica granatum* are boiled in water and the decoction thus obtained is used to wash wounds twice or thrice a day to heal soon.
Geodorum densiflorum (Lam). Schltr.	Orchidaceae	Nilapoochedi	Herb	Roots	Leaves and root paste was used for the chronic wounds.
Gloriosa superba Linn.	Liliaceae	Kalappankizhangu	Climber	Root	Bulb boiled with mustard oil to treat wounds.
Habenaria plantaginea Lindl.	Orchidaceae	-	Herb	tubers	Tubers from the plant were made into paste and are applied tropically on the cut wounds.
Hemidesmus indicus (L.) R.Br.	Asclepiadaceae	Nannaari	Climber	Root	Root paste is applied on wounds.
Ixora coccinia L.	Rubiaceae	Idli poo	Shrub	Flower	Flowers of this plant are mixed with the leaves of *Coldenia procumbens*, *Centella asiatica* and stem bark of *Madhuca longifolia* and boiled with water. The decoction thus obtained is applied topically along with coconut oil on affected places to heal wounds.
Jasminum grandiflorum Linn.	Oleaceae	Mullai	Climber	Leaves	Leaves juice was applied for cut wounds.
Lawsonia inermis L.	Lythraceae	Maruthani	Shrub	Leaves	Leaf powder is mixed with coconut oil and applied topically to treat cuts and wounds.
Melia azedarach Linn.	Meliaceae	Malaivemmpu	Tree	Leaves	Leaf paste is applied topically to treat cuts and Wounds.
Mimosa pudica L.	Mimosaceae	Thottasurungi	Herb	Whole plant	Pinch of leaf paste is applied topically to treat cuts and wounds.
Moringa oleifera Lam.	Moringaceae	Murungai	Tree	Root bark and leaves	Root bark paste used for wounds and leaves paste was applied on the wound.
Murryaya koenginii (Linn.) Spreng.	Rutaceae	Karuveppilai	Shrub	Leaves	Leaf paste with albumin applied as plaster on wounds.
Nerium indicum Mill.	Apocynaceae	Arali	Shrub	Leaves	Juice of the leaves was applied on the wound.
Oxalis corniculata L.	Oxalidaceae	Puliyaarila	Shrub	Leaves	Leaf paste is applied on cuts and wounds.
Pongamia pinnata (L.)	Fabaceae	Punga maram	Tree	Root and bark	Juice of root is mixed with equal amount of coconut milk, boiled and applied topically to cure wound.
Rauwolfia serpentina Benth.	Apocynaceae	Vesammurukee	Shrub	Root	Root powder mixed with coconut oil was used for the wound healing.
Sarcostemma intermedium Decne.	Asclepiadaceae	Kodikalli	Climber	Root	Root paste was applied to cure bone fracture and cut wounds.
Solanum nigrum	Solanaceae	Mana	Climb	Leaves	Leaf paste is applied topically to heal wounds.

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Tephrosia purpurea Linn	Leguminosae	Kattukkolunci	Shrub	Leaves and seeds	Leaf powder is mixed with coconut oil and applied topically to heal wounds (burns).
Tinospora cardifolia (Willd).	Menispermaceae	Chindil	Climber	Leaves	Leaf paste is applied topically to treat wounds.
Tridax procumbens Linn.	Asteraceae	Vettukkaaya-thalai	Herb	Leaves	Leaf juice is immediately applied to cure cut wounds.
Wattakaka volubilis (L.)	Asclepiadaceae	Kudasappalai	Climber	Leaves	Leaf paste is mixed with common salt and applied on affected places to treat all types of swellings.
Withania sominifera (L)	Solanaceae	Amukkura	Shrub	Dried roots	Dried root was powdered and the powder was mixed with water to made into paste and applied on the wounds externally.

4. Conclusion

The knowledge on the folklore uses of the medicinal plants leads to open up ways for effective utilization of herbal medicines in future. Future work in this direction may help to discover new drugs to cure cuts and wounds. This study may stimulate researches to take up similar investigations in other tribal areas. However, there is a need for scientific validation, standardization and safety evaluation of plants of the traditional medicine before these could be recommended for healing of the wounds.

Reference

1. Barreto R. S., Albuquerque-júnior R. L., Adriano A. A., Almeida J. R., Santos M. R., Barreto A. S., et al. 2014. A systematic review of the wound-healing effects of monoterpenes and iridoid derivatives. Molecules, 19: 846–862. 10.3390/molecules19010846
2. Benbow M. 2011. Debridement: wound bed preparation. J. Community Nurs. 25: 18–23.
3. Biswas T. K. and Mukherjee, B. 2003. Plant Medicines of Indian Origin for Wound Healing Activity: A Review. International Journal of Lower Extremety Wounds, 2: 25.
4. Gupta N, Gupta SK, Shukla VK and Singh SP. 2004. An Indian community based epidemiological study of wounds. Journal of Wound Care, 13: 323-325.
5. Harshbergar JN. 1896. The Purpose of Ethnobotany, 27:146-58
6. Jain SK. 1995. A Manual of Ethnobotany (Ed.2); Scientific Pub. Jodhpur.
7. Kumar B, Vijayakumar M, Govindarajan R, Pushpangadan P . 2007. Ethnopharma approaches to wound Healing Exploring medicinal plants of India. Journal of Ethnopharmacology, 114: 103-113.
8. Mukherjee PK. 2008. Quality Control of Herbal Drugs an approach to evaluation of Botanicals. Business horizones, New Delhi - 2.
9. Muniappan Ayyanar, Savarimuthu Ignacimuthu. 2011. Ethnobotanical survey of medicinal plants commonly used by Kani tribals in Tirunelveli hills of Western Ghats, India. Journal of Ethnopharmacology, 134: 851–864
10. Nolff M. C., Reese S., Fehr M., Dening R., Meyer-Lindenberg A. 2016. Assessment of wound bio-burden and prevalence of multi-drug resistant bacteria during open wound management. J. Small Anim. Pract., 57: 255–259. 10.1111/jsap.12476
11. Ramya, S., Rajasekaran, C., Sivaperumal, R., Krishnan, A. and Jayakumararaj, R. 2008. Ethnomedicinal Perspectives of Botanicals used by Malayali Tribes in Vattal Hills of Dharmapuri (TN), India. Ethnobotanical Leaflets, 12: 1054 - 1060.
12. Sandhya S, Kumar P Sai, Vinod KR, David B and Kumar K. 2011. Plants as potent anti-diabetic and wound healing agents: Review. Hygeia Journal for Drugs and Medicines, 3(1): 11-19.
13. Sanjay, Unial KR, Anjali, Aswathi Gopal S, Rawat. 2002. Traditional and Ethnobotanical users of Plants in Bhagirathi valley, Indian Journal of Traditional Knowledge, 1: 7-19.
14. Swamynathan Mani Dhivya and Kanthasamy Kalaichelvi. 2016. Medicinal plants used by Irula tribes of Nellithurai Beat, Karamadai Range, Western Ghats, Tamil Nadu, India: An ethnobotanical survey. Journal of Medicinal Plant Studies, 4(4): 270-277.

15. Thomas B, Arumugam R, Veerasamy A, Ramamoorthy S. 2014. Ethnomedicinal plants used for the treatment of cuts and wounds by *Kuruma* tribes, Wayanadu districts of Kerala, India. Asian Pacific Journal of Tropical Biomedicine, 4 (Suppl 1): S488-S491. doi:10.12980/APJTB.4.2014B571.
16. Venkatanarayana D, Kumar S and Mohana Lakshmi S. 2010. Review on Natural Wound Healing Agents. International Journal of Phytopharmacy, 1(1): 1-4.