WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 12, Issue 7, 877-890. Research Article ISSN 2277– 7105

ETHNOMEDICINAL PRACTICE IN WESTERN GHATS OF TAMIL NADU

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Article Received on
13 March 2023,

Revised on 02 April 2023,
Accepted on 23 April 2023

DOI: 10.20959/wjpr20237-28041

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ABSTRACT

India harbors natural unexploited ecosystem with maximum biodiversity lodging endemic plants of great medicinal value. Plants used in tribal medicine have played a major role in treating chronic as well as transmittable diseases. Western Ghats with its & major 7 hills chosen, have the most valuable bioactive phyto compounds in prime 77 herbs. Qualitative & Quantitative ethnobotanical data to compare the usefulness of the floristically distinct hill types of western Ghats of Tamil Nadu in India was collected using an informant consensus factor in utilization and treatment of diseases.70±7% of different hills had the same frequency value. Plants belonging to Family Solanaceae exhibited wider phytochemical variation. Antibacterial and antifungal activities were maximum in the hot April season. Medicinal plants with flavanoids had anti-inflammatory activity of 50 ± 3% in Nigiris and 52.7 ± 2% in Anamalai hills. Application of the statistical tool ANOVA for highest wound healing effects were noticed in 400mg/kg of aqueous extract with a significance, $P < 0.001$. Costlier experiments for this valuable Ethnopharmacological studies like FTIR,GC-MS, HPLC, HNMR and Scientific digitization, documentation, DNA data base analysis and GEN BANK deposition in Bethesda Gen Bank could help in the maintenance of a comprehensive Herbal Repository and promise low cost herbal solutions for major communicable diseases in future.

KEYWORDS: Ethnomedicine of Western ghats. Ethnoecological & pharmacological herbal appraisal, digitization, documentation, Herbal Repository.

Description of problem

Indian medicine, being cheaper and available to all people, is claimed to be superior by 85percentage of the people of the world, especially during the Corona War. The need of preservation, protection and perpetuation have been felt by the society at large. It is clear that the future of traditional medicine research requires more studies based on hypothesis testing in order to rigorously examine and effectively use interdisciplinary research methods, developed theoretical domains, and apply results. Ethnomedicine had been in practice since time immemorial and after 2011, 936 World Heritage sites in 153 countries have brought a new life and awakening to protect the time-tested knowledge of traditional healers. Most of the tribal wisdom having been passed on to generations through vocal transfer and is facing extinction, proper scientific documentation, standardization, digitization, and experimental clinical trials by modern practitioners could be the best way of preservation and protection of folklores. Ethnomedicine is the top priority today in India since our country harbors natural unexploited ecosystem with maximum biodiversity asin-situ cultural resources. The relation between social behavior and human adaptation is the primary concern, while the African, Chinese, Japanese, Korean and Arabic ethnomedicine systems depend totally on exotic invasive flora. Indian Ethnomed practice is based on endemic in-situ conserved forests. Measures to protect our cultural heritage is in the scientific wave since 1954. Plants used for traditional medicine contain a wide range of substances that can be used to treat chronic as well as transmittable diseases. Clinical microbiologists have a great interest in the screening of medicinal plants for new therapeutics. The active principles of many drugs found in plants are secondary metabolites. Phytochemical screening of medicinal plants has revealed the presence of various bioactive phytocompounds.

An attempt to study the nature, pattern, disease-based remedy is made to digitize, document and establish in repositories for the good of stakeholders from all walks of life. A thorough preliminary regional study made by our research team clearly expresses the unique type of ethnomedicinal practice with plants available in the specific geographic areas.

South Indian ethnomedicine gives more attention to common problems like cold, cough, asthma, gastritis, wound healing, snake bites, kidney problems, fracture and postnatal problems. These are taken up with ease and poise using the available medicinal herbs of wilderness in the Western Ghats.

Relevance to Heritage Science

Geographical variation totally depends on weather and topography. Each hill has its own heritage and endemic status of flora and fauna. Data collection of varying floral pattern in the seven hills has been carried out with special statistical tools.

Method of drug preparation, mode of administration, dosage and duration of treatment had not been specified in the oral folklore. Yet the success rate, cure and spiritual healing techniques had been a faith cure in many places. Though the major source of diverse chemical compounds have promising ethnomedical properties, the quest for novel plant components triggers a threat to the pharmaceutical industries. The four-element therapy of Unani with a link to four humours: blood, phlegm, yellow bile and black fluid representing earth, water, air and fire were supposed to maintain equilibrium in healthy body. Greek physicians have brought in Omani medicine as wise- men practice. But fire flake treatment with traditional herbal medicine stand on drugs based on medicinal plants. Hence ethnomedicinal practice and herbal plants stand a higher chance of success in healing diseases though without proper web-based digitization, documentation and Gen bank records.

Review of work already done

The pioneering scientific field studies of Western Ghats started with Dr. M V Rajendran, a bio Scientist, traditional healer (1969) and the founder trustee of Madras Snake Park who was a close associate of the snake charmers of Irula tribes at Chennai, Nilgiri hills, Siruvani hills, Anamalai hills, Kodaikanal hills, Cardamom hills, Palani hills, Varusanadu and Aundipatti hills, Megamalai hills, Mahendragiri hills. A complete survey made in 1971 in Nilgiris showed more than 770 medicinal plant genus used by hill tribes and 436 in Podhigai hills. The census of snakes and medicinal plants in 1981 gave a track record of more medicinal plant species which got decimated in 1991. Inventory and repository had been the two sides of ethnopharmacological research since 1977. Snakebites after-effects, Asthma, chronic cough, wheezing, headache, stomach ache, ulcer, rheumatism, wound healing, liver and kidney problems had been well documented and presented as research papers by our traditional research team. Safety, side effects and heavy metal toxicity emerged as tidal ebb in plant medicine practice. Nilgiri hills have peaks above 2000 mts, the highest peak is Doddapetta at 2067 mts. Over 2800 spices of flowering plants, 160 species of ferns, adorn Nilgiris, a home to unusual tribal groups Thodas, Kotas, Badagas, Kurumbas, Irulas, Uralus and Chettos. Thodas prepared herbal medicines in a ceremonial function in thatched sheds.

Anamalai hills located in Western Ghats of Coimbatore-Tirupur districts with Anaimudi peak (2695 mts) anthropological reserve supporting a diverse indigenous tribes malasars, malaimalasars, kadars, eravallars, pulayars and muduvars. Palani hills, an extension of Western Ghats is exploited by cross cultural heritage, floating population and export of valuable medicinal plants. Most of the herbs get extinct from the vicinity due to ex-situ agricultural practice. This area is known for respiratory &nervous ethnomedicinal practice with *Adhatoda, Andrographis, Cissus, Calotropis, Solanum and Ocimum.* Cardamom hills, home to urumban, mudugan and irula tribes working in tea estates practice bites and poison preparing herbal medicine from spices and aromatic medicinal plants. Meghamalai hill, located in Theni district (1500 mts) is an excellent biodiversity hot spot where ethnomedicinal practice for wound healing and bone fracture are at peak. 600 herbs a recorded in every 5-year census with in-situ multiplication. 436 valuable species had been used for preparation of herbal tea. A few exotic plants had been cultivated through tissue culture and micropropagation techniques. Vaidhyas use the following seven types of oil for setting fractured bones: *Acorus calamus, Brassica nigra, Cocos nucifera, Cymbopogan citratus Jatropha curcas, Nigella sativa, Sesamum indicum*. A minimum record of 6 publications in 2017 and 2021 are found in for ethnomedicine in wound repair. Further research on wound healing is necessitated.

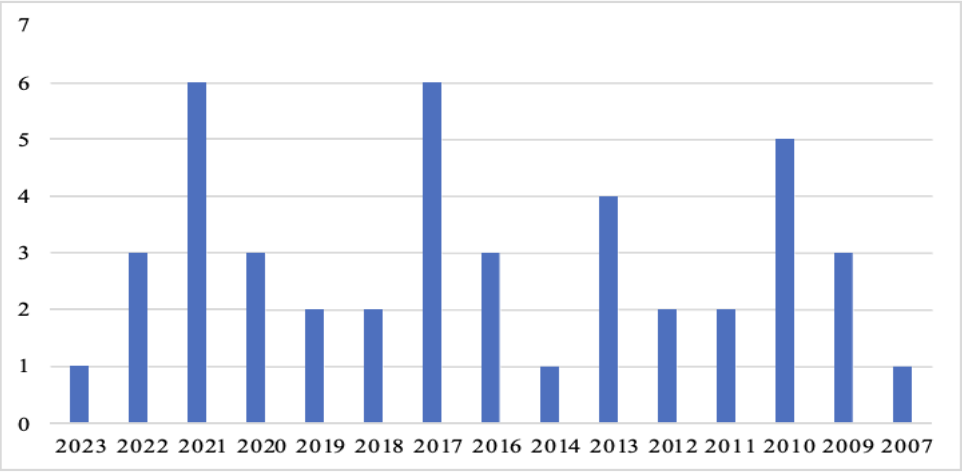

Figure 1. Publication in Ethnomedicine-wound repair

Citronella and Chamomile oils are used as pain relievers. *Rosmarinus officinalis* and *Gaultheria procumbens* are used to clear rheumatism and varicose problems. Podhigai hills with 1866 mts peak of Tirunelveli district is a natural habitat for in-situ conservation of

biological diversity with threatened species of significant value. The deciduous forest and sholas are noted as the medicinal plants resource centres with more than 30 rare and endangered species. Many species of *Curcuma* and *Artemisia* thrive here. Mahendragiri hills is located in Tirunelveli district with an elevation of 1645 mts. ISRO propulsion complex has brought down the native plants to a 10% status. Diabetes, Urinary and Skin problems are the major concern of the tribes. *Morinda Citrifolia* is under ex-situ cultivation in this hill. This is used as a panacea for cancer, arthritis, depression, hypertension, stroke & tuberculosis. *Waltheria indica* is used for all women problems. *Pavonia odorata* and *Polygala erioptera* are the two main plants used for skin diseases starting from allergy to boils.

Chronic diabetic wounds at the lower extremity problems had been well addressed by the Malayali tribes in Vattai hills, Dharmapuri, Eastern-ghats had been studied. The ethnopharmacological potentials of selected medicinal plants had been studied. (IRJP 2(5) May 2011). Due to the affordability, availability, accessibility and acceptability, the traditional folk medicine is gaining momentum. But the scientific evidence from the point of safety and effectiveness is much limited. Therefore collection, documentation, conservation of indigenous medicinal plants to isolate novel bioactive compound "leads" for treatment of infectious and ongoing viral infection need immediate attention. Traditional folk healers use about 2500 plant species to cure various ailments with digitization of research findings. Research publications found in pubmed since 2000 regarding ethnopharmacology and ethnomedicine practice are graphically represented in figures 2, 3 & 4.

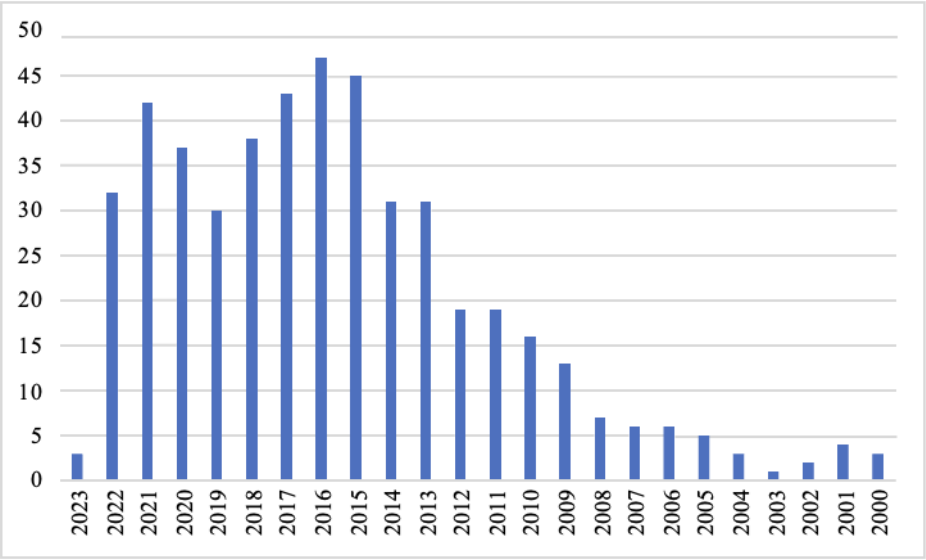

Figure 2. Publications found in Ethnomedicine

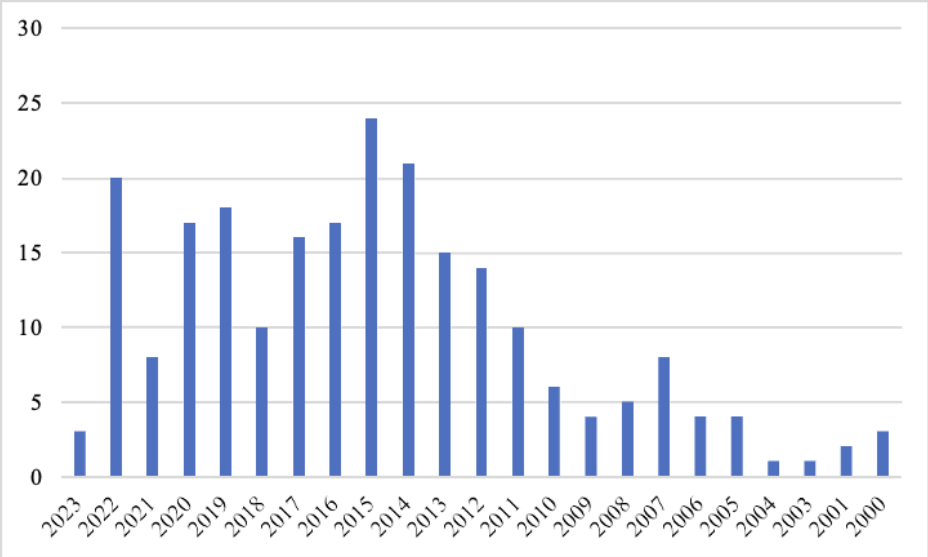

Figure 3. Publications in Ethnomedicine practices

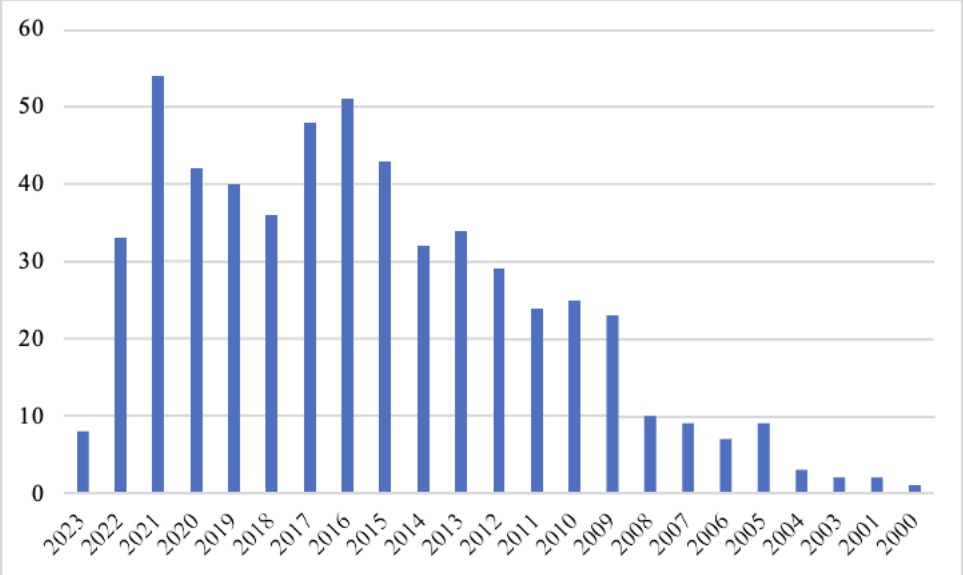

Figure 4. Publications in ethnopharmacology

Ethnomedicine research is aimed at finding new chemical compounds in medicinal herbs. Development of conventional medicine is getting more advanced since the plants play a main role as medicine for various human diseases. Ethnomedicinal data were analysed using Index of Cultural Significance (ICS) value. Certain parts of the plant are used by the local community. Many a times, toxicity due to heavy metals lead to side effects. apart from the quantitative and qualitative analysis toxicity with atomic spectrum becomes a necessity to avoid interaction with other drugs.

Ethnomedicine is more ethnic, more magical and less scientific. It is a study of healing practice of a cultural group and individual undocumented experience for curing disease. Medicinal plant study shows relationship between various tribal groups of different regions using available forest treasure. Ethnopharmacological studies are of great significance in the study of herbal medicine. The studies provide a scientific report for the medicinal plants used for therapeutic purpose and ensure preservation of cultural heritage and drug discovery towards development of modern therapeutic systems.

The studies involve several interdisciplinary disciplines such as botany, zoology, chemistry, biotechnology, microbiology and pharmacy involving field observation, description and botanical identification, scientific interpretation, bioactivities, utilization, active components. Bates – Jensen Wound Assessment Tool (BWAT), Pressure Sore Status Tool (PSST) could be applied to assess wound status and track healing status have ethnomedical use.

Study area

Disease based medicinal heritage patterns of seven hills are tabulated below.

#	Name of the hills	Ethnomedicinal Practice	Disease treated	Plants used *(Botanical name)*
1	Nilgiris	• Asava • Arishtam	• Snakebites • Asthma • Chronic cough • Wheezing • Kidney problems	• *Rosmarinus officinalis* • *Gaultheria procumbens* • *Chamomile* • *Andrographis paniculata* • *Strobilanthes* • *Achyranthes* • *Eucalyptus* • *Vinca rosea* • *Piper longum* • *Rutea graveolens* • *Vitex negundo* • *Sarpagantha*
2	Anaimalai	• Arishtam • Toner • Decoction • Churanam	• Nervous disorders • Bites • Indigestion • Fever • Gas touble	• *Andrographis paniculata* • *Alternanthera sessilis* • *Boerhaavia diffusa* • *Cissus quadrangularis* • *Centella asiatica* • *Cuminum ciminum* • *Euphorbia hirta* • *Eclipta alba* • *Leucas aspeara*

3	Palani	• Syrup • Globules	• Respiratory • Nervous disorders	• *Justicia adhatoda* • *Andrographis paniculata* • *Cissus quadrangularis* • *Calotropis procera* • *Solanum nigrum* • *Ocimum sanctum*
4	Cardamom	• Tincture • Extract	• Snakebites • Poison • Stomach ulcer • Cancer • Aches and pains	• *Elettaria Caramomum* • *Cardiospermum halicacabum* • *Vitex negundo* • *Piper longum* • *Piper nigrum* • *Pandanus latifolius* • *Syzygium aromaticum* • *Cinnamomum tamala* • *Zingiber officinale*
5	Meghamalai	• Tea • Syrup • Oil • Paste	• Wound healing • Bone fracture	• *Acorus calamus* • *Brassica nigra* • *Cocos nucifera* • *Cymbopogan citratus* • *Jatropha curcas* • *Nigella sativa* • *Sesamum indicum* • *Citronella nardus* • *Matricaria chamomilla* • *Rosmarinus officinalis* • *Gaultheria procumbens*
6	Podhigai	• Tonic • Churanas	• Jaundice • liver problems • Indigestion • Toothache	• *Polycarpaea corymbose* • *Portulaca quadrifida* • *Pavonia odorata* • *Curcuma* zedoaria • *Artemisia vulgaris*
7	Mahendragiri	• Energy drink • Decoction • Pills • Tonic	• Cancer • Arthritis • Depression • High blood pressure • Stroke • Tuberculosis • Women problems • Skin diseases	• *Morinda Citrifolia* • *Waltheria indica*

This team under the supervision and guidance of the resource person has taken up with Passion in healthcare mission the group research on the seven hills of western ghats following the Green Audit & Bio Diversity Register Model (Aruna Devaraj Rajendran, 2009), Phyto chemical screening of GCMS & FTIR Profile of Bioactive Natural products, (Ramya, S. *et.al 2022, Rajendra Herbal Research Centre, Periyakulam) Artificial*

*intelligence and machine learning approach for pharmakinetic profile of cancer healing herbs(*Ramya, S. *et.al 2022, Rajendra Herbal Research Centre, Periyakulam).*

The goal of the study is **Ensure adequate supply for future.** State and central Government of India has brought Biological Diversity Act 2002 to satisfy the seven objectives.

- To regulate, to **conserve**
- To respect and **protect**
- To **secure** sharing of benefits
- To develop **areas of conservation** value
- To protect heritage and **rehabilitation** and
- To implement through involvement

Conservation and Management of Natural Resource is the need of the hour. Biodiversity management is the basis for future studies, estimation of soil status, quantification of soil flora, alpha - beta - gamma diversity assessment and Geographic Information System (GIS). Green Audit is the right way to study biodiversity.

Green Audit and maintenance of Biodiversity Register

To monitor the organizations whose activities might threaten the environment & health, Green Audit is necessary. Biodiversity Register can give information regarding destruction factors. The Auditors can act as advisers and experts to advise environmentalists. **Green Audit was founded in 1992** as an environmental consultancy by Environmentalist & Radiation Expert **Dr.Chris Busby** Patrick Adams & co-founder Molly Scott Cato. Green audit undertakes and supports independent studies in the general areas of environmental public health, pollution, energy efficiency and research in relevant areas.

Species richness refers to the number of species in a given habitat, biotope, community or assemblage. **Save Mother Earth and hand over plant biodiversity to our future.** Anyone who does Justice to every tree can enjoy the fruits but should sow the seeds and nurture future. **Preserve the past. Conserve the present. Multiply for future.**

Plant Biodiversity study provides numerical data, serves as a source for analysing plants and animals & their interaction with the environment in different levels. Assessment of frequency density, abundance & Importance Value Index (IVI) could be treated statistically.

Inventory—Compilation of plant biodiversity register.

MATERIALS AND METHODS

Kumbakarai model

Intensive survey of farm area should be carried out as Seasonal and frequent survey. For Identification and classification proper Techniques should be used to get species number approved by Botanical survey of India after depositing Voucher specimens. accomplish. **Participatory training** should be given by environmentalists on.

1) Protection from Pollution
2) Reusing or recycling resources
3) Preserving resources- By Survey
4) Agro technology for Cultivation
5) Tissue culture techniques for conservation of endangered Plants.

OBSERVATION

Expressed in hectare area, plant species, genera and families.

Example – In a Survey of 5 hectares in Kumbakarai falls area following results were found.

No. of plant species- 425 Genera- 262 Families-14 F:G-14:262 F:S-14:425

Dominant Families- 2 (Convolvulaceae & Papilionaceae)

Expression based on Habitat Analysis

No. of species- 425

Herbs- 280 (dominant)

Shrubs- 72

Climbers- 42

Trees- 31

Fluctuating Biodiversity Index- Monitoring of IVI frequency, density & abundance

Method- quadrat (block A, block B) -Biodiversity indexing

a. Frequency (q/tqx100) b. Relative frequency

c. Density (ts/tqx100) d. Abundance (tsq/tqax100)

Green Environmental Audit of Phyllanthus amarus- A (58) B (60)

Utility Analysis – Index (Phyl. amarus)

No. of utility/quadrat x 100/Total no. of utility quadrats

METHODOLOGY

Ethnomedicine data were analysed using Index of Cultural Significance (ICS).

• Transect surveys (Zarger and Stepp 2004) method was adopted for conducting survey and collection of plants from the seven hills

• Specimen identification with voucher specimen deposited in Botanical Survey of India (Begossi, 1996)

• Interview with semi structured questionnaire – local informers who share traditional cultural and ecological knowledge.

• Qualitative techniques for direct analysis of the data on utilization of the existing plants (Philips et al., 1994)

• Quantitative ethnobotanical appraisal of medicinal plants. First explorative study, field trips in 20 locations of each hill.

• Classificatory records – Problem based assessment, highest relative frequency of citation, highest fidelity level for Malaria and Diabetes.

1. ICS – Index of Cultural Significance

2. RFC - Relative Frequency of Citation; RFC = FC/N where FC = (Number of times a particular species was mentioned/)(total number of times that all species were mentioned) ×100 and N is the total number of informant participated in the survey.

3. UV – Use Value; UV= ∑U/N where U is the number of use reports quoted by each informant for a given plant species

4. FL – Fidelity Level; FL (%) = (Np/N) ×100 (Canales et el., 2005)

• Documentation to avoid loss of precious folklore of traditional knowledge as per documentary information (Sahoo et al., 2010).

• Drug design and development to be effectively carried out with herbaria (plants dried and preserved in 1% CuSo4 mounted on herbarium sheets) and website repository. A repository is a comprehensive basis for the novel phytochemical pharmacological and cultural resource (Sruthi et al., 2009)

• Conventional study area description, sampling techniques and data collection methods

• Purposive sampling techniques for ethnomedicinal practice from local informants and traditional healers with 40 years' experience.

Herbarium Collection of medicinal plants and preparation of herbarium Pharmacognostical Analysis Qualitative & Quantitative analysis of ethnomedicinal plants Repository Database repository & pharmacological analysis and assessment of ICS, RFC, UV and FL value.

RESULTS AND DISCUSSION

All the 7 hills exhibited the frequency value of the top-rated plants at 70± 7 % Density varied in different seasons of the hills due to climate change. No hill had similar temp & humidity. Phytochemical changes of Solanaceae family had marked variation.

Antibacterial and anti fungal activities were maximum in the hot April season showing an inhibition zone of 30 mm as again 10 mm in the cold December-January season.

Anti inflammatory activity recorded in the 7 hills were 50 ± 3% in Nilgiris, 52.7±2% in Anamalais, 41±3% in Palani and Cardamom hills, and less than 40% in Megamalai, Mahendragiri & Varusanadu hills.

In general sulphate ash, Calcium, and flavonoid influenced the antioxidant and anti-ulcer activity during the wet seasons of July.

In almost all the samples collected in April leaves had rich protein and iron and many phyto chemicals in aqueous extracts.

Results revealed that the environmental facts like temperature, humidity and rainfall. An ova statistical tool confirms this result.

Healthy leaves collected without infestation of insect pests had the highest wound healing effect at the dose 400mg/kg of aqueous extract with a significance, $P<0.001$. Pain and inflammation considered as the basic components of disease in traditional medicine could not be roughly correlated with the disease pattern and hence proper scientific investigation and documentation becomes a necessity for authenticity and safety.

Leaves and stem had been traditionally used as ethnomedicine in healing activities the maximum effect of healthy leaf extracts has more flavanoids which are responsible for anti-inflammatory activity (Dev S, 1999)

Herbal clinical practice alternatively known as medicinal herbalism.

Future envisaged

Research component will be formatted. Ethnopharmacological – FTIR, GC-MS, HPLC, HNMR. • DNA database deposition in Bethesda Gen Bank.

• Medicinal plants recognition using Image Processing algorithms.

• Development of a replica Biomedical Instrument of the traditional tribal Kits.

• Development of a website repository of all the ethnomedicinal practice in the seven hills of western ghats

• Digitization and website development of all the plants.

• Design and development of replica biomedical instrument of the traditional Kits.

• Pytopharmacological work with DNA database study for GenBank deposition of 7 diseases and 77 medicinal herbs will be documented applying ICS, ICF and IFS value. Development of two biomedical tools for wound and pressure sore status assessment in fracture. (1. Two biomedical instruments namely Haemostat surgical tool to prevent bleeding. 2.Allis calliper to grasp fascia and soft tissues).

Linkage with S&T Instts./NGOs/resource persons/R&D organization/Industry for startup programmes in a national and global level.

REFERENCES

1. Begossi, 1996: Use of Ecological methods in Ethnobotany Diversity indices.
2. Ecological methods in Ethno botany, July- Sept. 1996; 50: 280-289.
3. Canalesa, M (2005)., T. Hernandez ´ a, J. Caballerob, A. Romo de Vivarc, G. Avilaa, A.Durana, R. Liraa Informant consensus factor and antibacterial activity of the medicinal plants used by the people of San Rafael Coxcatla Mexico Journal of Ethnopharmacology, 2005; 97: 429–439.
4. Dev S, 1999: Ancient moden concordance in Ayurvedic plants: Some examples Environ Healh. Perspect, 1999; 107: 783-788.
5. Ramya, S., N. Alaguchamy, VM. Maruthappan R. Sivaperumal, M. Sivalingam, A.Krishnan, V. GovindarajiK. Kannan and R.Jayakumararaj (2009). Wound Healing Ethnomedicinal Plants Popular.
6. Among Malayali Tribes in Vattal Hills, Dharmapuri, TN, India Ethnobotanical Leaflets, 2009; 13: 1257-1271.
7. Ramya S., Aruna Devaraj R., Jayakumararaj R.(2002), Artificial Intelligence and Machine Learning Approach based in –silico ADM E Tox and Pharmacokinetic Profile-linolenic acid from Catharanthus roseus.
8. Journal of Drug Delivery and Iherapeutics, 2022; 12(2-5): 96-109.
9. Phillips O., GentryA.H., Reynel, C., Wilkin P. and C. Galvez-Durant B.(1994) Quantitative Ethnobotany & Amazonian Conservation, Mar.1994; 8(1): 225-248, publication Wiley.

10. Suraj kumar behera & A. Leelaveni. (2019) phytochemical screening of some E Ethnomedicinal plants of kandhamal district of Odisha, india 8407 Int.res.j. pharm, 2019; 10(1): 190.
11. Inter Research Journal of Pharmacy www.irjponline.com doi: 10.7897/2230-8407.1001321.
12. Zarger, R. K. and J.R Stepp.(2004). Advances in Ethnobiological field methods, Sage Journals.