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Ethnobotanical survey of medicinal plants used by traditional healers in Karayar tribal village, Tirunelveli district, Tamil Nadu, India

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Abstract

This research aims to document and evaluate the traditional medical practices and the use of ethnomedicinal plants by the Kani tribal healers living in Karayar, Tirunelveli district, Tamil Nadu, India. The study documented 67 plant species from 59 genera and 35 families. Sixty-seven medicinal plants are used to treat thirty-one ailments, with the most common use of plants being for the treatment of cough (7 plants). Fabaceae has the highest number of species (10 species). The leaves of 23 species are used for medicinal purposes. This documentation can be valuable for pharmacologists, foresters, conservationists, researchers, and those interested in herbal medicine.

Keywords: Kani tribe; Ethnomedicinal plants; Tribal healers; Herbal medicine

1. Introduction

Humans have been using valuable ingredients extracted and processed from medicinal plant species to treat and cure various ailments since ancient times [1]. While traditional medicines are still recognised as the primary health care system in many underdeveloped communities, such as tribal, due to their effectiveness, lack of modern medical alternatives, and cultural preferences, medicinal plants offer a viable alternative to primary health care in developing countries [2].

Throughout history, both tribal and rural people have utilised medicinal plants that have been collected from the wild [1, 3]. This knowledge is passed down from one generation to the next [4]. The transition of such information is influenced by exposure to modern culture, rapid land degradation, access to modern facilities, and urban developmental processes that change the location of communities [5, 6].

Nowadays, the World Health Organization (WHO) estimates that 80% of the population of Asian and African nations use herbal medicine for some aspects, primarily for health care [7]. Despite the empirical nature of traditional medical practices, it is estimated that over 200 million people in India rely on different facets of the traditional medical system to meet their healthcare needs because they have limited access to organised primary healthcare service centres [8].

India has 67.37 million tribal people belonging to 537 groups. They live in diverse areas and have vast knowledge of utilizing and conserving food and medicinal plants [9]. There is a wealth of research indicating that tribal groups living in isolated regions are vital contributors to the sustainable management of natural resources. Furthermore, these communities have a deep-rooted dependence on plant-based resources for their critical needs such as food, fuel, medicine, and grazing [10, 11].

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The utilization of plants in ethnomedicine has been shown to contain a diverse range of substances that can be utilized to treat both chronic and infectious diseases. These plants have been found to contain secondary metabolites and essential oils that have significant therapeutic importance [12]. The use of medicinal plants in various ailments has been widely acknowledged for its safety, cost-effectiveness, efficacy, and easy availability. Additionally, the knowledge of indigenous people is highly valued for sustainable biodiversity utilization and the development of novel drug programs [9].

The objective of this investigation is to document and evaluate the traditional medical practices and use of ethnobotanical plants by the Kani tribal healers residing in Karayar, Tirunelveli district, Tamil Nadu, India. Similar ethnobotanical investigations to document the traditional knowledge that is disappearing have been reported from several parts of India [10, 11, 13]. Therefore, it is critical for the preservation of biological resources and their sustainable use that indigenous knowledge be recorded through ethnobotanical research.

2. Material and methods

The study was carried out in Tamil Nadu, India, in the Tirunelveli district's Karayar tribal village (8.6538° N, 77.3105° E) between December 2019 and March 2020, information was gathered from tribal traditional medicine practitioners through semi-structured interviews, observation, and escorted field trips. Names of the most well-known tribe traditional healers (Vaidyas) in the research area were requested from members of the tribal community. In the Karayar tribal settlement, interviews were conducted with twenty tribe traditional healers.

To confirm the accuracy of the information, all the data was gathered through interviews with native traditional healers who practised medicine and lived close to plants. Anthropologists refer to this concept as semi-structured [14]. Before conducting an interview, we obtained each participant's prior informed agreement, and we followed the International Society of Ethnobotany's ethical guidelines [15]. Utilising Participatory Rural Appraisal (PRA) techniques, data on medicinal plant utilisation (species and part(s) used, use(s), and preparation), as well as the local name(s) of the plant species were rigorously gathered [16]. We were shown the plants by tribal traditional medicine practitioners who were invited to the field. When it was not possible to do so, plants were gathered from the surrounding area and displayed to verify the names of the plants. Recordings of the interviews have been made for documentation.

To identify each plant, voucher samples were also gathered. Standard literature was utilised for identification, including Floras of Madras Presidency [17], Further Illustrations on the Flora of the Tamil Nadu and Carnatic [18, 19, 20], Flora of Tamil Nadu, India [21, 22, 23], and Legumes of India [24]. Using online resources like the International Plant Name Index (www.ipni.org), the Missouri Botanical Gardens Tropicos Nomenclatural database (www.tropicos.org), and the Royal Botanic Garden and Missouri Botanic Garden plant name database (www.theplantlist.org), all plant scientific names, plant families, and plant authorities were confirmed. Additionally, a herbarium was prepared for each plant and its parts, and it has been deposited in the PG & Research Department of Botany, V.O. Chidambaram College, Thoothukudi.

3. Result and Discussion

The use of 67 medicinal herbs by the traditional Kani tribal healers of Karayar village, Tirunelveli District, was recorded in the current study. A table was created that contained information on each plant, such as its common name, useful parts, and therapeutic use (Table 1).

Table 1 Medicinal Plants Used by Kani Tribal Traditional Medicinal Practitioners of Karayar Village

S. No	Botanical name	Family name	Local name	Habit	Parts used	Disease
1.	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Vilvam	Tree	Leaves	Wounds
2.	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae	Ciru-pulai	Herb	Whole plant	Cough
3.	<i>Allium cepa</i> (L.)	Amaryllidaceae	Vengayam	Herb	Bulb	Chicken box
4.	<i>Annona squamosa</i> L.	Annonaceae	Cintamaram	Tree	Leaves	Inflammation
5.	<i>Alpinia officinarum</i> Hance	Zingiberaceae	Sitharathai	Herb	Root	Inflammation

6.	<i>Andrographis paniculata</i> (Burm. fil.) Nees	Acanthaceae	Nilavembu	Herb	Leaves	Diabetic
7.	<i>Aristolochia indica</i> L.	Aristolochiaceae	Perumarunthukodi	Climber	Leaves	Stomach pain
8.	<i>Bauhinia purpurea</i> L.	Fabaceae	Nilattiruvatti	Tree	Bark	Cough
9	<i>Bauhinia variegata</i> L.	Fabaceae	Mantharai	Tree	Stem	Ulcer
10.	<i>Biophytum sensitivum</i> (L.) DC.	Oxalidaceae	Mukkutti	Herb	Leaf	Inflammation
11.	<i>Boerhaavia diffusa</i> L.	Nyctaginaceae	Mukkurttaikkoti	Herb	Root	Hydrocele
12.	<i>Buchanania lanzan</i> Spreng.	Anacardiaceae	Charam	Tree	Stem	Wound healing
13.	<i>Casalpina bonduc</i> L.Roxb	Fabaceae	Kac-cakay	Climber	Leaves	Cough
14.	<i>Cardiospermum helicacabum</i> L.	Sapindaceae	Mudakkathan	Climber	Root	Throat infection
15.	<i>Cardiospermum corindum</i> L.	Sapindaceae	Kattumudakkathan	Climber	Leaves	Abdominal pain
16.	<i>Cinnamomum verum</i> J. S. Presl	Lauraceae	Lavanga pattai	Tree	Bark	Inflammation
17.	<i>Cissus quadrangularis</i> L.	Vitaceae	Perandai	Shrub	Stem	Digestion
18.	<i>Citrus limon</i> (L.) Burm. f.	Rutaceae	Elumichai	Tree	Fruit	Stomach pain
19.	<i>Clitoria ternatea</i> L.	Fabaceae	Sangupushpam	Climber	Root	Headache
20.	<i>Cleome viscosa</i> L.	Cleomaceae	Naikadugu	Herb	Seed	Rheumatism
21.	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Kovai	Shrub	Stem	Digestion
22.	<i>Commelina benghalensis</i> L.	Commelinaceae	Aduthinnathalai	Herb	Stem	Wounds
23.	<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	Akasavalli	Herb	Leaves	Liver diseases
24.	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Karisalamkani	Herb	Leaves	Hair growth
25.	<i>Elephantopus scaber</i> Auct. non L.	Asteraceae	Aanachuvadi	Herb	Leaves	Rheumatism
26.	<i>Erythrina stricta</i> Roxb.	Fabaceae	Mullumuruku	Tree	Seed	Intestinal
27.	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Amman Pacharisi	Herb	Whole plant	Stomach pain
28.	<i>Ficus racemosa</i> L.	Moraceae	Atti	Tree	Whole plant	Teeth pain
29.	<i>Hemidesmus indicus</i> (L.) R. Br.	Apocynaceae	Nannari	Twiner	Whole plant	Body cool
30.	<i>Hygrophila schulli</i> (Hamilt.) M.R. Almeida & S.M. Almeida	Acanthaceae	Neermulli	Herb	Whole plant	Cough
31.	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	Thumbai	Herb	Leaves	Dermatitis
32.	<i>Limonia acidissima</i> L.	Rutaceae	Vilamaram	Tree	Fruit	Breathing problem
33.	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Andhi Mandarai	Herb	Root	Spasmolytic
34.	<i>Mucuna pruriens</i> (L.) DC.	Fabaceae	Poonaikaali	Shrub	Seed	Impotency

35.	<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	Tamarai	Herb	Flower	Heart diseases
36.	<i>Tecoma stans</i> (L.) Juss. ex Kunth	Bignoniaceae	Manjarali	Shrub	Root	Leprosy
37.	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Nalla Thulasi	Herb	Leaves	Cough
38.	<i>Ocimum basilicum</i> L.	Lamiaceae	Tirunittrupatchai	Herb	Leaves	Cold
39.	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Phyllanthaceae	Kizhaanelli	Herb	Root	Jaundice
40.	<i>Plantago ovata</i> Forsskal	Plantaginaceae	Isabgol	Herb	Seed	Prevent abortion
41.	<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	Ponga Maram	Tree	Bark	Digestion
42.	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Vengai	Tree	Whole plant	Constipation
43.	<i>Piper nigrum</i> L.	Piperaceae	Milaku	Climber	Seed	Cough
44.	<i>Piper battle</i> L.	Piperaceae	Vettrilai	Climber	Leaves	Indigestion
45.	<i>Randia dumetorum</i> (Retz.) Poir.	Rubiaceae	Marakalam.	Shrub	Fruit	Itching
46.	<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Sarbagandha	Shrub	Leaves	Constipation
47.	<i>Rubia cordifolia</i> L.	Rubiaceae	Manjistha	Climber	Leaves	Constipation
48.	<i>Ruta graveolens</i> L.	Rubiaceae	Aruvatham pachai	Herb	Leaves	Rheumatism
49.	<i>Sapindus trifoliatus</i> L.	Sapindaceae	Boondi Kottai	Tree	Fruit	Piles
50.	<i>Santalum album</i> L.	Santalaceae	Chandanam	Tree	Bark	Skin disease
51.	<i>Semecarpus anacardium</i> L. f.	Anacardiaceae	Serankottai	Herb	Fruit	Arthritis
52.	<i>Solanum nigrum</i> L.	Solanaceae	Manathallaki	Herb	Whole plant	Cough
53.	<i>Solanum virginianum</i> L.	Solanaceae	Kandankathri	Herb	Fruit	Toothache
54.	<i>Sphaeranthus indicus</i> L.	Asteraceae	Vishnu karandhai	Herb	Leaves	Asthma
55.	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Naval	Tree	Bark	Body heat
56.	<i>Tamarindus indica</i> L.	Fabaceae	Pulli	Tree	Leaves	Piles
57.	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Kattukolungi	Shrub	Leaves	Asthma
58.	<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	Combretaceae	Vella maruthu	Tree	Fruit	Head ache
59.	<i>Terminalia chebula</i> Retz.	Combretaceae	Kadukkaai	Tree	Seed	Diabetes
60.	<i>Terminalia crenulata</i> (Heyne) Roth	Combretaceae	Karumaruthu	Tree	Fruit	Asthma
61.	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Tanri	Tree	Fruit	Diarrhea
62.	<i>Tinospora cordifolia</i> (Willd.) Miers	Menispermaceae	Seenthil kodi	Climber	Leaves	Wound

63.	<i>Tridax procumbens</i> L.	Asteraceae	Thalavetti poo	Herb	Leaves	Healing wound
64.	<i>Tribulus terrestris</i> L.	Zycophyllaceae	Nerinji	Herb	Root	Kidney stone
65.	<i>Vitex negundo</i> L.	Lamiaceae	Nocchi	Tree	Leaves	Cold
66.	<i>Withania somnifera</i> (L.) Dunal	Solanaceae	Amukkuram	Shrub	Tuber	Rheumatism
67.	<i>Wrightia tinctoria</i> (Roxb.) R.Br	Apocynaceae	Vepalai	Tree	Leaves	Psoriasis

The current study resulted in the documentation of 67 plant species from 59 genera and 35 families (Table 2). Comparably, Salai Senthilkumar et al. [25] recorded 175 medicinal plants utilised by the *Malayali* tribe in the Yelagiri hills of Tamil Nadu, India, that belong to 147 genera and 56 families. Additionally, 85 medicinal plants from 39 families were documented by Jaganathan et al. [26] and were used by the *Irular* tribe in Pillur Valley, Coimbatore, Tamil Nadu, India.

Table 2 Familywise distribution of documented medicinal plants

S. No	Family Name	No of the Genus	No of the Species
1	Acanthaceae	2	2
2	Amaranthaceae	1	1
3	Amaryllidaceae	1	1
4	Anacardiaceae	2	2
5	Annonaceae	1	1
6	Apocynaceae	3	3
7	Aristolochiaceae	1	1
8	Asteraceae	4	4
9	Bignoniaceae	1	1
10	Cleomaceae	1	1
11	Combretaceae	1	4
12	Commelinaceae	1	1
13	Convolvulaceae	1	1
14	Cucurbitaceae	1	1
15	Euphorbiaceae	1	1
16	Fabaceae	9	10
17	Lamiaceae	3	4
18	Lauraceae	1	1
19	Menispermaceae	1	1
20	Moraceae	1	1
21	Myrtaceae	1	1
22	Nyctaginaceae	2	2
23	Nelumbonaceae	1	1
24	Oxalidaceae	1	1

25	Phyllanthaceae	1	1
26	Piperaceae	1	2
27	Plantaginaceae	1	1
28	Rubiaceae	3	3
29	Rutaceae	3	3
30	Santalaceae	1	1
31	Sapindaceae	2	3
32	Solanaceae	2	3
33	Vitaceae	1	1
34	Zingiberaceae	1	1
35	Zycophyllaceae	1	1
33	Total	59	67

Thirty-one ailments have been treated using the sixty-seven medicinal plants that have been identified in the current study region; the most common use of plants was for the treatment of cough (7 plants). Similarly, Karuppusamy [27] found that the *Paliyan* tribe of the Sirumalai hills, in the Dindigul district of Tamil Nadu, India, used ninety medicinal plants to treat seventeen different health issues, with wound healing being the most frequent usage (10 plants).

Out of the currently known sixty-seven species, Fabaceae has the highest number of species (10 species) (Table 2). In a related study, Samar et al. [28] listed 32 plant species from 26 genera and 18 families, with Fabaceae being the most prevalent family, utilised by the Bheel tribe in Guna district, Madhya Pradesh, India, to treat various ailments.

The present study focused on the traditional medicinal practices of the Kani tribals residing in the Karayar tribal village. The practitioners of this tribe use different parts of various plant species for their medicinal purposes. Leaves of 23 species, fruits of 9 species, roots of 8 species, whole plants of 7 species, seeds of 6 species, barks and stems of 5 species each, flowers of 2 species, and bulbs and tubers of 1 species each are used for medicinal purposes (Figure 1). The use of leaves as the most preferred plant part for medicinal purposes is consistent with other ethnobotanical surveys [27, 29]. The leaves of a plant are relatively easy to collect and do not pose a significant threat to the plant's survival. They also contain chlorophyll and other essential compounds used in photosynthesis and metabolism. On the other hand, collecting underground plant parts, such as roots, tubers, and rhizomes, can be critical for both ecological and survival reasons. The lush green leaves are easily available for most of the year, making it convenient to use them for preparing medicines. Both fresh and dried plant parts are used for their medicinal properties, ensuring accessibility regardless of availability.

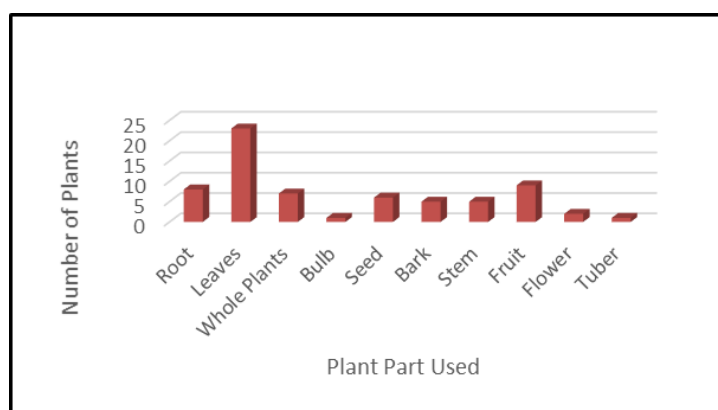


Figure 1 Plant part used for the preparation of medicine

The life forms of the reported species are shown in Figure 2. About 40% of the plant species that have been documented are herbaceous. This is similar to the findings of Bosco and Arumugam [9], who found that habit forms indicate that

there are 14 species of herbs, 10 species of trees, 8 species of shrubs, 2 species of twiner, and only 1 species of climber. Additionally, according to Figure 2, trees comprise 34% of the study, followed by climbers (15%) and shrubs (11%). Due to their great efficacy in treating ailments when compared to other living forms and their accessibility, herbs are frequently used by the Kani tribe's traditional medical practitioners in the Karayar tribal village.

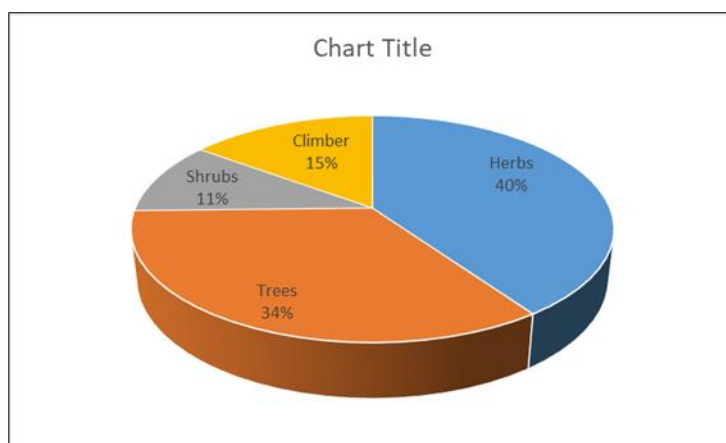


Figure 2 Habit-wise distribution of medicinal plants recorded in the study area

4. Conclusion

The study conducted highlights the importance of documenting the traditional knowledge of the Kani tribe's traditional healers from the Karayar tribal village. This documentation can be beneficial for pharmacologists, foresters, conservationists, researchers, and those interested in herbal medicine. The research paper provides valuable information to pharmacologists and biochemists for the screening of individual species and their phytochemicals. The ultimate aim is to expedite drug discovery.

Compliance with ethical standards

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Disclosure of conflict of interest

We hereby declare that we do not have any conflicts of interest.

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