Traditional healing practices for gynecological disorders: Insights from tribal communities of Bargarh district, Odisha, India

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Research

Abstract

Background: Gynecological disorders significantly affect women's health globally, prompting research into plant-based remedies. This study explores indigenous medicinal plants used by rural communities in Bargarh district, Odisha, India, for treating such disorders. It aims to document and preserve traditional knowledge passed down through folklore and practiced by local communities.

Methods: Field surveys regarding medicinal plants used for different gynecological disorders were carried out from January 2023 to April 2024 from 189 informants using semi-structured questionnaires, complemented by informal interviews, conversations, and direct observations.

Results: During the survey, 29 ethnomedicinal plant species from 22 families were recorded, with Fabaceae being the most frequently represented. Herbs and trees were the dominant life forms, each constituting 37.9%, followed by climbers (13.8%) and shrubs (10.4%). The most commonly used plant parts were leaves, flowers, seeds, fruits, and bark. These plants were found to address lactation-related issues (29%), followed by menstrual disorders (25.8%), abortion-related conditions (22.6%), facilitating delivery (19.4%), and gonorrhea (3.2%). The most significant species with higher use values were *Piper betle* L. (0.48), *Phyllanthus emblica* L. (0.35), *Cynodon dactylon* (L.) Pers. (0.30), and *Saraca asoca* (Roxb.) W.J.de Wilde (0.26). The informant consensus factor ranged between 0.95 and 0.97.

Conclusions: The current study shows that rural women often experience gynecological problems and rely on traditional medical care. The findings suggest that the local population is attentive and cautious regarding gynecological diseases. This study will serve as a foundation for future phytochemical and pharmacological screenings aimed at discovering new herbal treatments for various gynecological issues.

Keywords: Folk remedies, Indigenous knowledge, Gynecological disorders, Life form, Therapeutic plants.

Background

Gynecological disorders, including menstrual irregularities, leucorrhea, infertility, and postpartum complications, are major contributors to women's reproductive health challenges worldwide. These conditions involve the uterus, ovaries, fallopian tubes, and vulva, and are influenced by a combination of biological, environmental, and social factors. Poor nutrition, infections, exposure to environmental toxins, lack of education, and socioeconomic constraints exacerbate these issues, particularly in underserved regions (Buragohain 2008; Ciebiera *et al.* 2021; Meyyazhagan *et al.* 2023).

Reproductive health issues account for about 18% of the global disease burden among women, highlighting the urgency of effective management (Aziz *et al.* 2018). In addition, the rising incidence of reproductive system cancers driven by genetic susceptibility, sedentary lifestyles, environmental stressors, and socioeconomic disparities has intensified women's health challenges (Zhang *et al.* 2004; Bibi *et al.* 2017; Farina *et al.* 2025). Modern medicine provides diverse treatments for gynecological disorders, including hormonal therapy, anti-inflammatory agents, analgesics, and surgical interventions. While these interventions are often effective, they are not without limitations. Long-term medication use can lead to adverse effects such as gastrointestinal disturbances, dermatological issues, or organ-specific toxicity. Surgical procedures, including hysterectomies, may result in complications like sexual dysfunction or psychological distress. Moreover, the high cost of clinical treatments, limited accessibility, and risks associated with drugs during pregnancy create barriers for women in rural and economically marginalized settings (Aziz *et al.* 2018). Consequently, these constraints have reinforced the relevance of traditional healing systems as complementary alternatives to modern therapies.

In rural and tribal regions, where modern healthcare facilities are limited, traditional medicine remains an integral part of community health systems. Plant-based remedies, prepared and prescribed by traditional healers, offer affordable and sustainable treatments for various ailments, including gynecological disorders (Kropi *et al.* 2024; Wang *et al.* 2025). Herbal formulations are valued for their accessibility, perceived safety, and minimal side effects compared to synthetic drugs (Kawarty *et al.* 2020). Approximately 25% of modern pharmaceuticals are derived directly or indirectly from plants, reaffirming the continued importance of ethnomedicinal knowledge in contemporary pharmacology (Johnsy *et al.* 2013). In India, cultural taboos and social norms emphasizing privacy often prevent women from discussing reproductive health problems openly. Consequently, many women, particularly in tribal and rural areas, rely on local healers who provide discreet herbal treatments for menstrual disorders, leucorrhea, infertility, and menopause (Romm 2010; Patel 2012). Odisha, located on India's eastern coast, represents an intricate intersection of biodiversity, culture, and traditional healthcare. With nearly 22% tribal population and over 31% forest cover, the state sustains diverse medicinal flora and traditional healing practices. In Bargarh district of western Odisha, tribal healers continue to utilize a wide range of plants for managing gynecological conditions, reflecting deep ethnomedical wisdom and ecological understanding (Mohanty & Rautaray 2020). Such practices foster intergenerational knowledge transfer, cultural resilience, and sustainable resource use. India's traditional medical systems, such as Ayurveda, Siddha, and Unani, further reinforce this harmony between health, culture, and nature, emphasizing preventive care and natural healing (Sen & Chakraborty 2015; Srivastava 2018; Ouedraogo *et al.* 2020).

Ethnogynecology, a specialized branch of ethnobotany, focuses on the use of medicinal plants in managing women's reproductive health, including abortion, menstrual disorders, leucorrhea, infertility, and delivery complications (Rahman 2014).

In tribal societies such as those of Bargarh district, ethnogynecological practices are deeply rooted in cultural belief systems and community trust. However, despite their clinical and cultural significance, ethnogynecological studies remain relatively scarce in India (Das *et al.* 2015; Balamurugan *et al.* 2018; Niyaz *et al.* 2023). Integrating ethnobotanical wisdom with modern scientific approaches can thus strengthen women's reproductive healthcare in underserved regions and preserve globally significant traditional medicinal heritage (Kunwar & Bussmann 2008; Rafiu *et al.* 2025).

Within Odisha, few investigations have documented traditional plant-based therapies for women's reproductive health (Panda *et al.* 2018; Acharya *et al.* 2023). Research specific to Bargarh district remains particularly limited, highlighting a critical need for systematic documentation of local ethnobotanical knowledge (Mohanty & Rautaray 2020). Given this context, the present study aims to document and analyze medicinal plant species used by tribal communities in Bargarh district for the management of gynecological disorders. This research seeks to bridge gaps in women's healthcare through the recognition of indigenous knowledge systems and to contribute to the preservation of biodiversity and indigenous medicinal knowledge systems.

Materials and Methods

Study area

Bargarh, a tribal district in Odisha, India, is a hilly region located between 20° 45'N to 21° 45'N latitude and 82° 40'E to 83° 50'E longitude, covering an area of 5,837 sq. km. The district is bounded by Jharsuguda and Sambalpur districts to the north, Nuapada to the south, Bolangir and Sonepur to the east, and Raighar and Raipur districts of Chhattisgarh to the west (Figure 1). The region is home to several tribal communities, including the Barhia (Binjal), Kond, Mirdha, Gond, Munda, Nayak, Sabar, Shet, Barik, Oran, Harijan, Pandey, and Majhi (Baske *et al.* 2014). The study area, comprising the extensive forest ranges of the Gandhamardan hill range in the Eastern Ghats, functions as a vital repository of medicinal plant diversity and also holds sacred cultural significance (Reddy & Pattanaik 2009; Pandey *et al.* 2024).

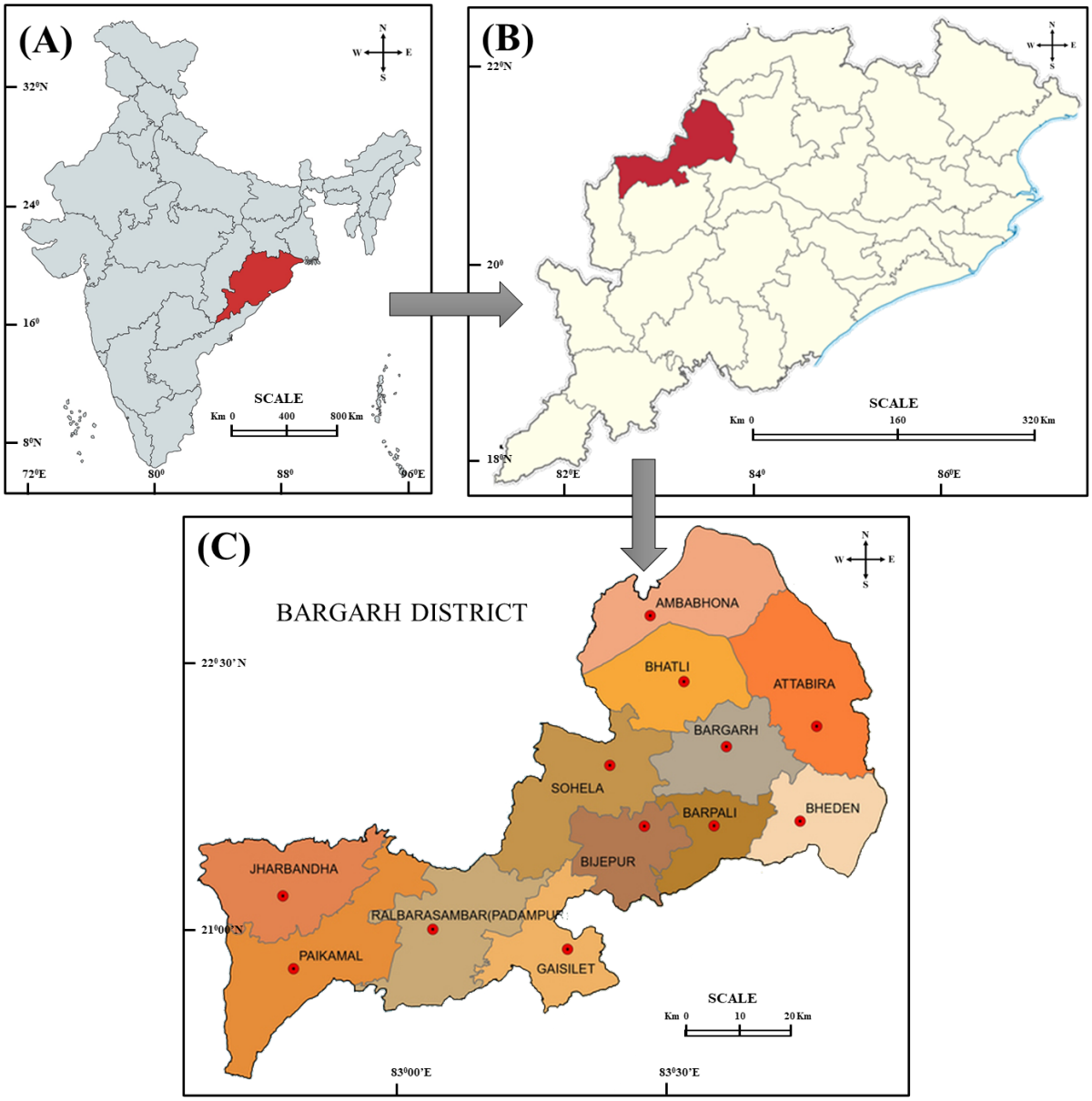

Figure 1. A. Location of Odisha state in India, B. Location of Bargarh district in Odisha, and C. Study area in Bargarh district

Data collection

The methods used in this study aimed to provide baseline information on the use of plant species for treating gynecological disorders within the local healthcare system. During the field survey, the aims, methods, and anticipated benefits of the study were clearly explained to the informants, and their consent was duly obtained prior to participation. Data were collected through an extensive literature review and systematic field visits across twelve blocks (Ambabhona, Attabira, Bargarh, Barpali, Bhatli, Bheden, Bijepur, Gaisilet, Jharbandh, Rajborasombar, Paikmal, and Sohella) of Bargarh district, Odisha, India, conducted monthly from January 2023 to April 2024. The field study followed established ethnobotanical

procedures as outlined by Martin (1995) and Huntington (2000). Information about the use of plants for gynecological treatment was gathered by interviewing 189 individuals (127 men and 62 women), aged between 21 and 80 years, through semi-structured questionnaires, complemented by informal interviews, conversations, and direct observations (Khoja *et al.* 2022a; Khoja *et al.* 2022b). Elderly individuals were prioritized as key informants due to their extensive knowledge, experience, and involvement in traditional practices related to ethnomedicinal plant use. Among the informants, 10.1% were aged 21-40 years, 29.6% were aged 41-60 years, and a majority of 60.3% were aged 61 years or older. Personal interviews and group discussions conducted in the local language provided specific information about the plants, which were further compared and authenticated by cross-checking (Cunningham 2001). The plant species were classified as wild or cultivated. Interviews also sought to gather information regarding plant species, their management, availability, and local distribution. The questionnaire included details such as informants' names, place of residence, gender, education level, age, occupation, local plant names, collection sites, medicinal uses, parts used, methods of preparation, dosage, and known side effects.

Medicinal plant collection, preservation, and identification

During plant collection, guided field walks were conducted in forests, fallows, and upland areas. Field photographs and collected samples were used for identification purposes. Plant species were identified with the help of existing scientific literature (Haines 1925; Saxena & Brahmam 1996), and through comparison with live specimens in the field. In cases where field identification was not possible, samples were further analyzed in the laboratory. The final list of plant species was organized according to their systematic positions following the APG IV (2016) classification system. The current accepted names and taxonomy of each species were validated using the Plants of the World Online (POWO 2022) database. The collected plant specimens were deposited at the Anchal College, Padampur, Bargarh (ACPB).

Quantitative data analysis

The data collected through interviews with the informants were analyzed using different quantitative indices such as relative frequency of citation (RFC), informant consensus factor (ICF), and use value (UV).

Frequency of Citation (FC)

Frequency of Citation (FC) is calculated using the use reports (UR), which is defined as the citation of a plant species by an informant. When total citations for a plant are added, it gives Frequency of Citation (FC) (Tardio & Pardo-de-Santayana 2008).

$$FC = \sum_{i=1}^{n} U\,R_i$$

a) Relative Frequency of Citation (RFC)

The RFC value for indigenous therapeutic plants is based on the number of informants for each plant species. A relative frequency of citation (RFC) was obtained by dividing the frequency of citation (FC) by the total number of informants(N). RFC was calculated by using the following formula (Vitalini *et al.* 2013).

$$RFC = \frac{\mathrm{FC}}{\mathrm{N}}$$

Where FC refers to frequency of citation, N refers to the total number of informants. The maximum value for the index is 1, and the minimum value is 0, i.e., 0 ≤ RFC ≤ 1

b) Informant Consensus Factor (ICF)

ICF is used to represent the consistency of the information among the informants, indicating whether there was shared knowledge and concurrence in the use of plants for treating the ailment category among the plant users in the study area. It was calculated by the following equation (Trotter & Logan 1986; Heinrich *et al.* 1998).

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where 'N_{ur}' refers to the number of users' reports in each illness category and 'N_t' refers to the number of plant species used for a particular illness category by all the informants. The ICF value ranges from 0 to 1, i.e., 0 ≤ ICF ≤ 1.

c) Species Use Value (UV)

The relative importance of the recorded taxa was calculated through the use value (UV) (Phillips *et al.* 1994). It was calculated through the following formula:

$$UV = \frac{\sum U}{n}$$

Where UV is the use value of a given species, U denotes the quantity of reports made by informants for a specific plant taxon, and n is the total number of informants who took part in the study. The UV value varies between 0 and 1. A species that was not mentioned by any of the informants has a UV value of 0, while a species that was mentioned by every informant has a UV value of 1.

Results

A total of 189 informants (127 men and 62 women) were interviewed, with males forming the majority of herbal healers in this study. Traditional healers constituted the largest occupational group (37.6%), followed by agricultural farmers (25.9%), government employees (15.3%), housewives (12.2%), and shopkeepers (9%). The age of informants ranged from 21 to 80 years, with elderly individuals (60.3%) being the primary knowledge holders, followed by middle-aged (29.6%) and young respondents (10.1%). Educational levels varied across age groups, reflecting improved literacy among younger participants. Among the respondents, 45.5% had primary education, 31.2% had studied up to high school, and 8.5% and 5.8% attained graduate and postgraduate degrees, respectively (Table 1).

Table 1. Demographic details of the informants (N=189)

Variables	**Informant Category**	**Number of informants**	**Percentage (%)**
Gender	Male	127	67.2
	Female	62	32.8
Age group	21-40 years	19	10.1
	41-60 years	56	29.6
	61 years or more	114	60.3
Educational Qualification	Illiterate	17	9.0
	Primary school	86	45.5
	High School	59	31.2
	Graduate	16	8.5
	Post Graduate	11	5.8
Occupation	Traditional healers	71	37.6
	Agricultural Farmer	49	25.9
	Govt. employees	29	15.3
	Housewives	23	12.2
	Shopkeepers	17	9.0

The ethnomedicinal survey documented 29 plant species belonging to 22 families, used to treat gynecological disorders (Table 2; Figures 2 and 3). Fabaceae was the dominant family (5 species), followed by Malvaceae, Solanaceae, and Zingiberaceae (two species each). The remaining families contributed one species each. Herbs and trees were the most common life forms (37.9% each), followed by climbers (13.8%) and shrubs (10.4%) (Figure 4). Herbs were used most frequently, likely due to their abundance and accessibility in nearby forests and homesteads. Various plant parts—bark, leaves, seeds, fruits, roots, and rhizomes—were employed for preparing remedies (Figure 5).

Table 2. List of the plants used for the treatment of different gynaecological disorders in Bargarh District, Odisha, India

Scientific name, family, and voucher number	**Local Name**	**Parts used**	**Mode of Use**	**UV**	**FC**	**RFC**
Acacia nilotica L. (Fabaceae) ACPB/23/247	Bamur	Bark	Decoction of bark combined with sugar candy is taken to induce abortion.	0.25	25	0.13
Achyranthes aspera L. (Amaranthaceae) ACPB/23263	Apa-marga	Root	Powdered root mixed with black pepper is taken orally to regulate menstrual irregularities.	0.18	11	0.06
Aegle marmelos (L.) Corr. (Rutaceae) ACPB/23/389	Bela	Fruit	Juice extracted from the unripe fruit is taken orally to facilitate easier delivery.	0.22	24	0.13

Alstonia scholaris (L.) R.Br. (Apocynaceae) ACPB/23/269	Sapta-pharni	Bark	Decoction of bark is taken orally for the enhancement of lactation.	0.12	10	0.05
Allium sativum L. (Amaryllidaceae) ACPB/23/245	Rasun	Bulb	Decoction of cloves of garlic is taken orally to increase lactation	0.19	18	0.09
Aloe vera Burm. f. (Liliaceae) ACPB/23/258	Ghikuanri	Leaf	Leaf juice mixed with turmeric powder is taken orally to regulate menstrual irregularities.	0.20	24	0.13
Asparagus racemosus Willd. (Asparagaceae) ACPB/23/272	Satabari	Whole plant	Juice extracted from the whole plant is taken to promote lactation.	0.21	20	0.11
Bombax ceiba L. (Malvaceae) ACPB/23/260	Simuli	Fruit	Fruit juice is mixed with banana is taken orally to treat gonorrhoea.	0.16	14	0.07
Butea monosperma (Lam.) Kuntze (Fabaceae) ACPB/23/371	Phalsa	Leaf, Bark	Decoction of leaf with milk is taken orally to induce abortion. Bark powder mixed with ghee is taken orally to control menstrual irregularity	0.28	26	0.14
Coriandrum sativum L. (Apiaceae) ACPB/23/226	Dhania	Seed	Juice extracted from the seed is taken orally to facilitate easy delivery.	0.17	16	0.08
Curcuma longa L. (Zingiberaceae) ACPB/23/238	Haldi	Rhizome	Juice extracted from the rhizome is taken orally to induce easy delivery.	0.22	24	0.13
Cynodon dactylon (L.) Pers. (Poaceae) ACPB/23/233	Duba	Leaf, Whole plant	Leaf Juice with curd is used to induce abortion. Powder of the whole plant is taken orally to control menstrual irregularity.	0.30	33	0.17
Datura stramonium L. (Solanaceae) ACPB/23/307	Kala dudura	Root	The juice extracted from the root is taken orally to facilitate delivery.	0.19	17	0.09
Euphorbia hirta L. (Euphorbiaceae) ACPB/23/270	Chitakuti	Whole plant	The juice extracted from the whole plant is taken orally to stimulate lactation.	0.12	09	0.05
Ficus carica L. (Moraceae) ACPB/23/389	Dumer	Bark	Bark juice added with milk is taken to induce abortion.	0.14	13	0.07
Hibiscus rosa-sinensis L. (Malvaceae) ACPB/23/374	Mandar	Flower	Powder of flowers with black pepper is taken orally to control menstrual disorders.	0.21	22	0.12
Ipomoea mauritiana Jacq. (Convolvulaceae) ACPB/23/391	Bhuin-kakharu	Fruit	Fruit Juice is taken orally to enhance lactation.	0.19	18	0.09
Lavandula bipinnata (Roth) Kuntze (Lamiaceae) ACPB/23/311	Kamraj	Flower	Flower decoction mixed with black pepper is taken orally to facilitate delivery.	0.09	06	0.03
Mimusops elengi L. (Sapotaceae) ACPB/23/369	Baula	Root	The root juice with milk is used to treat gonorrhoea.	0.21	21	0.11
Momordica charantia L. (Cucurbitaceae) ACPB/23/408	Kalara	Leaf	Leaf juice with molasses is taken to enhance lactation.	0.17	17	0.09

Phyllanthus emblica L. (Phyllanthaceae) ACPB/23/326	Ainla	Fruit, Leaf	Decoction of fruit with milk is taken to induce abortion, and Leaf juice with black pepper is used to enhance lactation.	0.35	43	0.23
Piper betle L. (Piperaceae) ACPB/23/451	Paan	Petiole	Juice of the petiole is taken orally to induce abortion.	0.48	66	0.35
Saraca asoca (Roxb.) W.J.de Wilde (Fabaceae) ACPB/23/652	Ashok	Bark	Decoction of the bark is used for menstrual and uterine disorders.	0.26	31	0.16
Tamarindus indica L. (Fabaceae) ACPB/23/660	Tentuli	Fruit	Grounded raw fruit with molasses is taken for menstrual disorders.	0.19	22	0.12
Terminalia chebula Retz. (Combretaceae) ACPB/23/640	Harida	Seed	A decoction juice prepared from the seeds, in combination with the juice of *Ziziphus jujuba* seeds, is orally administered as an abortifacient.	0.14	12	0.06
Tribulus terrestris L. (Zygophyllaceae) ACPB/23/664	Gokhura	Seed	Decoction of the seed is taken orally to induce delivery.	0.17	18	0.09
Trigonella foenum-graecum L. (Fabaceae) ACPB/23/669	Methi	Seed	Seed powder is taken orally to enhance lactation.	0.28	26	0.14
Withania somnifera (L.) Dunal (Solanaceae) ACPB/23/002	Ashwa-gandha	Seed	Seeds powder is taken orally to regulate menstruation.	0.14	14	0.07
Zingiber officinale Rosc. (Zingiberaceae) ACPB/23/008	Ada	Rhizome	Decoction of the rhizome is taken to promote lactation.	0.19	17	0.09

Leaves and bark were the most frequently used, followed by flowers, seeds, and fruits. These plant parts were administered to manage ailments such as menstrual and menopausal disorders, uterine complications, childbirth facilitation, and lactation enhancement. Among reported ailments, lactation-related issues were most common (29%), followed by menstrual disorders (25.8%), abortion-related conditions (22.6%), and treatments to facilitate delivery (19.4%). Gonorrhea represented the least-cited category (3.2%) (Figure 6). Decoction was the predominant mode of preparation, followed by paste and powder (Table 2). Decoctions involved boiling or soaking plant parts for oral use, while pastes were prepared by crushing or grinding, and powders by shade-drying and grinding for longer storage. Oral administration was most frequent, though external application was occasionally practiced. Sometimes multiple plants or parts were combined to enhance efficacy, with water as the main solvent and adjuvants such as milk, curd, or ghee used to improve palatability and stability.

Figure 2. Some plant species observed during the study a. *Acacia nilotica* L. b. *Achyranthes aspera* L. c. *Aegle marmelos* (L.) Corr. d. *Alstonia scholaris* (L.) R.Br. e. *Asparagus racemosus* Willd. f. *Bombax ceiba* L. g. *Butea monosperma* (Lam.) Kuntze h. *Curcuma longa* L.

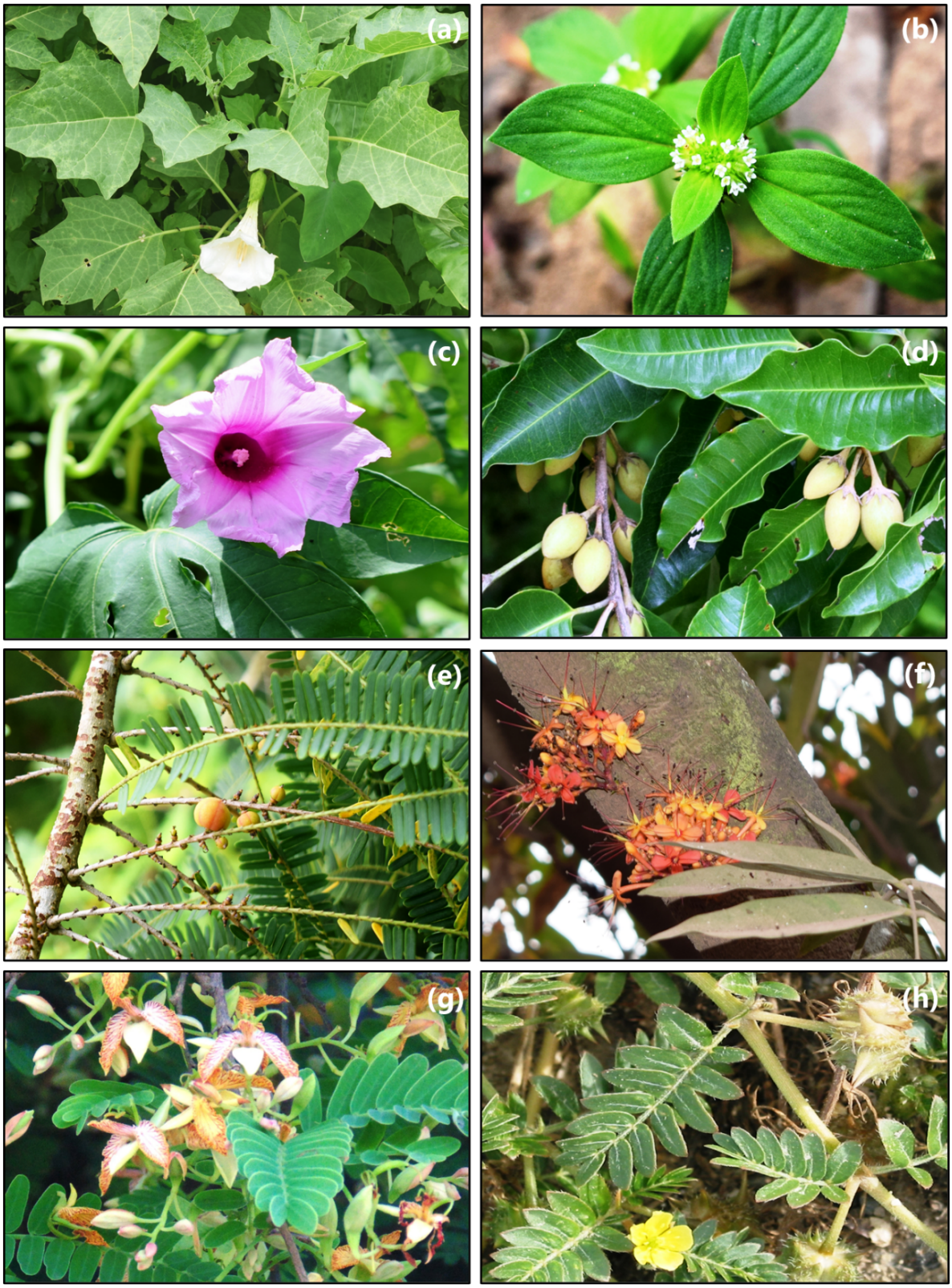

Figure 3. Some plant species observed during the study a. *Datura stramonium* L. b.*Euphorbia hirta* L. c. *Ipomoea mauritiana* Jacq. d. *Mimusops elengi* L. e. *Phyllanthus emblica* L. f. *Saraca asoca* (Roxb.) W.J.de Wilde g. *Tamarindus indica* L. h.*Tribulus terrestris* L.

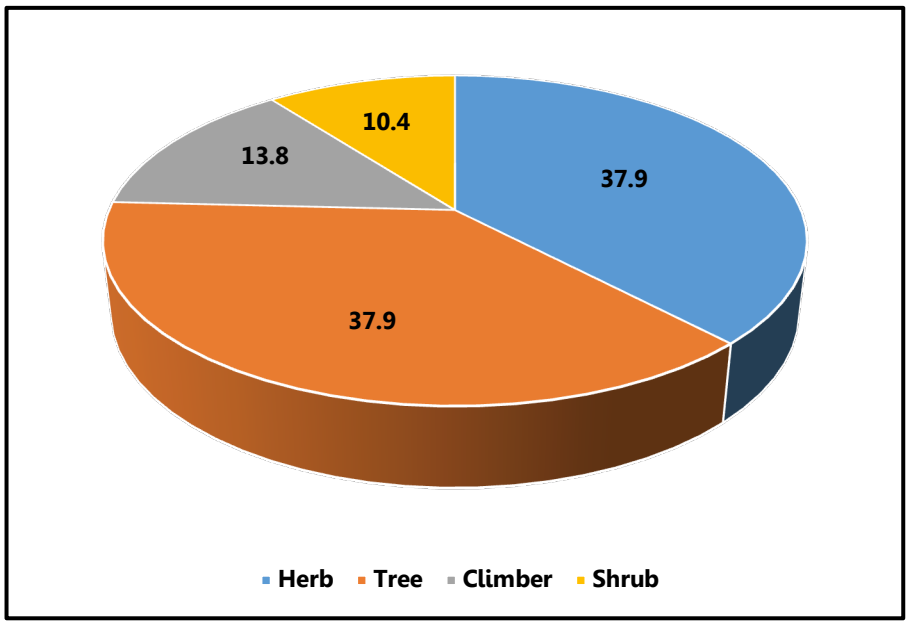

Figure 4. Life form analysis

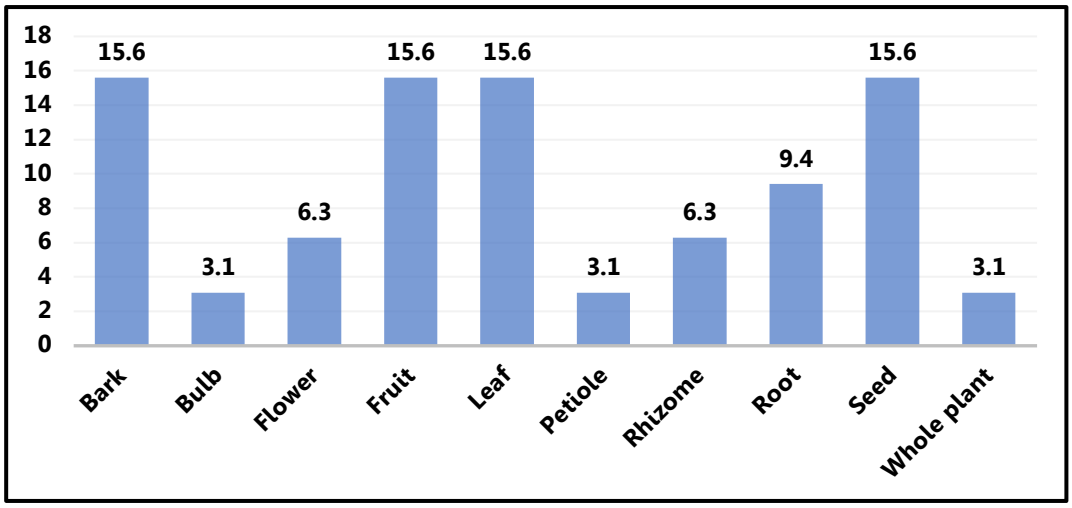

Figure 5. Percentage of plant parts used for various gynecological disorders

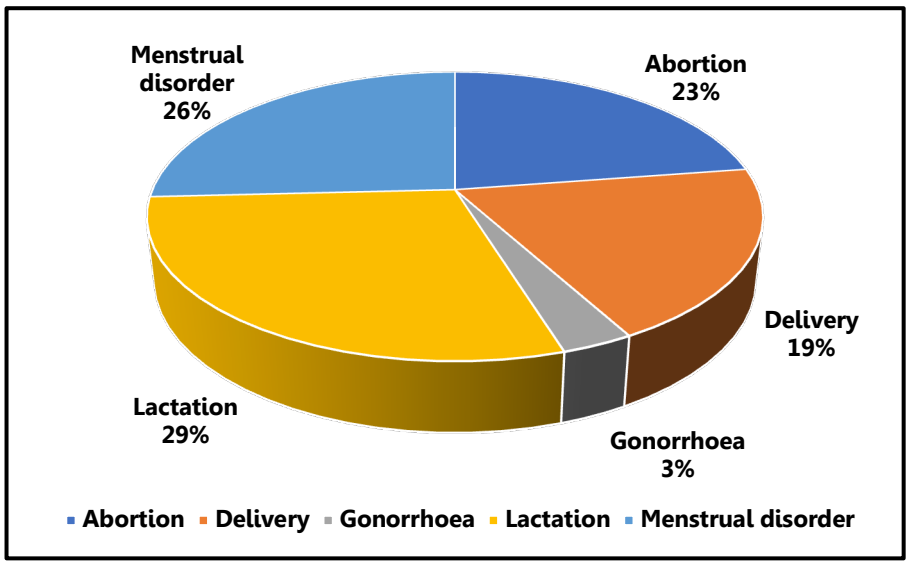

Figure 6. Percentage of plant species used for various gynaecological disorder

Quantitative ethnobotanical indices highlighted the cultural importance of specific

species. The highest Frequency of Citation (FC) values were recorded for *Piper betle* L. (66), *Phyllanthus emblica* L. (43), *Cynodon dactylon* (L.) Pers. (33), *Saraca asoca* (Roxb.) W.J.de Wilde (31), and *Trigonella foenum-graecum* L. (26), while *Lavandula bipinnata* (Roth) Kuntze showed the lowest FC (6). Correspondingly, the highest Relative Frequency of Citation (RFC) values were observed for *P. betle* (0.35), *P. emblica* (0.23), *C. dactylon* (0.17), *S. asoca* (0.16), and *T. foenum-graecum* (0.14). Use Value (UV) analysis indicated the ethnomedicinal prominence for *P. betle* (0.48), *P. emblica* (0.35), *C. dactylon* (0.30), and *S. asoca* (0.26), while *L. bipinnata* (0.09) and *Euphorbia hirta* L. (0.12) had lower UVs. The Informant Consensus Factor (ICF) values ranged between 0.95 and 0.97, with the highest for gonorrhea (0.97), followed by abortion and lactation-related conditions (0.96) (Table 3).

Table 3. Informant consensus factor (ICF)

Disease Category	Nur	Nt	Nur-Nt	Nur-1	ICF (Nur-Nt/Nur-1)
Abortion	165	8	165-08=157	165-1=164	0.96
Delivery	112	7	112-7=105	112-1=111	0.95
Gonorrhoea	35	2	35-2=33	35-1=34	0.97
Lactation	179	9	179-9=170	179-1=178	0.96
Menstrual Disorder	116	7	116-7=109	116-1=115	0.95

Nur=No. of use reports for each disease category; Nt=No of species cited

Discussion

The link between the indigenous people (aboriginals) and their environment is very intricate. From ancient times, the Indian medical system contributed to the health care of the world and provided several life-saving medicines. The indigenous knowledge system of Indian tribes has also contributed considerably to healthcare drug development in India. Indian tribes have traditionally practised their medical systems based on various plant parts and formulations.

Demographic characteristics of the respondents

The majority of herbal healers in this study were males, which is consistent with previous literature indicating that men often dominate traditional healing practices due to sociocultural roles and the intergenerational transfer of medicinal knowledge (Rajakumar & Shivanna 2009; Amujoyegbe *et al.* 2016; Kushavara & Rajkumar 2023; Beressa *et al.* 2024). The observed pattern in education shows that individuals with primary education possessed greater indigenous knowledge and use of therapeutic plants for the treatment of gynecological disorders compared to those with higher education. This reflects that traditional knowledge is more deeply rooted among older and less formally educated individuals, while it tends to decline among the younger, more educated generation. Hence, there is a dire need to conserve this indigenous knowledge from extinction (Kumar *et al.* 2015; Luczaj 2023).

Plant composition and distribution

The dominance of the Fabaceae family may be attributed to its wide ecological distribution and the presence of diverse bioactive compounds with known pharmacological properties. Members of this family are rich in flavonoids, alkaloids, and saponins, which are associated with anti-inflammatory, hormonal, and antimicrobial activities properties relevant to the treatment of gynecological disorders. Previous ethnobotanical studies have also reported the extensive use of Fabaceae species in traditional medicine for managing women's health issues, suggesting a long history of therapeutic relevance and cultural acceptance (Prabhu *et al.* 2014; Balamurugan *et al.* 2018; Kacholi *et al.* 2023; Sharma & Rani 2024).

Life form of medicinal flora

The dominance of herbs in traditional remedies can be linked to their abundance, ease of collection, and high concentration of bioactive and secondary metabolites that are effective in treating acute and seasonal illnesses (Wink 2015; Niyaz *et al.* 2023). Similarly, several authors have reported the predominance of tree species as the next most utilized life form in ethnomedicinal practices, especially concerning women's reproductive health, owing to the long-life cycle, perennial nature, and storage of potent medicinal compounds in barks, roots, and fruits (Tsobou *et al.* 2016; Sharma & Rani 2024). The combined dominance of herbs and trees indicates a balanced reliance on both easily accessible and pharmacologically potent plant resources in traditional healthcare systems.

Plant parts used

In traditional medicine, diverse plant parts have historically been employed to address gynecological issues. Leaves, often the most used plant part, serve as major sites of photosynthesis and storage for pharmacologically active compounds, making them a renewable and sustainable resource for herbal preparations (Balamurugan *et al.* 2018; Surendran *et al.* 2023). Owing to these properties, leaves from specific plants have been used to remedy menstrual disorders, alleviate menopausal symptoms, and support overall reproductive health. Flowers are utilized for managing menstrual discomfort and regulating cycles, while fruits provide nutritional benefits, particularly during pregnancy and lactation. Roots are incorporated in formulations targeting uterine disorders, and barks of certain trees are valued for their medicinal properties relevant to gynecological health (Van Andel *et al.* 2014; Tsobou *et al.* 2016; Sharma & Rani 2024).

Plant Utilization for the Treatment of Gynecological Disorders

The results indicate a strong reliance on ethnomedicinal practices for managing reproductive health among the indigenous communities of Bargarh district. Lactation-related issues and menstrual disorders were the most commonly treated conditions, reflecting the cultural significance and practical importance of traditional remedies in women's healthcare. The use of plant-based treatments for abortion, childbirth, and delivery demonstrates the community's dependence on indigenous knowledge for critical maternal health needs. Even gonorrhea is addressed through traditional practices, suggesting an awareness of sexually transmitted infections. These findings corroborate previous studies (Niyaz *et al.* 2023; Sharma & Rani 2024) and highlight the potential of these plant resources for developing cost-effective and culturally relevant healthcare interventions.

Cynodon dactylon (L.) Pers., commonly known as duba grass or Bermuda grass, has long been mentioned in traditional Indian medicine for its abortifacient properties (Vaidyaratnam 1995; Malpani *et al.* 2020). Scientific evaluation by Malpani *et al.* (2020) demonstrated significant antifertility effects of ethyl alcohol extract of the whole plant in female Wistar rats, showing up to 83.33% reduction in pregnancy. The extract displayed estrogenic effects, such as increased uterine weight, vaginal cornification, and reduced deciduoma formation, suggesting disruption of implantation processes. Phytochemical analysis confirmed the presence of flavonoids like apigenin, known for their phytoestrogenic and antifertility properties (Kalita & Milligan 2010; Malpani *et al.* 2020). Recent ethnobotanical studies further substantiate these findings. Shukla *et al.* (2022) reported the use of shoots and roots of *C. dactylon* as an abortifacient and for treating menstrual disorders in West Bengal, India. Similarly, Rani & Sharma (2024) documented the use of whole plant juice to induce abortion in Uttar Pradesh, while Mazzei *et al.* (2024) highlighted its use in treating menstrual disorders in Italian folk medicine.

Phyllanthus emblica L., commonly known as 'Amla', 'Aonla', or 'Indian gooseberry', is a fruit tree native to India and cultivated in several tropical and sub-tropical countries (Thilaga *et al.* 2013). Its primary bioactive components include polyphenols, tannins, flavonoids, and ascorbic acid (Kunchana *et al.* 2021). Fresh fruit contains about 4% tannins, which may reach 35% in dried powder, predominantly as hydrolysable tannins (Yang & Liu, 2014). Amla fruits have long been utilized in Ayurvedic medicine for their diverse health benefits, including reproductive health. Khaled et al. (2019) evaluated crude and solvent fractions of *P. emblica* fruit for effects on the female reproductive system, revealing that non-polar fractions (petroleum ether and chloroform) exhibited potent estrogenic and follicle-stimulating hormone (FSH)-like activities, while the n-butanol fraction showed luteinizing hormone (LH)-like activity. More recently, a rat-model study reported that an ethanolic extract of *P. emblica* ameliorated letrozole-induced polycystic ovary syndrome, restoring hormonal balance and reducing ovarian cystic follicles (Han et al., 2025). Additionally, a clinical trial of a Jawarish Amla formulation in women undergoing intracytoplasmic sperm injection or in vitro fertilization demonstrated significant reductions in fertility-related stress (Isakhani et al., 2025). These findings provide a pharmacological basis for the traditional use of *P. emblica* in modulating female reproductive functions.

Piper betel L., commonly known as the betel vine or paan, is an important medicinal plant whose leaves are widely used as a mouth freshener, and it is extensively cultivated in India, Sri Lanka, Malaysia, Thailand, Taiwan, and other Southeast Asian countries. Early experimental studies demonstrated that alcoholic extracts of *P. betel* possess fertility-reducing and anti-oestrogenic properties in rodents (Tiwari *et al.* 1970). Subsequent investigations reported decreased reproductive organ weights, altered oestrous cycles, suppressed sperm motility, reduced fertility, and reversible contraceptive effects following administration of alcoholic or ethanolic extracts (Adhikary et al., 1989; Sarkar et al., 2000; Sharma et al., 2007). More recently, Shah and Jhade (2017, 2018) observed significant antifertility, anti-implantation, and abortifacient activities in female Wistar rats treated with ethanolic and aqueous petiole extracts, accompanied by reduced levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), progesterone, and oestrogen, irregular oestrous cycles and decreased reproductive organ weights. Furthermore, Lumempow *et al.* (2025) demonstrated that green betel leaf decoction exhibited

strong antibacterial activity against *Pseudomonas aeruginosa*, a common cause of vaginal infections, suggesting its potential role in managing such conditions. These findings support the traditional use of *P. betel* as a natural, reversible contraceptive and therapeutic agent for female reproductive health.

Saraca asoca (Roxb.) W.J.de Wilde, commonly known as Asoka, is a revered medicinal tree in South Asia, widely mentioned in Ayurvedic classics such as Charaka Saṃhita, Susruta Saṃhita, Aṣṭangahṛdaya, Dhanvantari Nighaṇṭu, and Cakradatta. Its stem bark is the principal ingredient of Asokariṣṭa, a polyherbal decoction prescribed for gynecological disorders including menorrhagia (raktapradara), dysmenorrhea (kaṣṭartava), and leucorrhea (Pradhan et al., 2009; Begum et al., 2014; Sushma & Yadava, 2021). Traditionally, women across India, Sri Lanka, Bangladesh, and Pakistan use the bark to alleviate uterine disorders such as excessive menstrual bleeding and leucorrhea (Shukla *et al.* 2008; Pradhan *et al.* 2009; Mollik *et al.* 2010). Phytochemical studies using high-performance liquid chromatography (HPLC) and ultra-performance liquid chromatography (UPLC) revealed bioactive flavonoids and polyphenols, notably gallic acid, (+)-catechin, (−)-epicatechin, (−)-epigallocatechin gallate, and procyanidin B_2 (Dhanani et al., 2017), which modulate inflammatory pathways. Dysmenorrhea and abnormal uterine bleeding involve increased prostaglandins, cytokines, vascular endothelial growth factor, and matrix metalloproteinases, due to progesterone withdrawal (Proctor & Farquhar, 2006). Experimental studies demonstrate that methanolic bark extract reduces uterine COX-2 expression, suppresses estradiol-induced endometrial thickening, and normalizes reproductive hormones, reflecting anti-estrogenic and anti-inflammatory actions (Shahid et al., 2015; Hazarika et al., 2021). Clinically, Asokariṣṭa has shown improvement in symptoms of menorrhagia and dysmenorrhea (Akhtar et al., 2007), possibly through prostaglandin inhibition and progesterone modulation (Nie et al., 2020). Recent research substantiates its anti-inflammatory potential (Abidfaheem et al., 2025), and an ongoing clinical trial is evaluating an Ayurvedic regimen (Asokariṣṭa, Trinakantamaṇi Piṣṭi, and iron-folic acid) in comparison with tranexamic acid for managing menorrhagia (Jadhav et al., 2025).

Preparation

The predominance of decoction as the main preparation method aligns with earlier ethnomedicinal reports from other regions (Simbo 2010; Ayyanar & Ignacimuthu 2011; Panda *et al.* 2018; Swain *et al.* 2022; Surendran *et al.* 2023). This indicates a broader regional preference for water-based extractions, likely due to their simplicity and ability to release bioactive compounds efficiently. Similar to the findings of Mussarat *et al.* (2014), oral administration remains the most common route, reflecting both the practicality and cultural acceptance of internal herbal treatments. The use of multiple plant species in formulations reflects a traditional understanding of synergistic interactions, believed to enhance therapeutic efficacy or minimize adverse effects (Muthu *et al.* 2006; Tugume *et al.* 2016; Dwivedi *et al.* 2019). Furthermore, the inclusion of animal-derived products such as milk, curd, and ghee as carriers demonstrates an integrated pharmacological rationale, as these substances may improve bioavailability, stabilize active ingredients, and support women's reproductive health, as noted in previous studies (Mahmood *et al.* 2013; Mana *et al.* 2021).

Evaluating FC, RFC, UV, and ICF

The high FC values highlight the cultural and therapeutic significance of frequently cited species, reflecting their consistent use and recognition in traditional medicine (Namukobe et al., 2011; Sharma et al., 2023). Species such as *P. betle, P. emblica,* and *C. dactylon* are not only abundant in the local landscape but also deeply rooted in cultural and ritual practices, contributing to their recurrent use. Similarly, high RFC values indicate both widespread familiarity and availability of these species (Bano et al., 2014; Rehman et al., 2022). The alignment between FC and RFC underscores a reciprocal link between ecological abundance and ethnomedicinal importance, suggesting that accessible species are more frequently integrated into indigenous healthcare. Higher UVs for *P. betle, P. emblica, C. dactylon, and S. asoca* reflect broad therapeutic versatility across reproductive, gastrointestinal, and inflammatory disorders (Niyaz et al., 2023). Conversely, lower UVs for *L. bipinnata* and *E. hirta* indicate restricted or specialized ethnomedical use. These variations reveal hierarchical medicinal knowledge and identify potential species for pharmacological validation and conservation. Consistently high ICF values (0.95-0.97) across gynecological ailments demonstrate strong consensus among informants, reflecting reliable traditional knowledge systems. The highest consensus for gonorrhea (0.97) and similarly high values for abortion and lactation (0.96) indicate focused reliance on specific remedies, emphasizing their empirically validated efficacy in community-based women's healthcare (Balamurugan et al., 2018; Sharma et al., 2022; Khadim et al., 2023).

Conclusion

This study highlights ethnomedicine's vital role in rural women's healthcare in Bargarh district, Odisha, particularly in addressing gynecological disorders. Many rural women rely on traditional medicine because they hesitate to consult doctors

for such conditions. Traditional knowledge systems, deeply rooted in cultural beliefs and environmental familiarity, provide affordable and accessible alternatives to modern healthcare. A total of 29 plant species were documented for treating various gynecological ailments, with the Fabaceae family being the most dominant, reflecting the strong trust in indigenous healing practices. Commonly treated conditions include lactation issues, abortion-related problems, childbirth support, menstrual disorders, and gonorrhea, with remedies primarily prepared as decoctions and powders. High-use-value species such as *P. betle, P. emblica, C. dactylon,* and *S. asoka* underscore the therapeutic potential of local flora. However, the continuity of this traditional knowledge is under threat due to waning interest among the younger generation, insufficient documentation, and ecological degradation driven by industrial development. Therefore, comprehensive pharmacological validation, conservation of medicinal plant resources, and the integration of ethnomedicine into mainstream healthcare systems are essential for preserving and promoting this invaluable heritage for future generations.

Declarations

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