Ethnobotanical Indices on Wild Edible Plants of Thiruppuvanam Region in Sivagangai District of Tamil Nadu, India

Saranya, P.[1], Shanmugam, S.[2*] Mohan, E.[3]

[1,2,3] Post Graduate and Research Department of Botany, Thiagarajar College, Teppakulam, Madurai -625009, Tamil Nadu, India
Email: [1]ramsarn88@gmail.com, [2]shanmugambotany@gmail.com, [3]easanmohan74@gmail.com

***Corresponding author**
S. Shanmugam
Research Scholar,
Post Graduate and Research Department of Botany,
Thiagarajar College
Teppakulam, Madurai – 620023
Tamil Nadu, India.
Email: shanmugambotany@gmail.com
Mobile: +91-9976595769

Abstract

Wild plants are often easily accessible and affordable, particularly in rural regions. A variety of bioactive chemicals were found in wild edible plants that may have a wide range of therapeutic applications. In this concern, the present research work was carried out to collect and document the medicinal usages of wild edible plants used by local inhabitants of Thiruppuvanam region in Sivagangai district of Tamil Nadu, India. For this research work, the medicinal uses of plants were collected from a total of 30 informants residing in 6 different localities. The medicinal uses for a total of 40 medicinal plants belonging to 35 genera from 26 families were recorded by this study to cure a variety of ailments. It was noted that the study areas harboured 9 Least Concerned species. Tamarindus indica was found with high Use Value (1.70), Citation Frequency (8.80) and Relative Importance (1.0). Respiratory system disorders have the highest ICF value (0.96). The pharmacology and phytochemistry of these therapeutic plants need more investigation.

Keywords: *Ethnobotanical Indices, Wild edible plants, Thiruppuvanam region, Sivagangai district, Tamil Nadu*

1. Introduction

Wild plants have been an integral part of human existence from ancient times; they have been utilized as for food, medicine, fiber, and other purposes as well as domestic animal feed. In many communities, eating wild edibles is a part of people's diets and is closely related to almost every element of their sociocultural, spiritual, and physical well-being [1]. Throughout the year, wild edible plants play a crucial role in providing the rural people inhabiting isolated regions of the country with the nutrients they need. In many developing countries, wild food plants are also a vital component of peoples' subsistence strategies [2].

India is home to one of the world's second-largest populations, with 75% of its people residing in rural regions. In times of food crisis and for additional food supplements, the majority of rural people rely on natural resources, such as edible wild plants, to satisfy their food demands [3]. About 800 species are said to be used as food plants in India, mostly by the tribal and rural populations [4]. Considering the significance, Shanmugam and Sundari [5] recorded the traditional knowledge of wild edible plants utilized by the rural people dwelling in various localities of Thiruppuvanam region. In addition to being a source of food and nourishment, wild edible plants are also utilized as medicines to cure a variety of illnesses. In light of this, the current study was conducted to enumerate the therapeutic applications of edible wild plants existing in and around Thiruppuvanam region of Sivagangai district in Tamil Nadu, India.

2. Materials and Methods

2.1. Geographical profiles of study sites

Totally 6 locations in Thiruppuvanam taluk of Sivagangai district were selected for this study. They are Allinagaram (78.2477º E, 9.7970º N), Ladanendhal (78.2968º E, 9.7992º N), Pasiyapuram (78.1949º E, 9.8656º N), Piramanoor (78.2818º E, 9.7775º N), Thattankulam (78.2356º E, 9.8454º N) and T–Pudur (78.2666º E, 9.8210º N). The longitude (E) and latitude (N) data were provided in appropriate parentheses next to the name of study site. The altitude of the study sites is about 90 – 110 M above mean sea level (MSL). The temperature ranges from 21º C during winter to 41º C during summer. The study sites received an average annual rain fall of about 100 – 350 mm.

2.2. Data collection

Field works were conducted frequently from January 2024 to May 2025. The ethnomedicinal data were gathered by conducting direct field interviews with the rural residents of the study locations, in accordance with the methodology suggested by Jain [6]. A total of 30 informants were interviewed, and their current age, educational status, and occupation were also recorded. The collected data was verified in other locations. In order to identify the medicinal plants botanically, regional floras were used [7,8]. All the plants were authenticated as per APG IV classification [9] and information about the conservation status of plant species was obtained from the IUCN Red List of Threatened species (version 2025-1) [10].

2.3. Ethnobotanical indices

2.3.1. Use Value (UV)

The significance of a therapeutic plant was assessed using Use Value (UV) for a species with the following formula: UV = U / N. Where, 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 species [11].

2.3.2. Citation Frequency (CF)

Citation Frequency was calculated as follows: CF = (Number of citations of a particular species mentioned / Total number of citations of all species mentioned) × 100 [12].

2.3.3. Relative Importance (RI)

Relative Importance was calculated with the following formula: RI = (RCF + RNU) / 2. Where, RCF is the relative citation frequency, it is obtained by the number of citation of a species dividing with the maximum citation of all species obtained (RCF = CF/max CF), and RNU is the relative number of use-categories, it is obtained by dividing the number of uses of the species with the maximum number of uses of all species obtained (RNU = NU/max NU) [12].

2.3.4. Family Importance Value (FIV)

The FIV was assessed using the following formula: FIV = (Number of citation for a family/Total number of informants) × 100 [13].

2.3.5. Informant Consensus Factor (ICF)

The informant consensus factor (ICF) for an ailment category was calculated as ICF = Nur – Nt / Nur – 1. Where, Nur is the number of use-reports in each ailment category and Nt is the total number of taxa used in each ailment category by all informants [14].

3. Results and Discussion

3.1. Basic characteristics of the resource persons

In order to predict and clarify the precise nature of the traditional knowledge on wild edible plants that are being used to cure variety of illness, information on the medicinal uses of plants are gathered from a total of 30 informants residing in 6 different localities situated in Thiruppuvanam region. Of them, 13 informants (43.33%) were male and 17 were female (56.67%). Among them, 13 persons (43.33%) were come under the age category of 41 – 60 years and 9 persons (30.0%) were above 60 years. Of these interviewees, 11 informants were completed their school education (36.67%), 4 persons were completed college education (13.33%) and while most of informants, 15 persons were not educated (52%). In terms of their occupation, 13 people were working as agricultural labour (43.33%), 9 people as grazier (26%), 5 persons were farmer (16.67%) and 3 were government employee (10.0%). In case of native place, maximum informants (8 persons) were belongs to Pasiyapuram (26.67%) and least (3 persons) of Thattankulam (10.0%). The number and percentage of informants according to various fundamental attributes were provided in Table 1.

Table 1. Demographic profiles of the informants of the study sites

Characteristics	**Frequency (*n* = 30)**	**Percentage**
Gender		
Male	13	43.33
Female	17	56.67
Current age		
Below 40 years	8	26.67
40 – 60 years	13	43.33
Above 60 years	9	30.0
Educational status		
School education	11	36.67
College education	4	13.33

Unable to read & write	15	50.0
Occupation		
Agricultural labour	13	43.33
Farmer	5	16.67
Grazier	9	30.0
Government employee	3	10.0
Native place		
Allinagaram	4	13.33
Ladanendhal	5	16.67
Pasiyapuram	8	26.67
Piramanoor	4	13.33
Thattankulam	3	10.0
T–Pudur	6	20.0

It was known that ethnomedicinal knowledge was recognized to be significantly correlated with participant differences in gender, age, and educational attainment [15]. From the findings of current study, it was clearly evident that female were more knowledgeable and experienced with using medicinal plants than males. The current findings support those of Chukwuma *et al*. [16], who conducted an ethnobotanical study in Ado-Ekiti, a state in southwest Nigeria, and found that women were more likely than men to have herbal knowledge. In a similar vein, women in Algeria were the most knowledgeable and engaged in the use of medicinal herbs to avoid a wide range of illnesses [15]. Furthermore, the results of a study conducted by El-Ghazouani *et al*. [17] in Morocco also highlighted that women have three times much knowledge about medicinal plants than men. This might be due to the fact that women tend to take care of their families than men in the study sites and it is not a presence that is dominating everywhere. Research has demonstrated that ethnobotanical knowledge is possessed and applied by both men and women and the gender that predominates in a study might change based on the region and the particular area of inquiry.

By the current result, it was also well known that aged people possess greater traditional knowledge on the use of medicinal herbs. Furthermore, the results demonstrated that literate people in the study area are less knowledgeable about medicinal plants than illiterate people since the former are more likely to have been exposed to modernity as prior research works carried out in Tamil Nadu [18-21].

3.2. Medicinal uses of wild edible plants in Thiruppuvanam region

The diversity of wild edible plants distributed in different genus, family, habit and available period of edible parts in Thiruppuvanam region were well documented (See, Shanmugam and Sundari [5]). As the current research work was aimed to enumerate the therapeutic potential of those wild edible plants utilized by the local inhabitants of different study sites, the list of wild edible plants used to treat various ailments with their present day

IUCN status [10] was given in Table 2, list of families with FIV was given in Table 3 and their medicinal usages were highlighted in Table 4.

Table 2: List of wild edible plants recorded from the study sites (Source: Shanmugam and Sundari [5]) with present day IUCN status [10]

S. No.	Botanical name	Family	Habit	IUCN status*
1	*Alternanthera sessilis* (L.) R.Br. ex DC.	Amaranthaceae	Herb	LC
2	*Amaranthus spinosus* L.	Amaranthaceae	Herb	NE
3	*Amaranthus tristis* L.	Amaranthaceae	Herb	NE
4	*Amaranthus viridis* L.	Amaranthaceae	Herb	NE
5	*Annona squamosa* L.	Annonaceae	Tree	NE
6	*Azadirachta indica* A. Juss.	Meliaceae	Tree	LC
7	*Borassus flabellifer* L.	Arecaceae	Tree	NE
8	*Cardiospermum halicacabum* L.	Sapindaceae	Climber	NE
9	*Carica papaya* L.	Caricaceae	Tree	NE
10	*Cissus quadrangularis* L.	Vitaceae	Climber	NE
11	*Coccinia grandis* (L.) Voigt	Cucurbitaceae	Climber	NE
12	*Cyperus articulatus* L.	Cyperaceae	Herb	LC
13	*Delonix regia* (Boj. ex Hook.) Raf.	Fabaceae	Tree	LC
14	*Erythrina variegata* L.	Fabaceae	Tree	LC
15	*Euphorbia hirta* L.	Euphorbiaceae	Herb	NE
16	*Guazuma ulmifolia* Lam.	Malvaceae	Tree	LC
17	*Ipomoea aquatica* Forssk.	Convolvulaceae	Climber	LC
18	*Lantana camara* L.	Verbenaceae	Shrub	NE
19	*Limonia acidissima* L.	Rutaceae	Tree	NE
20	*Mangifera indica* L.	Anacardiaceae	Tree	NE
21	*Marsilea quadrifolia* L.	Marsileaceae	Herb	NE
22	*Morinda tinctoria* Roxb.	Rubiaceae	Tree	NE
23	*Opuntia stricta* (Haw.) Haw.	Cactaceae	Shrub	NE
24	*Passiflora foetida* L.	Passifloraceae	Climber	NE
25	*Phoenix sylvestris* (L.) Roxb.	Arecaceae	Tree	NE
26	*Physalis minima* L.	Solanaceae	Herb	NE
27	*Physalis peruviana* L.	Solanaceae	Herb	NE
28	*Pithecellobium dulce* (Roxb.) Benth.	Fabaceae	Tree	NE
29	*Portulaca oleracea* L.	Portulacaceae	Herb	NE
30	*Psidium guajava* L.	Myrtaceae	Tree	NE
31	*Pupalia lappacea* (L.) Juss.	Amaranthaceae	Herb	NE
32	*Oxystelma esculentum* (L.f.) Sm.	Apocynaceae	Climber	NE
33	*Solanum nigrum* L.	Solanaceae	Herb	NE

34	*Solanum torvum* Sw.	Solanaceae	Shrub	NE
35	*Syzygium cumini* (L.) Skeels	Myrtaceae	Tree	NE
36	*Tamarindus indica* L.	Fabaceae	Tree	LC
37	*Terminalia catappa* L.	Combretaceae	Tree	LC
38	*Vigna trilobata* (L.) Verdc.	Fabaceae	Herb	NE
39	*Ziziphus jujuba* Mill.	Rhamnaceae	Tree	NE
40	*Ziziphus mauritiana* Lam.	Rhamnaceae	Tree	NE

Table 3: List of families with genus, species (Source: Shanmugam and Sundari [5]) and FIV

S. No.	Family	Genus	Species	FIV
1	Amaranthaceae	3	5	210.0
2	Anacardiaceae	1	1	110.0
3	Arecaceae	1	1	13.33
4	Apocynaceae	1	1	46.66
5	Arecaceae[#]	2	2	136.66
6	Cactaceae	1	1	10.0
7	Caricaceae	1	1	66.66
8	Combretaceae	1	1	50.0
9	Convolvulaceae	1	1	23.33
10	Cucurbitaceae	1	1	103.33
11	Cyperaceae[#]	1	1	30.0
12	Euphorbiaceae	1	1	43.33
13	Fabaceae	5	5	316.66
14	Malvaceae	1	1	10.0
15	Marsileaceae[†]	1	1	13.33
16	Meliaceae	1	1	43.33
17	Myrtaceae	2	2	143.33
18	Passifloraceae	1	1	6.66
19	Portulacaceae	1	1	20.0
20	Rhamnaceae	1	2	80.0
21	Rubiaceae	1	1	23.33
22	Rutaceae	1	1	20.0
23	Sapindaceae	1	1	90.0
24	Solanaceae	2	4	203.33
25	Verbenaceae	1	1	36.66
26	Vitaceae	1	1	80.0
Total		**35**	**40**	**-**

Note: [#]Monocot families; [†]Pteridophytic family: Others are dicot families.

Table 4: Wild edible plants with their medicinal uses, UV, CF and RI

Botanical name	Medicinal use(s) of edible part(s)	UR	UV	CF	RI
Alternanthera sessilis	Leaves are cooked and eaten to improve hair growth.	18	0.60	3.10	0.27
Amaranthus spinosus	Decoction made from aerial parts is drink to reduce menstrual pain.	12	0.40	2.07	0.21
Amaranthus tristis	Leaf extract is poured to treat wound.	10	0.33	1.72	0.19
Amaranthus viridis	Leaf paste is applied on boils.	10	0.33	1.72	0.19
Annona squamosa	Fruit pulp is made into paste with pepper powder and taken orally to treat fever.	4	0.13	0.69	0.13
Azadirachta indica	Fruit is eaten raw to expel intestinal worms.	13	0.43	2.24	0.22
Borassus flabellifer	Fresh endosperm is eaten for the treatment of blood dysentery and body heat. Sprout is boiled and eaten to get relief from piles.	31 (8 + 16 + 7)	1.03	5.35	0.60
Cardiospermum halicacabum	Leaf decoction is given to drink for the treatment of arthritis. Leaves are made into decoction with cumin seeds and taken orally to get relief from body pain.	27 (15 + 12)	0.90	4.66	0.46
Carica papaya	Fruit pulp is eaten to treat piles. Latex obtained from unripened fruit is applied and washed to ward off lice.	20 (9 + 11)	0.66	3.45	0.39
Cissus quadrangularis	Tender stems are shallow fried in ghee and made into paste (*Thuvaiyal*) along with salt. This paste is eaten along with normal diet for the treatment of piles. Stem paste is applied to treat joint pain.	24 (18 + 6)	0.80	4.14	0.43
Coccinia grandis	Ripened fruits are eaten raw to reduce sugar level. Unripened fruit paste is applied to treat sore throat.	31 (22 + 9)	1.03	5.35	0.50
Cyperus articulatus	Tuber decoction is drink to cure fever. Tuber powder is mixed with honey and drink to increase memory power.	9 (6 + 3)	0.30	1.55	0.28
Delonix regia	Flower paste is applied to cure itch.	2	0.06	0.34	0.11
Erythrina variegata	Leaf paste mixed with rice flour is made into round shaped rotti, roasted with anyone edible oil and eaten for the treatment of cough and cold.	26 (18 + 8)	0.86	4.49	0.45
Euphorbia hirta	Seed paste is applied to heal wound.	13	0.43	2.24	0.22
Guazuma ulmifolia	Fruit pulp is eaten raw to cure diarrhoea.	3	0.10	0.51	0.12

Ipomoea aquatica	Leaf juice is poured to heal wound.	7	0.23	1.20	0.21
Lantana camara	Fruit juice is poured on cuts to stop bleeding.	11	0.36	1.89	0.20
Limonia acidissima	Fruit pulp is eaten for the treatment of piles.	6	0.20	1.03	0.15
Mangifera indica	Ripened fruit is eaten raw to maintain blood pressure. Fresh nut is eaten raw to treat diabetes. Nut powder is mixed with water and drink to expel intestinal worms.	33 (6 + 19 + 8)	1.10	5.69	0.62
Marsilea quadrifolia	Leaves are cooked with green gram and eaten to cure loss of appetite.	4	0.13	0.69	0.13
Morinda tinctoria	Fruit decoction is drink to cure diarrhoea.	7	0.23	1.20	0.16
Opuntia stricta	Fruit decoction is taken orally to treat cough.	3	0.10	0.51	0.12
Passiflora foetida	Fruit paste is applied to treat itch.	2	0.06	0.34	0.11
Phoenix sylvestris	Fruit decoction is taken orally along with honey for the treatment of asthma.	10	0.33	1.72	0.19
Physalis minima	Fruits are eaten to treat anaemia. Fruits are soaked in milk and eaten to treat male infertility.	9 (3 + 6)	0.30	1.55	0.28
Physalis peruviana	Fruits are eaten raw to treat fever.	6	0.20	1.03	0.15
Pithecellobium dulce	Fruits are eaten raw to cure sore throat.	14	0.46	2.41	0.23
Portulaca oleracea	Leaves are cooked with common spices and eaten to cure anaemia.	6	0.20	1.03	0.15
Psidium guajava	Both ripe and unripe fruit is eaten raw to reduce blood sugar level.	19	0.63	3.28	0.28
Pupalia lappacea	Tender shoots are cooked with common spices and eaten to reduce menstrual pain.	13	0.43	2.24	0.22
Oxystelma esculentum	Tender fruits are eaten raw to cure ulcer.	14	0.46	2.41	0.23
Solanum nigrum	Leaves are cooked and eaten to treat ulcer.	21	0.70	3.62	0.30
Solanum torvum	Fruits are soaked in salty water for overnight and dried. The dried fruits are shallow fried in sesame oil and eaten for the treatment of asthma. Fruits are cooked and eaten with normal diet to expel intestinal worms.	25 (14 + 11)	0.83	4.31	0.44
Syzygium cumini	Fruits are eaten raw to treat diabetes.	24	0.80	4.14	0.33
Tamarindus indica	Leaves are boiled and tied on the spot to treat sprain. Flower paste is applied to treat swelling. Fruit pulp juice is given to drink to reduce burning sensation during urination. Fruit pulp is applied along with lime powder for the treatment of honey bee sting. Seed coat powder is drink along with milk for the treatment of blood dysentery.	51 (9 + 4 + 16 + 15 + 7)	1.70	8.80	1.00

Terminalia catappa	Nuts are eaten raw to cure constipation. Nuts are soaked in honey and eaten to treat male infertility.	15 (3 + 12)	0.50	2.59	0.64
Vigna trilobata	Fruit decoction is given to drink along with ginger juice to cure fever.	2	0.06	0.34	0.11
Ziziphus jujuba	Fruits are eaten raw to cure loss of appetite.	13	0.43	2.24	0.22
Ziziphus mauritiana	Fruits are eaten raw to treat gas trouble.	11	0.36	1.89	0.20

3.3. Conservation status of wild edible plants

According to IUCN conservation status [10], it was noted that the study area harboured 9 Least Concerned species (9 species (*Alternanthera sessilis*, *Azadirachta indica*, *Cyperus articulatus*, *Delonix regia*, *Erythrina variegata*, *Guazuma ulmifolia*, *Ipomoea aquatica*, *Tamarindus indica* and *Terminalia catappa*) and the remaining species were categorized under Not Evaluated (NE) category (Table 2).

3.4. Parts used

In the case of plant parts used for medicinal utility, fruit was the mostly used plant part in 28 preparations (49.13%) to treat various diseases followed by leaf in 13 preparations (22.80%), nut in 4 preparations (7.02%) and aerial parts, flower, stem and tuber in 2 preparations (3.51% each). Endosperm, seed and sprout were the least used parts in 1 preparation with 7.51% each (Figure 1).

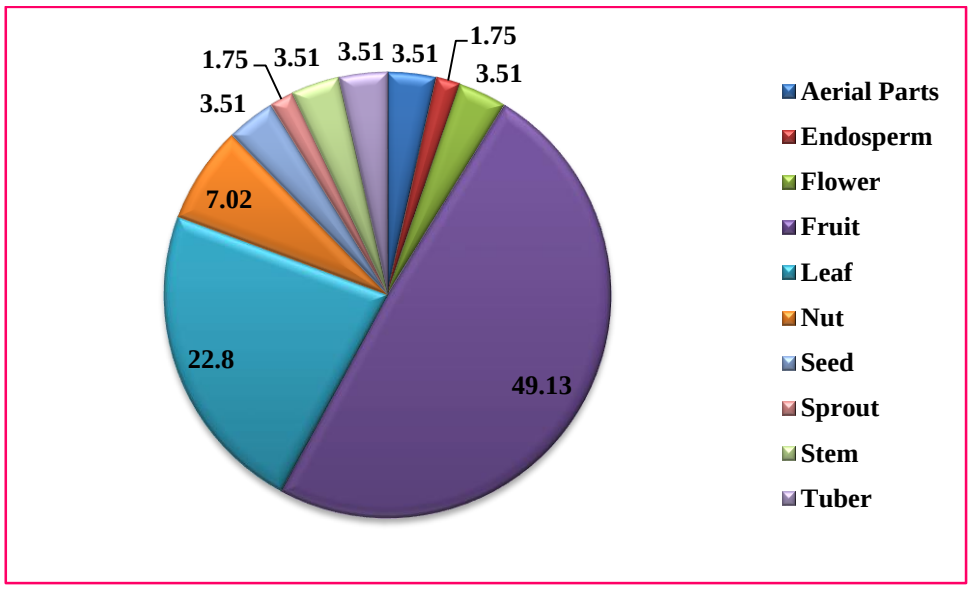

Figure 1. Percent distribution of plant parts used

The findings of the current study were corroborated by certain reports that claimed fruits were mostly utilized to treat illnesses. According to such reports, fruits are a prominent and dominant category of plant components that can be utilized medicinally, especially in traditional medicine. Numerous fruits have therapeutic qualities and are used to cure a range

of illnesses [22]. Additionally, fruits were rich in vital vitamins, minerals, and antioxidants, which made them simple to digest and good for general health [23].

The findings current study are controversy with several significant research works conducted in various regions of Tamil Nadu, which demonstrated that leaves were the commonly used plant part for the treatment various diseases [24-32]. This discrepancy may result from differences in the species that are accessible and the cultural preferences of the people on the use of specific wild edible plant parts to cure specific illnesses.

3.5. Mode of preparation

The informants of the study area prescribed the medicine mostly in raw form (34.48%) followed by paste (17.21%), cooked form (15.52%) and in the form of decoction (15.52%). The least use was recorded for boiled, extract and latex with 1.73% each (Figure 2).

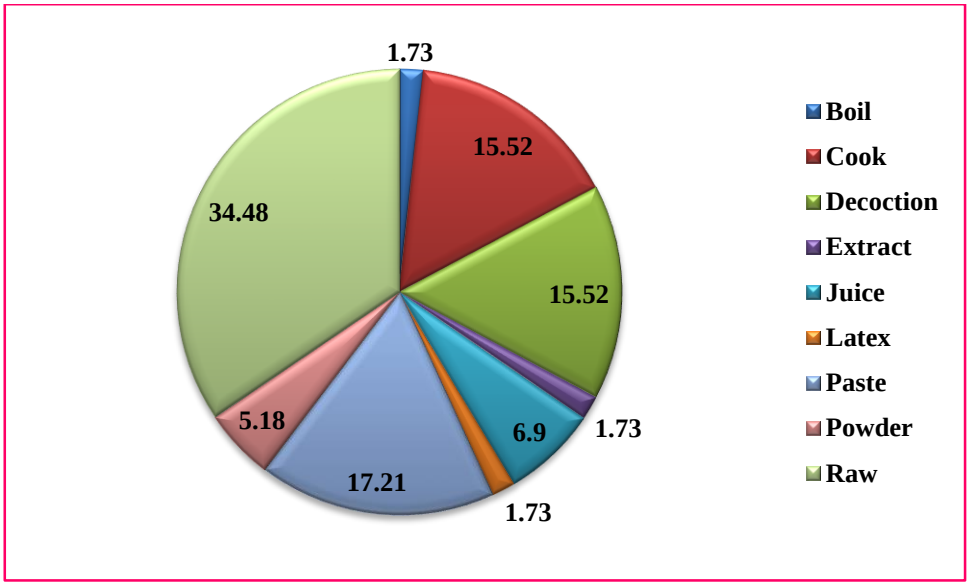

Figure 2. Percent distribution of mode of medicinal preparation

It was documented that taking therapeutic herbs in their raw state is a frequent practice in traditional medicine, often involving consuming whole plant parts like leaves, roots, or bark in teas, infusions, or even directly and this technique offers an unfiltered and natural means of obtaining the plant's therapeutic benefits [33]. It was also stated that using the raw plant parts directly can be a simpler and more accessible method, even though certain medicinal plants have been processed into extracts, tinctures, or capsules [34].

3.6. Mode of administration

The results of current research work were also revealed that the local people were followed mostly by eaten the medicinal preparations (51.72%) to treat a particular ailment. Drank the medicine orally (22.41%) was next administration mode. Some preparations were taken through the following routes: applied the medicine topically (15.51%), poured (6.90%),

washed (1.73%) and tied (1.73%) (Figure 3). These findings are consistent with the results of the majority of earlier studies conducted in various study sites of Tamil Nadu [35-39].

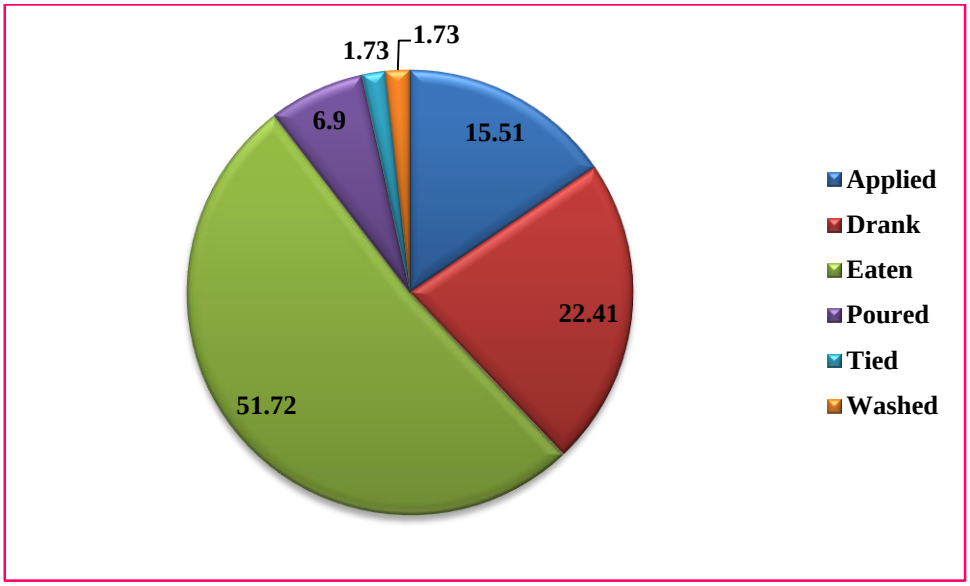

Figure 3. Percent distribution of mode medicinal application

3.7. Use of medicine with ingredients

In general, the people in the present study area prepared the medicine from a single plant. In few cases, they prepared the medicine along with other products. For example, fruit pulp of *Annona squamosa* is made into paste with pepper powder and taken orally to treat fever, leaves of *Cardiospermum halicacabum* are made into decoction with cumin seeds and taken orally to get relief from body pain, tender stems of *Cissus quadrangularis* are shallow fried in ghee and made into paste (*Thuvaiyal*) along with salt and this paste is eaten along with normal diet for the treatment of piles, tuber powder of *Cyperus articulatus* is mixed with honey and drink to increase memory power, leaf paste of *Erythrina variegata* mixed with rice flour is made into round shaped rotti, roasted with anyone edible oil and eaten for the treatment of cough and cold, fruits of *Physalis minima* are soaked in milk and eaten to treat male infertility and nuts of *Terminalia catappa* are soaked in honey and eaten to treat male infertility (Table 4).

The belief in synergistic interactions among traditional healers may be the reason for the frequent usage of several plant parts [40]. Additionally, it is thought that a multi-herbal remedy has greater therapeutic potential than a single plant [19].

3.8. Extensively used plants for illness

The rural people of the study sites were mostly used the medicinal remedies derived from the medicinal plants to treat diabetes (4 species: *Coccinia grandis*, *Mangifera indica*, *Psidium guajava* and *Syzygium cumini*), fever (4 species: *Annona squamosa*, *Cyperus articulatus*,

Physalis peruviana and *Vigna trilobata*), piles (4 species: *Borassus flabellifer*, *Carica papaya*, *Cissus quadrangularis* and *Limonia acidissima*), to expel intestinal worms (3 species: *Azadirachta indica*, *Mangifera indica* and *Solanum torvum*) and to heal wound (3 species: *Amaranthus tristis*, *Euphorbia hirta* and *Ipomoea aquatica*). Anaemia, asthma, blood dysentery, cough, diarrhoea, itch, loss of appetite, male infertility, menstrual pain, sore throat and ulcer were treated with 2 plants each and the remaining ailments with single species only (Table 5).

Table 5: List of illness cases with name of the plants used to treat

Illness	**No. of plants used**	**Name of plants used (use reports)**
Anaemia	2	*Physalis minima* (3), *Portulaca oleracea* (6)
Arthritis	1	*Cardiospermum halicacabum* (15)
Asthma	2	*Phoenix sylvestris* (10), *Solanum torvum* (14)
Blood dysentery	2	*Borassus flabellifer* (8), *Tamarindus indica* (7)
Blood pressure	1	*Mangifera indica* (6)
Body heat	1	*Borassus flabellifer* (16)
Body pain	1	*Cardiospermum halicacabum* (12)
Boils	1	*Amaranthus viridis* (10)
Burn	1	*Tamarindus indica* (16)
Cold	1	*Erythrina variegata* (8)
Constipation	1	*Terminalia catappa* (3)
Cough	2	*Erythrina variegata* (18), *Opuntia stricta* (3)
Diabetes	4	*Coccinia grandis* (22), *Mangifera indica* (19), *Psidium guajava* (19), *Syzygium cumini* (24)
Diarrhoea	2	*Guazuma ulmifolia* (3), *Morinda tinctoria* (7)
Fever	4	*Annona squamosa* (4), *Cyperus articulatus* (6), *Physalis peruviana* (6), *Vigna trilobata* (2)
Gas trouble	1	*Ziziphus mauritiana* (11)
Haemorrhage	1	*Lantana camara* (11)
Hair growth	1	*Alternanthera sessilis* (18)
Honey bee sting	1	*Tamarindus indica* (15)
Intestinal worms	3	*Azadirachta indica* (13), *Mangifera indica* (8), *Solanum torvum* (11)
Itch	2	*Delonix regia* (2), *Passiflora foetida* (2)
Joint pain	1	*Cissus quadrangularis* (6)
Lice	1	*Carica papaya* (11)
Loos of appetite	2	*Marsilea quadrifolia* (4), *Ziziphus jujuba* (13)

Male infertility	2	*Physalis minima* (6), *Terminalia catappa* (12)
Memory power	1	*Cyperus articulatus* (3)
Menstrual pain	2	*Amaranthus spinosus* (12), *Pupalia lappacea* (13)
Piles	4	*Borassus flabellifer* (7), *Carica papaya* (9), *Cissus quadrangularis* (18), *Limonia acidissima* (6)
Sore throat	2	*Coccinia grandis* (9), *Pithecellobium dulce* (14)
Sprain	1	*Tamarindus indica* (9)
Swelling	1	*Tamarindus indica* (4)
Ulcer	2	*Oxystelma esculentum* (14), *Solanum nigrum* (21)
Wound	3	*Amaranthus tristis* (10), *Euphorbia hirta* (13), *Ipomoea aquatica* (7)

3.9. Ethnobotanical Indices

3.9.1. Use value (UV)

It was stated that when a plant has numerous usage reports, its use value is high; when there are few reports, its use value is low (Trotter and Logan, 1986). According to the UV analysis, the most frequently used species in the study area was *Tamarindus indica* (UV: 1.70), followed by *Mangifera indica* (1.10), *Borassus flabellifer* (1.03), *Cardiospermum halicacabum* (0.90), *Erythrina variegata* (0.86) and *Solanum torvum* (0.83). The least frequently used species were *Delonix regia*, *Passiflora foetida* and *Vigna trilobata* (0.06 each) (Table 4). The highest use values shown by some medicinal plants indicated that these species are highly favored for the treatment of a variety of illnesses. The reduced UV is exhibited by certain species being used less frequently in the study area.

3.9.2. Citation Frequency (CF) and Relative Importance (RI)

In the present study, CF values ranged from 0.34 to 8.80 and RI ranged from 0.11 to 1.0 (Table 4). The high CF was recorded for *Tamarindus indica* (8.80), followed by *Mangifera indica* (5.69), *Borassus flabellifer* (5.35), *Cardiospermum halicacabum* (4.66), *Erythrina variegata* (4.49) and *Solanum torvum* (4.31), while the lowest value of CF (0.34) was recorded for *Delonix regia*, *Passiflora foetida* and *Vigna trilobata* each (Table 4). In case of RI, *Tamarindus indica* was recorded with highest RI (1.0) followed by *Terminalia catappa* (0.64), *Mangifera indica* (0.62), *Borassus flabellifer* (0.60) and lowest RI (0.11) with *Delonix regia*, *Passiflora foetida* and *Vigna trilobata* (Table 4). The plants with high CF and RI values were extensively recognized in the local community, had several uses, and were widely dispersed. The local populations gathered plants from the natural environment and grew some of them close to their homes for immediate use.

3.9.3. Family Importance Value (FIV)

On the subject of FIV, the best represented family for treating various illnesses was Fabaceae by highest FIV (316.66) with 5 species, followed by Amaranthaceae (210.0) with 5 species, Solanaceae (203.33) with 4 species and Myrtaceae (143.33) with 2 species. The lower most FIV (6.66) was noted for Passifloraceae with single species (Table 2). These findings make it clear that a certain family notably, one with a high FIV, is widely used in the region to treat a range of ailments. Additionally, it has been shown that the local community prefers to use some plant families over others based on their use-value. Similar results from a recent ethnobotanical study have been reported [41].

3.9.4. Ailment Categories

Based on data gathered from traditional healers among the Kani tribes living in Tirunelveli hills of the Western Ghats, Ayyanar and Ignacimuthu [42] divided all illnesses that were documented into 15 categories. By the current study, all the reported illnesses were grouped into the following 11 categories viz. Circulatory system disorders, Cold/Cough, Cut/Wound, Dermatological infections, ENT (Ear, Nose & Throat) problems, Fever, Gastro-intestinal ailments, Reproductive system ailments, Respiratory system disorders, Skeleto-muscular system problems and Other ailments. Information regarding the disease categories and their respective illness recorded during this research work was presented in Table 6.

Table 6. Illness categories with number plants used and use reports

Illness category	**Illness**	**No. of plants used**	**No. of use reports**
Circulatory system disorders	Anaemia	2	9
	Blood pressure	1	6
	Diabetes	4	84
Cold/Cough	Cold	1	8
	Cough	2	21
Cut/Wound	Wound	3	30
	Haemorrhage	1	11
Dermatological infections	Boils	1	10
	Hair growth	1	18
	Itch	2	4
	Lice	1	11
ENT (Ear, Nose, Throat) problems	Sore throat	2	23
Fever	Fever	4	18
Gastro-intestinal ailments	Blood dysentery	2	15
	Constipation	1	3
	Diarrhoea	2	10
	Gas trouble	1	11
	Intestinal worms	3	32

	Loss of appetite	2	17
	Piles	4	40
	Ulcer	2	35
Reproductive system disorders	Burn	1	16
	Male infertility	2	18
	Menstrual pain	2	25
Respiratory system disorders	Asthma	2	24
Skeleto-muscular system problems	Arthritis	1	15
	Body pain	1	12
	Joint pain	1	6
	Sprain	1	9
	Swelling	1	4
Other ailments	Body heat	1	16
	Honey bee sting	1	15
	Memory power	1	3

3.9.5. Informant Consensus Factor (ICF)

Usually, the ICF of local knowledge for disease treatment was based on the plant species availability at the study site [43]. For the current study, the diseases were categorized into broad disease groups in order to evaluate the informant consensus factor. The ICF values in current research work were ranged from 0.82 to 0.96 (Table 7). Respiratory system disorders have the highest ICF value 0.96 with 24 use reports for 2 species, followed by ENT problems (0.95 with 23 use reports for 2 species), Circulatory system disorders (0.93 with 99 use reports for 7 species), Reproductive system disorders (0.93 with 59 use reports for 5 species) and lowest ICF (0.82) for Fever with 18 use reports for 4 species (Table 7). These findings were contradicted with the earlier study [42] carried out in Tirunelveli hills of Tamil Nadu, by which it was documented that liver problems had high ICF value (0.86).

Table 7: List of illness category with ICF values

Illness category	**No. of illness**	**Total no. of plants used**	**Total no. of use reports**	**ICF**
Circulatory system disorders	3	7	99	0.93
Cold/Cough	2	3	29	0.92
Cut/Wound	2	4	41	0.92
Dermatological infections	4	5	43	0.90
ENT (Ear, Nose, Throat) problems	1	2	23	0.95
Fever	1	4	18	0.82
Gastro-intestinal ailments	8	17	163	0.90
Reproductive system disorders	3	5	59	0.93
Respiratory system disorders	1	2	24	0.96

Skeleto-muscular system problems	5	5	46	0.91
Other ailments	3	3	34	0.93

It was reported that a high ICF for a particular disease category indicates that the research sites have a high prevalence of the many diseases that fall under that particular category and that the local population is well-informed about the plants that are used to treat particular illnesses. The low ICF might be the consequence of poor communication amongst informants in the research region who are practicing that specific ailment category, or it could be because the population under investigation is not afflicted by such diseases [44].

4. Conclusions

These medicinally important plants should be the subject for human clinical trials to demonstrate their pharmacological efficacies in relation to treatment potential. Testing the pharmacological and phytochemical properties of each of these plants is necessary in order to develop a novel medication. The appropriate use and exploitation of these plants must also be considered, since improper use might lead to the potential extinction of some species.

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