



Bridging tradition and science: Ethnomedicinal plant use among the Irula Tribe of Arayur, Nilgiris

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Abstract

Recent trends in plant science have increasingly emphasized the documentation and scientific validation of traditional medicinal knowledge as a valuable resource for novel drug discovery. In line with this shift, indigenous communities like the Irula tribe of Arayur village represent crucial repositories of ethnobotanical wisdom developed over generations. This study documents the ethnomedicinal knowledge of the Irula tribe, focusing on plant resources utilized for traditional healthcare practices. Ethnobotanical data was collected through semi-structured interviews, guided field walks, and participatory rural appraisal methods. A total of 45 plant species belonging to 24 families were documented, with Fabaceae (20%), Asteraceae (13%), and Lamiaceae (10%) being the dominant families. Leaves constituted the most frequently used plant part (45%), followed by roots (17%), bark (12%), whole plant (10%), fruits (8%), and flowers (8%). Regarding mode of administration, oral consumption was predominant (66%), followed by topical application (23%), inhalation (7%), and other methods (4%). The documented medicinal plants were primarily used to treat respiratory ailments (25%), gastrointestinal disorders (20%), skin diseases (16%), and fever (12%), highlighting their crucial role in primary healthcare management among the Irula community. This study bridges traditional ecological knowledge with contemporary plant science, emphasizing the significance of preserving ethnomedicinal wisdom while suggesting further pharmacological investigations to validate the therapeutic efficacy of these indigenous plant resources.

Keywords: Ethnobotany, traditional knowledge, Irula tribe, Arayur

Introduction

Centuries of human-environment interaction have produced traditional knowledge of medicinal plants, which constitutes a priceless legacy that is becoming more and more threatened. The Irula tribe of Tamil Nadu's ethnomedicinal practices are a prime example of indigenous knowledge that has supported community healthcare for many generations among these knowledge systems (Rajan *et al.*, 2018) ^[18]. The current study aims to document the medicinal plants used by the Irula tribe in Arayur village, Kotagiri, The Nilgiris, Tamil Nadu. It highlights the critical need to preserve this knowledge and investigates how it might be applied to contemporary medicine.

Using the rich biodiversity of the Nilgiri biosphere Reserve, the Irula tribe is renowned for its deep understanding of the forest ecosystem and its high standards of traditional health care practices (Parthiban *et al.*, 2016) ^[16]. Due to modernization, habitat loss, and shifting socioeconomic patterns, this traditional knowledge that was transmitted orally to the following generation is in danger of disintegrating (Ayyanar & Ignacimuthu, 2011) ^[4]. Therefore, it becomes imperative that these ethnomedicinal knowledge be documented in order to preserve them.

Recent development in pharmacognosy and natural product chemistry have authenticated that traditional knowledge as valuable sources have paved way for drug discovery and development of numerous traditional remedies (Fabricant & Farnsworth, 2001 ^[8]; Newman & Cragg, 2020) ^[15]. The identification of bioactive active compounds from traditionally used medicinal plants have contributed to modern pharmaceutical research and formulation of novel therapeutic agents and compounds (Heinrich, 2010). The growing awareness of indigenous medicine's potential has strengthened the bridge between traditional knowledge

system to contemporary scientific research (Saslis-Lagoudakis *et al.*, 2012) ^[20].

The integration of traditional knowledge with modern investigation leads to a holistic approach to ethnobotanical research which respects and preserves cultural heritage, while exploring its connections to modern healthcare challenges (Reyes-García *et al.*, 2019) ^[19]. As biodiversity loss and cultural homogenization continue to threaten both ecology and knowledge system, it focuses the significant and urgent need for documentation.

Materials and Methods

1. The study area

The study was carried out in Arayur village, kotagiri Taluk, the nilgiri District within the Nilgiri Biosphere Reserve (11°08'-11°37'N, 76°27'-77°4'E) in Tamil Nadu, India. It has average elevation ranging from 750 to 2580 meters above the sea level, with average temperature between 21-25°C, having diverse flora with medicinal value.

2. Data Collection

The data was collected from April to August 2024 among Vaidayas (Traditional Healers) of Irula tribe, through Semi structured interview focusing on their traditional knowledge, preparation methods, therapeutic applications and Applications. The data was collected with prior concern of the informant after having explained about the content of the research.

3. Identification of Plant

The research team documented 45 medicinal plant species from 24 families. The collected plant specimens were identified by Taxonomist Dr. Vishalakshi, Head of the department of Botany, Providence College for women, The Nilgiris. Further as the primary reference Taxonomic

Identification and verification of plant specimens were carried out using Flora of the Presidency of Madras (Gamble & Fischer, 1915-1936), and then the collected ethnobotanical information, herbarium and photography were systematically arranged according to the therapeutic use and preparation to facilitate analysis and interpretation. (Fig.1)

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Fig 1: Sampling and Collection of Data

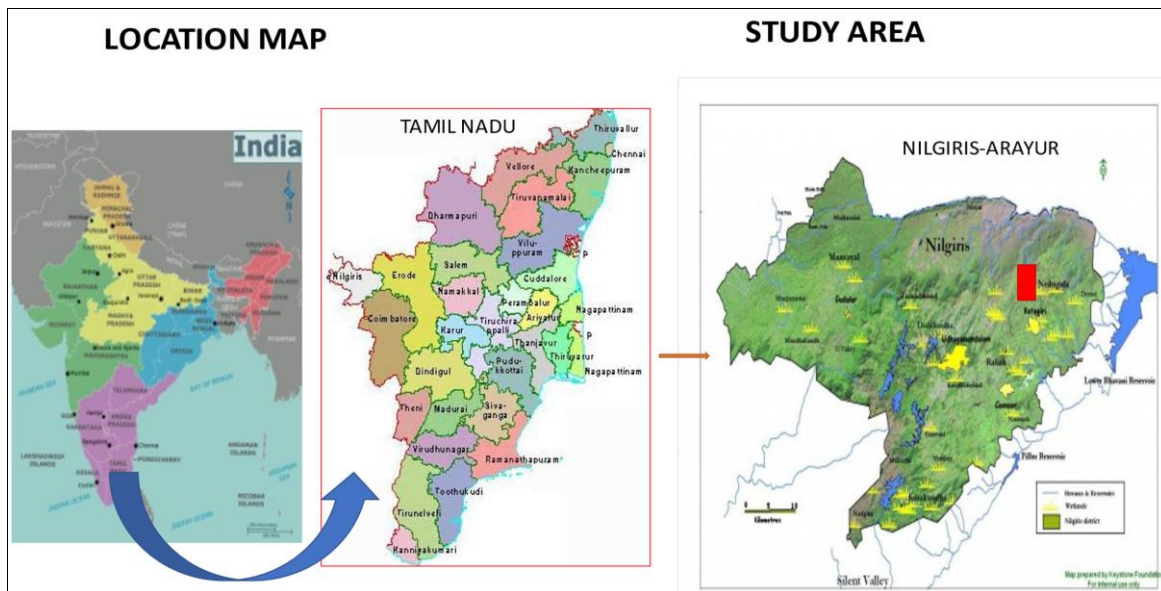


Fig 1: Map of the study area

Result

Medicinal Plants of Nilgiris

***Persicaria chinensis* (L.) H. Gross**

The root of *Persicaria chinensis* is ground with a few drops of water to form a mixture that is given to treat vomiting, bile, and nausea. The stem, along with three leaves and a bud, is ground into a paste that is used to alleviate tiredness.

***Senna sophera* (L.) Roxb**

The roots of *Senna sophera* are ground with water to create a paste. This paste is blown over the ear and applied to the crown of the head, and it is also consumed to cure vomiting.

***Senna septemtrionalis* (Viv.) H.S. Irwin & Barneby**

The bark of *Senna septemtrionalis* is ground into a paste and applied to the body to detect lumps. If a lump is present, the

area where the paste is applied becomes moist or watery. Applying a mixture of cassia fistula leaf, tobacco leaf, and human saliva topically to cure skin rashes lacks scientific evidence and may pose potential risks.

***Helicteres isora* L.**

The root of *Helicteres isora* is ground with a few drops of water and mixed with palm sugar. This mixture is given in a coconut shell to be consumed on an empty stomach to cure lower abdominal pain, especially for polycystic ovary disease (PCOD).

***Rubia cordifolia* L.**

The root and leaves of *Rubia cordifolia* are ground together to form a paste that is applied to the affected area to treat beetles or any insect bites. A mixture made by grinding the root, leaves, and cumin is given to eat to relieve lower abdominal pain. The mature root is ground, and the powder is given to consume to reduce body heat.

***Stephania japonica* (Thunb.) Miers**

The leaves of *Stephania japonica* are ground and made into a paste, which is then spread like dosa and placed on the head to reduce excess water accumulation in the head and to lower body heat. The paste made from the leaves is applied for treating the early stage of leprosy. The juice extracted from the root is given to alleviate stomach ache. When someone is bitten by a snake, they chew the root to remove venom.

***Catunaregam spinosa* (Thunb.) Tirveng.**

The root of *Catunaregam spinosa* is ground into a paste and mixed with lemon juice. This mixture is applied to wounds on the legs or toes from top to bottom. It is also given for curing lymph node issues. The roots and bark are ground together with the bark of *Ligustrum robustum* subsp. *perrottetii*. This ground mixture is applied to the body to help reduce diabetes.

***Ipomoea obscura* (L.) Ker Gawl**

A hole is created in the center of the leaf of *Ipomoea obscura*, and coconut or gingelly oil is applied on it. The leaf is then heated and placed on the lump in such a way that the root of the lump remains exposed. Immediately, the root of the lump breaks, causing the discharge of all waste matter from the lump. This process is repeated for 3 to 4 days.

***Grewia tiliifolia* Vahl**

The bark of *Grewia tiliifolia* is scraped and ground, and the resulting powder is given to drink as it acts as a laxative to relieve constipation. The tender bark is applied on the head like a shampoo to promote hair growth and treat alopecia (hair loss) and baldness.

***Pterolobium hexapetalum* (Roth) Santapau & Wagh.**

For diabetic patients, the root of *Pterolobium hexapetalum* is ground and mixed with black hen feces. This paste is applied to gangrene wounds using a hen's feather. The paste made from the root and black hen feces is also used to treat wounds on the limbs of heavy or chain smokers due to its detoxifying properties.

***Pterocarpus marsupium* subsp. *acuminatus* (Prain) Thoth**

The tender, red-colored bark of *Pterocarpus marsupium* subsp. *acuminatus* is ground with palm sugar and given to women to stop excessive bleeding. The ground bark is

applied as a bindi (dot on the forehead) for children up to the age of 10. The wood from this plant is not used for making thresholds or doorsteps. The black bark is ground and mixed with half a glass of water, and the resulting mixture is given as a remedy to control dysentery.

***Achyranthes aspera* var. *sicula* L**

The root of *Achyranthes aspera* var. *sicula* is chewed and tasted to provide relief from toothache. The leaves are powdered and mixed with coconut oil. The resulting paste is applied on burns.

***Ruta graveolens* L.**

The leaves of *Ruta graveolens* are ground together with the leaves of *Acalypha indica* and the rhizome of *Curcuma longa*. This mixture is applied to the body, allowed to dry, and then a bath is taken to overcome skin rashes. The plants grown near the house are believed to repel snakes and prevent them from entering. For infants, the leaves are mixed with turmeric and sweet flag, which is used to bathe them to protect against airborne diseases. The leaves are roasted with coconut oil for knee pain and skin diseases, and the resulting paste is applied topically.

***Hippeastrum puniceum* (L.) Voss**

The bulb of *Hippeastrum puniceum* is ground into a paste and applied for treating breast cancer. Coconut oil is applied to the leaf, which is then heated and tied around the affected area to provide relief from muscle catch.

***Kalanchoe grandiflora* Wight & Arn.**

The leaves of *Kalanchoe grandiflora* are ground into a paste and applied on the forehead to cure evening fever in children.

***Solanum nigrum* L**

The leaf and onion of *Solanum nigrum* are squeezed together in the hand, and the extracted juice is licked to overcome nausea and vomiting.

***Senegalia rugata* (Lam.) Britton & Rose**

The fruit of *Senegalia rugata* is made into a paste and applied over the body to cure skin diseases. It is also used to wash hair. The fruits of *Terminalia chebula* and *Senegalia rugata* are ground together with the bark of *Grewia tiliifolia*, and this mixture is applied to the body before taking a bath, as it helps reduce body heat.

***Bergera koenigii* L.**

The forest curry leaves of *Bergera koenigii* are squeezed along with tobacco and coconut fiber, and the resulting mixture is smelled through the nose to overcome evening fever.

***Canarium strictum* Roxb.**

The resin of *Canarium strictum* is used as incense for its repellent properties. The smoke from burning the resin is used to cure cold. The newborn baby and the mother inhale the smoke to overcome cold.

***Gmelina arborea* Roxb. ex Sm.**

The leaves of *Gmelina arborea* are used as fodder for goats. A paste is made from the plant and used to prepare the pounder (pestle) for pounding millets.

***Drynaria quercifolia* (L.) J.Sm.**

The rhizome of *Drynaria quercifolia* is ground with the bark of *Machilus glaucescens*, made into a paste, and tied around the knee to alleviate knee pain. The rhizome of *Drynaria quercifolia* is cooked and consumed as a remedy for joint pains.

***Machilus glaucescens* (Nees) Wight**

The rhizome of *Drynaria quercifolia* is ground with the bark of *Machilus glaucescens*, made into a paste, and tied around the knee to alleviate knee pain.

***Mimosa pudica* L.**

A decoction prepared from the Touch-me-not plant (*Mimosa pudica*) is consumed on an empty stomach for blood purification. The leaves of the Touch-me-not plant and the Vallari (*Centella asiatica*) plant are ground together and administered to stop the white vaginal discharge. The Touch-me-not plant is also believed to possess properties that can mesmerize or captivate individuals.

***Centella asiatica* (L.) Urb.**

The leaves of the Touch-me-not plant and the Vallari (*Centella asiatica*) plant are ground together and administered to stop the white vaginal discharge. The boiled leaves are eaten as vegetables. The leaf is used as a memory tonic.

***Asparagus racemosus* Willd.**

The tuber of *Asparagus racemosus* is eaten as a vegetable and is used to cure stomach trouble. The tuber is made into a paste and applied on the body to repel honey bee attacks during honey collection.

***Hevea brasiliensis* (Willd. ex A. Juss.) Müll.Arg.**

The latex of *Hevea brasiliensis* is taken from the bark and used for commercial purposes.

***Syzygium aromaticum* (L.) Merr. & L.M. Perry**

Clove oil of *Syzygium aromaticum* is applied topically for halitosis and dental care. Clove decoction is used for skin infections. Cloves are consumed orally for stress relief. Clove oil or powder is used as an insect repellent.

***Alpinia officinarum* Hance**

The rhizome of galangal (*Alpinia galanga*) is ground into powder or made into a decoction and used traditionally for its anti-inflammatory, digestive, antimicrobial, and expectorant properties to treat conditions like pain, inflammation, stomach ache, microbial infections, and colds.

Vitex negundo* var. *negundo

The dry leaves of *Vitex negundo* var. *negundo* are smoked or inhaled to cure headaches. The plant is used for steam baths to treat joint pain. The leaves are boiled in water, and the steam is inhaled for relief from cold, cough, and headache for 3 days. The leaves and roots are soaked in tender coconut water and given to drink, traditionally believed to reduce body heat.

***Azadirachta indica* A. Juss.**

The leaves of *Azadirachta indica* are used to prepare a decoction or extract that is consumed orally for fever,

malaria, and skin diseases. A paste made from the leaves is applied topically for skin infections, wounds, and leprosy. The bark is used to prepare a decoction that is consumed orally as an anti-fertility agent and to treat stomach ulcers. Powder made from the bark is applied topically for skin diseases and insect bites. Oil extracted from the seeds is applied topologically for skin disorders, headaches, and rheumatism. Twigs are used as a natural toothbrush (datun) for oral hygiene and treating gum diseases. Smoke from burning neem leaves is used as an insect/mosquito repellent.

***Justicia adhatoda* L.**

The leaf of *Justicia adhatoda* is crusted with water, filtered, and given from the third day of menstruation till seven days to promote fertility. The leaves are ground with small onions and applied on the body to treat allergies. Leaves of *Vitex negundo* var. *negundo*, *Ocimum basilicum*, and *Justicia adhatoda* are mixed with lemon and turmeric, boiled in water, and just before inhalation, a hot brick is placed in the boiled leaf water.

***Solanum torvum* Sw.**

The fruits of *Solanum torvum* are edible. The fruit is squeezed and drunk to get relief from stomach disorder. A paste of the fruit is applied on the scalp to overcome dandruff.

***Lantana camara* L.**

The leaf juice of *Lantana camara* mixed with slaked lime is used for cuts and wounds in ethnomedicine. The leaf juice is also used as a local anesthetic.

***Ocimum basilicum* L.**

The leaves of *Ocimum basilicum* are crushed with water and given orally for cold. The same water is applied to the forehead to cure headaches. Leaves of *Vitex negundo* var. *negundo*, *Ocimum basilicum*, and *Justicia adhatoda* are mixed with lemon and turmeric, boiled in water, and just before inhalation, a hot brick is placed in the boiled leaf water.

***Coleus amboinicus* Lour.**

The fresh few leaves of *Coleus amboinicus* are given orally to cure cold.

***Piper nigrum* L.**

The dried fruit and salt of *Piper nigrum* are powdered and applied over the aching tooth for relief.

***Capsicum frutescens* L.**

A few chili fruits of *Capsicum frutescens* are smoked to chase elephants from living areas. It is prepared as chutney and traditionally given to reduce high blood pressure. The small chili fruit is made into a paste and placed on the inner surface of the tongue to traditionally treat persistent cold, cough, and fever.

***Capsicum annuum* L.**

Capsicum annuum, commonly known as 'moor milagai', is used medicinally. Its dried fruit, mixed with curd, is traditionally given for ulcers, chest pain, and heartburn.

***Chamaecostus cuspidatus* (Nees & Mart.) C.D. Specht & D.W. Stev.**

The leaves of *Chamaecostus cuspidatus* are cooked and eaten to control diabetes.

***Andrographis paniculata* (Burm.f.) Wall. ex Nees**

The leaf paste of *Andrographis paniculata* is applied externally to cure skin diseases.

***Portulaca oleracea* L.**

The leaves of *Portulaca oleracea* are cooked as vegetables and given to pregnant women for five days to reduce swelling.

***Acorus calamus* L.**

The tuber of *Acorus calamus* is ground and mixed with the mother's milk and given to children for indigestion and to promote good sleep in infants. The decoction of the tuber is given to adults for indigestion.

***Ligustrum robustum* subsp. *perrottetii* (A.DC.) de**

The roots and bark of *Catunaregam spinosa* are ground together

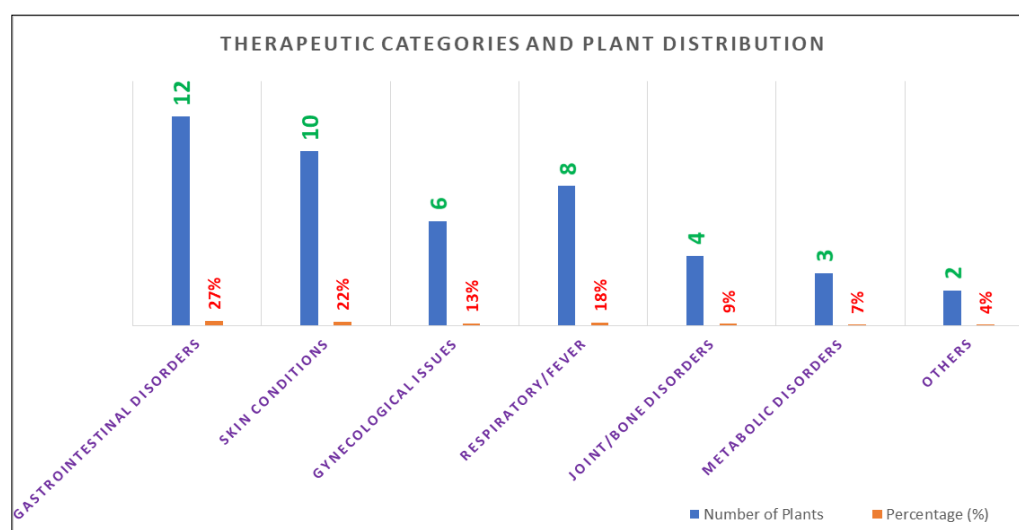
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Discussion**1. Medicinal Plants of Nilgiris and Their Ethnobotanical Uses**

The ethnobotanical survey conducted among the Irula tribe of Kotagiri village, Nilgiri district, has documented 45 medicinal plants, and are highlighted in this study. The traditional knowledge of these medicinal plants is crucial in primary healthcare among the Irula community. The documented plants exhibit diverse therapeutic applications ranging from gastrointestinal ailments (27%), skin conditions (22%), Respiratory and fever (18%) and gynaecological (13%) issues to more complex conditions such as leprosy and snakebite treatment. (Table1, Fig 2)

Table 1: Therapeutic Categories and Plant Distribution

Therapeutic Category	Number of Plants	Percentage (%)	Key Plants
Gastrointestinal Disorders	12	27%	<i>Persicaria chinensis</i> , <i>Stephania japonica</i>
Skin Conditions	10	22%	<i>Rubia cordifolia</i> , <i>Ruta graveolens</i>
Gynaecological Issues	6	13%	<i>Helicteres isora</i> , <i>Mimosa pudica</i>
Respiratory/Fever	8	18%	<i>Canarium strictum</i> , <i>Vitex negundo</i>
Joint/Bone Disorders	4	9%	<i>Drynaria quercifolia</i>
Metabolic Disorders	3	7%	<i>Catunaregam spinosa</i>
Others	2	4%	<i>Hippeastrum puniceum</i>

**Fig 2:** Therapeutic category and plant distribution**Traditional Medicinal Uses and Efficacy****Gastrointestinal and Digestive Disorders**

Several plants are used for treating digestive issues, nausea, vomiting, and stomach ache. *Persicaria chinensis* (L.) H. Gross (Kotwal, N. K. (2024). *Persicaria chinensis* (L.) H. Gross and *Senna sophora* (L.) Roxb. are primarily used for alleviating nausea and bile-related conditions Gritsanapan, W. (2010). *Stephania japonica* (Thunb.) Miens root extract is given for stomach aches (Uddin, M. Z. (2016), while *Rubia cordifolia* L. and *Grewia tiliifolia* helps in treating constipation. Archana Rawat, A. R., & Satya Narain, S. N. (2018) [3].

Skin Conditions and Wound Healing

Plants like *Rubia cordifolia* L (Karodi *et al.*,2009) [11], *Ruta graveolens* L, and *Senegalia rugata* (Lam.) Britton & Rose

are traditionally used for curing rashes in the skin and infections (Velmurugan *et al* 2022). (Sutjaritjai *et al.*, 2022). The root of *Catunaregam spinosa* (Thunb.) Tirveng, mixed with lemon juice is applied to leg wounds. Soren, A. D., & Lalthanpuui, P. B. (2021). *Pterolobium hexapetalum* (Roth) Santapau & Wagh is uniquely used to treat wounds associated with diabetes and chronic smokers, mixed with black hen faeces. Thangaraj, P., & Sathyanarayanan, S. (2018).

Women's Health and Gynecological Issues

Helicteres isora L (Balkrishna *et al.*, 2022) [5] and *Rubia cordifolia* L are used for treating lower abdominal pain and menstrual irregularities (Zhang *et al.*, 2023) [24] (Wen *et al.*, 2022) [23]. *Pterocarpus marsupium* subsp. *acuminatus* (Prain) Thoth. bark is administered to women to control

excessive bleeding (Majeed *et al.*, 2023) ^[14]. *Mimosa pudica* L. and *Centella asiatica* (L.) Urb. are ground together to treat white vaginal discharge, childbirth and infertility Lans, C. (2007) ^[12], (Galli *et al.*, 2023)

Respiratory and Fever-Related Treatments

Stephania japonica (Thun.) Miers paste is applied to reduce body heat and treat excess water accumulation in the head by Irula tribes. For low density of semen, leaves of *Stephania japonica* are squeezed in water. As a result, a dense gum-like juice comes out, which is taken. Leaves are rubbed on abscesses or skin infections by Santal tribes of Odisha, India (Sahu, J. *et al.* 2023). *Ruta graveolens* L. Loonat, F., & Amabeoku, G. J. (2014) ^[13]. *Curcuma longa* L. and *Acalypha indica* L are combined to treat airborne diseases and rashes (Nag *et al.*, 2018). The *Canarium strictum* Roxb. resin is burned to treat colds, particularly for newborns and mothers (Chanda *et al.*, 2023) ^[7].

Joint Pain and Bone Disorders

Drynaria quercifolia (L.) J.Sm. (Wong *et al.*, 2021) and *Machilus glaucescens* Nees Wight is combined and used as a paste to treat knee pain and joint problems. The rhizome of *Drynaria quercifolia* (L.) J.Sm. is also consumed for its anti-inflammatory properties. Ali, M. (2017) ^[2].

Snakebite and Poison Detoxification

The root of *Stephania japonica* (Thun.) Miers, (Wang *et al.*, 2022) ^[22] is chewed to prevent snake venom spreading in human body.

Hair and Scalp Treatments

Grewia tiliifolia Vahl (Singh *et al.*, 2023) bark promotes hair

growth and treats alopecia. *Senegalia rugata* (Lam.) Britton & Rose fruit is used as a natural hair cleaner. (Ponugoti, M. *et al.*, 2021) ^[17].

Diabetes and Metabolic Disorders

The bark and root mixture of *Catunaregam spinosa* (Thunb.) Tirveng. (Timalsina, D *et al.*, 2021) ^[21] with *Ligustrum robustum* subsp. *perrottetii* (A.DC.) de reduces blood sugar levels (Basini *et al.*, 2019) ^[6] *Pterolobium hexapetalum* (Roth) Santapau & Wagh is specifically used for wound healing in diabetic patients. Ganesh, P., & Sudarsanam, G. (2013) ^[10].

Cancer Treatment and Tumor Detection

Hippeastrum puniceum (Lam.) Voss Al Shammari, L. A. M. (2021) ^[1]. bulb is traditionally applied to treat breast cancer, though scientific validation is required (Feu *et al.*, 2021) ^[9]. *Senna septemtrionalis* (Viv.) H.S. Irwin & Barneby paste detects lumps by observing skin reactions.

Memory and Cognitive Enhancement

Centella asiatica (L.) Urb. is consumed as a memory tonic, and its boiled leaves are included in the diet for cognitive benefits. (Mishra *et al.*, 2022) (Table 4)

The ethnobotanical survey revealed that every part of a plant has medicinal values but the leaves were used in highest medicinal preparation. The method of using various parts of the plants reflects the community's extensive knowledge of plant priorities and their sustainable harvesting practices, as leaf collections generally cause less damage to plant population compared to the roots and other parts of the plants (Table. 2 & Fig.3).

Table 2: Plant Parts Utilization Analysis

Plant Part	Number of Species	Percentage (%)	Examples
Leaves	20	45%	<i>Stephania japonica</i> , <i>Ruta graveolens</i>
Roots	8	17%	<i>Persicaria chinensis</i> , <i>Rubia cordifolia</i>
Bark	5	12%	<i>Grewia tiliifolia</i> , <i>Pterocarpus marsupium</i>
Whole Plant	4	10%	<i>Mimosa pudica</i> , <i>Andrographis paniculata</i>
Fruits	4	8%	<i>Solanum torvum</i> , <i>Opuntia stricta</i>
Flowers	4	8%	<i>Azadirachta indica</i>

The tribal community administer 22 plants topically, 18 plants orally and 3 plants through inhalation (Table 3)

Table 3: Route of Administration Analysis

Administration Route	Number of Applications	Percentage (%)	Common Preparations
Topical	22	49%	Paste, oil application
Oral	18	40%	Decoction, powder
Inhalation	3	7%	Smoke, steam
Nasal	2	4%	Juice, powder

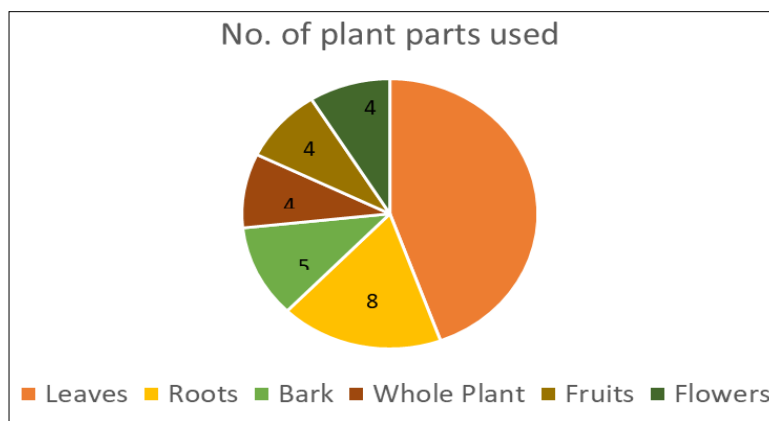


Fig 3: Plant Parts Utilization Analysis

Table 5: Comparative Analysis with Scientific Literature

Plant Species	Traditional Use by Irula Tribe	Scientific Validation Status	Known Bioactive Compounds	Research Status
<i>Azadirachta indica</i>	Fever, malaria, skin diseases, oral hygiene, anthelmintic	Extensively validated	Azadirachtin, nimbin, nimbi din, quercetin	Well-documented antimicrobial, anti-inflammatory
<i>Centella asiatica</i>	Memory tonic, vaginal discharge treatment	Confirmed neuroprotective effects	Asiatic side, madecassoside, Asiatic acid	Extensively studied for cognitive enhancement
<i>Rubia cordifolia</i>	Insect bites, abdominal pain, body heat reduction	Partially validated	Anthraquinones, purpurin, alizarin	Moderate research on anti-inflammatory properties
<i>Mimosa pudica</i>	Blood purification, vaginal discharge	Limited validation	Mimosine, tannins, flavonoids	Some studies on antimicrobial activity
<i>Solanum nigrum</i>	Nausea, vomiting relief	Partially validated	Solanine, solasonine, glycoalkaloids	Limited clinical studies
<i>Andrographis paniculata</i>	Skin disease treatment	Well-validated	Andrographolide, neoandrographolide	Proven anti-inflammatory, hepatoprotective
<i>Asparagus racemosus</i>	Stomach trouble, bee repellent	Validated for digestive issues	Saponins, asparagamine, racemosol	Well-studied adaptogenic properties
<i>Stephania japonica</i>	Snake bite, stomach ache, body heat	Minimal studies	Alkaloids (stephanine, protostephanine)	Requires extensive research
<i>Pterolobium hexapetalum</i>	Diabetic wound healing with hen feces	No scientific validation	Tannins, flavonoids	Minimal research available
<i>Helicteres isora</i>	Lower abdominal pain, PCOD	Limited validation	Betulic acid, oleanolic acid	Some studies on anti-diabetic properties
<i>Grewia tiliifolia</i>	Constipation, hair growth	Partially validated	Mucilage, tannins, flavonoids	Limited pharmacological studies
<i>Ruta graveolens</i>	Skin rashes, snake repellent	Moderate validation	Rutin, coumarin, alkaloids	Some studies on anti-inflammatory effects
<i>Vitex negundo</i>	Headache, joint pain, cold	Well-validated	Vitexin, casticin, orientin	Proven anti-inflammatory, analgesic
<i>Senna sophora (L.) Roxb</i>	Vomiting treatment	Partially validated	Sennosides, anthraquinones	Limited clinical validation
<i>Canarium strictum</i>	Cold treatment, repellent	Limited studies	Triterpenes, essential oils	Minimal research on medicinal properties
<i>Catunaregam spinosa</i>	Wound healing, diabetes	Very limited studies	Iridoids, flavonoids	Requires comprehensive research
<i>Hippeastrum puniceum</i>	Breast cancer treatment	No scientific validation	<i>Amaryllidaceae</i> alkaloids	No clinical studies available
<i>Drynaria quercifolia</i>	Joint pain, knee pain	Validated for bone health	Naringin, flavonoids, phenolics	Proven osteogenic properties
<i>Syzygium aromaticum</i>	Dental care, skin infections	Extensively validated	Eugenol, caryophyllene	Well-documented antimicrobial, analgesic
<i>Piper nigrum</i>	Toothache relief	Validated	Piperine, chavicine	Proven analgesic, antimicrobial properties

This finding reveals that some traditional uses align well with scientific knowledge, some are unique to tribal treatment that lack scientific validation which require the urgent need for research priorities

Conclusion

This ethnobotanical survey recorded 45 medicinal plant species from 24 families used by the Irula tribe in Kotagiri village Nilgiri District, Tamil Nadu. It highlights their traditional Knowledge for Various Diseases from Simple fever to complicated ailments like diabetes and cancer. The primary uses of leaves and simple and unique preparation diagnostic methods, reveal their holistic Approach. The ethnomedicinal knowledge of the tribal community complements the pharmacological studies. The above-mentioned plants have bioactive compounds with antimicrobial, anti-inflammatory, and antioxidant effects. But some species lack methods of scientific backing that pave the way for the urgent need for clinical trials and phytochemical analysis. This research also creates the need for pharmacological studies with the support of traditional knowledge to produce many herbal medicines for validation, thus preserving the cultural heritage.

Declarations

Ethics approval and consent to participate: The development of the study followed the ethical and legal guidelines for the

development of research on traditional knowledge. The participation of healers was subject to the acceptance of the Free and Informed Consent Form. discussions.

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