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Research Article

SURVEY OF SOME PLANTS IN NAINAMALAI FOOTHILL, EASTERN GHATS, NAMAKKAL

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ABSTRACT

Objectives: This study was designed to document some medicinal plants in Nainamalai foothill.

Methods: The plants were collected from different sites of the hill area, identified by their local names with the help of villagers while walking through the vegetation. The photographs of these plant species were taken during the field visits.

Results: Plant survey at Ninamalai foothill has documented a total of 124 plants. Among 124 species surveyed, 123 were angiospermic plants and one pteridophytic plant. Analysis of plants showed that the more number of dicotyledons (115 species) belongs to 43 families and 8 monocotyledons are represented in 5 families. Within dicotyledons, 53 species are polypetalae, 34 species are gamopetalae, and 28 monochlamydeae. For each species, botanical name, family, habit, local name, parts used, and medicinal usage are identified and presented. The family-wise analysis showed that the family Amaranthaceae held the dominant position by representing more number of species (13 species). Habit-wise analysis shows that maximum representatives to the plants are from herb (76) community, followed by trees (22), shrubs (17), climbers (6), parasitic shrub and parasitic twinner (1), and fern (1). The absence of epiphytes indicates the loss special habitats due to the degraded status of the hill. Part-wise analysis showed the predominant use of whole plants, followed by leaves, root, seed, bark, fruit, flower, and stem.

Conclusion: People of the study area mostly administered phytomedicine orally. A majority of remedies are prepared in the form of extract or juice, followed by powder form, decoction, and freshly collected plant parts. Most of the villagers in the study are poor, and they largely depend on plants for food, medicine, fuel, and other daily necessities.

Keywords: Nainamalai, Dicotyledons, Amaranthaceae, Tree, Epiphytes, Leaves.

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INTRODUCTION

Human evolution in growth has advanced due to the outcome of total interaction with the environment, including plants and animals. Pre-historic man documented the great diversity of plants accessible to him. Living intimate to nature, traditional societies have attained inimitable experience about the use of wild flora and fauna. Most of the species are unknown to the people because they live away from such a natural forest ecosystem. Later years of observations and exploration, trials, error, experimentation, or even use of natural methods, the novel member of human communities has recognized whether they are useful or toxic members. Plants are the mainstay of life on earth and a vital resource for human welfare. The close association between the human and plants has evolved over generations of experience. This trend has been continued to the present time where people get much of their needs, particularly, the food and medicine from biological resources [1].

For millennia, the herbs, animals, rocks, and trees were the only pharmaceutical giants we had. For thousands of years, mankind is using plant source to alleviate or cure illnesses. Like all living things on earth, every one of us is still a shareholder in nature - the greatest pharmacy on the earth. The plants represent an enormous pool of natural resources that can produce various products and chemicals for the advantage of all other life forms. Plants are the most formidable chemists. They are constantly producing an arsenal of chemical compounds, to respond to different challenges and threats in their environment [2].

India is one of the most medico-culturally diverse countries in the world. India has a rich diversity of medicinal plants. During the past two decades, some substantial progress has been made in the field of medicinal plants and their traditional use in different parts of India [3]. The Indian subcontinent is a vast repository of medicinal plants that are used in traditional medical treatments; around 20,000 medicinal plants have been recorded. The Indian systems of medicine use around 8000 species of plants which include trees (33%), herbs (32%), shrubs (20%), climbers (12%), and epiphytes, grasses, lichens, ferns, and algae put together (3%) [4]. It is also believed that the people in ancient time were healthier than that of today that is only because of their lifestyle and harmony with the nature. The villagers have their own remedies for medicinal treatment using various plants or plant products present in their near neighborhood area. The traditional use of plants as medicines is well known among the native groups of the area because most of the population of India lives in villages and is economically poor. Due to the lack of modern medical facilities, they use plants to get rid of different ailments.

Crude drugs are usually the dried parts of medicinal plants that form the essential raw materials for the production of traditional remedies of Ayurveda, Siddha, Unani, Homeopathy, Tibetan, and other systems of medicine including the folk, ethno, or tribal medicines. Considering a sharp shrinkage of biological species all around the globe and the increasing commercial values of medicinal plants are confirming the ethnobotanical knowledge and use of plants to treat various ailments and to preserve these natural resources.

India is tenth among the plant-rich countries of the world, fourth among the Asian countries. Moreover, India is also one among the 12 mega biodiversity centers of the world by having 47,000 plants species. The Eastern Ghats is one such a place. The average elevation of the Eastern Ghats is about 750 m, though individual peaks rise to heights of 1672 m [5]. Toward the south, the Eastern Ghats run in a westward direction meeting the Western Ghats in the Nilgiris of Tamil Nadu. The vegetation of Eastern Ghats is remarkable, and as a whole, the vegetation is typically deciduous type and scrub jungle in most places. Nainamalai foothills are situated on the Eastern Ghats at an altitude of 1200 m in the Namakkal district

and are 45 km from Namakkal town (Plate 1). In the present study, an attempt has been made to enumerate the diversity of medicinal plants in Nainamalai, which is located in Thirumalaipatti village, a plateau of Eastern Ghats, situated in the northern part of Namakkal district, Tamil Nadu, India. Nainamalai Varadharaja Swamy is one of the most ancient temples in Tamil Nadu. This temple is called as "Thirupathi of Salem." Main deities are Sri Varadharaja Swamy and Kuvalayavali Thayar. The temple is situated at a hilltop. The hilltop can be reached by climbing 3500 steps which would hardly take 3 h trek up the hill.

Complete information of survey, documentation, and inventory of wild medicinal plants in the Nainamalai foothills of Eastern Ghats is meager. In view of this present study, an attempt was made to survey and document the wild medicinal plant species in the foothill area. Therapeutic values and medicinal plants used are also documented.

METHODS

Survey of Nainamalai foothill, Eastern Ghats, Tamil Nadu, India

Description of the study area

The present study was conducted a survey in the Nainamalai, a plateau of Eastern Ghats, situated in the northern part of Namakkal district, Tamil Nadu, India. Nainamalai foothill is known for medicinal herbs and plants that grow in abundance on the hill slopes. Field trips were conducted from 2015 to 2016. Field trips were made in different seasons to collect medicinal plants.

Field observation

The plants were collected from different sites of the hill area, identified by their local names with the help of villagers while walking through the vegetation. The photographs of these plant species were taken during the field visits. During the period of the study, regular surveys were undertaken to document the list of wild medicinal plants and their traditional uses. The medicinal plants were also collected during the field survey, identified, and photographed.

The collected plant materials were named in a field book, and number and the field characters such as habit, habitat, color, and odor of flowers, period of flowering and fruiting, occurrence, and other relevant ecological features were observed and are noted in the field book. Proper data regarding each plant species were also collected by assigning botanical name, family, local names, habit, useful parts and medicinal uses. The collected data were entered into an Excel spreadsheet and summarized. Descriptive statistical methods such as percentage were employed, and graphs and tables show the results generated. The plants collected and tagged from foothills around the year were dried and duplicated. Representative samples of medicinal species collected from the study area were preserved as herbarium as per standard methods [6,7]. Each specimen was carefully examined in fresh condition and checked. The taxonomic identification of the plant specimens was done with the help of local and regional floras [8,9]. The collected plant specimens were deposited in the Department of Botany, Vellalar College for Women (Autonomous), Erode, Tamil Nadu, for future reference.

RESULT

In India, the use of plants as medicine dates back to 5000 years. Since times immemorial, medicinal plant nature's veiled and, to a large extent, unexplored nature's pharmacy have been used well-nigh in all human cultures around the world as a basis of safe and effective medicine. Phytochemical and pharmacological feedbacks can be headed to the evidence of possible therapeutic use of medicinal plants and the expansion of novel medicines. No survey of naturally growing medicinal plants of the present study area of Nainamalai, Eastern Ghats, Tamil Nadu, has been reported till date.

Survey of Nainamalai Eastern Ghats

In the present study, an attempt has been made to catalog the diversity of medicinal plants in the foothill of Nainamalai, Namakkal district. The study clearly indicates that the foothill of Nainamalai has a great diversity

Plate 1: View of Nainamalai (Hill)

of medicinal plants with rich properties which make well of varied kinds of ailments. Most of the medicinal plants hold therapeutic properties in parts such as leaves, roots, stem, fruit, bark, seeds, and flowers.

The study was carried out during 2015–2016, and 124 plant species were collected and identified. The species are arranged in alphabetical order. For each species, botanical name, family, habit, local name, parts used, and medicinal usage are identified and presented (Table 1). The botanical investigation has also led to the documentation of a large number of wild plants used by local villagers.

Analysis of plant diversity and enumeration

The entire survey revealed that a total of 124 medicinal plant species, distributed among 100 genera belonging to 49 families, were recorded. Among the 124 plants surveyed in the foothill of Nainamalai, 115 dicotyledons, 8 monocotyledons, and one species belonging to pteridophytes were noted, and their percentage is also given (Fig. 1).

Among 115 species from 43 families of dicotyledons, 53 species from polypetalae, 34 from gamopetalae, and 28 from monochlamydeae were also noted. 8 monocotyledons were also represented from 5 families. The family-wise analysis showed that the family Amaranthaceae held the dominant position by representing more number of species (13 species), Euphorbiaceae with 9 species, Fabaceae with 7 species, Acanthaceae and Aizoaceae 6 species each, Malvaceae with 5 species, Mimosaceae and Verbenaceae 4 species each, Asclepiadaceae, Capparidaceae, Lamiaceae, Solanaceae, Apocynaceae, Convolvulaceae, Moraceae, and Liliaceae 3 species each, Asteraceae, Rhamnaceae, Tiliaceae, Meliaceae, Menispermaceae, Pedaliaceae, Sapindaceae, Vitaceae, Cucurbitaceae, Papilionaceae, Portulacaceae, Nyctaginaceae, and Cyperaceae with 2 species each, and the rest of the families are represented with single number of species.

Growth form and plant parts used

Habit-wise analysis indicates that herbs held the dominant position which was followed by trees, shrubs, climbers, and ferns. Parasitic shrub and parasitic twiner were also present. Among the recorded species, 61% herbs (76) were found to be dominating over 18% trees (22), 13% shrubs (17), 9% climbers (6), and 1% fern (1), followed by parasitic 1%shrub (1) and 1% parasitic twiner (1) (Fig. 2). In the study area, the highest number from 93 species (55%) of plants were whole plants used for the preparation of medicine, followed by leaves from 27 species (16%), roots from 16 species (10%), seed from 14 species (80%), bark from 8 species (4%), fruits from 6 species (4%), flower from 2 species (2%), and stem from 1 species (1%) (Fig. 2).

A total of 124 plant species distributed in 49 families during the field survey were found to be used as traditional medicine for various disorders and diseases such as anti-inflammatory, anthelmintic, analgesic, leprosy, gonorrhea, bronchitis, diarrhea, dysentery, leukoderma, diabetes, skin diseases, antimutagenic, anticancer, smallpox, seminal weakness, antiplasmodia, asthma, pneumonia, rheumatism, ulcer, malaria, snakebite, piles, rabies, influenza, eye diseases, kidney disorder, wound, jaundice, hepatitis, blood pressure, leprosy, dysentery, dyspepsia, anti-anaphylactic, antispasmodic, nervous disorder, throat infection, anti-asthma, intestinal astringent, rheumatic joint, dental treatment, urinary infection, intestinal

Table: 1 Survey of medicinal plants in Nainamalai

Botanical name	Family name	Local name	Habit	Parts used	Medicinal uses
Abrus precatorius L.	Fabaceae	Kundumani and gunj	Climber	Leaf seed	Fever, cold, cough, eye diseases
Abutilon indicum G. Don.	Malvaceae	Thuththi	Woody Herb	Whole plant	Anti-inflammatory, anthelmintic, analgesic, leprosy, gonorrhea
Acacia arabica Willd.	Mimosaceae	Karuvelam	Tree	Whole plant	Bronchitis, diarrhea, dysentery, bleeding piles, leukoderma, biliousness, diabetes, skin diseases
Acacia nilotica Wild.	Mimosaceae	Karuvelai	Tree	Leaf	Antimutagenic anticancer, diarrhea, anti-inflammatory
				Stem bark	Leukoderma, smallpox, skin diseases, dysentery, seminal weakness, biliousness
				Seed	Spasmogenic, antiplasmodia
Acalypha indica L.	Euphorbiaceae	Kuppaimeni	Erect herb	Whole plant	Asthma, bronchitis, pneumonia, rheumatism
				Leaf	Ulcer
Acanthospermum hispidum DC.	Asteraceae	Kaantimull	Herb	Whole plant	Jaundice, malaria, blennorrhea, hepatobiliary disorder
Achyranthes aspera L.	Amaranthaceae	Naiyuruvi	Herb	Whole plant	Asthmatic cough, snakebite, piles, abdominal pain, bronchitis, rabies, influenza, gonorrhea
Aegle marmelos Corr.	Rutaceae	Vilvam	Tree	Fruit	Diarrhea, dysentery, piles
Aerva lanata Juss.	Amaranthaceae	Poolaipoo, cirupoolai	Under shrub	Root	Kidney disorder, gonorrhea
Agave americana L.	Taxaceae	Kanthaalai	Herb	Leaf	Dysentery, gonorrhea, wound, jaundice, snakebite, hydrophobia
Allmania nodiflora R. Br.	Amaranthaceae	Kumuti keerai	Herb	Whole plant	Stomach pain, dysentery
Aloe vera L.	Liliaceae	Kathazhai and Kumari	Herb	Whole plant	Skin diseases, menstrual disorders
Alternanthera pungens Kunth.	Amaranthaceae	Thevidimullu	Herb	Whole plant	Diuretic, gonorrhea
Alternanthera sessilis, R. Br.	Amaranthaceae	Ponnanganni keerai	Herb	Whole plant	Hepatitis, bronchitis, asthma, lung troubles
Alternanthera triandra Lam.	Amaranthaceae	Ponnanganni keerai	Herb	Whole plant	Eye trouble
Alysicarpus rugosus Dc.	Papilionaceae	Chain pea, red moneywort	Herb	Root	Cough
				Seed	Dysentery, colic swelling
Amaranthus polygamus L.	Amaranthaceae	Mullukurai	Herb	Seed	Aphrodisiac
Amaranthus polygonoides Roxb.	Amaranthaceae	Sirukeerai	Herb	Leaf	Laxative
				Root	Fever, Urinary trouble, diarrhea, dysentery
Amaranthus viridis L.	Amaranthaceae	Kuppai keerai	Herb	Whole plant	Emollient, inflammation gonorrhea, orchitis, hemorrhoids
				Leaf	Eye infection
Andrographis paniculata Nees.	Acanthaceae	Siriyanangai	Herb	Whole plant	Cancer, diabetes, high blood pressure, ulcer, leprosy, bronchitis, skin diseases, colic, influenza, dysentery, dyspepsia, snakebite
Anisomeles malabarica R.Br.	Lamiaceae	Payemiratti	Herb	Whole plant	Anti-anaphylactic, antiepileptic, antipyretic, antispasmodic
Annona squamosa L.	Anonnaceae	Sita	Tree	Bark, Root	Diarrhea Dysentery
Asparagus racemosus Willd.	Liliaceae	Nirvekea	Climber	Root	Nervous disorder, throat infection, bronchitis
Asystasia gangetica T. And.	Acanthaceae	Parchorri	Herb	Leaf	Anti-inflammatory, asthma
				Flower	Intestinal astringent
				Whole plant	Rheumatic joint
Azadirachta indica A. Juss.	Meliaceae	Vepamaram	Tree	Whole plant	Skin diseases, improve liver function, dental treatment, urinary infection, intestinal worms

(Contd...)

Table: 1 (Continued)

Botanical name	Family name	Local name	Habit	Parts used	Medicinal uses
Barleria acuminata W.	Acanthaceae	Vellaikurinji	Shrub	Whole plant	Antimicrobial, chemotherapeutic, toothache
Barleria buxifolia L.	Acanthaceae	Kattimullu and Rosmullippuntu	Shrub	Leaf	Diaphoretic, expectorant, catarrhal infection, anti-inflammatory
				Seed	Antidote
Barleria cuspidata Heyne.	Acanthaceae	Vellaimulli	Shrub	Whole plant	Prevent maceration, cracking
Boerhaavia diffusa L.	Nyctaginaceae	Mukkarattai, punarnava	Herb	Whole plant	Heart diseases, anemia, hernia, respiratory, liver problems
Boerhaavia verticillata Poir.	Nyctaginaceae	Sharunnai, mukkarattai keerai	Herb	Root	Leukorrhea, gonorrhea
Borreria hispida K. Sch.	Rubiaceae	Nathaichoori	Shrub	Leaf	Astringent, hemorrhoids
				Seed	Diarrhea, dysentery
Calotropis gigantea R.Br.	Asclepiadaceae	Erukku	Herb	Whole plant	Fever, rheumatism, indigestion, eczema, asthma, nausea, diarrhea
Caralluma umbellata Haw.	Asclepiadaceae	Eluman, elumanpuli	Herb	Stem	Stomach disorder, abdominal pain, obesity, ulcer
Cardiospermum halicacabum L.	Sapindaceae	Mudakathan keerai	Herb	Whole plant	Anti-inflammation, diuretic, laxative, analgesic, stomachic
Cassia auriculata L.	Caesalpiniaceae	Aavaram	Tree	Whole plant	Diabetes, joint and muscle pain (rheumatism), eye infections (conjunctivitis), constipation, liver disease, urinary tract diseases, jaundice
Catharanthus roseus (L.) G.Don.	Apocynaceae	Nithya kalyani	Herb	Whole plant	Leukemia, cancer
Celosia argentea L.	Amaranthaceae	Kozhi poo	Shrub	Whole plant	Wound, sores, skin eruption
				Seed	Jaundice, gonorrhea, wound, fever
Celosia polygonoides Retz.	Amaranthaceae	Pannai keerai	Herb	Whole plant	Insect bite, skin disease
Centella asiatica Urb.	Apiaceae	Vallarai	creeper herb	Whole plant	Skin diseases, brain tonic
Chloris barbata Sw.	Poaceae	Kodaipillu, sevarugu pillu	Herb	Whole plant	Rheumatism, skin disorder, antidiabetic, antibacterial, antimicrobial
Cissus quadrangularis L.	Vitaceae	Pirandai	Shrub	Whole plant	Obesity, diabetes, heart diseases, high cholesterol, indigestion, piles
Cissus repanda Vahl.	Vitaceae	Chunnam buvalli, nerrinampulli	Climber	Whole plant	Bone fracture, wound
Citrullus colocynthis Schrad.	Cucurbitaceae	Pikkumutti	Herb	Fruit	Purgative, anthelmintic, antipyretic, carminative, leukoderma, ulcer, urinary diseases, leukoderma, asthma, bronchitis, anemia
				Root	Rheumatism, inflammation, pimples
Cleome felina L.F.	Capparidaceae	Asagandar	Herb	Whole plant	Neuromuscular
Cleome viscosa L.	Capparidaceae	Naikkaduku	Herb	Whole plant	Ringworm, dyspepsia, flatulence, bronchitis
				Leaf, seed	Rheumatism, rubefacient,
Clitoria ternatea L.	Fabaceae	Sangupu, karka karutan	Climber	Whole plant	Antipyretic, diuretic, anthelmintic, leprosy, inflammation, leukoderma, bronchitis, asthma
				Seed	Cathartic
Coccinia indica W & A	Cucurbitaceae	Kovai	Climber	Whole plant	Gastrointestinal problems, blood purification, asthma, bronchitis
Cocculus hirsutus DC.	Menispermaceae	Kattukodi	Herb	Whole plant	Diuretic, stomach ache, laxative, Night blindness,
				Leaf	Skin infection, eczema, rheumatism, gonorrhea laxative, diuretic, fever
				Root	Rheumatism, weight loss

(Contd...)

Table: 1 (Continued)

Botanical name	Family name	Local name	Habit	Parts used	Medicinal uses
Commelina benghalensis L.	Commelinaceae	Aduthinna thalai	Herb	Whole plant	Skin diseases, astringent, demulcent, laxative, eye complaints
				Root	Stomach disorder
Commiphora caudata Engl.	Burseraceae	Mangiluvai	Small Tree	Leaf	Antipasmodic, cytotoxic, hypothermic
				Seed	Stomach ache
Corchorus aestuans L.	Tiliaceae	Perumpinak kukirai	Herb	Whole plant	Stomach ache, pneumonia
				Seed	Carminative, febrifuge
Corchorus trilocularis, L.	Tiliaceae	Talakkaip poondu	Herb	Whole plant	Anti-inflammatory
Crotalaria ovalifolia Wall.	Papilionaceae	-	Herb	Whole plant	Antipyretic
Crotalaria retusa L.	Fabaceae	Kilukiluppai	Herb	Whole plant	Skin infection
				Leaf	Scabies, lung diseases
				Seed	Snakebite
Croton sparsiflorus Mor.	Euphorbiaceae	Aathupoondu	Herb	Whole plant	Hypotensive, anti-inflammatory, antipyretic, antibacterial, antifungal
Cuscuta chinensiis Lam.	Convolvulaceae	Amar bel	Parasitic twiner	Whole plant	Kidney deficiency
Cyperus rotundus L.	Cyperaceae	Korai, koraikilangu	Herb	Whole plant	Menstrual irregularities, fever, diarrhea, dysentery, emmenagogue, intestinal problem, wound, stomach ailments
Datura metal L.	Solanaceae	Vellaiumathai	Herb	Whole plant	Antiasthma, antispasmodic, hypnotic, narcotic
Desmodium triflorum DC.	Fabaceae	Cirupullati	Herb	Whole plant	Ulcer, skin disease, wound
Dichrostachys cinerea W. & A.	Mimosaceae	Veduttalam	Thorny Shrub	Bark	Dysentery
				Root	Anthelmintic, purgative, diuretic, laxative, bone fracture
Digera arvensis Forsk.	Amaranthaceae	Toyyak kirasi	Herb	Whole plant	Renal disorder
				Flower seed	Urinary disorder
Diospyros ebenum Koen.	Ebenaceae	Acha, karunkali	Tree	Fruit	Attenuant, lithontripic
				Bark	Cough, asthma, diabetes
Eclipta alba Hassk.	Compositae	Karisilaan ganni	Herb	Whole plant	Ringworm, spleen, liver enlargement, jaundice, hepatitis, wound
				Root	Purgative, emetic
				Leaf	Scorpion sting, anthelmintic
Euphorbia hirta L.	Euphorbiaceae	Amman pacarisi	Herb	Whole plant	Cough, bronchitis, asthma, jaundice, dysentery, tumors, gonorrhea
Euphorbia tirucalli L.	Euphorbiaceae	Catukalli, kalli	Herb	Whole plant	Cancer, asthma, cough, neuralgia, rheumatism
Evolvulus alsinoides L.	Convolvulaceae	Vishnu kranthi	Herb	Whole plant	Febrifuge, loss of memory, fever nervous debility, dysentery
Ficus bengalensis L.	Moraceae	Aal, peral	Tree	Bark, leaf	Skin diseases, chronic diarrhea, dysentry
Ficus racemosa L.	Moraceae	Atti	Tree	Whole plant	Diabetes, diarrhea, inflammation, respiratory, urinary diseases
Ficus religiosa L.	Moraceae	Arasu	Tree	Whole plant	Diabetes, diarrhea, asthma, epilepsy, inflammation, gastric problems
Gloriosa superba L.	Liliaceae	Kanthal malar, kanvilli, kalapi kilangu	Climber	Whole plant	inflammation, rheumatism, ulcer, leprosy, snakebite, gonorrhea, abdominal pain, cancer, itching, purgative
Gomphrena decumbens Jacq.	Amaranthaceae	Arasa con todo	Herb	Whole plant	Antibacterial, antimalarial, diuretic
Gynandropis pentaphylla DC.	Capparidaceae	Naalvalai	Herb	Whole plant	Anti-inflammatory
Hibiscus vitifolius L.	Malvaceae	Manithuthi	Herb	Root bark	Jaundice, inflammation diabetes
Indigofera trita L. f.	Fabaceae	Punal murunkai, kattauvari	Shrub	Whole plant	Nematicide, scorpion bite, stomach cancer

(Contd...)

Table: 1 (Continued)

Botanical name	Family name	Local name	Habit	Parts used	Medicinal uses
Ipomaea aquatic Forsk.	Convolvulaceae	Nali, nalikam, vallai	Herb	Leaf	Green leafy vegetable
Jasminum angustifolium Vahl.	Oleaceae	Pithikam, pichi poo, kaatum alligai	climbing shrub	Leaf	Emetic
Jatropha curca, L.	Euphorbiaceae	Katta manakku	Herb	Whole plant	Insecticide, fungicide, antitumor, wound
Kyllinga triceps Rottb.	Cyperaceae	Velutta nirbasi	Herb	Root Whole plant	Diabetic, diuretic, demulcent Antipyretic
Lantana camara L.	Verbenaceae	Unnichedi	Herb	Whole plant	Ailments, cancer, skin diseases, leprosy, asthma, ulcer
Leonotis nepetaefolia R.Br.	Lamiaceae	Irana-peri	Tall herb	Whole plant	Diuretic, diarrhea, gastrointestinal trouble
Leucas aspera Spr.	Lamiaceae	Thumbai	Herb	Whole plant Leaf	Antipyretic, insecticide Chronic rheumatism, snakebites
Lippia nodiflora Mich.	Verbenaceae	Poduthu valai	Herb	Leaf, fruit	Diarrhea, gonorrhea, bleeding piles
Loranthus longiflorus Desv.	Loranthaceae	Pulluri	Stem parasitic shrub	Whole plant Leaf	Antifertility, anticancer, diuretic Skin diseases
Ludwigia perennis L.	Ongaraceae	Neer karayambu, musal kithilai	Herb	Leaf Root	Skin diseases Cancer
Martynia annua L.	Pedaliaceae	Puli–Nagam	Herb	Whole plant	Antiepileptic, antiseptic, wounds
Melia azedarach L.	Meliaceae	Malaivembu	Tree	Leaf Root	Leprosy, anthelmintic, diuretic Ulcer, rheumatism, skin diseases, ringworm, scabies
Micrococca mercurialis (L.) Benth.	Euphorbiaceae	Kunuk kuththukki	Herb	Leaf	Purgative
Mimosa pudica L.	Mimosaceae	Thotta chinungi	Herb	Root	Muscular pain, piles
Mollugo cerviana Ser.	Aizoaceae	Parpadagam, tura	Herb	Whole plant	Fever, thirst, diarrhea
Mollugo nudicaulis Lam.	Aizoaceae	Parpadagam, ullukumarannuchedi	Herb	Whole plant	Cough, jaundice, wound healing, diabetes, ringworm
Mollugo oppositifolia L.	Aizoaceae	Pampartna	Herb	Whole plant	Stomachic, antiseptic, skin diseases
Mollugo pentaphylla L.	Aizoaceae	Siruserupati	Herb	Whole plant	Anti-inflammatory, antipyretic
Orygia decumbens Forsk.	Aizoaceae	Numnel likeeray	Herb	Whole plant	Kidney stone, gonorrhea
Oxalis corniculata L.	Oxalidaceae	Pulliyaarai	Herb	Leaf	Stomach pain
Passiflora foetida L.	Passifloraceae	Mupparisavalli, sirupu naikalli	Herb	Whole plant	Digestive problem, dyspepsia, diarrhea, astringent
Pedalium murex L.	Pedaliaceae	Anainerunji	Herb	Whole plant	Digestive, carminative, spasmodic, inflammation, flatulence, kidney stone
Phyllanthus emblica L.	Euphorbiaceae	Nelli	Tree	Fruit	Antioxidant, antitumor, anticarcinogenic
Phyllanthus maderaspatensis L.	Euphorbiaceae	Melanelli	Tree	Leaf Seed Whole plant	Purgative, rheumatism Carminative, diuretic, laxative Bronchitis, jaundice
Phyllanthus niruri, L.	Euphorbiaceae	Keezhanelli	Tree	Whole plant	Astringent, laxative, carminative, gonorrhea, dyspepsia, urinary disorders, jaundice, diuretic
Polygala rosmarinifolia W.&A.	Polygalaceae	-	Herb	Whole plant	Snakebite, cough, bronchitis
Pongamia glabra Vent.	Fabaceae	Punga maram	Tree	Bark	Skin disease
Portulaca oleracea L.	Portulacaceae	keerai	Herb	Whole parts	Kidney problem
Portulaca quadrifida L.	Portulacaceae	Pasalai keerai	Herb	Whole plant	Rheumatism, diuretic, ulcer, eczema, dermatitis, dysentery
Ruellia punctata Nees.	Acanthaceae	Krishikorsh	Shrub	Whole plant	Malaria
Sapindus emarginatus Vahl	Sapindaceae	Ponankottai, poovandi kottai	Tree	Whole plant	Asthma, colic, dysentery
Sarcostemma brevistigma W. & A.	Asclepiadaceae	Kondapala, kodikalli	Trailing shrub	Whole plant	Asthma, rheumatism, joint pain, chronic ulcer, bronchitis, snakebite
Sida acuta Burm.	Malvaceae	Palambasi	Herb	Whole plant	Asthma, ulcer, snakebite
Sida cordifolia L.	Malvaceae	Mayil-manika	Herb	Whole plant	Fat loss, asthma, heart diseases
Solanum pubescens Willd.	Solanaceae	Kaatu sundaikkai	Under shrub	Whole plant	Joint pain, analgesic activity

(Contd...)

Table: 1 (Continued)

Botanical name	Family name	Local name	Habit	Parts used	Medicinal uses
Solanum torvum Sw.	Solanaceae	Sundaikkai	Shrub	Leaf Whole plant	Wound, skin diseases Asthma, rheumatism, dropsy, gonorrhea
Tectona grandis L. f.	Verbenaceae	Tekku	Tree	Whole plant	Bronchitis, dysentery, diabetes, leprosy
Tephrosia purpurea Pers.	Fabaceae	Kollukkai	Herb	Whole plant	Ulcer, asthma, spleen, liver disease, leprosy, anthelmintic
Thespesia populnea Cav.	Malvaceae	Poovarasa maram	Tree	Bark, fruit	Skin diseases, dysentery
Thevetia neriifolia Juss.	Apocynaceae	Yellow oleander	Shrub	Whole plant	Leprosy, eye diseases, skin disorders
Tinospora cordifolia Miers.	Menispermaceae	Gunduchi	Herb	Whole plant	Diabetes, cancer, rheumatoid arthritis, peptic ulcer disease, fever, gonorrhea
Trianthema portulacastrum L.	Aizoaceae	Saaranatthi	Herb	Whole plant	Disease resistance
Trichodesma indicum (L.) R. Br.	Boraginaceae	Kallutaitumpai	Herb	Whole plant	Skin disease, snakebite
Tridax procumbens L.	Asteraceae	Vettu kayathalai	Herb	Whole plant	Wound healing, antifungal, insect repellent
Vitex negundo L.	Verbenaceae	Nochi	Shrub	Leaf	Fever, chronic, intestinal worm, spleen disorder
Waltheria indica L.	Sterculiaceae	Shengali poondu	Shrub	Whole plant	Febrifuge, fever, cold, bladder ailment, vaginal infection, wound healing
Wrightia tinctoria R.Br.	Apocynaceae	Nilapalai	Tree	Whole plant	Fever, skin disorder, anti-dandruff, hair oil
Zizyphus jujuba Lam.	Rhamnaceae	Illanthai	Tree	Whole plant	Diarrhea, mental retardation
Ziziphus oenoplia Mill.	Rhamnaceae	Suraimullu	Small tree	Whole plant	Wound healing, astringent
Actiniopteris radiata (J. Koenig. ex Sw.) Link	Actinopteridaceae	Small fern		Whole plant	Asthma, cough

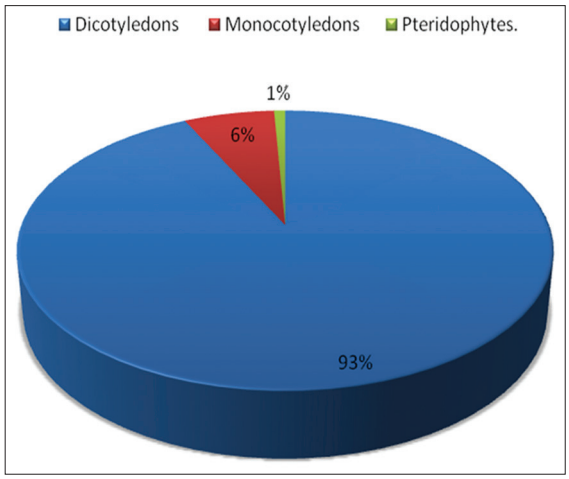


Fig. 1: Percentage of the classification of plants

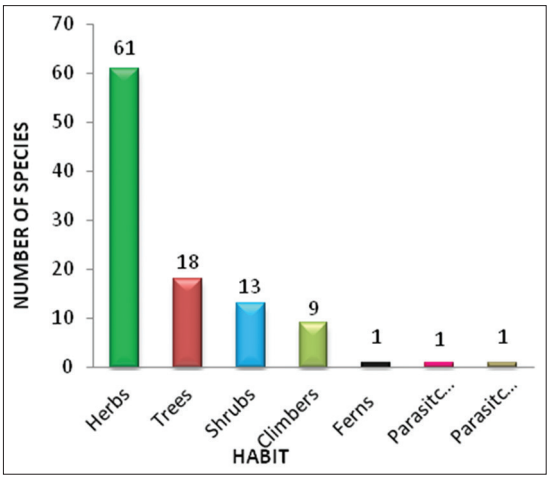


Fig. 2: Percentage of medicinal plants on the basis of their habit

worms, urinary tract diseases, antimicrobial, chemotherapeutic, diaphoretic, expectorant, antidote, heart diseases, anemia, hernia, leukorrhea, indigestion, eczema, nausea, hemorrhoids, liver disease, wound, purgative, anthelmintic, antipyretic, carminative, leukoderma, dyspepsia, night blindness, pneumonia febrifuge, scabies, spleen, liver enlargement, anticarcinogenic, and mental retardation (Table 1).

People of the study area mostly administered phytomedicine orally. A majority of remedies are prepared in the form of extract or juice followed by powder form, decoction, and freshly collected plant parts. Most of the villagers in the study are poor, and they largely depend on plants for food, medicine, fuel, and other daily necessities.

DISCUSSION

Ranganathan *et al.* [10] assured that ethnobotanical survey was made on the utilization of medicinal plants among the people of selected six villages from Jawadhu Hills in Tamil Nadu, which was carried out during December 2009–April 2010. They use forest plants, weeds, fruit plants, vegetables, spices, ornamental plants, ferns, and many others as traditional medicine. Although many of these species are known as medicinal plants, others are mainly used for non-medicinal purposes such as preparing agricultural implements. *Santalum album*, *Terminalia bellirica*, *Cassia fistula*, *Gymnema sylvestre*, *Melia dubia,* and *Rauvolfia tetraphylla* are the leading species used as remedies against a variety of complaints. The results of the present study provide evidence that medicinal plants continue to play an important role in the health-care system of this tribal (Malayalis) community in Jawadhu Hills of Tami Nadu.

The indigenous knowledge on medicinal plants is gaining recognition worldwide because of its support in the discovery of new medicines and its importance for proper conservation of biodiversity. This paper documents the traditional knowledge of medicinal plants used for the

treatment of skin diseases by the tribe, namely, Kaani, of Kanyakumari District, Tamil Nadu, India. The present study was done through structured questionnaires in consultation with the tribal ethnomedical practitioners and has resulted in the documentation of 55 medicinal plant species belonging to 38 families. For curing the skin disease, the use of aboveground plant parts was higher (83.33%) than the underground plant parts (16.67%). Of the aboveground plant parts, leaves were used in the majority of cases (19 species), followed by whole plants (11 species). Different underground plant forms such as roots and rhizomes were also used by the tribe as medicine. Johnsy *et al*. [11] thus underlined the potentials of the ethnobotanical research and the need for the documentation of traditional ecological knowledge pertaining to the medicinal plant utilization for the greater benefit of humankind.

Ethnobotanical study to investigate the ethnomedicinal uses of plants by the Batswapong tribe, Eastern Botswana, was done. This revealed a wealth of traditional knowledge on uses of medicinal plants. 36 plants distributed across 22 families were recorded to treat 60 ailments. Most of these plants were trees (61%) with roots (82%) being the most frequently used parts for the preparation of remedies across the 22 families. For each species, its botanical family and vernacular name, medicinal uses, parts used, and mode of preparation were documented. This study has revealed that knowledge on uses of medicinal plants is shrinking because of restrictions from religions, migration to urban areas, and lack of interest by younger generations on uses of medicinal plants. Motlhanka and Nthoiwa [12] concluded by advocating for the implementation of government policies that will significantly contribute toward the preservation of biodiversity and indigenous traditional knowledge of medicinal flora.

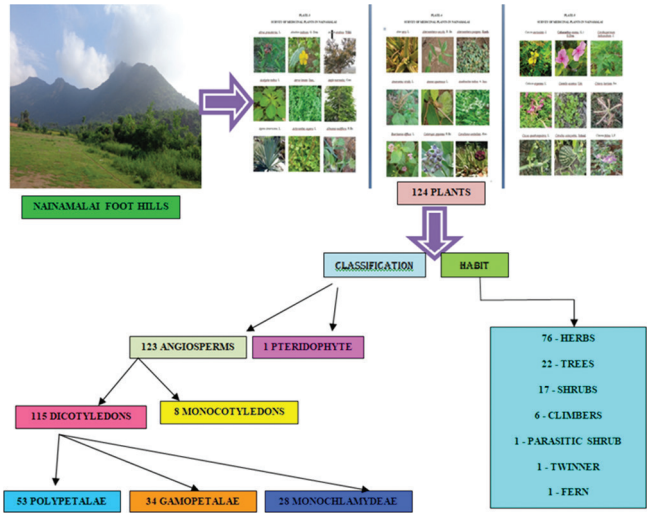
Ethnobotanical survey was conducted in the remote hills, forests, and rural areas of Tripura, a diversified ethnic people rich state of Northeastern India, for gathering information about the traditional method of birth control [13]. A semi-structured questionnaire was used during the interview with the informants having traditional botanical knowledge. The use of medicinal plants was documented using an interview datasheet mentioning the detailed information of the informants and vernacular names, parts used, method of preparation, and administration modes of botanicals. Finally, collected samples of botanicals, prepared herbarium, and identified and scientific names were confirmed by consulting reference herbarium specimen available in Assam University, Silchar. A total of 55 ethnomedicinal plants belonging to 42 families and 49 genera have been documented having antifertility property. Apocynaceae, Caesalpiniaceae, Combretaceae, and Fabaceae were found to be the dominant families of medicinal plants used for fertility regulation. This paper represents the detailed profile of each plant including scientific name, family, common name, parts used, activities, mode of preparation, and dosage. While comparing the established literature, it is interestingly recorded that antifertility activity of 10 plants has been reported for the first time. Conservation of the traditional informations should be given utmost importance in this region to prevent the rapid loss of ethnobotanical wealth.

Women in Katsina State, Nigeria, have been using medicinal plants to cure various ailments associated with maternal health since time immemorial; however, the use of such plants was never documented. In this study, an ethnobotanical survey was conducted to document medicinal plants used for traditional maternal health care in Katsina State, Nigeria [14]. A semi-structured questionnaire method was used to interview 300 respondents (50 from two local government areas of each of the 3 senatorial districts) comprising of herbalists, traditional birth attendants, traditional medical practitioners, house wives, farmers, and others. Medicinal plants belonging to 101 genera distributed among 50 families were documented. Most of the reported plants belong to the Fabaceae (22.52%), Asteraceae (7.21%), Malvaceae (5.41%), and Anacardiaceae (4.51%) families. *Acacia nilotica* (L.) Delile and *Guiera senegalensis* J.F. Gmel had the highest relative frequency of citation and fidelity level of 0.93; 100% and 0.92; 100%, respectively. Among the 18 categories of ailments, headache, navel pain, postpartum hemorrhage, and postpartum wound healing had the highest informant consensus factor of 1.00 each. Most of the reported plants (68.47%) were herbs and shrubs, and about 84.68% of the surveyed plants were wild. Leaves were the most frequently used (32.14%) plant's part. Most of the medications (32%) were prepared as decoctions and preparations are mostly administered orally (84.68%). Scientific validation of the biological properties of the surveyed plants is highly advocated, and cultivation of medicinal plants to minimize the pressure on wild species is also recommended.

Kodi *et al*. [15] identified 33 plant species from 30 genera that consisted of *Flueggea virosa* (Willd.) Voigt, *Securidaca longipedunculata*, *Erythrina abyssinica*, *Melia azedarach*, *Carissa edulis* Fork, *Harrisonia abyssinica* Olive., *Zanthoxylum chalybeum* Engl., *Psidium guajava*, *Citrus sinensis*, *Schkuhria pinnata* (Lam.), *Lantana camara*, *Carica papaya*, *Mangifera indica* L., *Azadirachta indica*., Persea americana Mill., *Bidens pilosa*, *Cymbopogon citratus* (DC), *Plectranthus barbatus*, *Maytenus senegalensis*, *Citrus reticulata*, *Ocimum gratissimum*, *Ocimum basilicum*, *Croton macrostachyus* Olive., *Oncoba spinosa* Forssk., *Steganotaenia araliacea*, *Acacia sieberiana*, *Ormocarpum trachycarpum*, *Acacia hockii* De Wild., *Euclea latideus* Staff, *Cassia hirsuta*, *Chamaecrista nigricans* Greene, *Butyrospermum paradoxum*, and *Aristolochia tomentosa* (Sims) were identified as being used by communities as antimalarial plants. These belong to 23 families of Rutaceae, Lamiaceae, Euphorbiaceae, Mimosaceae, Celastraceae, Meliaceae, Asteraceae, Papilionaceae, Polygalaceae, Flacourtiaceae, Umbelliferae, Sapotaceae, Apocynaceae, Simaroubaceae, Ebenaceae, Aristolochiaceae, Anacardiaceae, Caricaceae, Lauranceae, Myrtaceae, Verbenaceae, Poaceae, and Celastraceae. The most frequently used medicinal plants were from the families: Rutaceae and Lamiaceae (13.0% each) that had three plant species each. 10 species (30.3%) were identified and documented for the first time in Uganda to treat malaria. The most commonly used plant part was the root (44.68%), followed by leaves (38.30%), stem (6.38%) each, bark, and whole plant (4.30%) each, and the least was the seeds with 2.13%. The growth habits included trees (48.48%), shrubs and herbs (24.24% each), and the climbers with the least percentage of 3.03%. The largest habitat of the medicinal plants was found in the homesteads (21.10%), followed by wooded grassland and garden with 18.20%, grasslands (15.20%), open grassland (9.10%), cultivated and roadside (6.10% each), and garden edge and forest had the lowest value of 3.0% each. Most of the plant materials were dried in the shade, pounded into a powder, and taken orally as water decoctions (76.50%) and infusions (23.50%). Many plants used traditionally for the treatment of malaria were identified, and claims of some of the medicinal plants documented in the survey are supported by literature. However, the scientific validation of the traditional claims of antimalarial activity of some of these plants not researched on is needed. This includes testing for efficacy, safety (toxicity), antiplasmodial screening, and structure elucidation to find the identity of active compounds present. This would make them considered for future research for active compounds and the possible synthesis of new, cheaper, and more effective antimalarial drugs. This would help in conserving and sustainable use of the antimalarial plants. Therefore, it is necessary to carry out research to solve these problems so that the lives of people are not at risk.

Aadhan and Anand [16] reported an ethnobotanical and literature survey to collect information about medicinal plants used for the treatment of diabetics and associated complications by Paliyar tribal people of Sadhuragiri hills. Analysis of remedies obtained from different plant parts was performed. The indigenous knowledge of plants used for the treatment of diabetics was collected through questionnaire and personal interviews. A total of 65 plants used to treat diabetes have been documented. The investigation revealed that leaves (27%), followed by fruits (11%), roots (6%), seeds (6%), flower (6%), bark (4%), whole plant (4%), tuber (3%), rhizomes (2%), and bulb (1%) were mostly used for the treatment of diabetes. Antidiabetic medicinal plants used by Tamil people have been listed along with plant parts used and its active chemical constituents.

Structural Abstract



CONCLUSION

In the present study, plant survey at Ninamalai hill has documented a total of 124 plants. Among 124 species surveyed, 123 were angiospermic plants and one pteridophytic plant. Analysis of plants showed that more number of dicotyledons (115 species) belongs to 43 families and 8 monocotyledons are represented in 5 families. Within dicotyledons, 53 species are polypetalae, 34 species are gamopetalae, and 28 are monochlamydeae. For each species, botanical name, family, habit, local name, parts used, and medicinal usage are identified and presented. The family-wise analysis showed that the family Amaranthaceae held the dominant position by representing more number of species (13 species). Habit-wise analysis shows that maximum representatives to the plants are from herb (76) community, followed by trees (22), shrubs (17), climbers (6), parasitic shrub and parasitic twinner (1), and fern (1). The absence of epiphytes indicates the loss special habitats due to the degraded status of the hill. Part-wise analysis showed the predominant use of whole plants followed by leaves, root, seed, bark, fruit, flower, and stem. Herbal remedies play a fundamental role in traditional medicine in some tribal people of rural regions in Tamil Nadu. These collected medicinal plants are used for the treatment of several diseases such as ulcer, anti-inflammatory, anthelmintic, analgesic, leprosy, gonorrhea, bronchitis, diarrhea, dysentery, bleeding piles, leukoderma, diabetes, antimutagenic, antimicrobial, anticancer, smallpox, seminal weakness, biliousness, spasmogenic, antiplasmodia, asthma, pneumonia, rheumatism, jaundice, malaria, blennorrhea, hepatobiliary disorder, asthmatic cough, snakebite, abdominal pain, rabies, influenza, fever, cold, cough, eye diseases, kidney disorder, wound, hydrophobia, stomach pain, menstrual disorders, hepatitis, lung troubles, colic swelling, aphrodisiac, laxative, urinary trouble, emollient, inflammation, orchitis, hemorrhoids, eye infection, cancer, high blood pressure, leprosy, dyspepsia, antianaphylatic, antiepileptic, antipyretic, antispasmodic, nervous disorder, throat infection, anti-inflammatory, asthma, intestinal astringent, rheumatic joint, dental treatment, urinary infection, intestinal worms, joint, muscle pain (rheumatism), eye infections, constipation, liver disease, and urinary tract diseases.

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