

Ethnobotanical Analysis and Traditional Medicinal Plants Used for Women's Healthcare in Idukki District, Kerala, India.

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Abstract

Traditional herbal medicine remains dominant to women's healthcare due to its accessibility, affordability and cultural acceptance. This study documented and quantitatively analysed medicinal plants used for women's health and reproductive care among rural communities of Idukki district, Kerala. Ethnobotanical data were collected exclusively from women informants using semi-structured interviews, field observations and identifying women as the primary guardians of reproductive health knowledge. A total of 42 medicinal plant species belonging to 29 families were recorded, with major use for menstrual disorders and postnatal care. Use Value and Fidelity Level analyses revealed the culturally important multipurpose species and ailment-specific remedies. The study highlights under-documented traditional knowledge and highlights the need for conservation and scientific validation of key medicinal plants.

Keywords: Women's health, Traditional medicine, Reproductive health, Ethnobotany, Idukki district

Introduction

Ethnobotany is the documentation of relationships between plants and human cultures and it helps to understand how the indigenous people managed their health care needs (Bussmann & Sharon, 2006). Traditional herbal medicines are an excellent alternative for primary healthcare in developing nations due to the lack of basic health care facilities. By using the herbal medicine nearly every kind of diseases are cured that include digestive disorders, dermatological problems, common health, kidney, neurological problems and ENT illnesses. The human race depends on many plant species, and their requirements are growing as more and more time passes (Mintah *et al.*, 2019). The indigenous communities have been preparing medicine from the available therapeutic plants and they generally used to treat women's health care and diseases (Khattak *et al.*, 2015). Many of the traditional studies have reported the plant based curative methods to women health care and these traditional communities are rich in their cultural and traditional knowledge (Hosseinzadeh *et al.*, 2015). Herbal medicinal plants used to treat gynaecological disorders such as menstruation, miscarriage, menopause, leucorrhoea and infertility problems have been reported in some areas of this country's traditional groups (Patel & Patel, 2012). In worldwide total of 18% disease are sexual and reproductive health related (Kaingu *et al.*, 2011). According to the world health organizations the menstrual problems are not considered as a serious health issue but the menstrual related conditions are greatly disrupting women's daily life (van Andel *et al.*, 2014).

Ethnobotanical knowledge in India has a long historical tradition, and systematic direct field-based ethnobotanical investigations have been conducted by numerous researchers (Yesodharan & Sujana, 2007). Despite its importance and knowledge remains under-documented and rapidly decreasing due to socio-cultural changes, urbanization, and increased reliance on allopathic medicine. Several ethnobotanical studies have documented medicinal plants used for women's health and gynaecological disorders across different regions of Asia. For example, Ayyanar *et al.*, 2005 documented the use of 66 ethnomedicinal plant species for gynecological and reproductive healthcare in Vedaranyam taluk, Tamil Nadu, highlighting species diversity, traditional preparations, and therapeutic applications. Studies from India have also highlighted the dependence on plant-based remedies for menstrual irregularities, leucorrhoea, and postnatal care among different populations (Sharma & Joshi, 2016). However, many of these investigations focus on tribal or community-based knowledge systems, while the ethnobotanical information derived specifically from adult women at the individual and household level remains comparatively limited. In Kerala, particularly in ecologically diverse districts such as Idukki, traditional medicinal practices continue to be used by women for managing common reproductive and health-related conditions. In this study systematic ethnobotanical documentation focusing completely on adult women informants is unusual. Targeted documentation of such knowledge is essential and it reflects practical healthcare choices made by women themselves and provides insight into everyday medicinal plant use outside formalized traditional healing systems.

The present study aims to document and quantitatively analyse medicinal plants used for women's healthcare based on interviews conducted with women aged 18 years and above in Idukki District, Kerala. By focusing on adult women informants and applying quantitative ethnobotanical indices. The study seeks to generate baseline data on women-specific ethnomedicinal practices and contribute to the preservation of traditional knowledge relevant to women's health.

Materials and Methods

Study Area

The data collection was carried out in Idukki district, Kerala, India, a region located in the Western Ghats biodiversity hotspot and known for its rich medicinal plant diversity and continued use of traditional plant-based healthcare practices (Yesodharan & Sujana, 2006). The district contains diverse forest types, including moist deciduous and evergreen vegetation which are provided important resources for traditional medicinal plant use (Nayar *et al.*, 2006).

Selection of Informants

Ethnobotanical data were collected exclusively from women informants aged 18 years and above. Informants included elderly women, homemakers, traditional caregivers, and women with experiential knowledge of medicinal plant use. A total of 86 women informants given their contributions in the study.

Data Collection

Ethnobotanical information was gathered through semi-structured interviews, informal discussions, and participant observation following standard ethnobotanical fieldwork methods

(Martin, 1995). Interviews focused specifically on medicinal plants used for women's health conditions, including menstrual disorders, reproductive health problems, pregnancy-related care, postnatal management, and menopausal complaints. For each medicinal plant, data were recorded on local name, plant parts used, way of preparation, and specific women's health conditions treated. Only those plant uses reported independently by more than one informant were considered for analysis to ensure reliability of the data (Trotter, 1986).

Quantitative Ethnobotanical Analysis

Quantitative ethnobotanical indices were applied to assess the cultural significance and consensus of medicinal plant use. Use Value (UV) was calculated to determine the relative importance of each plant species based on the number of use reports (Phillips *et al.*, 1993; Trotter, 1986). Fidelity Level (FL) was used to identify plant species strongly associated with specific women's health conditions (Friedman *et al.*, 1986) (Table:1.). All ethnobotanical data were compiled and analysed using Microsoft Excel. Descriptive statistics were used to summarize plant species diversity, plant parts used, preparation methods, and ailment categories. Results were presented in tables and figures to clearly illustrate ethnobotanical patterns (Bhat *et al.*, 2013).

Table 1: Quantitative ethnobotanical indices and Equations.

Quantitative ethnobotanical indices	Equations
Use Value (UV)	$UV = \sum U_i / n$ Where, N = Total number of informants U _i = Total number of uses reported by informants for a given species
Fidelity Level Percentage (FL %)	$FL (\%) = (N_p/N) \times 100$ Where, NP= number of informants who independently reported the use of a plant species for a particular ailment N= total number of informants who mentioned the use of the same plant species for any ailment

Result and Discussion

Demographic Profile of Informants

The age of women informants ranged from 18 to over 61 years, with the highest proportion recorded in the 46–60-year age group (38.37%), followed by informants aged above 61 years (30.23%). Younger informants aged 18–30 years constituted the smallest proportion (10.46%). This distribution indicates that ethnobotanical knowledge related to women's healthcare is predominantly retained among middle-aged and elderly women, reflecting the cumulative nature of traditional knowledge achievement. Based on educational status, no formal education (37.20%), while primary education (31.39%) and middle school education (19.76%) were also common. Only 11.62% of informants had attained higher secondary education or above, suggesting that traditional medicinal knowledge is largely preserved among women with limited formal education and transmitted through experiential and household practices rather than formal learning systems. In terms of informant category, indigenous women constituted

the majority of participants (72.09%), whereas local herbalists accounted for 27.90%. This pattern highlights that women's healthcare knowledge in the study area is primarily maintained at the household and indigenous knowledge level and with local herbalists playing a supportive but secondary role.

Table 2: Demographic information of women informants from the study area.

Demographic information	Informants	Percentage
Informants age group		
Between 18- 30	09	10.46%
Between 31- 45	18	20.93%
Between 46 - 60	33	38.37%
> 61 years	26	30.23%
Informants' education level		
Illiterate	32	37.20%
Primary education	27	31.39%
Middle school education	17	19.76%
Higher secondary education and above	10	11.62%
Informants' category		
Indigenous people	62	72.09%
Local herbalists	24	27.90%
Total	86	100%

Medicinal plants and Preparation of herbal remedies

The ethnobotanical survey documented 42 medicinal plant species 29 families used for the management of women's health care. The most represented families were Zingiberaceae(4), Apiaceae(3), Amaranthaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Lythraceae, Malvaceae, Piperaceae (2) and Families represented by one species each Alliaceae, Apocynaceae, Asparagaceae, Asphodelaceae, Asteraceae, Bromeliaceae, Caricaceae, Cucurbitaceae, Lauraceae, Meliaceae, Menispermaceae, Mimosaceae, Moraceae, Moringaceae, Oleaceae, Phyllanthaceae, Poaceae, Ranunculaceae, Rutaceae, Solanaceae, Vitaceae. Herbs constituted the dominant growth form, followed by shrubs and trees. Documented plant parts used revealed that leaves were the most frequently utilized part (34.78%), followed by fruits (17.39%), roots (13.04%), seeds (10.87%) and rhizomes (8.70%). Flowers (6.52%), stems (4.35%), bulbs (2.17%) and gel (2.17%) were less commonly used (Fig.1). The predominance of leaves and fruits reflects a preference for easily accessible and renewable plant parts in traditional medicinal practices. Among the documented medicinal plants, herbs were the dominant growth form (17 species), followed by trees (11 species), shrubs (8 species) and climbers (6 species) (Fig.2). Study of remedy preparation methods revealed that decoction was the predominant mode of preparation, accounting for nearly half of the total use-reports (49.15%). This was followed by juice (15.25%) and paste (11.86%) preparations. Cooked (8.47%) and raw (6.78%) forms were moderately used, while oil-based preparations (5.08%), boiled (1.69%) and powdered forms (1.69%) were rarely reported.

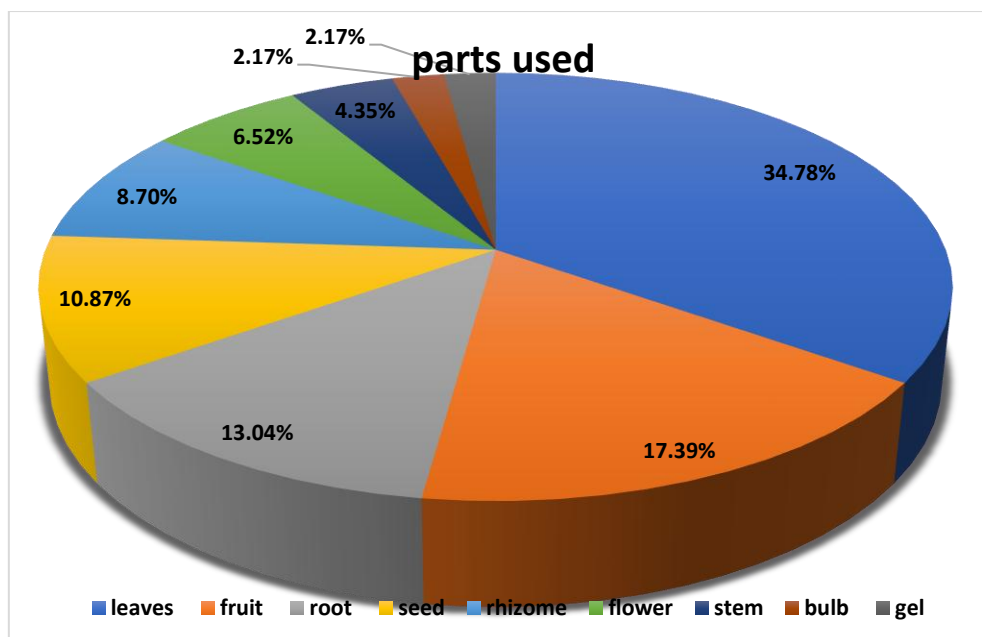


Figure 1: percentage of plant part used for women health care

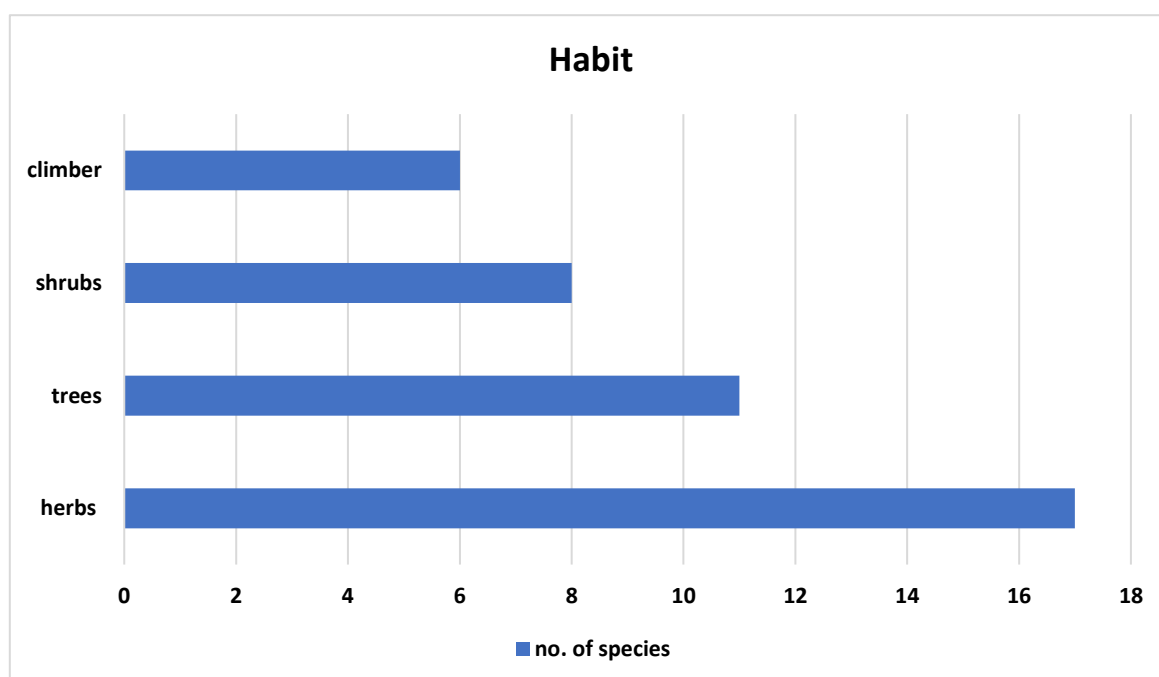


Figure 2: Classification of medicinal plants based on the habit

The dominance of decoction highlights the continued reliance on traditional aqueous extraction methods in indigenous medicinal practices (Table:3). The high proportion of certain plant families such as Zingiberaceae, Apiaceae, Fabaceae and Lamiaceae in the present study is constant with earlier ethnobotanical investigations from India and other tropical regions. Where these families are frequently associated with medicinal applications due to their rich secondary metabolite profiles (Khare, 2007; Pullaiah, 2017; Heinrich *et al.*, 2009). The dominance of herbs (17 species), followed by trees and shrubs, reflects a common pattern in traditional healthcare systems and herbs are easily accessible, require minimal processing and available during most of the year (Cunningham, 2001; Giday *et al.*, 2009). The frequent use of leaves

(34.78%). Leaf collecting is generally non-destructive and sustainable they allowing repeated use without threatening plant survival (Alexiades & Sheldon, 1996). Fruits, roots and seeds were used to a lesser amount, while rhizomes were notably represented due to the dominance of Zingiberaceae species, which are traditionally valued for their therapeutic potency. Decoction emerged as the most common mode of preparation (49.15%), followed by juice and paste, which aligns with previous studies indicating that aqueous preparations are preferred in traditional medicine because they facilitate the extraction of bioactive compounds and are considered safe for oral administration (Heinrich *et al.*, 2009; Harborne, 1998).

Table 3: List of ethnomedicinal plants used for women healthcare.

Plant name	Family	Vernacular name	Habit	Parts used	Remedies preparation	Ailments treated	UV	FL (%)
<i>Allium cepa</i> L.	Alliaceae	Savola	Herb	Bulb	Decoction /paste	Ovary problems /menstrual issues	0.65	100
<i>Achyranthes aspera</i> L.	Amaranthaceae	Kadaladi	Herb	Root	Decoction	Easy delivery by pregnant women	0.20	100
<i>Cuminum cyminum</i> L.	Apiaceae	Jeerakam	Herb	Seed	Decoction	Postnatal digestion/ Lactation	0.90	50
<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Kudangal	Herb	Leaves	Decoction / cooked	Weakness/ menstrual irregularities	0.13	50
<i>Foeniculum vulgare</i> Mill.	Apiaceae	Perumjeerakam	Herb	Seed	Decoction	Reduce Menstruation pain	0.72	50
<i>Alstonia scholaris</i> (L.) R. Br	Apocynaceae	Ezhilampala	Tree	Leaves	Decoction	After child birth helps to clear the uterus	0.09	50
<i>Asparagus racemosus</i> Willd.	Asparagaceae	Sathavari	climber	Root	Decoction / juice	Menstrual disorders/ lactation	0.18	100
<i>Aloe vera</i> (L.) Burm.f.	Asphodelaceae	kattarvazha	Herb	Gel	Juice	Menstrual regulation	0.74	100
<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Kayyonni	Herb	Leaves	Decoction	After pregnancy care	0.65	50
<i>Ananas comosus</i> (L.) Merr.	Bromeliaceae	Kaithachakka	Shrub	Fruit	Raw	Avoided during early pregnancy	0.82	50
<i>Carica papaya</i> L.	Caricaceae	Kappalanga	Tree	Fruit /leaves	Raw/decoction/cooked	Enhance stamina after pregnancy/anaemic / avoided during early pregnancy /	1.06	100
<i>Chenopodium album</i> L.	Amaranthaceae	vasthuchera	Herb	Leaves	Decoction	Reducing Leucorrhoea	0.03	100
<i>Benincasa hispida</i>	Cucurbitaceae	Kumbalam	climber	Leaves /Fruit	Paste /decoction	Enhance milk production	0.22	100

(Thunb.) Cogn.								
<i>Ricinus communis</i> L.	Euphorbiaceae	Avanak ku	Shrub	Root	Decoction	Pregnancy related pain sparing topically	0.06	33.33
<i>Phyllanthus urinaria</i> L.	Euphorbiaceae	Keezharnelli	Herb	Leaves	Paste	Reducing Leucorrhoea	0.15	33.33
<i>Trigonella foenum-graecum</i> L.	Fabaceae	Uluva	Herb	Seed	Decoction	Menstrual pain/lactation	1.13	33.33
<i>Saraca asoca</i> (Roxb.) de Wilde	Fabaceae	Ashokam	Tree	Flower	Decoction	Uterine disorders/menorrhagia	0.08	100
<i>Vitex negundo</i> L.	Lamiaceae	Karinocchi	Shrub	Leaves	Decoction/oil	Menstrual pain/postnatal care	0.12	100
<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Thulasi	Herb	Leaves	Decoction/juice/paste	Hormonal imbalance/infections	0.60	100
<i>Cinnamomum tamala</i> (Buch.-Ham.) T. Nees & Nees	Lauraceae	Edana	Tree	Leaves	Decoction	Excessive menstruation	0.25	100
<i>Punica granatum</i> L.	Lythraceae	Mathalam	Tree	Fruit	Juice	Anemia, leucorrhoea	0.96	50
<i>Lawsonia inermis</i> L.	Lythraceae	Mailanji	Tree	Leaves	Paste /oil	Prevent hair loss after pregnancy	0.56	50
<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	Chembarathi	Shrub	Leaves / flower	Paste / oil	Prevent hair loss/headache after pregnancy	0.67	100
<i>Sida rhombifolia</i> L.	Malvaceae	Kurunthotti	Shrub	Root	Decoction	During pregnancy	0.55	50
<i>Azadiracta indica</i> A. Jus	Meliaceae	Veppu	Tree	Leaves	Decoction	Boosting Immunity	0.56	50
<i>Tinosporacodi folia</i> (Willd.) Hook.f. & Thomson	Menispermaceae	Chittamruthu	climber	Leaves	Decoction	Menstrual disorders	0.5	100
<i>Mimosa pudica</i> L.	Mimosaceae	Thottavadi	Herb	Leaves /root	Decoction	White discharge /urinary pain/postnatal care	0.83	100
<i>Ficus septica</i> Burm. F.	Moraceae	Athi	Tree	Root	Juice	Enhance fertility	0.39	50
<i>Moringa oleifera</i> Lam.	Moringaceae	Muringayila	Tree	Leaves	Cooked /decoction	For the treatment all kind of ovarian issues	0.82	50
<i>Jasminum sambac</i> (L.) Aiton	Oleaceae	Mulla	Shrub	Flower	Decoction	Breast milk enhancement	0.1	100

<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Nellika	Tree	Fruit	Raw/decoction /juice	Anemia/general health	0.87	100
<i>Piper nigrum</i> L.	Piperaceae	Kurumulagu	climber	Leaves	Boiled	Using for bath after pregnancy	0.43	100
<i>Piper longum</i> L.	Piperaceae	Thippali	climber	Fruit	Decoction	Postnatal recovery	0.39	100
<i>Saccharum officinarum</i> L.	Poaceae	Karimbu	Shrub	Stem	Juice	Menstrual pain relief	0.44	100
<i>Nigella sativa</i> L.	Ranunculaceae	karinjeerakam	Herb	Seed	Raw /cooked/decoction	Menstrual disorders	1.01	33.33
<i>Citrus aurantiifolia</i> (Christm.) Swingle	Rutaceae	Cherunara	Tree	Fruit	Juice	Boosting immunity/dysmenorrhea/ stamina	0.89	33.33
<i>Solanum torvum</i> Sw.	Solanaceae	Chunda	Shrub	Fruit	Cooked	Enhance immunity	0.26	33.33
<i>Cissus quadrangularis</i> L.	Vitaceae	Changalam parranda	climber	Stem	Decoction	Postnatal weakness	0.87	100
<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Inji	Herb	Rhizome	Decoction	Menstrual pain/delay menstruation/nausea	1.05	100
<i>Curcuma longa</i> L.	Zingiberaceae	Manjal	Herb	Rhizome	Paste	Postnatal care/ inflammation / irregular periods/ leukorrhea	1.01	100
<i>Alpinia galanga</i> (L.) Wild.	Zingiberaceae	Kolinji, malayinj	Herb	Rhizome	Juice	Menstrual pain	0.75	100
<i>Elettaria cardamomum</i> (L.) Maton	Zingiberaceae	Elakka	Herb	Seed	Decoction / powder	Enhance Milk production/ boost immunity / urinary infection	0.31	100

Use Value Analysis

The Use Value (UV) analysis verified noticeable variation in the cultural importance of the documented medicinal plants, with UV values ranging from low (<0.20) to high (>1.00). Species such as *Trigonella foenum-graecum* (UV = 1.14), *Carica papaya* (UV = 1.07), *Zingiber officinale* (UV = 1.06) and *Curcuma longa* (UV = 1.01) recorded the highest UV scores, indicating their frequent citation and widespread utilization among informants. Moderately high UV values were observed for *Nigella sativa* (UV = 1.01), *Citrus aurantiifolia* (UV = 0.90) and *Moringa oleifera* (UV = 0.83), whereas plants such as *Chenopodium album* (UV = 0.03) and *Alstonia scholaris* (UV = 0.09) exhibited comparatively low UV values, reflecting their limited values (Table 3).

Fidelity Level Analysis

Fidelity Level (FL%) analysis is further highlighted the specificity of individual plant species toward particular disease categories. A significant number of plants displayed a high FL value of 100%, indicating exclusive use for a single ailment category. Notable examples include *Foeniculum vulgare*, *Aloe vera*, *Saraca asoca* and *Benincasa hispida*, each showing 100% fidelity toward menstrual or lactation-related conditions. Plants with moderate fidelity (FL = 50%), such as *Trigonella foenum-graecum*, *Asparagus racemosus* and *Vitex negundo*, were used for two distinct ailment categories and suggesting balanced but focused therapeutic roles. In contrast, multipurpose species including *Curcuma longa* (FL = 25%), *Zingiber officinale* (FL = 33.33%) and *Elettaria cardamomum* (FL = 33.33%) showed lower FL values and reflecting their application across multiple disease categories (Table 3).

Analysis of ailment categories revealed that menstrual disorders and postnatal care constituted the highest proportion of use-reports, highlighting the central role of traditional medicinal plants in women's reproductive healthcare. Similar trends have been documented across South and Southeast Asia. Where ethnomedicinal knowledge is deeply rooted in managing menstrual irregularities, postnatal recovery and lactation (van Andel *et al.*, 2014; Yesodharan & Sujana, 2006). Use Value (UV) analysis indicated that species such as *Trigonella foenum-graecum* (UV = 1.14), *Carica papaya* (UV = 1.07), *Zingiber officinale* (UV = 1.06) and *Curcuma longa* (UV = 1.01) are culturally important and widely utilized suggesting their usefulness and strong acceptance among informants (Phillips & Gentry, 1993). Fidelity Level (FL%) analysis revealed that several species exhibited high specificity (FL = 100%), particularly for menstrual disorders, postnatal care and lactation, indicating a focused therapeutic role. Plants with lower FL values, such as *Curcuma longa* and *Zingiber officinale*, were used across multiple ailment categories, reflecting their broad-spectrum applications rather than low importance. The complementary interpretation of UV and FL demonstrates that traditional knowledge in the study area balances both multipurpose remedies and ailment-specific plants, highlighting the depth, selectivity and functional diversity of ethnobotanical practices related to women's health (Friedman *et al.*, 1986; Albuquerque *et al.*, 2014).

Conclusion

In this study 42 medicinal plant species belonging to 29 families used in traditional women's healthcare practices were documented. The dominance of herbaceous species, preferential use of leaves, and frequent support on decoction-based preparations reflect practical, sustainable and culturally rooted medicinal practices. Quantitative analyses using Use Value and Fidelity Level revealed both generally utilized multipurpose species and ailment-specific plants, particularly for menstrual disorders, postnatal care and lactation-related conditions. The findings highlight the importance of traditional plant-based remedies in managing women's reproductive health and provide a scientific basis for future phytochemical and pharmacological validation of culturally significant species.

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References

1. Albuquerque UP, Cunha LVFC, Lucena RFP, Alves RRN. Methods and techniques in ethnobiology and ethnoecology. New York: Springer; 2014.
2. Alexiades MN, Sheldon JW. Selected guidelines for ethnobotanical research: A field manual. New York: New York Botanical Garden; 1996.
3. Ayyanar M, Sankarasivaraman K, Ignacimuthu S. Traditional herbal medicines used for the treatment of gynecological disorders in Vedaranyam taluk, Tamil Nadu, India. *Journal of Ethnopharmacology*. 2008;117(2):282–294.
4. Bhat P, Hegde GR, Hegde G, Mulgund GS. Ethnomedicinal plants to cure skin diseases: an account of traditional knowledge from the coastal parts of Central Western Ghats, Karnataka, India. *J Ethnopharmacol*. 2013; 149:493–502.
5. Bussmann RW, Sharon D. Traditional medicinal plant uses in northern Peru: tracking two thousand years of healing culture. *J Ethnobiol Ethnomed*. 2006; 2:47.
6. Cunningham AB. Applied ethnobotany: people, wild plant use and conservation. London: Earthscan Publications; 2001.
7. Friedman J, Yaniv Z, Dafni A, Palewitch D. A preliminary classification of the healing potential of medicinal plants based on a rational analysis of an ethnopharmacological field survey. *J Ethnopharmacol*. 1986; 16(2–3):275–287.
8. Giday M, Asfaw Z, Woldu Z, Teklehaymanot T. Medicinal plant knowledge of the Bench ethnic group of Ethiopia. *J Ethnobiol Ethnomed*. 2009; 5:34.
9. Harborne JB. Phytochemical methods: a guide to modern techniques of plant analysis. 3rd ed. London: Chapman & Hall; 1998.
10. Heinrich M, Barnes J, Gibbons S, Williamson EM. Fundamentals of pharmacognosy and phytotherapy. 2nd ed. London: Churchill Livingstone; 2009.
11. Hosseinzadeh S, Jafarikukhdan A, Hosseini A, Armand R. The application of medicinal plants in traditional and modern medicine: a review of *Thymus vulgaris*. *Int J Clin Med*. 2015; 6:635–642.
12. Kaingu CK, Oduma JA, Kanui TI. Practices of traditional birth attendants in Machakos District, Kenya. *J Ethnopharmacol*. 2011; 137(1):495–502.
13. Khare CP. Indian medicinal plants: an illustrated dictionary. New York: Springer; 2007.
14. Khattak NS, Nouroz F, Rahman IU, Noreen S. Ethnoveterinary uses of medicinal plants of District Karak, Pakistan. *J Ethnopharmacol*. 2015; 171:273–279.
15. Martin GJ. Ethnobotany: a methods manual. London: Chapman & Hall; 1995.
16. Nayar TS, Beegam AR, Mohanan N. Flowering plants of Kerala. Thiruvananthapuram: Tropical Botanic Garden and Research Institute; 2006.
17. Oteng-Mintah S, Asafo-Agyei T, Archer MA, Atta-Adjei P Jr, Boamah D, Kumadoh D, et al. Medicinal plants for treatment of prevalent diseases. In: Pharmacognosy – medicinal plants. London: IntechOpen; 2019.
18. Patel PK, Patel MK. Ethnogynaecological uses of plants from Gujarat, India. *Bangladesh J Plant Taxon*. 2012; 19(1):93–94.
19. Phillips O, Gentry AH. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. *Econ Bot*. 1993; 47(1):15–32.
20. Pullaiah T. Encyclopedia of world medicinal plants. New Delhi: Regency Publications; 2017.
21. Sharma P, Joshi R. Ethnobotanical and phytochemical investigation of medicinal plants used by rural communities. *J Ethnopharmacol*. 2016; 194:97–110.
22. Trotter RT, Logan MH. Informant consensus: a new approach for identifying potentially effective medicinal plants. In: Etkin NL, editor. Plants in indigenous medicine and diet. New York: Redgrave Publishing; 1986. p. 91–112.

23. Van Andel T, de Boer HJ, Barnes J, Vandebroek I. Medicinal plants used for menstrual disorders in Latin America, the Caribbean, sub-Saharan Africa, South and Southeast Asia and their uterine properties: a review. *J Ethnopharmacol.* 2014; 155(2):992–1000.
24. Yesodharan K, Sujana KA. Ethnomedicinal knowledge among Malamalasar tribe of Parambikulam Wildlife Sanctuary, Kerala. *Indian J Tradit Knowl.* 2007; 6(1):22–27.