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Journal of Ethnopharmacology

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Ethnobotanical study of Kani tribes in Thoduhills of Kerala, South India



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ARTICLE INFO

Article history:

Received 3 October 2013

Received in revised form

9 December 2013

Accepted 11 December 2013

Available online 3 January 2014

Keywords:

Ethnomedicine

Traditional healers

Kani tribes

Thoduhills

ABSTRACT

Ethnopharmacological relevance: India is having a rich vegetation with a wide variety of plants, because of the extreme variations in geographical and climatic conditions prevailing in the country. Plants have been used since ancient times for the treatment of various ailments. Especially, Kani tribal communities in Thodu hills of Kerala meet their healthcare needs by using non-timber minor forest products and preparations based on traditional knowledge. They still depend on medicinal plants and most of them have a basic knowledge of medicinal plants which are used for first aid remedies, to treat cough, cold, fever, headache, poisonous bites and some simple ailments. The present study was initiated with an aim to identify traditional healers who are practicing herbal medicine among the Kani tribals in Thodu hills of Kerala, India and quantitatively document their indigenous knowledge on the utilization of medicinal plants, particularly most common ethnomedicinal plants.

Methods: A field study was carried out over a period of 1 year in Thodu hills. The ethnomedicinal information was collected through interviews among the Kani traditional healers. The collected data were analyzed through use value (UV), informant consensus factor (Fic), fidelity level (FL) and relative importance (RI).

Results: During the present study a total of 35 medicinal plant species belonging to 28 families and 34 genera have been documented. These plants were used to treat various diseases and ailments grouped under 14 disease categories, with the highest number of species (7) being used for liver problems, circulatory system and dermatological disorders, followed by skeletal muscular system disorders (6), and fever (5). In the study area the informant consensus about usages of medicinal plants ranges from 0.70 to 1 with an average value of 0.83. Herbs (46%) were the primary source of medicine, followed by shrubs (23%). *Plumbago zeylanica* (UV of 1.86) and *Ocimum tenuiflorum* (UV of 1.57) are the most frequently and popularly used medicinal plant species in the study area. *Aristolochia tagala* is rare and a vulnerable climber, *Curculigo orchoides*, *Elephantopus scaber*, *Helicteres isora*, *Smilax zeylanica* and *Strychnos nux-vomica* are rare species which need to be conserved for future use.

Conclusion: The high degree of consensus among the informants suggests that the current use and knowledge is still strong. The efficacy and safety of all the reported ethnomedicinal plants needs to be evaluated for phytochemical and pharmacological studies, especially the plants with high informant consensus factor, use value and fidelity level should be given priority to carry out bioassay and toxicity studies. We recommend the plants *Plumbago zeylanica*, *Ocimum tenuiflorum*, *Artocarpus hirsutus*, *Andropogon muricatus*, *Helicteres isora*, *Coscinium fenestratum* and *Justicia adhatoda* with high UV and RI values. *Biophytum sensitivum*, *Curculigo orchoides*, *Strychnos nux-vomica*, *Gossypium hirsutum*, *Artocarpus heterophyllus*, *Elephantopus scaber*, *Pergularia daemia* and *Pyrrosia heterophylla* (newly reported claims with highest FL) for further ethnopharmacological studies for the discovery of potential new drugs.

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1. Introduction

Tribals dwelling in remote places depend on the forest that includes rich diversity of flora and fauna to meet their lively hood and health care needs (Chopra et al., 1986; Kadhivel et al., 2010).

Herbal medicines have been used by them since antiquity in treating diseases. However, valid scientific data on the usage of ethnomedicinal plants is rather obscure. Recently, (Schmidt et al., 2009) experimentally proved that plants offer immense scope for researchers engaged in validation of traditional claims for the development of novel drugs. Since interest in traditional medicine have been increasing world over, ethnobotanical studies have gained prominence to explore the traditional knowledge particularly in developing countries (Joshi and Joshi, 2000). Therefore, collection of ethnobotanical information and

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documentation of traditional knowledge has gained prominence from the prospective of drug development (Ragupathy et al., 2008). India has more than 427 tribal communities with rich diversity of indigenous tradition. However, traditional knowledge base and practices have been marginalized due to political and socio-economical reasons. Off late, interest in traditional medicine has been initiated to explore the knowledge base from various tribal groups across the country (Jain and Patole, 2001; Pei, 2001; Ignacimuthu et al., 2006; Sandhya et al., 2006; Ragupathy and Newmaster, 2009). Several studies have related that tribal population in remote area, not only depend on plant based resources for medicines, food, forage, and fuel, but also play a vital role in the management of natural resources (Ignacimuthu et al., 2006; Ragupathy et al., 2008; Ragupathy and Newmaster, 2009). Tribal communities in Kerala meet their healthcare needs by using non-timber minor forest products and preparations based on traditional knowledge. Further, it has been established that herbal drugs obtained from plants are safe in treating various ailments with few side effects (Ayyanar and Ignacimuthu, 2005).

The main objective of this study was to assess the diversity of ethnomedicinal plants used by Kani tribes and document the traditional medicinal practices followed in healing ailments. Similar ethnobotanical studies have been reported in several parts of India to document the traditional knowledge that has been vanishing (Rajan et al., 2002; Ganesan et al., 2004; Ignacimuthu et al., 2006; Sandhya et al., 2006). Therefore, documenting indigenous knowledge through ethnobotanical studies is important for the conservation of biological resources and their sustainable utilization.

2. Methodology

2.1. Study area and people

In view of exploitation and conservation of folk knowledge, an attempt has been made to study the medico-ethnobotanical aspects from the Iyavilagam of Thoduhills lying between 8° 28' – 8° 53' N latitude and 77° 10' – 77° 35' E longitude (Fig. 5). The dense vegetation is contiguous with the Neyyar wild life sanctuary in the southeast borders and the Peppara wild life sanctuary in the northeast. Climatic conditions are moderately hot and humid. Maximum temperature is recorded in March and April. Annual temperature generally ranges from 16 to 35 °C. Annual rainfall is 2800 mm. Maximum rainfall occurs from May to July during the southeast monsoon and October to November during northeast monsoon (Arun et al., 2007). There is limited and scattered scientific record of the herbal remedies in detail, used by the local inhabitants of this region belonging to Kani tribes. The *Kanis*, a forest dwelling tribe, live in and around the Thoduhills of South Western Ghats in Thiruvananthapuram district of Kerala. The word *Kanikar* means a hereditary proprietor of land (Arun et al., 2007). *Kanis* live together in small communities; some of their names are Binu kani, Mundan kani, Chinnan kani, Chamban kani, Ayappan kani, Sulochanan kani, Kutti kani, Kunjappan kani, Maniyan kani, Velikutti kani. (Iyavilagam, Neyyatinkara); some are settled in the vicinity of towns and become domesticated. Traditional occupation of *Kanis* includes collection of cane and supplying it to the artisans living close by. They themselves also make some baskets and mats. They are also engaged in seasonal collection of minor non-timber forest products, such as honey, bee wax, medicinal plants, gums, etc. They acquired the knowledge of treatment procedures from their ancestors.

2.2. Data collection

The study area was investigated to get information from tribal practitioners and also to cross check the information provided by the other tribal practitioners during the earlier visits. During each field

survey at least 10 days were spent with the local people in their tribal hamlets. In order to document the utilization of medicinal plants, field trips were made during the 15 months period (March 2012–May 2013) ensuring that the dry and monsoon seasons were accommodated. The collected specimens were identified and authenticated with the help of valid references (Gamble and Fischer, 1935; Bor, 1960; Henry et al., 1987, 1989; Matthew, 1991) and further validated through herbarium referencing at the Department of Botany, St. Joseph's College. Angiosperm phylogenic group III (APG III, 2009) was followed to classify the species. Nomenclature and correct author citation for all the species were thoroughly checked in the (Tropicos, 2012) database. A total of seven resource persons or informants or traditional healers were identified to get the ethnomedicinal information through direct interviews/oral conversations. They have sound knowledge on the medicinal plants found in their surrounding areas and they practise medicine within their families and neighbors (Fig. 7). Information gathered from the traditional healers on local name of the plant, plant part used for curing, method of preparation, any other plants/agents used as ingredients, modes of administration, etc. were recorded for each collected ethnomedicinal plant.

2.3. Ailment categories

Based on the information obtained from the traditional healers in the study area, all the reported ailments were categorized into 14 categories (Table 1) viz. liver problems (LP), circulatory system (CS), poisonous bites (PB), endocrinal disorders (ED), fever (Fvr), respiratory system disorders (RSD), skeletal muscular system disorders (SMSD), gastro intestinal ailments (GIA), eye infection (EI), genito urinary ailments (GUA), dermatological infections/diseases (DID), hair diseases (HC), kidney stone (US) and cancer diseases (CD).

2.4. Data analysis

2.4.1. Informant consensus factor (Fic)

The informant consensus factor (Fic) was used to see if there was agreement in the use of plants in the ailment categories between the plant users in the study area. The *Fic* was calculated by the following formula (Heinrich et al., 1998).

$$Fic = \frac{Nur - Nt}{Nur - 1}$$

where *Nur* refers to the number of use-reports for a particular ailment category and *Nt* refers to the number of taxa used for a particular ailment category by all informants. The product of this factor ranges from 0 to 1. A high value (close to 1.0) indicates that relatively few taxa are used by a large proportion of the informants. A low value indicates that the informants disagree on the taxa to be used in the treatment within a category of illness.

2.4.2. Use value (UV)

The relative importance of each plant species known locally to be used as herbal remedy is reported as the use value (*UV*) and it was calculated using the following formula (Phillips et al., 1994).

$$UV = \frac{\sum U}{n}$$

where *UV* is the use value of a species, *U* is the number of use reports cited by each informant for a given plant species and *n* is the total number of informants interviewed for a given plant. The *UV* is helpful in determining the plants with the highest use (most frequently indicated) in the treatment of an ailment. *UVs* are high when there are many use-reports for a plant and low when there are few reports related to its use.

2.4.3. Fidelity level (FL)

To determine the most frequently used plant species for treating a particular ailment category by the informants of the study area, we calculated the fidelity level (FL). The FL was calculated using the following formula (Friedmen et al., 1986):

$$FL(\%) = \frac{Np}{N} \times 100$$

where *Np* is the number of use-reports cited for a given species for a particular ailment category and *N* is the total number of use

reports cited for any given species. Generally, high FLs are obtained for plants for which almost all use-reports refer to the same way of using it, whereas low FLs are obtained for plants that are used for many different purposes (Srithi et al., 2009).

2.4.4. Relative importance (RI)

We designed the relative importance (RI) of each remedial plant based on the normalized number of pharmacological properties (PH) accredited to it and the normalized number of body

Table 1
Ailments grouped by different ailment categories.

Ailment categories	Biomedical terms	Malayalam terms
Liver problems (LP)	Jaundice	Manja pitham
Circulatory system (CS)	Blood clotting, blood purification, scurvy, cholesterol	Raktham kattu, raktham shudheekarikkan, sheethapittham or chorikkarappan, kozhuppu
Poisonous bites (PB)	Poison bites, centipede bite, snake bite, bee bite	Pooran kadi, pambu kadi, theneecha kadi
Endocrinal disorders (ED)	Diabetes	Prameham
Fever (Fvr)	Fever, malarial fever	Pani, malampani
Respiratory system disorders (RSD)	Cold, pneumonia fever	Jaladosham, vishamajjvaram
Skeleto muscular system disorders (SMSD)	Arthritis, inflammation, muscular pain, elephantoid swelling	Vatham, thadippu, peshi vedhana, aanakkal or mandh
Gastro intestinal ailments (GIA)	Dysentery, ulcers, pitta	Arshasu or udaraamayam, kodalpun, pittam
Eye infection (EI)	Eye infection	Kannu vedana
Genito urinary ailments (GUA)	Sexual weakness, menstrual problems, postnatal care	Laimgikamaaya balaheenatha, aartthava prashnam, prasavaanatharamulla shraddha
Dermatological infections/diseases (DID)	Cuts, wounds, itching, skin irritation, burning injury	Vettukayam, murivu, chorchil, thokku asvasthatha, theekayam
Hair diseases (HC)	Hair diseases	Thalamudi rogam
Kidney stone (US)	Kidney stone	Vrukka kallu
Cancer diseases (CD)	Cancer	Arbudam

Table 2
List of commonly used medicinal plants by Kani tribal's in Thoduhills, India.

Botanical name (Family)	Local name	Life form	Parts used	Preparation	Application
<i>Phyllanthus amarus</i> Schum. and Thonn. (Euphorbiaceae)	Keezhaneli	Herb	Ep	Juice	Oral
<i>Abrus precatorius</i> L. (Fabaceae)	Atimaduram	Climber	Rt	Juice	Oral
<i>Pergularia daemia</i> (Forssk.) Chiov. (Asclepiadaceae)	Veliparuthi	Climbing herb	Ep	Paste	Oral
<i>Gossypium hirsutum</i> L. (Malvaceae)	Paruthi	Sub Shrub	Lf	Paste	Oral/topical/inhalation
<i>Moringa pterygosperma</i> Gaertn. (Moringaceae)	Murungai	Tree	Sb	Paste	Topical
<i>Elephantopus scaber</i> L. (Asteraceae)	Anachuvadi	Herb	Ep	Paste	Oral
<i>Strychnos nux-vomica</i> L. (Loganiaceae)	Kanjiram	Tree	Lf	Juice	Topical
<i>Allium cepa</i> L. (Amaryllidaceae)	Ulli (Onion)	Herb	Bb	Raw	Topical
<i>Artocarpus hirsutus</i> Lam. (Moraceae)	Ayani maram	Tree	Fr, Lf, Sb.	Paste/juice	Topical/oral
<i>Andropogon muricatus</i> Retz. (Poaceae)	Ramacham	Herb	Rt with Rh	Decoction/paste	Oral/topical/inhalation
<i>Ocimum tenuiflorum</i> L. (Lamiaceae)	Thulasi	Herb	Lf, Rt	Juice	Oral
<i>Artocarpus heterophyllus</i> Lam. (Moraceae)	Plavu	Tree	Lf	Paste	Topical
<i>Acorus calamus</i> L. (Acoraceae)	Vayambu	Herb	St	Juice	Oral
<i>Chromolaena odorata</i> (L.) R.M.King and H.Rob. (Asteraceae)	Communist pacha	Herb	Lf	Paste	Topical
<i>Clerodendrum infortunatum</i> L. (Lamiaceae)	Peruvelum	Herb	Lf	Decoction	Topical
<i>Curculigo orchiooides</i> Gaertn. (Hypoxidaceae)	Nilapanai	Herb	Ep	Paste	Oral
<i>Helicteres isora</i> L. (Sterculiaceae)	Idampiri/Valampiri	Shrub	Fr, Lf	Paste/juice	Oral
<i>Biophytum sensitivum</i> (L.) DC. (Oxalidaceae)	Nilathengu	Herb	Ep	Juice	Oral
<i>Justicia adhatoda</i> L. (Acanthaceae)	Adalotakam	Shrub	Lf	Paste/juice	Topical/oral
<i>Vitex trifolia</i> L. (Verbenaceae)	Vellanochi	Shrub	Ep	Decoction/juice	Oral/topical/inhalation
<i>Smilax zeylanica</i> L. (Liliaceae)	Kareelanji	Climber	Rh, Lf	Decoction	Oral
<i>Scoparia dulcis</i> L. (Scrophulariaceae)	Kallurukkipacha	Herb	Lf, Fl, Fr	Paste	Oral
<i>Centella asiatica</i> (L.) Urb. (Apiaceae)	Kodangal	Herb	Ep	Paste	Topical
<i>Aristolochia tagala</i> Cham. (Aristolochiaceae)	Garuda kodi	Climber	Lf	Paste	Topical
<i>Plumbago zeylanica</i> L. (Plumbaginaceae)	Vata koduvveli	Shrub	Rt	Paste/raw	Oral/topical/inhalation
<i>Pyrosia heterophylla</i> (L.) M.G. Price (Polypodiaceae)	Seethathali	Herb	Lf, Rt	Paste	Oral
<i>Calycopteris floribunda</i> Lam. (Combretaceae)	Pullanthi	Shrub	Lf, Fr, Fl	Juice/raw	Oral
<i>Hemidesmus indicus</i> (L.) R.Br. (Asclepiadaceae)	Narunindi	Herb	Rt	Decoction	Oral
<i>Clitoria ternatea</i> L. (Fabaceae)	Sangupushpam	Climber	Lf	Decoction	Topical
<i>Coscinium fenestratum</i> (Gaertn.) Coleb. (Menispermaceae)	Maramanjil	Climber	St	Paste/juice	Oral
<i>Morinda reticulata</i> Gamble. (Rubiaceae)	Neyvalli	Shrub	Ep	Juice	Oral
<i>Senna alexandrina</i> Gars. ex Mill. (Fabaceae)	Thavara	Shrub	Ep	Juice/paste	Oral/topical/inhalation
<i>Capsicum frutescens</i> L. (Solanaceae)	Kantharimulaku	Herb	Ep	Raw/paste	Oral
<i>Averrhoa bilimbi</i> L. (Oxalidaceae)	Irumban puli	Tree	Lf, Fr	Raw	Oral
<i>Pisonia grandis</i> R. Br. (Nyctaginaceae)	Marakeera	Tree/shrub	Lf	Paste/raw	Topical

Parts used: Ep – entire plant, Rt – root, Lf – leaf, Sb – stem bark, Bb – bulb, Fr – fruit, Rh – rhizome, St – stem, Fl – flower.

systems (BS) it treated. Data on remedial uses were prearranged according to the PH accredited to each taxon (e.g. astringent, anti-inflammatory, emollient, etc.) and to the specific body systems treated (e.g. jaundice, cold, wounds, fever, etc.). The RI was calculated using the following formula (Bennett and Prance, 2000):

$$RI = \frac{RelPH + RelBS}{2} \times 100$$

where RI is the relative importance, PH is the number of reported pharmacological properties for the given plant, Rel. PH is the relative number of pharmacological properties (PH of a given plant/maximum PH of all reported species), BS is the number of body systems treated and Rel. BS is the relative number of body systems treated (BS of a given plant/maximum BS of all reported species).

3. Result and discussion

3.1. Documentation of indigenous ethnomedical knowledge

During the present investigation, it was noted that (Table 2) 35 plant species are used as herbal remedy for the treatment of several ailments. Among them, (Fig. 1) 16 plants were herbs, 8 plants were shrubs, 6 tree species and 5 climber species. 34 angiospermic plants and another one was a pteridophyte. These were enumerated with their medicinal importance. Out of the 35 plant species studied 29 were dicot, 5 were monocot and 1 was a pteridophyte. More over a single plant is used for more than 1 disease, for example *Calycotris floribunda* (malarial fever,

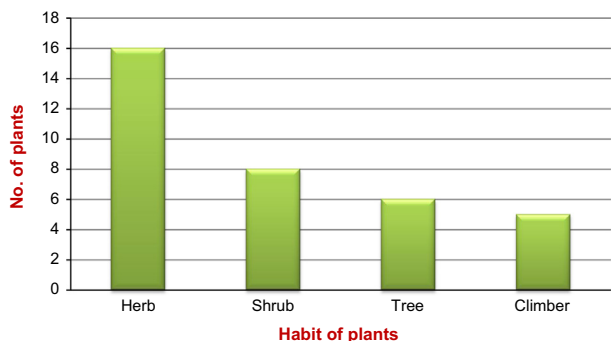


Fig. 1. Analysis of habit with respect to no. of species.

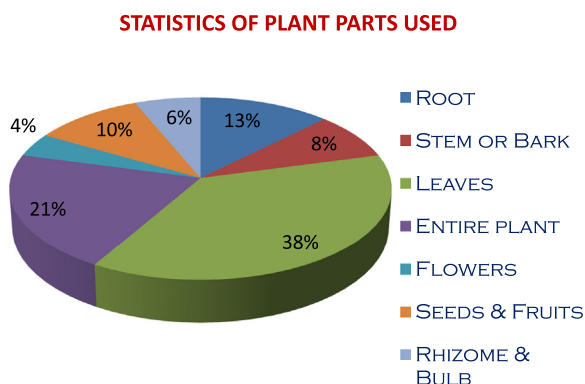


Fig. 2. Statistics of plant parts used.

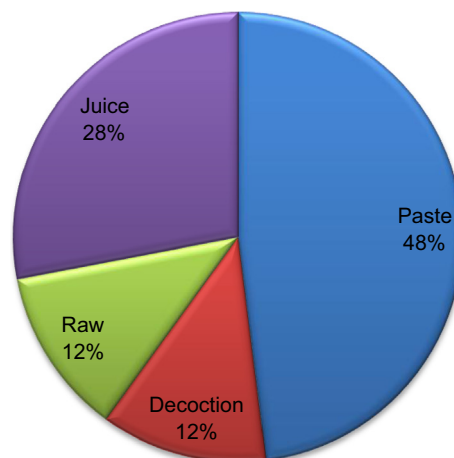


Fig. 4. Categories of Kani tribes mode of utilization for the preparation of medicine.

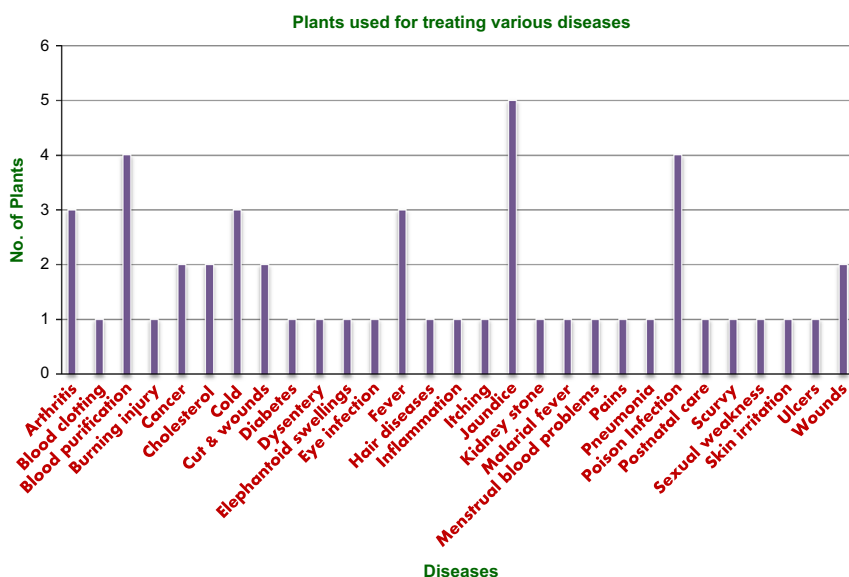


Fig. 3. Plants used for treating various diseases.

dysentery and jaundice), *Coscinium fenestratum* (jaundice and diabetes), *Andropogon muricatus* (fever, inflammation, skin irritation), *Artocarpus hirsutus* (arthritis, pitta, sexual weakness), *Ocimum tenuiflorum* (cold, fever), *Helicteres isora* (cold, fever, cancer), *Pisonia grandis* (elephantoid swellings, arthritis), *Plumbago zeylanica* (arthritis, cold, fever), *Senna alexandrina* (blood purification, bee bite) and *Vitex trifolia* (wounds, ulcers) Seven remedies were used to treat jaundice. In western Madhya Pradesh of India 13 plants were used for the treatment of jaundice (Samvatsar and Diwanji, 2000). Similarly traditional healers in Kancheepuram district of Tamilnadu, India used *Phyllanthus amarus* as a remedy for jaundice (Muthu et al., 2006). Common ailment cold is considered to be a natural causal disease and hence its symptoms are treated at the house hold level (Busia, 2005).

In the present study 3 remedies (*Ocimum tenuiflorum*, *Helicteres isora*, *Plumbago zeylanica*) were used to get relief from cold, and

common health problems in the site of the study area were skin diseases such as burning injury, skin irritation, cut and wounds, itching etc. Some plants (8 remedies) were used to treat these troubles. Several studies have reported the plants used for wound healing, itching, skin irritations and other skin diseases in various parts of the world (Harsha et al., 2003; Ayyanar and Ignacimuthu, 2005; Chah et al., 2006 and Saikia et al., 2006).

3.2. Life form and parts used

Most of the remedies are reported for the first time. The population used herbal remedies for the treatment of common minor ailments and even for some major diseases like jaundice, malarial fever, blood clotting, etc. These people have a long history of traditional use of plants. Traditional medicine is still widely practiced throughout the region; it is now fast disappearing due to

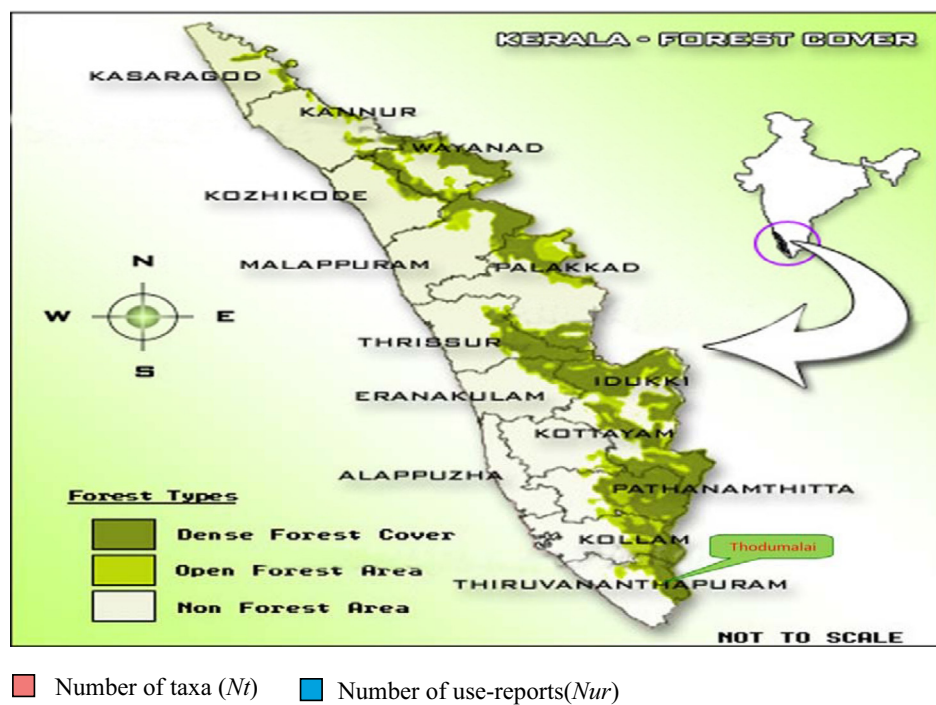


Fig. 5. Map showing the location of Thodumalai in Kerala state, India.

Table 3
Ingredients added for the preparation of herbal medicines by the Kani tribes.

Botanical name	Other plants added in medicinal preparation	Other ingredients added
<i>Pergularia daemia</i>	—	Eggwhite/alcohol
<i>Elephantopus scaber</i>	—	Milk
<i>Morinda reticulata</i>	—	Rice
<i>Moringa pterygosperma</i>	—	Turmeric/coconut oil
<i>Chromolaena odorata</i>	—	Calcium
<i>Coscinium fenestratum</i>	—	Coconut milk
<i>Strychnos nux-vomica</i>	—	Breast milk
<i>Andropogon muricatus</i>	<i>Aristolochia tagala</i> , <i>Strychnos nux-vomica</i> , <i>Plumbago zeylanica</i>	—
<i>Phyllanthus amarus</i>	<i>Abrus precatorius</i>	Coconut milk
<i>Morinda reticulata</i>	—	Coconut milk
<i>Coscinium fenestratum</i>	<i>Acorus calamus</i>	Coconut water
<i>Pyrosia heterophylla</i>	—	Coconut milk/rice soup
<i>Calcyopteris floribunda</i>	—	Coconut milk
<i>Scorpio dulcis</i>	—	Coconut water
<i>Calcyopteris floribunda</i>	—	Milk
<i>Curculigo orchioides</i>	—	Milk
<i>Justicia adhatoda</i>	—	Honey
<i>Gossypium hirsutum</i>	<i>Aristolochia tagala</i>	—
<i>Capscicum frutescens</i>	<i>Curcuma longa</i> , <i>Allium sativum</i>	Dried coconut
<i>Vitex trifolia</i>	—	Oil

modernization. Most of the time drugs are utilized in the fresh or dried state. It is found that leafy crude drug preparations are mostly recommended as ethno medicine followed by entire plant, root, seeds and fruits, stem or bark, flower, rhizome and bulb (Fig. 2). The most frequently used preparations being juice, decoction, extract and paste, the methods and period of administration may be widely different. Fig. 3 shows the no. of plants used for treating various diseases. Some remedies consist of single herbs but more than two herbs are reported in several preparations.

3.3. Method of preparation and mode of administration of plants

The preparation and utilization of plant parts were grouped into four categories (Fig. 4). Of these, the most commonly used method of preparation was paste (48%) followed by juice (28%), raw (12%, taken as raw material of plant parts like leaves, fruits, etc.) and decoction (10%). Preparation of paste for the treatment of ailments is a common practise among the other tribal people in India (Ignacimuthu et al., 2006) and other parts of the world (Giday et al., 2010). The paste was prepared by grinding the fresh or dried plant parts with water or oil. The decoction was obtained by boiling the plant parts in water until the volume of the water reduced to minimum or the required amount.

3.4. Ingredients added

The medicinal arrangements were completed out of a single plant part or in mixture of several plant parts. In case of Kani's medicinal arrangements, multiple modes of preparation were

dominating over the single mode of arrangements (Table 3). The Kani traditional healers used more than two or three plant parts for the preparation of medicine in the treatment of single

Table 5
Informant consensus factor for commonly used medicinal plants.

Ailment category	Number of use-reports (Nur)	Number of taxa (N _t)	Informant consensus factor (Fic)
Liver problems	26	7	0.76
Circulatory system	27	7	0.77
Poisonous bites	11	4	0.70
Endocrinal disorders	5	1	1
Fever	19	5	0.78
Respiratory system disorders	14	4	0.77
Skeleto-muscular system disorders	20	6	0.73
Gastro intestinal ailments	8	3	0.71
Eye infection	3	1	1
Genito-urinary ailments	12	3	0.81
Dermatological infections/disorders	24	7	0.74
Hair diseases	6	1	1
Kidney stone	5	1	1
Cancer	10	2	0.88
Total	190	52 ^a	

^a A taxa may be reported in more than one ailment category.

Table 4
Use value, no. of use-reports (ailment treated) and relative importance (RI) for commonly used medicinal plants.

Botanical name (Family)	Use value	Ailment category: no. of use-reports (ailment treated)	RI
<i>Phyllanthus amarus</i> (Euphorbiaceae)	0.71	LP:5 (jaundice)	44.0
<i>Abrus precatorius</i> (Fabaceae)	0.57	LP:4 (jaundice)	41.5
<i>Pergularia daemia</i> (Asclepiadaceae)	0.86	CS:6 (blood clotting)	61.5
<i>Gossypium hirsutum</i> (Malvaceae)	0.43	PB:3 (poison infection)	34.0
<i>Moringa pterygosperma</i> (Moringaceae)	0.57	DID:4 (burning injury)	66.5
<i>Elephantopus scaber</i> (Asteraceae)	0.28	CS:2 (blood clotting)	36.5
<i>Strychnos nux-vomica</i> (Loganiaceae)	0.43	EI:3(eye infection)	56.5
<i>Allium cepa</i> (Amaryllidaceae)	0.86	DID:6 (cut wounds)	46.5
<i>Artocarpus hirsutus</i> (Moraceae)	1.43	SMSD:2 (arthritis) GIA:3GUA:5 (sex weakness)	82.5
<i>Andropogon muricatus</i> (Poaceae)	1.43	Fvr:4SMSD:3inflammationDID:3skin irritation	92.5
<i>Ocimum tenuiflorum</i> (Lamiaceae)	1.57	RSD:5 (cold) Fvr:6 (fever)	75.5
<i>Artocarpus heterophyllus</i> (Moraceae)	0.57	PB:4 (centipede bite)	61.5
<i>Acorus calamus</i> (Acoraceae)	0.71	LP:5 (jaundice)	41.5
<i>Chromolaena odorata</i> (Asteraceae)	0.28	DID:2 (cut wounds)	34.0
<i>Clerodendrum infortunatum</i> (Lamiaceae)	0.43	DID:3 (itching)	51.5
<i>Curculigo orchioides</i> (Hyppoxidaceae)	0.57	GUA:4 (menstrual blood problems)	46.5
<i>Helicteres isora</i> (Sterculiaceae)	1.28	RSD:3 (cold)Fvr:2 (fever) CD:4 (cancer)	77.5
<i>Biophytum sensitivum</i> (Oxalidaceae)	0.86	CD:6 (cancer)	61.5
<i>Justicia adhatoda</i> (Acanthaceae)	1.14	RSD:3 (pneumonia) SMSD:5 (pains)	75.5
<i>Vitex trifolia</i> (Verbenaceae)	1.00	DID:4 (wounds) GIA:3 (ulcers)	60.5
<i>Smilax zeylanica</i> (Liliaceae)	0.71	CS:5 (blood purification)	34.0
<i>Scoparia dulcis</i> (Scrophulariaceae)	0.71	US:5 (kidney stone)	41.5
<i>Centella asiatica</i> (Apiaceae)	0.86	HC:6 (hair diseases)	64.0
<i>Aristolochia tagala</i> (Aristolochiaceae)	0.43	PB:3 (snake bite)	29.0
<i>Plumbago zeylanica</i> (Plumbaginaceae)	1.86	SMSD:6 (arthritis) RSD:3 (cold)Fvr:4 (fever)	75.0
<i>Pyrrosia heterophylla</i> (Polypodiaceae)	0.57	LP:4 (jaundice)	44.0
<i>Calycopteris floribunda</i> (Combretaceae)	1.00	Fvr:3 (malarial fever) GIA:2 (dysentery) LP:2	67.5
<i>Hemidesmus indicus</i> (Asclepiadaceae)	0.71	CS:5 (blood purification)	46.5
<i>Clitoria ternatea</i> (Fabaceae)	0.28	DID:2 (wounds)	51.5
<i>Coscinium fenestratum</i> (Menispermaceae)	1.28	LP:4 (jaundice) ED:5 (diabetes)	70.5
<i>Morinda reticulata</i> (Rubiaceae)	0.71	CS:3 (blood purification) LP:2 (jaundice)	58.0
<i>Senna alexandrina</i> (Fabaceae)	0.43	CS:2 (blood purification) PB:1 (bee bite)	53.0
<i>Capscicum frutescens</i> (Solanaceae)	0.71	CS:2 (cholesterol) GUA:3 (postnatal care)	68.0
<i>Averrhoa bilimbi</i> (Oxalidaceae)	1.00	CS:4 (scurvy) CS:3 (cholesterol)	60.5
<i>Pisonia grandis</i> (Nyctaginaceae)	0.57	SMSD:3 (Elephantoid swelling) SMSD:1 (arthritis)	55.5

or multiple ailments; similar findings were reported by several researchers (Teklehaymanot et al., 2007; Ignacimuthu et al., 2008; Tabuti et al., 2010 and Upadhyay et al., 2010). The frequent use of

multiple plant remedies among the traditional healers could be attributed to the belief of synergic reactions where one plant could have a potentiating effect on the other (Giday et al., 2010). It is believed that multiple prescriptions contain a range of pharmacologically active compounds and the poly-herbal treatment has more healing power than the single medicinal plant treatment, since each medicinal plant used in the mixture is a remedy (Teklehaymanot et al., 2007).

Kani traditional healers too frequently use some ingredients such as honey, cow/goat's milk, sugar, ghee, salt, boiled rice, coconut water and coconut milk to improve the acceptability and medicinal property of certain remedies (Poonam and Singh, 2009). Oils of coconut and turmeric were commonly used for the preparation of paste/medicated oil. They used specific plant parts and specific dosages for the treatment of diseases and the dose given to the patient depended on age, physical status and health conditions. Before giving treatment the condition of the patient was observed deeply and then they were given the prepared medicines.

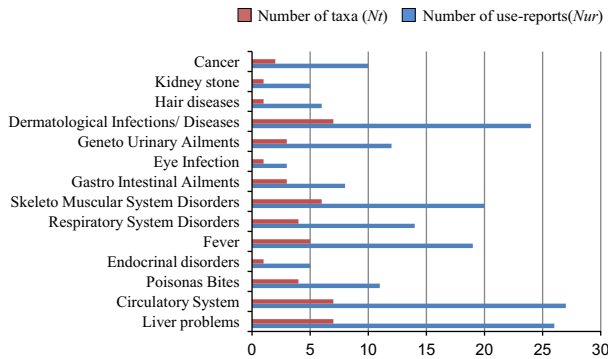


Fig. 6. Categories of ailments treated by Kani tribal's arranged by number of use-reports.

ETHNOPHARMACOLOGY AND MICROBIOLOGY RESEARCH UNIT
DEPARTMENT OF BOTANY, ST. JOSEPH'S COLLEGE
TIRUCHIRAPPALLI - 620 002, TAMILNADU, INDIA. No : **037**

FIELD DATASHEET

1. Collection No. : 17 2. Date : 23-11-2012
 3. Altitude : 1100 m Latitude : 8°28' - 8°47' N Longitude : 77°11' - 77°19' E
 4. Name of the Forest : Iyyavilagan, Thoduk hills 5. Locality : Kankuzhi ferry
 6. District : Thiruvananthapuram 7. State : Kerala
 8. Type of Vegetation : Dry Ever green 9. Soil : Black
 10. Botanical name : Helicteres isora L. 11. Family : Sterculiaceae
 12. Occurrence : Occasional 13. Vernacular Name : Idampizi, Valampiri,
 14. Language : Malayalam
 15. Status : Herb / Shrub / Sub-Shrub / Small Tree / Tree / Climber
 16. Phenological Status : Vegetative / Flowering / Fruiting
 17. Root : 18. Stem :
 19. Leaves : Simple, serrate margin, scabrous, pubescent beneath
 20. Bark : 21. Inflorescence : Axillary fascicle cyme
 22. Flower colour : Red Petals, Turning Pale blue when Old.
 23. Fruit : Brown, Greenish Brown, Spirally twisted.
 24. Uses : രോമന്ദം - ചിരകൃഷ്ണം, ചിരകൃഷ്ണം - ചിരകൃഷ്ണം, ചിരകൃഷ്ണം - ചിരകൃഷ്ണം
ചിരകൃഷ്ണം - ചിരകൃഷ്ണം, ചിരകൃഷ്ണം - ചിരകൃഷ്ണം
ചിരകൃഷ്ണം - ചിരകൃഷ്ണം, ചിരകൃഷ്ണം - ചിരകൃഷ്ണം
 25. Collector (s) : T. Francis Xavier, M. Kannan,
 26. Tribal Name : Velikutti Kani,

TFX No: **037** TFX No: **037**

Fig. 7. Format of field datasheet used to record the plant details and ethnomedicinal information.

3.5. Plant use values

The most commonly used species was *Plumbago zeylanica* with 13 use reports by 7 informants, giving the highest use value of 1.86. *Plumbago zeylanica* is attributed to its use in the treatment of various diseases and it is well recognized by all informants as the plant having the highest medicinal value (Table 4). Other important plants with a high use value were *Ocimum tenuiflorum* (11 use reports by 7 informants with a use value of 1.57), *Artocarpus hirsutus*, *Andropogon muricatus*, (10 use reports by 7 informants with a UV value of 1.43) and *Helicteres isora*, *Coscinium fenestratum*, (9 use reports by 7 informants with a UV value of 1.28).

The plants with a very low use value were *Elephantopus scaber*, *Chromolaena odorata*, *Clitoria ternatea*, which were reported by two informants with a UV of 0.28, but the informants regularly used these plants for the treatment of blood clotting, cut and wounds. In general, scarce availability of the plants in the study area lead to a low UV (Rokaya et al., 2010), as in the case of Thoduhills. In the present study plants reported with a low use value (three use reports by 7 informants with a UV of 0.43) were *Gossypium hirsutum*, *Strychnos nux-vomica*, *Clerodendrum infortunatum*, *Aristolochia tagala* and *Senna alexandrina*, *Elephantopus scaber*, *Chromolaena odorata*, *Clitoria ternatea*, are have a very low UV value of 0.28 among the local people of Kani tribal's for treating blood clotting, cuts and wounds.

3.6. Informant consensus factor

To gain credibility, scientific studies that utilize traditional knowledge must be reliable. In Ethnobotanical studies, consensus analysis provides a measure of reliability for any given claim providing reliable evidence. The product of *Fic* ranges from 0 to 1. A high value *Fic* indicates the agreement of selection of taxa between informants, whereas a low value indicates disagreement (Ragupathy et al., 2008). Commonly *Fic* of local knowledge for disease treatment depended on the availability of the plant species in the study area (Rajakumar and Shivanna, 2009). The *Fic* values

in our study ranged from 0.70 to 1 (Table 5). The use categories with more than 20 use-reports were circulatory system (27 use reports, 7 species), liver problems (26 use reports 7 species) and dermatological infections/diseases (24 use reports, 7 species) (Fig. 6). In the present study, endocrinal disorders, eye infection, hair diseases and kidney stone had the highest *Fic* of 1; whereas diabetes and jaundice had the highest *Fic* of 1.00 among the Irlas in the Tanjore district (Ragupathy and Newmaster, 2009). *Phyllanthus amarus*, *Coscinium fenestratum*, were very commonly used for the treatment of Jaundice and Diabetes respectively in these studies.

The least agreement between the informants was observed in poisonous bites with a *Fic* of 0.7 followed by Gastro intestinal ailments with a *Fic* of 0.71 and Dermatological infections/diseases with a *Fic* of 0.74. Thus the study indicates that the degree of knowledge shared by the users in the study area regarding the use of medicinal plants in the treatment of ailments is high. Dermatological infections/diseases had the lowest *Fic* of 0.74, but this ailment category ranked third in the number of use reports (24) and number of taxa (7) and poisonous bites had the lowest *Fic* of 0.70, but this ailment category ranked eighth in the number of use reports (11) and number of taxa (4) attributed to this category. It may be due to lack of communication among the informants in the study area who are practicing these ailment categories (Rajakumar and Shivanna, 2009).

3.7. Fidelity level

The analyzed categories with major agreements to highlight the most important plants in each category are listed in Table 6. Of the reported plants, 23 species had the highest fidelity level of 100% most of which were used in the single ailment category with multiple informants. The plants with the highest *FL* of 100% were *Phyllanthus amarus*, *Abrus precatorius*, *Pergularia daemia*, *Gossypium hirsutum*, *Moringa pterygosperma*, *Elephantopus scaber*, *Strychnos nux-vomica*, *Allium cepa*, *Artocarpus heterophyllus*, *Acorus calamus*, *Chromolaena odorata*, *Clerodendrum infortunatum*, *Curculigo orchoides*, *Biophytum sensitivum*, *Smilax zeylanica*,

Table 6

Fidelity (*FL*) values for common medicinal plants used by Kani traditional healers by ailment category.

Ailment category	Most preferred species with specific ailment	<i>FL</i> %
Liver problems (LP)	<i>Phyllanthus amarus</i>	100
	<i>Abrus precatorius</i>	100
	<i>Pyrrosia heterophylla</i>	100
Circulatory system (CS)	<i>Pergularia daemia</i> (blood clotting)	100
	<i>Smilax zeylanica</i> (blood purification)	100
	<i>Averrhoa bilimbi</i>	100
	<i>Elephantopus scaber</i>	100
	<i>Artocarpus heterophyllus</i> (centipede bite)	100
Poisonous bites (PB)	<i>Gossypium hirsutum</i> (poison infection)	100
	<i>Coscinium fenestratum</i> (diabetes)	55.56
Endocrinal disorders (ED)	<i>Ocimum sanctum</i> (fever)	54.54
	<i>Calycopteris floribunda</i>	43
Fever (Fvr)	<i>Ocimum sanctum</i> (cold)	45.45
	<i>Helicteres isora</i>	33
Respiratory system disorders (RSD)	<i>Pisonia alba</i> (elephantoid swelling)	100
	<i>Justicia adhatoda</i> (pains)	62.5
	<i>Plumbago zeylanica</i> (arthritis)	46
	<i>Strychnos nux-vomica</i>	100
Eye infection (EI)	<i>Artocarpus hirsutus</i> (sexual weakness)	50
	<i>Curculigo orchoides</i> (menstrual blood problems)	100
	<i>Capsicum frutescens</i> (postnatal care)	60
Genito urinary ailments (GUA)	<i>Moringa pterygosperma</i> (burning injury)	100
	<i>Allium cepa</i> (cut wounds)	100
	<i>Centella asiatica</i>	100
Dermatological infections/diseases (DID)	<i>Scoparia dulcis</i>	100
	<i>Biophytum sensitivum</i>	100
Hair diseases (HC)		
Kidney stone (US)		
Cancer diseases (CD)		

Table 7
Comparison of medicinal uses reported by Kani tribes and neighboring indigenous communities in India.

S. No	Botanical name	Medicinal uses reported by Kani tribes in the present study area	Medicinal uses reported by neighboring indigenous communities in India	References
1	<i>Abrus precatorius</i> L.	Jaundice	Inflammation, scorpion sting and snake bite, stomach problems, sexual disorders	Binu Thomas and Rajendran (2013), Muthu et al., 2006, Revathi and Parimelazhagan (2010)
2	<i>Acorus calamus</i> L.	Jaundice	Dysentery, abdominal pain, diarrhea, children for clarity of speech.	Rajith and Ramachandran (2010), Devi Prasad et al. (2013), Muthu et al. (2006)
3	<i>Allium cepa</i> L.	Cut wounds	Rheumatism, headache	Ayyanar and Ignacimuthu (2011)
4	<i>Andropogon muricatus</i> Retz.	Fever, inflammation, skin irritation	Anti-spasmodic, diuretic	Krishnaraju et al. (2006)
5	<i>Aristolochia tagala</i> Cham.	Snake bite	Abdominal pain, stomach ache, poisonous bite	Devi Prasad et al. (2013), Rajith and Ramachandran (2010)
6	<i>Artocarpus heterophyllus</i> Lam.	Centipede bite	Cooling, nutritious, ulcers, male hormone activity	Elevitch (2006).
7	<i>Artocarpus hirsutus</i> Lam.	Arthritis, pitta, sexual weakness	Piles, abdominal problem, cure small pimples and cracks on the skin	Devi Prasad et al. (2013), Silja et al. (2008)
8	<i>Biophytum sensitivum</i> (L.) DC.	Cancer	Poisonous bite, dysentery, cough, wounds, uterus cleaning	Rajith and Ramachandran (2010), Jery Thomas and John De (1999), Francis Xavier et al. (2012)
9	<i>Capsicum frutescens</i> L.	Cholesterol, postnatal care	Relieve muscle, joint, tooth ache pain, cough, asthma, sore throat	Sota (2013)
10	<i>Centella asiatica</i> (L.) Urb.	Hair diseases	Diabetic ulcers, treat piles, jaundice, anemia, skin diseases, memory power	Jayakumar et al. (2010), Devi Prasad et al. (2013), Silja et al. (2008), Rajith and Ramachandran (2010), Jery Thomas and John De (1999), Francis Xavier et al. (2012), Ayyanar and Ignacimuthu (2011)
11	<i>Chromolaena odorata</i> (L.) R.M. King and H. Rob.	Wounds	Wounds	Silja et al. (2008)
12	<i>Clitoria ternatea</i> L.	Wounds	Poison affected, indigestion, eye diseases, head ache. throat pain	Ayyanar and Ignacimuthu (2011)
13	<i>Coscinium fenestratum</i> (Gaertn.) Coleb.	Jaundice, diabetes	Headache	Arun et al. (2007)
14	<i>Curculigo orchoides</i> Gaertn.	Menstrual blood problems.	Gall bladder, skin diseases, asthma, bronchitis, physical strength, sexual weakness	Saba Irshad et al. (2006)
15	<i>Elephantopus scaber</i> L.	Blood clotting	Urinary problem, Dysentery, Stomach pain, Diarrhea, Skin ailments	Silja et al. (2008), Rajith and Ramachandran (2010), Francis Xavier et al. (2012)
16	<i>Helicteres isora</i> L.	Cold, fever, cancer	Diabetes, dysentery, bronchial diseases, asthma, cough	Jayakumar et al. (2010), Silja et al. (2008)
17	<i>Hemidesmus indicus</i> (L.) R.Br.	Blood purification	Digestive problem, liver tonic, diuretic, eczema, leucorrhea, diabetes, stomach ulcer, bronchitis, abdominal colic. drug preparation	Venkatasamy et al. (2010), Silja et al. (2008), Binu Thomas and Rajendran (2013), Rajith and Ramachandran (2010), Arun et al. (2007), Ayyanar and Ignacimuthu (2011)
18	<i>Justicia adhatoda</i> L.	Pneumonia, pains	Pneumonia	Arun et al. (2007)
19	<i>Morinda reticulata</i> Gamble	Blood purification, Jaundice	Blood purification, stomach ailments	Raveendran et al. (2012).
20	<i>Moringa pterygosperma</i> Gaertn.	Burning injury	Cold, cough, uterine disorders, stomach ache, piles, anemia. head ache, reduces body heat, indigestion, sperm production	Venkatasamy et al. (2010), Silja et al. (2008), Jery Thomas and John De (1999), Muthu et al. (2006), Ayyanar and Ignacimuthu (2011)
21	<i>Ocimum tenuiflorum</i> L.	Cold, fever	Cold, fever, cough, ear pain, skin diseases	Silja et al. (2008), Muthu et al. (2006), Ayyanar and Ignacimuthu (2011)
22	<i>Pergularia daemia</i> (Forrsk.) Chiov.	Blood clotting	Head ache, fever, head ache	Muthu et al. (2006), Ayyanar and Ignacimuthu (2011)
23	<i>Phyllanthus amarus</i> Schum. and Thonn.	Jaundice	Jaundice, skin diseases, anemia, dandruff, jaundice, jaundice	Silja et al. (2008), Jery Thomas and John De (1999), Muthu et al. (2006)
24	<i>Plumbago zeylanica</i> L.	Arthritis, cold, fever	Skin diseases, piles	Rajith and Ramachandran (2010), Revathi and Parimelazhagan (2010)
25	<i>Pyrrosia heterophylla</i> (L.) M.G. Price	Jaundice	Cooling agent, swelling, sprains	Benjamin and Manickam (2007)
26	<i>Scoparia dulcis</i> L.	Kidney stone	Urinary disorders, kidney stone	Silja et al. (2008), Binu Thomas and Rajendran (2013), Rajith and Ramachandran (2010)
27	<i>Senna alexandrina</i> Gars. ex Mill.	Blood purification, bee bite, eye infection	Constipation, rheumatism	Ibrahim et al. (2012), Ayyanar and Ignacimuthu (2011)
28	<i>Smilax zeylanica</i> L.	Blood purification	Piles	Arun et al. (2007)
29	<i>Strychnos nux-vomica</i> L.	Eye infection	Snake bite	Arun et al. (2007)
30	<i>Vitex trifolia</i> L.	Wounds, ulcers	Rheumatism, liver diseases	Orwa et al. (2009)

Scoparia dulcis, *Centella asiatica*, *Aristolochia tagala*, *Pyrrosia heterophylla*, *Hemidesmus indicus*, *Clitoria ternatea*, *Averrhoa bilimbi* and *Pisonia grandis*.

The maximum FL for the above plants indicated 100% choice of the interviewed informants for treating specific ailments and this could be an indication of their healing potential. In support to our

study, a 100% FL was reported in *Phyllanthus amarus* for jaundice among the herbal healers in Shimoga district of Karnataka (Rajakumar and Shivanna, 2009) and Malasar tribals in Velliangiri hills of Tamil Nadu (Ragupathy et al., 2008).

3.8. Relative importance (RI)

The collected ethnomedicinal plants possessed a number of pharmacological properties (Varier's, 1993; Khare, 2007). The plant with the most number of pharmacological properties (PH) was *Moringa pterygosperma* (20 PH); it had a normalized PH value of 1.00 (20/20). *Artocarpus hirsutus*, *Andropogon muricatus*, *Helicteres isora*, *Plumbago zeylanica* and *Calycopteris floribunda* were employed in 3 body systems and had a normalized BS value of 1.00 (3/3). *Andropogon muricatus* had the highest RI of 92.5 followed by *Artocarpus hirsutus* (82.5), *Helicteres isora* (77.5), *Ocimum tenuiflorum* and *Justicia adhatoda* (75.5), *Plumbago zeylanica* (75.0), *Coscinium fenestratum* (70.5) and *Capsicum frutescens* (68.0) (Table 4). These plants were also used to treat more body systems and were considered as the most resourceful taxa in the study area.

According to Ayyanar and Ignacimuthu (2011), *Moringa pterygosperma* was recognized as the most resourceful taxa since it was mentioned by most of the informants among the tribal practitioners in Tirunelveli hills of Western Ghats, India. *Centella asiatica* resourceful taxa were used against Jaundice by the Kurichia, Adiya and the Kuruma tribes in Wayand, Kerala (Devi Prasad et al., 2013). *Ocimum tenuiflorum*, another resourceful taxa were used in Kancheepuram dist., Tamil Nadu (Muthu et al., 2006). Many of the more resourceful species reported in this study were similar (Table 7) for some neighboring indigenous communities in India (Ignacimuthu et al., 2006, 2008; Poonam and Singh, 2009; Ayyanar and Ignacimuthu., 2011; Pandikumar et al., 2011).

3.9. Identification of new claims and reliability of reported claims

Reported uses of various medicinal plants were compared with previously reported ethnobotanical uses in neighboring hills

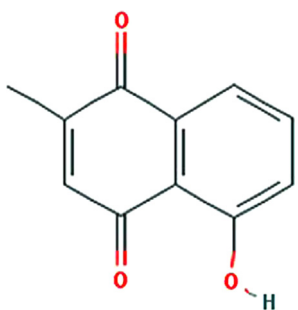


Fig. 8. Anti rheumatoid arthritis compound – Plumbagin.

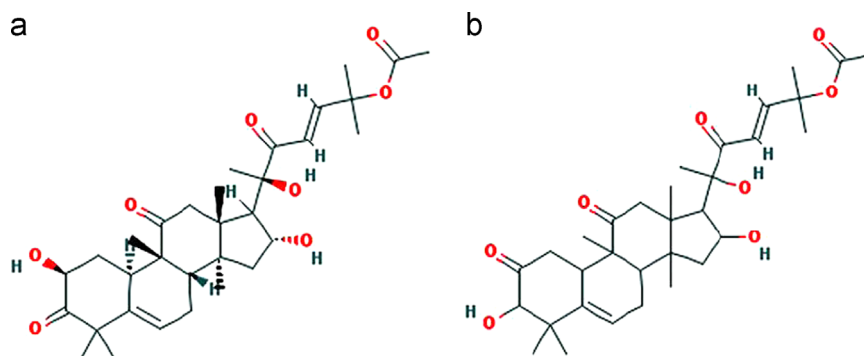


Fig. 9. Anti tumor compounds – (a) Cucurbitacin B and (b) Iso cucurbitacin B.

of Kerala and adjoining areas of India. Table 7 identifies new medicinal uses of *Abrus precatorius*, *Acorus calamus*, *Allium cepa*, *Andropogon muricatus*, *Aristolochia tagala*, *Artocarpus heterophyllus*, *Artocarpus hirsutus*, *Biophytum sensitivum*, *Capsicum frutescens*, *Centella asiatica*, *Chromolaena odorata*, *Clitoria ternatea*, *Coscinium fenestratum*, *Curculigo orchioides*, *Elephantopus scaber*, *Helicteres isora*, *Morinda reticulata*, *Moringa pterygosperma*, *Ocimum tenuiflorum*, *Pergularia daemia*, *Phyllanthus amarus*, *Plumbago zeylanica*, *Pyrrosia heterophylla*, *Senna alexandrina*, *Smilax zeylanica*, *Strychnos nux-vomica* and *Vitex trifolia* (References given in Table 7). Some of the medicinal plants reported during the present study were reported for biological activities and bioactive constituents responsible for their therapeutic properties. In support of our study *Plumbago zeylanica* has been scientifically proven to treat rheumatoid arthritis. Plumbagin (Fig. 8) is a quinone compound isolated from *Plumbago zeylanica* which has been used for the suppression of collagen induced T cell proliferation and Interleucin-2 in arthritic mice. This study also indicates that plumbagin is a very effective bioactive constituent for the treatment of rheumatoid arthritis (Poosarla et al., 2011). Similarly, cucurbitacin B and Iso cucurbitacin B (Fig. 9) and cyto toxic compounds have been isolated from *Helicteres isora* for antitumor activity (Bean et al., 1985). *Biophytum sensitivum* is another scientifically proven ethnomedicinal plant to control cancer (Guruvayurappan and Kuttan, 2008). In this study (Fig. 10a) Amentoflavone at a concentration of 10 mg/ml significantly inhibits No and proinflammatory cytokine production in B16F-10 cells tumor associated macrophages (TAMs) and peritoneal macrophages. This study also showed that Amentoflavone stimulates apoptosis by regulating hc₂. Caspase-3 and 53 genes in B16F-10 melanoma cells of cancer induced mice.

In addition Tungpradit et al. (2010) proved the anticancer activity of *Coscinium fenestratum* in their in vitro studies. The methanol extract of *Coscinium fenestratum* contained a major compound of berberine (Fig. 10b), it shows the highest cytotoxic activity against HL-60 leukemia cells, with an Ic 50 of $1.41 \pm 0.7 \mu\text{g/ml}$. This study also confirms the anticancer claims of *Coscinium fenestratum*, an ethnomedicinal plant of the present study. The chemical composition of some wound healing plants reported in this study has also been scientifically studied. Leaves of *Chromolaena odorata* used traditionally for wound healing has been found to contain phenolic acids viz (Fig. 11a–e). p-Hydroxy benzoic acid, protocatechuic, p-coumaric, ferulic acids, flavonoids and glycols viz. flavonol, flavones; and this may be the potential mechanism contributing to enhanced wound healing (Phan et al., 2001).

4. Conclusion

In conclusion, the study clearly demonstrated that apart from many conventionally used medicinal plants, traditional healers

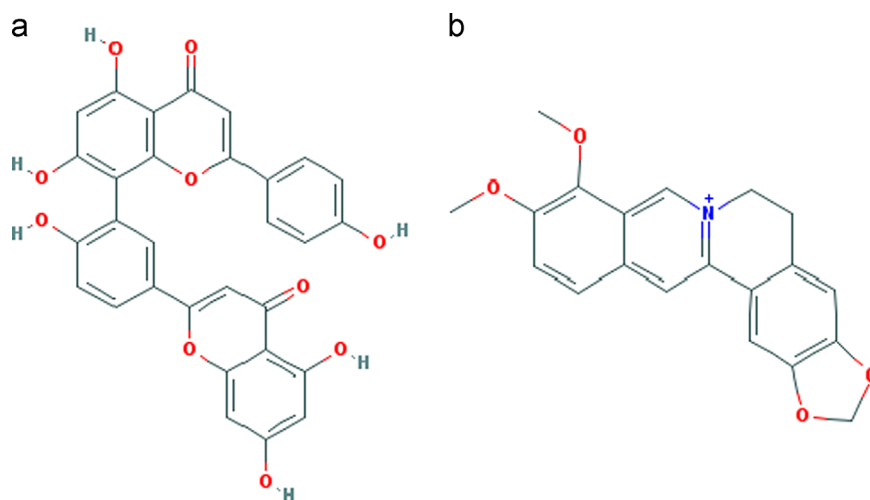


Fig. 10. Anti cancer compounds – (a) Amentoflavone and (b) Berberine.

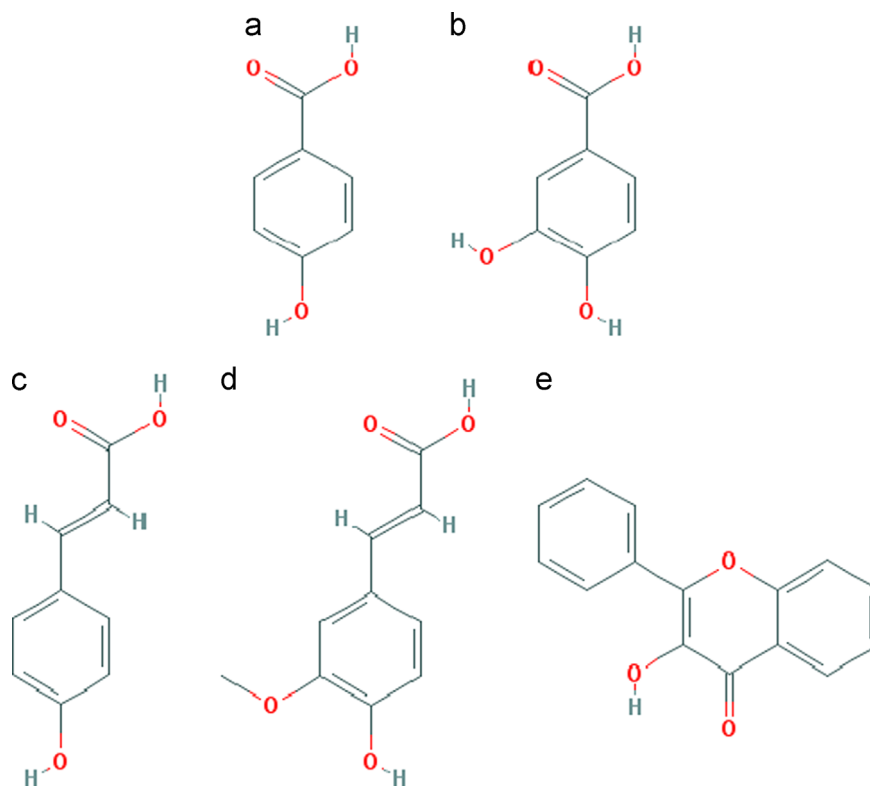


Fig. 11. Wound healing compounds – (a) p-Hydroxybenzoic acid, (b) Protocatechuic acid, (c) p-Coumaric acid, (d) Ferulic acids and (e) Flavonol.

used other little known herbs which could be the subject for future studies. The local health traditions explored in this study significantly contribute for the well being of mankind with locally available natural resources. The plants with the highest fidelity level and use values in the present study may indicate the possible occurrence of valuable phytochemical compounds and a search for potential new drugs to treat various ailments is required. The efficacy and safety of all the reported ethnomedicinal plants needs to be evaluated for phytochemical and pharmacological studies, especially the plants with high informant consensus factor, use value and fidelity level should be given priority to carry out bioassay and toxicity studies. As a result of the study on *Aristolochia tagala* which is a rare and vulnerable climber, we are suggesting the plants *Plumbago zeylanica*, *Ocimum tenuiflorum*, *Artocarpus hirsutus*, *Andropogon muricatus*, *Helicteres isora*, *Coscinium fenestratum* for

further ethnopharmacological studies, since these plants had high UV values. Further investigation on pharmacological importance of these plants and their diversity may add new knowledge to the traditional medicinal and cultural systems. The traditional healers have a strong belief that if they disclose the mystery about the therapeutic properties of a particular plant, all the therapeutic potentialities of that plant would vanish and the solution will not work correctly.

Acknowledgments

The authors are grateful to the Kani tribals and hilly migrants of Thodu hills of Kerala for sharing their indigenous knowledge throughout the field study, without their participation this

research would not have been possible. Dr. TFX is also thankful to the Science and Engineering Research Board (SERB), Department of Science and Technology, New Delhi, India (No. SB/FT/LS-141/2012) for their financial support in the form of Young Scientist Grant and also thank Rev. Dr. S. John Britto Rector, Rev. Dr. S. Sebastian, Secretary, Rev. Dr. F. Andrew, Principal of St. Joseph's College, Trichy for proving infrastructure. The authors are also thankful to Editor-in-Chief Dr. Robert Verpoorte, and three anonymous reviewers for their critical comments and useful suggestions on the previous version of the manuscript.

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