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Ethno-gynecological Cognizance of Phytomedicine Used by Tribes of Central and Eastern India: An Indigenous Heritage

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ABSTRACT

Ethnomedicinal information that exists with individuals from diverse regions is rapidly dwindling owing to a lack of interest among the young in imbibing traditional information from elderly home herbal healers, which is their golden heritage. There are huge benefits of indigenous prescriptions and using medicinal herbs for the treatment of many ailments. Tribal people are ignorant of evidence-based research on herbs, which can assist to improve their knowledge worldwide with scientific backing. This research is an attempt to document essential medicinal plants utilized by indigenous people of Central and Eastern India to treat gynecological disorders. The information was acquired from a literature search in electronic databases such as PubMed, Google-Scholar, SpringerLink, Scopus, and Wiley up to 2023. About 80 plants have been listed which have been reported to be used for the treatment of different gynecological disorders by the indigenous people of Central and Eastern India to treat gynecological disorders. Additionally, several scientific studies supporting the usage of the plant have been also described with their mechanistic insights. Since drug discovery from medicinal plants continues to provide a new array and important leads against various pharmacological targets, an effort to collect medicinal plants and their associated traditional knowledge could serve as an important tool for the discovery of new potent compounds. The extremely intriguing findings for gynecological illness necessitate further investigation, while the efficacy of numerous traditional phytomedicines must be assessed for their pharmacological confirmation before they can be embraced universally for the benefit of humanity.

Keywords: abortifacient; ethnomedicine; Gynecological disorders; herbal medicine; traditional medicine

INTRODUCTION

A healthy lifestyle is key for the correct functioning of the body, and many individuals suffer from medical issues as a result of their ignorance. Understanding the health issue can be highly beneficial for timely and correct treatment (Jha et al. 2020). Plants have always played a pivotal role in medicine. According to the WHO, conventional forms of medicine are used by more than 80% of the world's population (Peela et al. 2016). In most parts of the world, ethnomedicine has been a fundamental component of the traditional medical care system (Dash and Satapathy 2016). It suggests that the vast majority of the overall population is reliant on traditional drugs for vital medical services, including the use of plant extracts. Herbs and herbal medicine are the premises of many of the modern medications used today to treat various disorders (Dash and Satapathy 2016).

Globally, there has been increasing attention and interest in the use of traditional medicine during the last decade. In India, Ayurveda and medicinal herbs are used by 65% of the rural population to address their basic health care requirements (Tripathi 2019). To address their basic medical needs, a huge section of India's population still relies on traditional tribal clinical professionals and local medicinal plants (Basak et al. 2016). India is tenth among the world's plant-rich countries and fourth among Asian countries (Dash and Satapathy 2016). It has been formally acknowledged that 2500 plant species have medicinal usefulness, and over 6000 plants are being evaluated for use in folk and natural medicine (Peela et al. 2016).

According to Census 2011, in India, the population of tribes is around 10,45,45,716, wherein about 48009010 of the tribal population (Ministry of Tribal Affairs 2021) i.e. about 46% of the tribal population resides in Central and Eastern India. The states that are included in Central and Eastern India are Madhya Pradesh, Chhattisgarh, Jharkhand, Bihar, Odisha, and West Bengal (Figure 1). These states have been able to preserve their natural systems of medicine because of limited exposure to the West side (Sinha et al. 2016). Thus, traditional medication, moderated over the decade from old civilizations, can serve as

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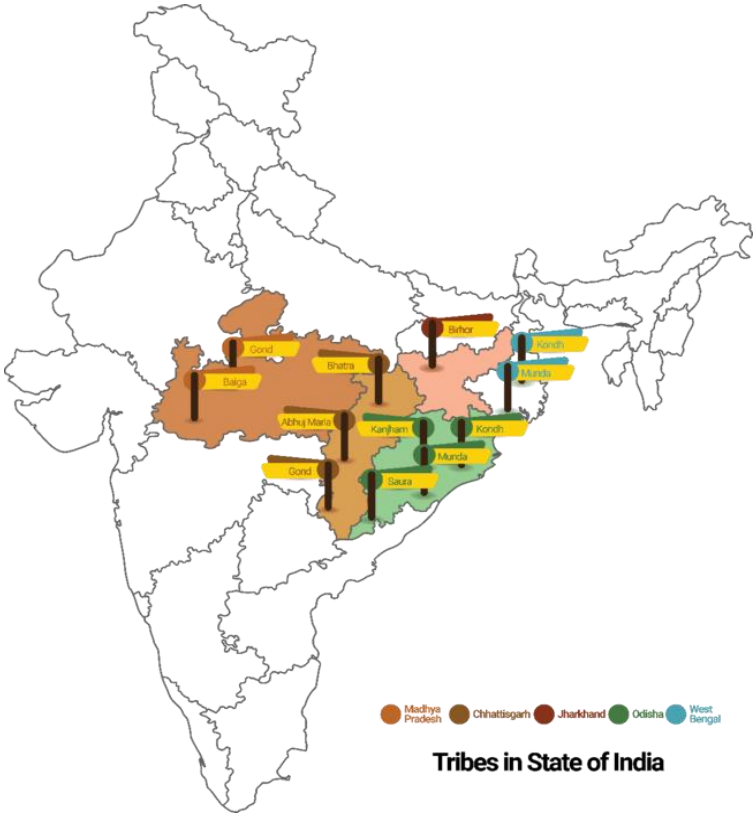

Figure 1. Tribes of Central and Eastern India

a viable reason for the revelation and improvement of modern medicine. The tribal individuals are the genuine custodian of therapeutic plants. The tribal individuals have been planning medications from the accessible types of plants which are utilized widely to treat normal sicknesses.

Improving indigenous prescriptions and utilizing therapeutic plants for treating various diseases offer significant economic advantages (Tripathi 2019). Ethnomedicines are the foundation of modern medication, and knowledge of these plants resides with people from different regions. However, this knowledge is rapidly declining due to the lack of interest among the youth in learning traditional practices from older herbal healers (Maru et al. 2016). Despite this decline, traditional medicine remains a vital part of life and culture among tribes, highlighting the connection between cultural and biological diversity (Maru et al. 2016). While the use of traditional medicine has been documented in terms of its restorative properties, preparation, storage, dosage, and effectiveness against ailments, further documentation is needed to scientifically validate these practices for global use (Leelaveni et al. 2018). Assessing the safety and efficacy of documented ethnomedicinal herbs through phytochemical and pharmacological examinations is crucial, especially for plants with high use value, which should be prioritized for toxicity and bioassay studies (Leelaveni et al. 2018). This present study addresses the need for documenting and scientifically validating herbal treatments for gynecological problems, focusing on the incidence of these issues among tribes in the central and eastern regions of India.

METHODOLOGY

The literature search was conducted using scientific databases, including PubMed and Google Scholar, covering publications until October 2023. Articles focused on phytomedicine used by tribes in Central and Eastern India were included. The exclusion criteria were as follows: (1) articles for which the full text was not accessible due to institutional subscription limitations; (2) publications that did not include the search phrases in the abstract or title; (3) articles published in languages other than English; (4) Unpublished literature and conference proceedings were not included in the search. A combination of keywords and search phrases such as "Ethnomedicine," "Central and Eastern India," and "Gynecological disorders" was used with different syntax to refine the search.

GYNECOLOGICAL PROBLEMS AND THEIR PATHOLOGICAL INSIGHTS

Ethnomedicinal research is more important for the identification of novel crude pharmaceuticals from indigenous medicinal plants for the treatment of gynecological problems. Gynecology is a key field that deals with the treatment of many women's issues such as menstruation disorders, abortion, vaginal infection, leukorrhea, female infertility, menopause, morning sickness, leukorrhea, menorrhagia, dysmenorrhea, partum and postpartum problems, and so on (Figure 2) (Balamurugan et al. 2018). Indigenous tribes handle female health concerns using a traditional approach known as ethno-gynecology. Tribes have their own natural/spiritual treatments for gynecological issues (Chakraborty et al. 2015; Bain and Premi 2019; Rehman et al. 2022). Fortunately, the traditional treatment of female-related problems is still in use. It is very important to understand the mechanistic insights of gynecological disorders which can further help in designing the best treatment.

Dysmenorrhea

Dysmenorrhea is a Greek word that means "painful monthly bleeding." The two kinds of dysmenorrhea are primary and secondary. Secondary dysmenorrhea is commonly associated with further disease within or outside the uterus, whereas primary dysmenorrhea is frequently associated with other illnesses or pathology. Dysmenorrhea is a common problem among women of reproductive age. Dysmenorrhea has significant emotional, psychological, and functional health implications (Nagy et al. 2022; Adib-Rad et al. 2022; Matsumura et al. 2023)**.**

However, the accepted cause is uterine inner lining prostaglandin hypersecretion. Prostaglandin F2alpha (PGF-2a) and PGF 2 increase uterine tone and cause high-amplitude uterine contractions. Vasopressin has also been linked to primary dysmenorrhea. Vasopressin increases uterine contractility and may cause ischemia pain due to its vasoconstriction activities (Figure 3). During the first two days of the menstrual period, uterine contractility is more visible. Before menstruation, progesterone levels decline, resulting in increased PG production and dysmenorrhea. Endometriosis and adenomyosis are the most common causes of secondary dysmenorrhea in premenopausal women (Nagy et al. 2022; Jiang et al. 2023).

Menorrhagia

Menorrhagia is described as either excessive uterine bleeding that occurs at regular intervals or protracted uterine bleeding that lasts longer than seven days. The traditional definition of menorrhagia (i.e., more than 80 mL of blood loss each cycle) is rarely employed in clinical practice (Apgar et al. 2007; Walker et al. 2019).

The cause of abnormal uterine bleeding (AUB) is as complicated. Hormone imbalance, ovarian dysfunction, uterine fibroids, polyps, adenomyosis, PID, bleeding disorders, cervical and endometrial cancer, intrauterine device (IUD), pregnancy problems, and other medical disorders can all lead to AUB (Figure 4). A balance of the hormones estrogen and progesterone governs the growth of the uterine lining (endometrium), which is shed during menstruation, in a regular menstrual cycle. When there is a hormonal imbalance, the endometrium grows in excess and finally sheds through excessive monthly bleeding. In the event of an ovulation problem, the hormone progesterone is affected, resulting in hormonal imbalance and the condition of menorrhagia. Uterine fibroids and polyps are also to blame for heavy and extended menstrual bleeding. Adenomyosis is also one of the causes of menorrhagia, it is a disorder in which endometrial glands become entrenched in the uterine muscle, resulting in severe bleeding and painful periods (Mayo clinic 2022; Doctorlib 2022; Osei et al. 2005)**.**

Another important consideration and a significant cause of AUB are the patient's medications. An intact coagulation pathway is essential for menstrual regulation and medications such as aspirin, contraceptive medicine, tamoxifen, corticosteroids, etc., that interact with platelets and coagulation factors can lead to Acute AUB (Walker et al. 2019).

Leukorrhea

Leukorrhea, is a flow of a whitish, yellowish, or greenish discharge from the vagina of the female that may be normal or that may be a sign of infection. Such discharges may originate from the vagina, ovaries, fallopian tubes, or, most commonly, the cervix. This discharge is often caused by inflammation or infection within the vagina or cervix. It turns yellow with a foul smell. It can be due to an underlying infection. The three most common vaginal infection in pathological leukorrhea includes bacterial vaginosis (BV), candidiasis vulvovaginalis (VVC) and trichomoniasis. Pathological

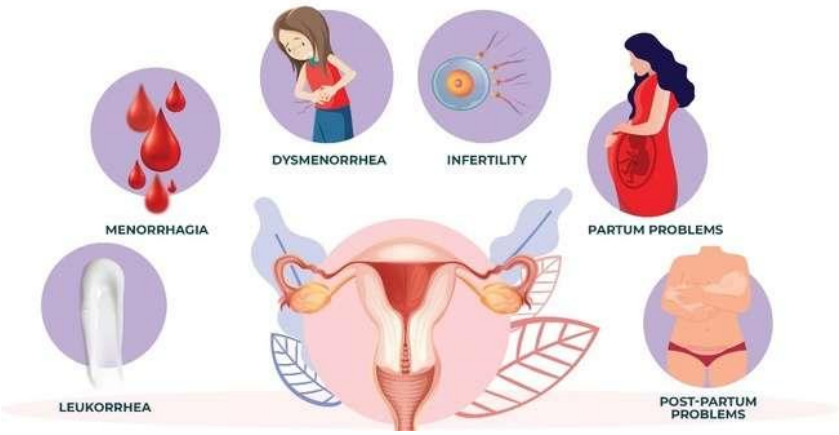

Figure 2. Different gynecological problems

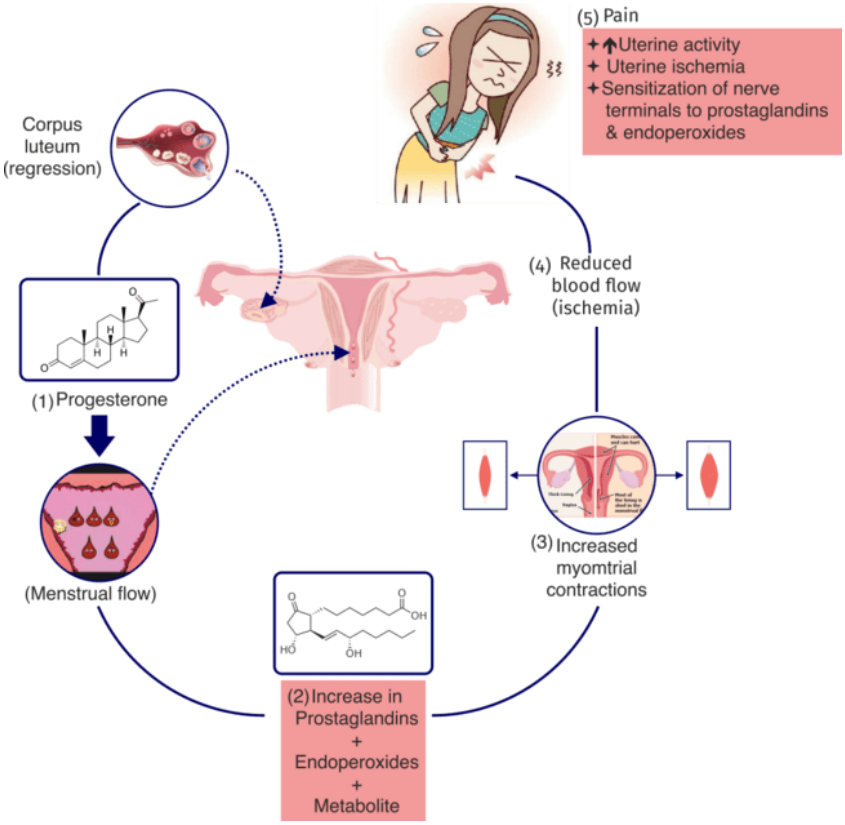

Figure 3. Pathological insights of dysmenorrhea

leukorrhea is commonly caused by a cervical and vaginal abnormality that can be non-infection or infection (Trilisnawati et al. 2021). Its major cause is hormonal imbalance, especially estrogen. It is the primary female sex hormone that is responsible for the regulation and development of the female reproductive system and secondary sex characteristics. The estrogen level increases, which increases gland activity. This led to an increase in the level of glycogen. This in turn starts shredding of epithelium and glycogen starts to convert into lactic acid. This results in acidic vaginal discharge leading to leukorrhea (Figure 5) (Ayurveda, 2022).

Infertility

Nowadays the rate of female infertility cases has been increasing across the world. Oxidative stress (OS) is a state of imbalance between pro- and antioxidant defenses and is generated from the disruption of the delicate balance between reactive oxygen species (ROS) produced from the aerobic

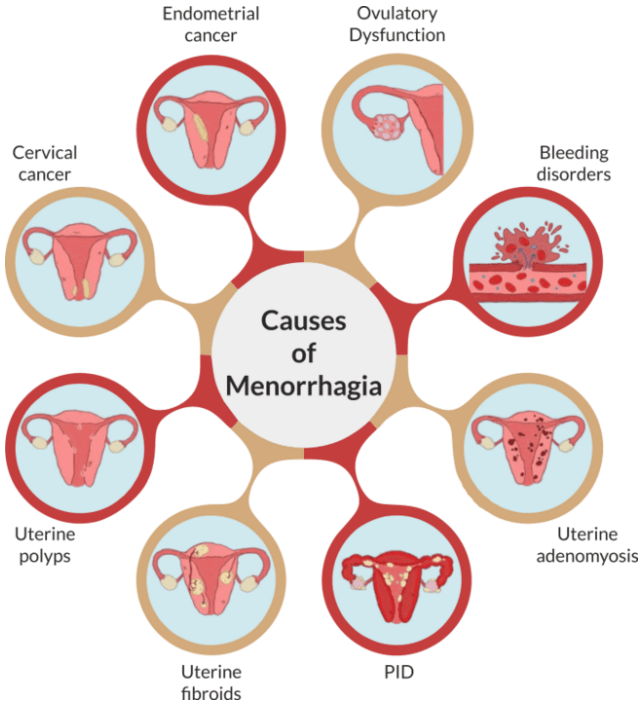

Figure 4. Different pathological conditions leading to menorrhagia

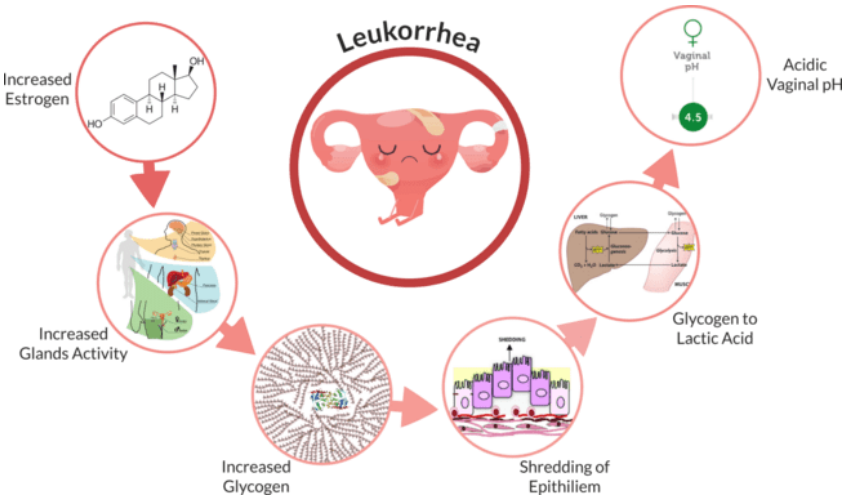

Figure 5. Pathological insights of leukorrhea

metabolism of cells and defending antioxidants as well as form the exogenous sources including water and air pollution, alcohol, smoking, heavy metals, radiation, and various kinds of drugs. The increased reactive oxygen species (ROS) and the insufficient production or availability of endogenous and exogenous antioxidants in the body lead to oxidative stress. ROS are essential for carrying out various biological functions in the body. It also plays a pivotal role in the reproduction system (Zaha et al. 2023). For reproductive processes like folliculogenesis, ovulation, steroidogenesis, fertilization, and implantation, a significant amount of ROS is required. However, an excess of ROS causes oxidative stress, which has been linked to a number of issues including endometriosis, PCOS, preeclampsia, spontaneous abortion, unexplained infertility, etc. Inflammation, genetic and epigenetic changes, endothelial dysfunction, and loss of cellular integrity of somatic and germ cells are all caused by oxidative stress. The pathogenesis of various female reproductive disorders is caused by the disruption of numerous pathways and

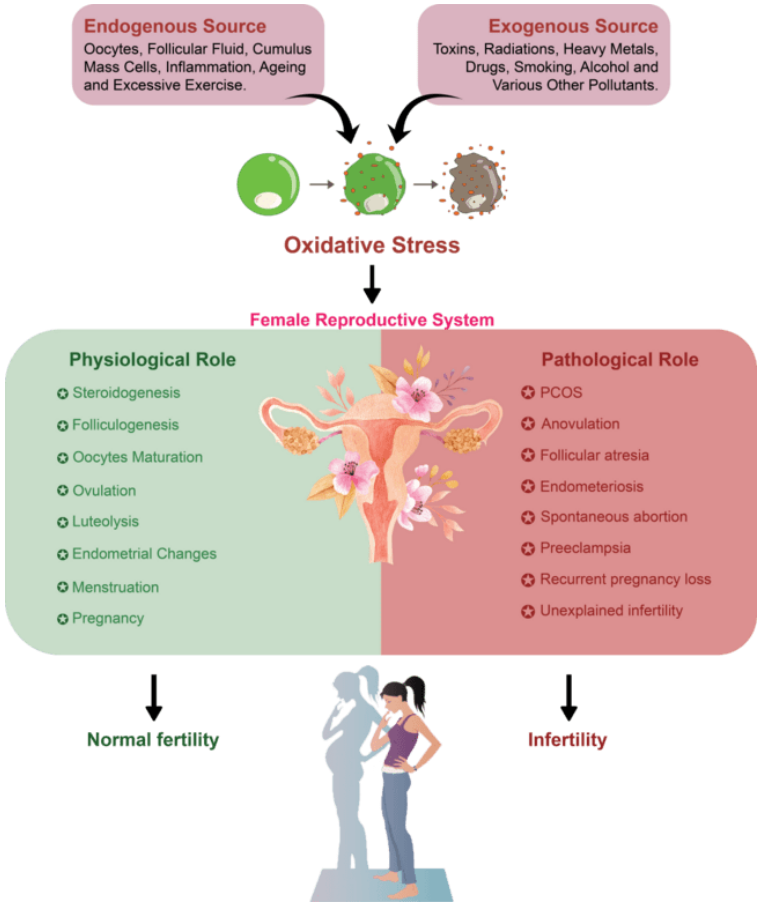

Figure 6. Effect of oxidative stress on fertility

mechanisms by oxidative stress (Figure 6) (Banerjee et al. 2019; Bhardwaj et al. 2021; Manokaran et al. 2022).

ANALYTICAL DESCRIPTION OF THE MEDICINAL PLANTS USED BY THE TRIBALS OF CENTRAL AND EASTERN TRIBES OF INDIA

There is a need for alternative and effective therapy which is devoid of the adverse effects. It is also preferred to administer medications that do not alter the menstrual cycle or delay ovulation. In this context, clinicians can choose herbal extracts that have proven benefit and may be a safer alternative. The present study is an attempt to collect the herbals used by the ethnic people for the betterment of the world which is on the verse of depletion. In this review, selected herbs have been tabulated that have spasmolytic, anxiolytic, and anti-inflammatory action. Eighty plant species have been tabulated which have the potency to treat different women problems.

Among the 5 states of the Central and Eastern India, West Bengal tribes reported the maximum number of plant species for treating women diseases (63 plants, Table 1; Figure 7). There are different tribes living in Central and Eastern India with vast knowledge about the plants used for women problems, and most of the plants were reported by the Lodha tribe (45 plants). The plant species reported are of wide varieties belonging to 46 families, among which maximum plant species i.e. 12 were from Fabaceae family (Table 1). These plants were reported to treat different types of gynecological problems and the maximum numbers of the plants were reported to treat menstrual problems. The use of specific parts also has their immense role and in this study, it has been reported that the parts mostly used were roots (Table 1; Figure 7).

SCIENTIFIC VALIDATION OF ETHNOGYNECOLOGICAL MEDICINAL PLANTS

Scientific validation studies for medicinal plants are crucial for ensuring their safe and effective use by the general public. It has been observed that some plants used by tribal communities have undergone clinical studies, which have validated their use. Ethnogynecology is an emerging field focused on treating illnesses affecting indigenous women, including abortion,

Table I. Plants used by tribal community for gynecological disorders in Central and Eastern India

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
1	*Abrus precatorius* L.	Fabaceae	Runj	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
2	*Aeginetia indica* L.	Orobanchaceae	Golapi	Bark	WB	Lodhas	Hypogalactia	(Chaudhury et al. 2018)
3	*Aerva lanata* (L.) Juss.	Amaranthaceae	Kunda vuturi	Root	WB	Lodhas	Dysmenorrhea, Infertility	(Chaudhury et al. 2018)
4	*Achyranthes aspera* L.	Amaranthaceae	Chirchita	Root	MP	Gond & Baiga	Easy delivery	(Sahu 2011)
5	*Aloe vera* Mill.	Asphodelaceae	Gwarpatha	Leaves	MP	Gond & Baiga	Labor pain during delivery	(Sahu 2011)
6	*Amaranthus spinosus* L.	Amaranthaceae	Kanta marich	Whole plant	WB	Lodhas	Menorrhagia	(Chaudhury et al. 2018)
7	*Annona squamosa* L.	Annonaceae	Sitaphal	Leaves	MP	Gond & Baiga	Easy delivery	(Sahu 2011)
8	*Andrographis glandulosa* (Roth) Nees	Acanthaceae	Bisalyo	Leaves	WB	lodhas	Leukorrhea	(Chaudhury et al. 2018)
9	*Argemone mexicana* L.	Papaveraceae	Daskeranda, Kantajati, Beng	Leaves	Odisha	Munda	Leukorrhea	(Dash and Satapathy 2016)
			Bhatkatai	Root	MP	Gond & Baiga	Regulating fertility	(Sahu 2011)
			Bhatkatai	Leaves	MP	Gond & Baiga	Leukorrhea	(Sahu 2011)
10	*Aristolochia indica* L.	Aristolochiaceae	Iswarmul	Leaves	WB	Lodhas	Dysmenorrhea, Postpartum care	(Chaudhury et al. 2018)
				Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
11	*Argyreia nervosa* (Burm.f.) Bojer	Convolvulaceae	Brudhadareka, Fudrimal (Kondh), Gaguli (Beng)	-	Odisha	Munda	Detaching of placenta	(Dash and Satapathy 2016)
12	*Asparagus racemosus* Willd.	Asparagaceae	Sataver	Tuberous Root	MP	Gond & Baiga	Hypogalactia	(Sahu 2011)
			Sataver	Leaves	MP	Gond & Baiga	Easy delivery	(Sahu 2011)
			Satamul	Tuberous Root	WB		Leukorrhea	(Biswas et al. 2017)

Table I. (Continued)

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
			Swet mul	Leave, Root	WB	Lodhas	Leukorrhea, Infertility, Dysmenorrhea	(Chaudhury et al. 2018)
			Satavar	Root	Chattigarh	Gond, Abhuj Maria, Bhatra	Hypogalactia	(Kaushik et al. 2021)
			Shatavari	Whole Plant	Odisha	Kondh	Protects pregnancy	(Panigrahy et al. 2016)
			Satabari	Whole plant	Odisha	Ganjam District	Protects pregnancy	(Leelaveni et al. 2018)
13	*Azanza lampas* (Cav.) Alef.	Malvaceae	Bankapas	Root	WB	Kankrajhor	Hypogalactia, Leukorrhea , amenorrhoea	(Biswas et al. 2017)
14	*Baliospermum solanifolium* (Brum.) Suresh	Euphorbiaceae	Kedar sindur	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
15	*Boerhavia diffusa L.*	Nyctaginaceae	Puruni Saga	Whole Plant	Odisha	Munda	Leukorrhea	(Dash and Satapathy 2016)
			Puruni saga	Whole plant	Jharkhand	Birhor	Leukorrhea	(Sinha 2016)
16	*Borreria articularis (L.f.) Williams*	Rubiaceae	Sanaghar podia, Jibkata, Pitu arak	Whole plant	Odisha	Munda	Menorrhagia	(Dash and Satapathy 2016)
			Solaganthi, Sanaghar podia	Whole plant, Root	Jharkhand	Birhor	Menorrhagia	(Sinha 2016)
17	*Bombax ceiba L.*	Malvaceae	Simili, Simal, Edel, Emal,	Root	Odisha	Munda	regulate irregular menstruation	(Dash and Satapathy 2016)
			Semulo, Simili	Root	Jharkhand	Birhor	regulate irregular menstruation	(Sinha 2016)
18	*Butea monosperma (Lam.) Kuntze*	Fabaceae	Palash	Root	WB	Lodhas	Menstrual disorders	(Chaudhury et al. 2018)

Table I. (Continued)

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
19	*Buettneria herbacea*Roxb.	Malvaceae	Dikosinduri	Roots tock	WB	Kankrajhor	Gynecological disorders	(Biswas et al. 2017)
			Kamraj	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
20	*Cajanus cajan* (L.)	Fabaceae Lindl.	Arhar	Fruit	WB	Lodhas	Hypogalactia	(Chaudhury et al. 2018)
21	*Calotropis gigantea* (L.) W.T.Aiton	Apocynaceae Juss.	Arakha, Patladudha, Akaona, Mudha	Root	Odisha	Munda	Leukorrhea	(Dash and Satapathy 2016)
			Akondo	Root	WB	Lodhas	Leukorrhea, Postpartum care	(Chaudhury et al. 2018)
			Arakha, Patladhudha, Parkha	Root	Jharkhand	Birhor	Leukorrhea	(Chaudhury et al. 2018)
22	*Cannabis sativa L. Cannabaceae*	Cannabaceae	Ganja	Leaves	WB	Lodhas	Dysmenorrhea	(Chaudhury et al. 2018)
23	*Cardiospermum halicacabum L.*	Sapindaceae	Sibjhuli	Fruit	WB	Lodhas	Dysmenorrhea	(Chaudhury et al. 2018)
24	*Cassia tora*	Fabaceae	Chawokra	Seedling	Madhya Pradesh	Gond & Baiga	Easy delivery	(Sahu 2011)
25	*Cassia fistula L.*	Fabaceae	Sonalu	Stern	WB	Kankrajhor	Menstrual disorders	(Biswas et al. 2017)
			Sonari	Stem	WB	Lodhas	Leukorrhea Postpartum care	(Chaudhury et al. 2018)
26	*Ceriscoides turgida (Roxb.) Tirveng.*	Rubiaceae	Gurman	Fruit	WB	Kankrajhor	Affection of mammary glands	(Biswas et al. 2017)
27	*Cheilocostus speciosus (J.Koenig)C.D.*	Costaceae	Keualu	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
28	*Cissampelos pareira L. Menispermaceae*	Menispermaceae	Akon bindi	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
29	*Coccinia indica Wight & Arn.*	Cucurbitaceae	Kundri	Plant	WB	Kankrajhor	Leukorrhea	(Biswas et al. 2017)
30	*Curculigo orchioides Gaertn.*	Hypoxidaceae	Talmuli	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)

Table I. (Continued)

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
			Talamuli	Root	Odisha	Kondh	Leukorrhea	(Panigrahy et al. 2016)
31	*Dalbergia sisoo Roxb*	Fabaceae	Sissum	Leaves	Madhya Pradesh	Gond & Baiga	Leukorrhea	(Sahu 2011)
32	*Desmostachya bipinnata (L.) Stapf*	Poaceae	Kush ghas	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
33	*Dichanthium caricosum (L.) A.Camus*	Poaceae	Khoran khachi	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
34	*Dillenia aurea Sm.*	Dilleniaceae	Rai, Korkotta	Stem	Odisha	Munda	Restoration of health after child birth	(Dash and Satapathy 2016)
			Rai, Rai-daru	Stem	Jharkhand	Birhor	Post partum problems	(Sinha 2016)
35	*Dillenia pentagyna Roxb.*	Dilleniaceae	Rai, Aghai	Stem	Jharkhand	Birhor	Easy delivery	(Sinha 2016)
			Rai (O, B), Korkotta (Sa)	Stem	Odisha	Munda	Easy delivery	(Dash and Satapathy 2016)
36	*Dolichos biflorum L.*	Fabaceae	Kulthi	Seed	Madhya Pradesh	Gondn& Baiga	Leukorrhea	(Sahu 2011)
37	*Dregea volubilis* (L.f.) Benth.	Apocynaceae	Chitpunji	Root and tender stalk	WB	Kankrajhor	Leukorrhea	(Biswas et al. 2017)
38	*Ehretia laevis Roxb.*	Boraginaceae	Bon kanthal	Fruit	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
39	*Eupatorium album L.*	Compositae	Hurhure	Fruit	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
40	*Euphorbia hirta*	Euphorbiaceae	Dudhi	Leaves	Madhya Pradesh	Gond & Baiga	Leukorrhea	(Sahu 2011)
41	*Euphorbia fusiformis Buch.-Ham. ex D.Don*	Euphorbiaceae	Dudh mugra	Tuber	WB	Lodhas	Hypogalactia	(Chaudhury et al.,2018)
			Khirakancha na	Dry plant, Root	Odisha	Kondh	Hypogalactia	(Panigrahy et al. 2016)

Table I. (Continued)

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
42	*Ficus Benghalensis L.*	Moraceae	Bargad/vat	Leaves	Chhattisgarh	Gond, Abhuj Maria, Bhatra	Gynecological	(Kaushik et al. 2021)
			Bot	Fruit and Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
43	*Ficus hispida* L.F.Suupl	Moraceae	Buidimiri, Barmur, Katgulasia	Fruit	Odisha	Munda	Hypogalactia	(Dash and Satapathy 2016)
			Panidimiri, Demburu, Kharsen	Fruit	Jharkhand	Birhor	Hypogalactia	(Sinha 2016)
44	*Flacourtia indica* (Burm.f.) Merr.	Salicaceae	Chini kul	Leaves	WB	Lodhas	Leukorrhea	(Sinha 2016)
45	*Ficus religiosa* L.	Moraceae	Pipal	Fruits	Chhattisgarh	Gond, Abhuj Maria, Bhatra	Gynecological	(Kaushik et al. 2021)
46	*Gossypium arboretum* L.	Malvaceae	Kapas	Root	Madhya Pradesh	Gond & Baiga	Menorrhagia	(Sahu 2011)
			Kapas	Root	Madhya Pradesh	Gond & Baiga	Dysmenorrhoea	(Sahu 2011)
47	*Hemidesmus indicus* (L)R. Br.	Asclepiadaceae	Anantamul	Root	Odisha	Munda	Leukorrhea	(Dash and Satapathy 2016)
			Anantamul	Root	WB	Kankrajhor	Menstrual and vaginal disorders, Hypogalactia	(Biswas et al. 2017)
			Anantamul	Root	WB	Lodhas	Leukorrhea, Infertility, Dysmenorrhea	(Chaudhury et al. 2018)
			Hati-sura	Root	Jharkhand	Birhor	anemia during pregnancy	(Sinha 2016)
48	*Hibiscus rosa-sinensis* L.	Malvaceae	Jaba	Flower, Leaves	WB	Lodhas	Dysmenorrhea, Menorrhagia	(Chaudhury et al. 2018)
49	*Holarrhena pubescens (*Buch.-Ham.) Wall. Ex G. Don.	Apocynaceae	Kurchi	Stem	WB	Kankrajhor	Labor complaints	(Biswas et al. 2017)

Table I. (Continued)

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
50	*Ipomoea paniculata*(L.) R.Br.	Convolvulaceae	Bhui Kumra	Roots	WB	Kankrajhor	Menorrhagia	(Biswas et al. 2017)
51	*Ixora parviflora Lam.*	Rubiaceae	Lohajang	-	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
52	*Litsea glutinosa (Lour.) C.B.Rob.*	Lauraceae	Pojo/Haroa	Stem	WB	Lodhas	Dysmenorrhea	(Chaudhury et al. 2018)
53	*Lygodium flexuosum (L.) Sw.*	Schizaeaceae	Bera jal	Leaves	WB	Lodhas	Leukorrhea, Infertility	(Chaudhury et al. 2018)
54	*Mesua ferrae* L.	Calophyllaceae	Nageswara	Flowers	Odisha	Kondh	Leukorrhea, Menorrhagia	(Panigrahy et al. 2016)
55	*Musa paradisiaca* L.	Musaceae	Kadali	Root and Stem	WB	Lodhas	Menorrhagia, Leukorrhea	(Chaudhury et al. 2018)
56	*Nelumbo nucifera* Gaertn	Nymphaeaceae	Padama, Dhalapadam	Rhizome	Odisha	Munda	Leukorrhea	(Dash and Satapathy 2016)
			Padam, Ranga padam	Rhizome	Jharkhand	Birhor	Leukorrhea	(Sinha 2016)
57	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	Phonphana, Phampan	Stem	Jharkhand	Birhor	Menorrhagia:	(Sinha 2016)
58	*Phoenix acaulis* Roxb.	Arecaceae	Khejur kul	Root and Fruit	WB	Lodhas	Menorrhagia, Dysmenorrhea	(Chaudhury et al. 2018)
59	*Phyla nodiflora* (L.) Greene.	Verbenaceae	Gosingi, Jalapipli	Root	Odisha	Munda	Promote sexual urge in women	(Dash and Satapathy 2016)
60	*Phyllanthus niruri L.*	Phyllanthaceae	Badi anla	Whole plant	Odisha	Kondh	Leukorrhea	(Panigrahyet al. 2016)
61	*Piper nigrum L.*	Piperaceae	Gol maricha	Fruit	Odisha	Kondh	Dysmenorrhea	(Panigrahyet al. 2016)
			Gol maricha	Fruit	Odisha	Kanjham	Dysmenorrhea	(Leelaveniet al. 2018)
62	*Pterocarpus marsupium Roxb.*	Fabaceae	Piasal	Wood	WB	Kankrajhor	Post-partum proplems	(Biswas et al. 2017)
			Piyasal	Root	WB	Lodhas	Dysmenorrhea	(Chaudhury et al. 2018)

Table I. (Continued)

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
63	*Rauvolfia serpentine* (L.) Benth. ex Kurz	Apocynaceae	Patal garur	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
64	*Rauvolfia tetraphylla* L.	Apocynaceae	Patal garur	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
65	*Saraca ashoka* (Roxb.) de Wilde	Fabaceae	Asoka	Bark, Seeds Flowers	Odisha	Kandhamal District	Oligomenorrhea	(Panigrahy et al. 2016)
			Asoka	Bark, Seeds Flowers	Odisha	Kanjham	Metrorrhagia	(Leelaveni et al. 2018)
66	*Schleichera oleosa* (Lour.) Oken.	Fabaceae	K usum	Seeds	WB	Kankrajhor	Vaginal disease	(Biswas et al. 2017)
67	*Senegalia catechu* var. *Sundra*(L.F)	Fabaceae	Khaira	Bark	Odisha	Ganjam District	Hypogalactia	(Leelaveni et al. 2018)
68	*Sesamum indicum* L.	Pedaliaceae	Til	Seeds	WB	Lodhas	Postpartum care	(Chaudhury et al.2018)
69	*Smilax zeylanica* L.	Smilaceae	Ram datun	Root	WB	Lodhas	Birth Stimulator, Leukorrhea	(Chaudhury et al.2018)
70	*Solena amplexicaulis* (Lam.) Gandhi	Cucurbitaceae	Rakhal kundri	Root	WB	Lodhas	Infertility, Leukorrhea, Dysmenorrhea	(Chaudhury et al. 2018)
71	*Soymida febrifuga* (Roxb.) A. Juss.	Meliaceae	Bon gach	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
72	*Spermacoce hispida L.*	Rubiaceae	Madhu	Flowers	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
73	*Strychnos nux-vomica* L.	Loganiaceae	Kuchiia, Gorumar	Stem	Odisha	Munda	Leukorrhea	(Dash and Satapathy 2016)
			Kuchla	Fruit	WB	Lodhas	Dysmenorrhea	(Chaudhury et al., 2018)
74	*Tinospora sinensis* (Lour.) Merr.	Menispermaceae	Gulancha	Stem	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)

Table I. (Continued)

S.no	Plants	Family	Local Name	Parts Used	Place	Tribe	Ethno Medicinal uses	Reference
75	*Terminalia arjuna* Roxb.	Combrertaceae	Arjuna	Bark	Chhattisgarh	Gond, Abhuj Maria, Bhatra	Gynecological	(Kaushik et al. 2021)
76	*Tephrosia purpurea* (L.) Pers.	Fabaceae	Bano-kuthi, Gileri, Kulathio	Leaves	Jharkhand	Birhor	Post-partum problems	(Sinha 2016)
77	*Ventilago denticulata* Willd.	Rhamnaceae	Aturi	Leaves, Whole plant	WB	Lodhas	Postpartum pain, Postpartum body swelling	(Chaudhury et al. 2018)
78	*Vitex negundo*	Verbenaceae	Nirgundi	Root	Madhya Pradesh	Gond & Baiga	Restore fertility	(Sahu 2011)
			Nirgundi	Leaves	Chhattisgarh	Gond, Abhuj Maria, Bhatra	Gynecological	(Kaushik et al. 2021)
79	*Woodfordia fruticose* (L.) Kurz	Lythraceae	Dhatuki, Dhatki, Dhatuk, Icha, Ichak, Patakula	Flowers	Odisha	Munda	Leukorrhea	(Dash and Satapathy 2016)
			Dhadki	Root	WB	Lodhas	Leukorrhea	(Chaudhury et al. 2018)
			Dhai, Dhatuki	Flowers	Jharkhand	Birhor	Leukorrhea	(Sinha 2016)
80	*Zizyphus mauritiana* Lam	Rhamnaceae	Borokoli, Bodokoli, Bodori, Barakuli, Baer	Stem	Odisha	Munda	Abdominal pain during pregnancy	(Dash and Satapathy 2016)
			Borokoli, Bodokoli	Stem	Jharkhand	Birhor	Abdominal pain during pregnancy	(Sinha 2016)

*WB=West Bengal; MP=Madhya Pradesh

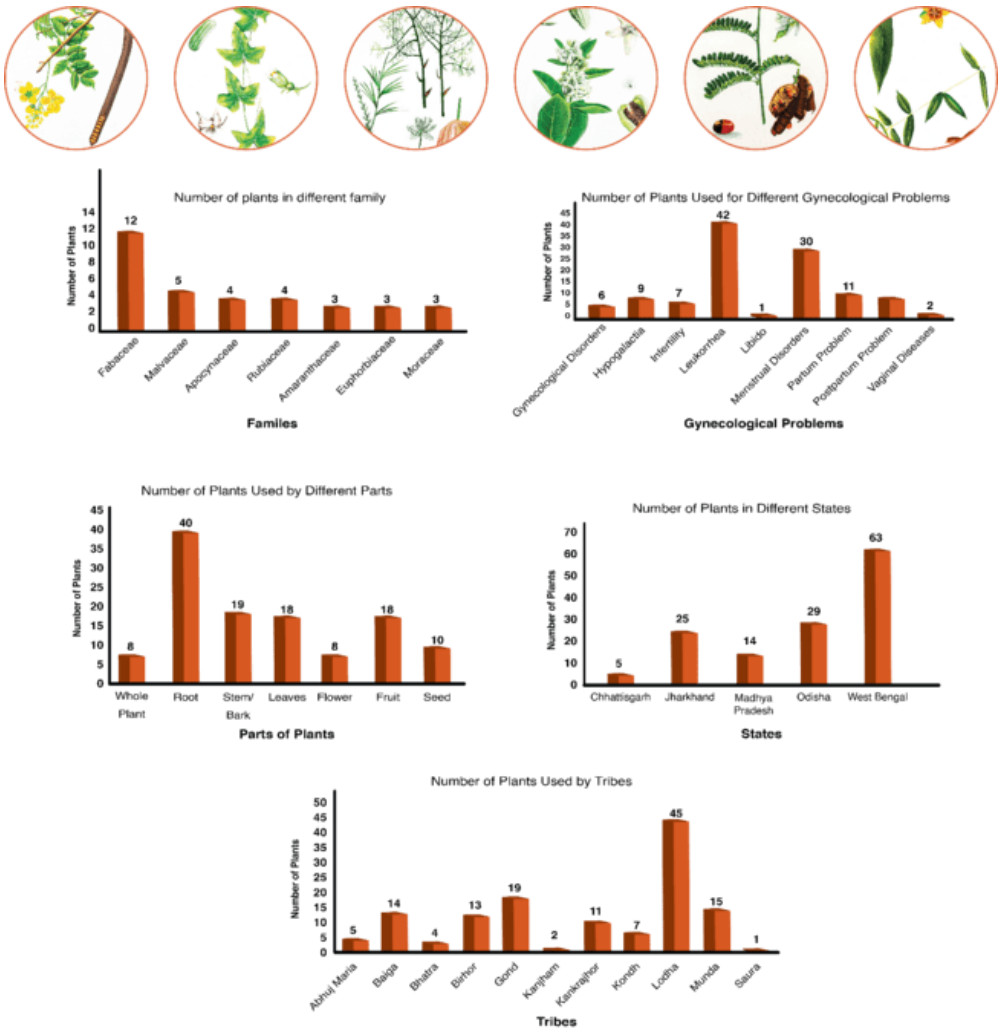

Figure 7. Analytical data of documented plants used by tribes of Central and Eastern India against gynecological problems

menstrual disorders, leukorrhea, infertility, and delivery issues. Despite this, many medicinal plants used by tribal people to treat gynecological problems have not been clinically tested or studied experimentally. These plants possess various properties that could be beneficial in treating gynecological conditions.

For instance, a study demonstrated that in DMBA-induced female SD rats, treatment with stigmasterol and β-monolinolein (the two primary cytotoxic components of *Abrus precatorius* leaf extract) as a combinatorial drug therapy led to the recovery of body weight and a reduction in tumor size and volume without toxic side effects. Stigmasterol and β-monolinolein showed a safe-positive pharmacological effect in treating breast cancers in female SD rats, suggesting that combined medication therapy with these compounds can be effective in breast cancer treatment (Sofi et al. 2018). Over the years, studies on benign gynecological disorders (BGDs) have provided new insights into their pathophysiology, highlighting inflammation as a fundamental aspect of BGDs that influences their development (AlAshqar et al. 2019). Understanding this association may lead to unexplored pathobiological routes and novel diagnostic and therapeutic frameworks (AlAshqar et al. 2021).

The flavonoid-rich fraction of *Butea monosperma* stem bark demonstrated anti-inflammatory activity by altering the cyclooxygenase and lipoxygenase enzymes and enhancing the antioxidant defense system in inflammatory-prone rats (Sutariya et al. 2015). Pinostrobin, a flavanone isolated from the leaves of the *Cajanus cajan* plant, also has anti-inflammatory properties (Pal et al. 2011). Rutin's anti-inflammatory properties have been shown to decrease oxidative tissue damage by raising colonic glutathione levels. It protected against asbestos-induced oxidative cellular harm due to its radical-scavenging and iron-chelating capacities.

Rutin's antioxidant and anti-inflammatory roles support ethnopharmacological claims of its use in treating inflammatory disorders, potentially aiding in various gynecological problems (Babu et al. 2005).

Botanicals that relax smooth muscles may be effective antispasmodics and traditional remedies for menstrual irregularities, urinary tract infections, pregnancy/lactation, and menopausal symptoms (Dietz et al. 2016). However, most data come from international studies, highlighting the need for local research since plant phytoconstituents can vary by region. The specific nature of the gynecological problem is often unspecified in ethnopharmacological usage. Some plants used for both gynecological and non-gynecological disorders may adversely affect female fertility and even cause abortions. Pregnant women and healthcare professionals should be aware of the risks of using herbal supplements for conception, maintenance, or starting a family (Akour et al. 2016).

The roots of *Asparagus racemosus* tested for galactagogue activity in lactating mothers with insufficient lactation showed significant efficacy compared to a control group, without any acute toxicity. Steroid saponins in this plant may contribute to its galactagogue action, which has been scientifically validated using prolactin hormone levels, biochemically responsible for lactation (Gupta et al. 2011).

Though data on plant effectiveness in younger versus older women is limited, the impact on hormone balance is likely age-dependent. Comprehensive standardization of plants for their biological, phytochemical, and botanical qualities is essential. Determining the bioavailability and distribution characteristics of bioactive constituents is necessary to achieve safe and effective concentrations in clinical settings (Dietz et al. 2016).

A study showed that the ethanolic seed extract of *Abrus precatorius* had a transient antifertility effect at lower concentrations (40 mg/kg body weight), while a higher dose (80 mg/kg body weight) resulted in more lasting antifertility action (Abu et al. 2012). *Aerva lanata* demonstrated pre-implantation loss of 20% and 30% compared to controls at doses of 200 and 400 mg/kg body weight, respectively. At a concentration of 10%, *Aerva lanata* showed no motility of rat spermatozoa within 60 seconds (Savadi et al. 2009). Further experimental and clinical research is needed to explore the cellular and molecular mechanisms involved and to establish causal roles for these plants in treating gynecological problems.

CONCLUSION AND FUTURE PROSPECTIVE

The link between the use of medicinal plants and tribal groups is always inspiring, but throughout time it has been seen that tribal dependence on natural sources is slowing down due to cultural advancement, deforestation, land degradation, and numerous developmental activities. The tribals are unaware of experimental and scientific aspects of herbs found in their region. The clinical evidences that herbals have significant therapeutic role in treating women disorder will help to pave the way to limelight the ethnomedicinal plants for the use of modern World. For the proper use of these plants, it is suggested to study the doses in a well-designed randomized controlled trial to establish the long-term clinical efficacy. Ethnomedicinal documentation, in conjunction with scientific support for their action, will assist to persuade the way to find novel medicines.

CONFLICT OF INTEREST

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