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Review Article

Therapeutic Use of Phytochemicals in the Treatment of Various Female Reproductive Disorders

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ABSTRACT

Reproductive diseases are the leading cause of death among the female population and the medication provided or the therapeutics used conventionally for the treatment of those conditions leads to various side effects which downplays the efficacy of the drugs and here, the use of medical plants plays a pivotal role. Medical plants consist of various phytochemicals which have therapeutic properties that are found to be useful in the treatment of various disorders related to the female reproductive system, without causing any severe side effects. It has been found that the use of various phytochemicals, medical plants, or herbal formulas along with Western medicine results in increased treatment efficiency, which further proves the importance of using herbs and medical plants as therapeutics. This paper discusses the importance of these herbal medicines and formulas in treating female reproductive disorders evidenced by the discussion of various medical systems such as "Ayurveda" and "Traditional Chinese Medicine (TCM)" that rely on herbs for the treatment of such disorders and conditions. A table discussing various therapeutic herbs related to various disorders in relevance to the targeted organ of the female reproductive system is also discussed in this paper.

Keywords: Female reproductive disorders, Herbal medicine, Herbal drugs, Ayurveda, Traditional Chinese medicine, Medical plants, Endometriosis, Infertility, Polycystic ovary syndrome, Ovarian cancer, Fallopian tube obstruction, Phytochemicals, Medicinal plants.

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INTRODUCTION

Purpose

Traditionally, medicinal plants have been used to treat and prevent disease (Al-Samydai *et al.*, 2021) These healing properties of the plants are also observed in the treatment of various reproductive and post-reproductive health issues, thus enhancing women's reproductive health can be achieved by the use of medical herbs. Various conventional medical treatments for female reproductive disorders, such as hormonal therapy and nonsteroidal anti-inflammatory medications are either out of reach of people in rural areas or have serious side effects. In females, the target areas of fertility and antifertility drugs are the hypothalamus, anterior pituitary, ovary, oviduct, uterus and vagina and the antinociceptive, anti-estrogenic and estrogenic substances, in conventional drugs impacts the reproductive system, this can be solved by the use of alternative medicines or medical herbs as they generally mimic the natural hormone and causes less side effects. Various phytochemicals possess estrogenic activity and imitate some of the effects of estrogen through pathways mediated by estrogen receptors, it is fair to refer to them as phytoestrogens (Ogunlakin *et al.*, 2023). Moreover, the majority of the female population living in tropical countries prefer traditional medicines for their reproductive health issues which also reflects the social acceptance of herbal medicine for treating female reproductive disorders (Akbaribazm *et al.*, 2021; Bates & Legro, 2013; Bhardwaj *et al.*, 2021; Ogunlakina & Sonibare, 2019).

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SCOPE

Endometriosis

Patients of endometriosis suffer from long-term management issues as the treatment is based on suppressing estrogen and ovulation which can in turn result in infertility issues (Pickett *et al.*, 2023). Gonadotrophin-Releasing Hormone (GnRH) agonist and antagonist therapies are usually considered for the treatment, these therapies have been proven to provide pain relief to the patient but in turn, may lead to various side effects related to menopause, could worsen the mood disorders and can also decrease bone mineral density is used for a longer period (Surrey *et al.*, 2019). There are still limitations and adverse consequences to the conventional treatment for endometriosis. Because of this, more and more women are looking into complementary therapies

like herbal medicine, which shows great promise in the treatment of endometriosis. Flavonoids and phenolic acids are examples of phytochemicals that have demonstrated their advantageous effects through their pro-apoptotic, immunomodulatory, antioxidant and anti-inflammatory properties (Corte *et al*., 2020).

Infertility

According to the WHO, Infertility is a disease of the male or female reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse. Ovarian diseases, abnormal menstruation, uterine fibroids, intrauterine adhesions, endometriosis and uterine polyps are the most frequent risk factors linked to infertility in females, throughout the year's various techniques have been used for treating infertility in females such as Intrauterine Insemination (IUI),*in vitro* fertilization, Assisted Reproductive Techniques (ART), preliminary tubal surgeries, Gamete Intrafallopian Transfer (GIFT), fimbrioplasty and tubal reanastomosis. These techniques also objected to certain limitations, such as Assisted Reproductive Techniques (ART) has a lower success rate for pregnancy and live birth, additional limitations of the conventionally used infertility treatment include high cost and adverse effects on the patient's mental health (Chorosho *et al*., 2023). IVF may lead to premature labor and is also related to congenital defects and neurological disorders (Sullivan-Pyke *et al*., 2017) (Rooney and Domar, 2018). Herbal medicine sources from various plants such as Ashoka, Guduchi and Dashmool have been used in Ayurveda to treat infertility as they improve egg quality, treat PCOD, balance hormones and improve premature ovarian failure. Because of their great potential to treat infertility, plants can therefore be employed in addition to traditional therapy, According to a 2022 study, treating PCOS with Ayurvedic help leads to regular ovulation and a healthy pregnancy; however, when the patient is treated with conventional methods, such as hormone therapy for conception, the pregnancy is found to be unsuccessful (Akbaribazm *et al*., 2021; Asmabi and Jithesh, 2021).

Polycystic Ovary Syndrome (PCOS)

Polycystic ovary syndrome is a common endocrine disorder affecting women of all age groups from the reproductive age and post-menopausal women (M. Joshi *et al*., 2021; Rashid *et al*., 2022). Several characteristics of PCOS include irregular menstrual cycles, polycystic ovaries, hyperandrogenism (Hoeger *et al*., 2020; Stein and Leventhal, 1935), dyslipidemias, recurrent abortion, obesity, infertility, hypertension, diabetes mellitus-2, cardiovascular diseases, anovulation, depression and anxiety (Soumya, 2021). Various synthetic drugs are being used for the treatment of PCOS such as metformin, spironolactone, oral contraceptives, gonadotropins, Myo-inositol and d-chiro-inositol, liraglutide, exenatide, etc. Still, these synthetic medicines can lead to various side effects such as nausea and vomiting, diarrhea, irregular menstrual cycles, hyperkalemia, hypotension, weight gain, fluid retention, breast tenderness, mood swings, blurred vision, cardiovascular diseases, difficulty in sleeping, abdomen pains, upper respiratory infection (Rashid *et al*., 2022). Recently, the use of herbal medicine has become trendy for the treatment of PCOS due to its therapeutic character, chest berries, licorice, flaxseeds and berberine are been included in diets for treating PCOS (Hajimonfarednejad *et al*., 2018; Heydarpour *et al*., 2020; Khan and Begum, 2019; Rashid *et al*., 2022). The addition of natural compounds such as flavonoids, omega-3 fatty acids and inositol can reduce pathological features of PCOS (Iervolino *et al*., 2021). These active agents have the potential to improve the homeostatic complications caused due to PCOS, which can help in reducing the condition of PCOS (Chavez *et al*., 2023).

Fallopian Tube Obstruction

The fallopian tube is the site of fertilization of sperm and egg and any obstruction in this site leads to infertility (Liu *et al*., 2017). Around 30-40% of infertility in women is due to fallopian tube obstruction (Rezvani and Shaaban, 2011). Various treatments for Fallopian tube obstruction include tubal recanalization under the assistance of endoscopy, interventional treatment and medical treatments via drugs, These therapies are also subjected to various disadvantages such as high cost, exposure to X-rays in case of interventional treatment and treatment via tubal recanalization are also considered invasive (Liu *et al*., 2017). The use of Ayurvedic treatments is considered effective to treat fallopian tube obstruction, Old Ayurvedic literature states that Uttarabasti is a specific and essential technique, particularly for the treatment of gynecological issues such as Vandhyatva. Kumari Taila Uttarabasti is a very effective treatment that doesn't display any symptoms of problems when treating tubal blockage (Baraiya *et al*., 2017).

Ovarian Carcinoma

Ovarian cancer is the seventh most common tumor cancer and the leading cause of mortality among females suffering from reproductive diseases (Webb and Jordan, 2017). Currently, surgery is considered the last if not the primary treatment for ovarian cancer, thus primarily standard procedure of chemotherapy is used which includes paclitaxel and docetaxel and platinum agents such as carboplatin and cisplatin (Dancey, 2013) but it has been noted that the patients receiving chemotherapy develop resistance to it, which results in the rapid growth of tumors if the condition is relapsed, Due to the long history of ethnopharmacology plant-based drugs have gained recognition as a part of primary treatment and also as maintenance therapy which can result in improving multi-drug sensitivity (J. Wu *et al*., 2021). Triptolide is an antineoplastic agent used in traditional Chinese medicine and has been proven to kill p^{53} wild-type and p^{53} mutated ovarian cancer cells (J. Wu *et al*., 2014) and another herb used in traditional Chinese medicine has emodin as its phytochemical constituent which is a natural anthraquinone and

has the characteristic of killing ovarian cancer cells by inhibiting their growth (Song *et al*., 2018). Such plant-based remains have huge availability, fewer adverse effects and are generally well accepted by society for treatments (J. Wu *et al*., 2021).

LITERATURE REVIEW

Summary of phytochemicals used in the treatment of female reproductive disorders

Plants have been used as therapeutics since the Sumerian and Akkadian civilizations; this therapeutic nature of the plants is due to their bioactive properties such as flavones, antioxidants, monoterpenoids, indoles and isoprenoids. Various classifications of phytochemicals include lipids (these include unsaturated fatty acids, oils and fatty acid esters), terpenes (these are made up of single or various hydrocarbon units), organic Sulphur compounds (have a spicy aroma due to the presence of multiple forms of sulfur), organic acids and polysaccharides, phenols (large family of phytochemicals) (Rais *et al*., 2017).

Lipids

Phytochemical lipids have sub-categories, such as isoprenoids and omega-3 and omega-6 fatty acids. The source of isoprenoids includes grains and palm oils. They increase the cell's antioxidative power and protect the lipid bilayer (Bouvier *et al*., 2005).

The source of omega-3 and omega-6 fatty acids include the EPA and DHA found in salmon, ALA seed oil such as borage, legumes, grains and dark leafy vegetables, it reduces inflammation and prevents breast cancer (MacLean *et al*., 2006).

Terpenes

Terpenes are the largest category of phytochemicals and are found majorly in liquid form, terpenes are classified further into the following categories carotenoids, monoterpenes, saponins (Rais *et al*., 2017). Perillyl alcohol and limonene are subcategories of monoterpenes (Crowell *et al*., 1996).

Carotenoids are fast-acting antioxidants due to the presence of conjugated bonds on their forty-carbon polyene chain which results in carotenoids acquiring large amounts of energy from other molecules through a non-radiative energy transfer mechanism (Palozza and Krinsky, 1992). Thus carotenoids have antioxidative qualities that improve immunological function, neutralize reactive oxygen and free radicals and prevent the growth of several malignancies (Burri, 1997). The sources of carotenoids include apricot, pumpkin, tomatoes and watermelon, mango, papaya (Rais *et al*., 2017). Perillyl alcohol is a type of monoterpene and is found in peppermint, celery seeds and spearmint cherries. It induces apoptosis in tumor cells without harming the normal cells and can lead to the activation of the detoxification system (Chen *et al*., 2015). Limonene is another category of monoterpene and is a colorless liquid hydrocarbon, it is a cyclic terpene, the sources of limonene include oranges and mandarins and it prevents cell proliferation (Crowell, 1999). Saponins are heavy molecules and are water soluble, they are divided into two types based on their chemical structure aglycones, legumes and soybeans are certain sources of saponins, they lower cholesterol and anti-cancerous properties along with that they also possess antioxidant properties (Francis *et al*., 2002).

Organic Sulphur Compounds

This category of phytochemicals possesses various forms of sulfur, which gives out a signature spicy aroma. The two categories of organic sulfur compounds include indoles isothiocyanates and thiosulfonates. Broccoli, cauliflower, mustard green seeds, horse- radish and cabbage are certain sources of indole and isothiocyanates (Higdon *et al*., 2007). Indole-3-carbinol which is majorly found in cabbage has anticancerous activity as it can activate cytochromeP450 and glutathione S- transferase and also induces liver detoxification (Sparnins *et al*., 1982). Garlic and onion are the major sources of thiosulfonates and they possess highly antioxidative, They block the activity of toxins induced by various viruses and bacteria and it is anti-microbial, increase immunity and prevent stomach cancer (Rais *et al*., 2017).

Organic Acid and Polysaccharides

Certain sources of polysaccharides include peppermint, tea, coffee, spinach and aloe vera, it has antioxidative properties, protects the liver and mediates inflammation (Brul and Coote, 1999). Mushrooms are also a major source of polysaccharides, they boost immune system and induce anti-cancer activity (Bouvier *et al*., 2005).

Phenols

Phenols are synthesized from phenylalanine through the action of phenylalanine ammonia-lyase (Omojate Godstime *et al*., 2014). Phenols are the largest category of phytochemicals, containing more than 2000 families, They are antioxidant and have antimicrobial and antifungal properties and are majorly classified into polyphenols and flavonoids (Rais *et al*., 2017). Polyphenols are majorly found in fruits, vegetables and spices. A diet rich in polyphenols is found to be effective in reducing cardiovascular diseases, cancer and neurodegenerative diseases, sources rich in phenols include red wine, cocoa, fruit juice and olive oil, The mechanism of action of polyphenols includes regulation of enzymatic activity and controlling of cancer cell signaling (Rais *et al*., 2017). Flavonoids are present in largely all plant tissues and are further classified into seven classes such as flavones, flavonols, flavanonols, isoflavones, flavanols and anthocyanidins (M.-T. Huang and Ferraro, 1992). Flavonoids can be found in leafy vegetables, coffee, tea, legumes, spices, herbs and red wine. Flavonoids can create hydrogen peroxide, block nitrosation, chelate metals and regulate the action of cellular enzymes (M.-T. Huang and Ferraro, 1992).

CERTAIN TRADITIONAL AND MODERN USE OF HERBAL MEDICINE TARGETING FEMALE REPRODUCTIVE DISORDER

Ayurveda

Ayurveda is an ancient healing system originating from the Indian subcontinent, if understood closely, the word Ayurveda is comprised of two Sanskrit terms, “Ayus”, meaning every facet of existence, from conception to demise and “Veda”, meaning knowledge (Mukherjee *et al*., 2012). Ayurveda uses natural treatments, food, lifestyle modification and spirituality to treat and prevent disease, therefore promoting health and a longer life expectancy (Mukherjee *et al*., 2012). Texts like the Charaka Samhita, Sushruta Samhita and Ashtanga Hridaya contain its foundational knowledge, which includes detailed information on over 700 herbs and 6,000 formulations. This knowledge offers a thorough understanding of various diseases, diagnostic techniques and useful dietary and lifestyle recommendations (Gyawali *et al*., 2021).Within the field of female reproductive health, the Ayurvedic specialties of "Prasuti Tantra" (obstetrics) and "Stri Roga" (gynecology) aim to enhance women's health through appropriate diet, disease prevention and targeted therapies for a range of ailments (Patel *et al*., 2024). About 7500 of these medicinal plants have been documented as being utilized for the treatment of a variety of medical ailments. The mainstay of Ayurvedic medicine is the use of numerous medicinal herbs (Pandey *et al*., 2013). Ayurvedic medicine views the human body as consisting of three key components: "Dosh," "Dhatu," and "Mala." Herbal medicines and dietary changes can have an impact on these elements (Patel *et al*., 2024).

Shatavari (Asparagus racemosus)

Due to its potential benefits for women's health, *Asparagus racemosus* is a versatile plant that is commonly utilized in traditional medicinal practices including Ayurveda, Unani and Siddha.

(Hasan *et al*., 2016). It includes bioactive substances such as flavonoids, polyphenols, folic acid, sarsasapogenin, polysaccharides, mucilage, asparagamine and racemosol (R. K. Joshi, 2016) (singh and geetanjali, 2015). Because of its phytoestrogen qualities, *Asparagus racemosus* is used to improve lactation and treat menopausal symptoms in female reproductive health (singh and geetanjali, 2015). 6 female albino Wistar rats that were nulliparous and not pregnant were used to assess the effects of ibuprofen and *Asparagus racemosus* on isolated uterine strips. The uterine strips were subjected to varying quantities of plant extract (20, 40, 80 and 160 mg/mL), with 20 mg/mL ibuprofen serving as a positive control. After being exposed to the plant extract, the authors saw a marked rise in the proestrus phase of the estrous cycle and a corresponding decrease in the metestrus and diestrus phases. It has also been demonstrated that *Asparagus racemosus* reduces the force and frequency of uterine contractions in a dose-dependent manner (Kaaria, 2019).

Gupta and Shaw used prolactin hormone levels to assess the galactogogue effects of *Asparagus racemosus* on nursing women. Prolactin hormone levels were shown to be significantly elevated by *Asparagus racemosus*, more than three times higher than baseline and there was a favorable correlation with secondary outcome measures. The study supports *Asparagus racemosus* galactogogue properties, indicating that human populations should use it (Gupta and Shaw, 2011). The effect of *Asparagus racemosus* on inducing fertility was observed when a test was conducted in which for 2 consecutive cycles, 40 women were randomly assigned to two groups: a test group that received oral administration of 6 g of *Asparagus racemosus* powder twice a day on days 1-14 of their menstrual cycle and a control group that received oral administration of 50 g of clomiphene citrate once a day on days two-six of their cycle. When it came to promoting follicular growth (30% and 40% in the test group, 60% and 50% in the control group for the first and second cycles, respectively) and ovulation (25% and 30% in the test group, 40% and 25% in the control group for the first and second cycles, respectively), the effects of *Asparagus racemosus* were directly comparable to the gold standard, clomiphene citrate (Majeedi *et al*., 2016).

The efficacy of *Asparagus racemosus* for the menopausal syndrome was investigated in women aged 40 to 60 years in a placebo-controlled, randomized, single-blind research conducted in 2015 by Farzan and Sultana. Patients in the test group were given 3 g of powder containing Glycyrrhiza glabra (licorice) and *Asparagus racemosus* orally twice a day for 8 weeks, whereas control patients were given 3 g of roasted wheat flour. By the trial's end, patients receiving the herbs reported fewer hot flashes and nocturnal sweats over 24 hr, as well as lower anxiety measured by the Hamilton anxiety scale and decreased insomnia measured by the Pittsburgh Sleep Quality Index Duration (PSQIDURAT) scale (M.U.Z.N and Sultana, 2015).

Cardamom (*Elettaria cardamomum*)

The herb, *Elettaria cardamomum*, is Indigenous to the Indian subcontinent (Sengupta and Bhattacharjee, 2009; Sharma *et al*., 2023). Cardamom's fragrant qualities are attributed to chemicals such as flavonoids and terpenoids, which are abundant in essential oils (Sengupta and Bhattacharjee, 2009). Cardamom also includes minerals like magnesium, calcium and potassium. Due to the antioxidant and anti-inflammatory qualities of cardamom's bioactive components, including cineole, terpineol, terpene and volatile oil, research on the plant's effects on reproductive health has begun (Abdullah *et al*., 2022; Sharma *et al*., 2023). Pregnancy is the most common use of cardamom in the context of female reproductive health. The effectiveness of cardamom ginger pudding in lowering the frequency of nausea and vomiting in 16 pregnant women in their first trimester was investigated (Sari

et al., 2023), Before eating cardamom ginger pudding, most responders reported having mild nausea and vomiting. Following ingestion, most people only experienced moderate symptoms and the frequency of nausea and vomiting decreased statistically significantly (Sari *et al*., 2023).

Elettaria cardamomum is also proven to be effective in the treatment of Polycystic Ovary Syndrome (PCOS). A study was conducted in which 194 obese women with the condition PCOS were kept on a calorie-deficient diet, the test group was given 3g of green cardamom daily whereas the placebo group was given 3g of starch power. The reduction in weight and total fat percentage of the body was observed because of the calorie-deficient diet, the test group had lower amounts of Dehydroepiandrosterone (DHEA) and Luteinizing Hormone (LH) and androstenedione, while the levels of the Follicle-Stimulating Hormone (FSH) were higher. It has also been observed that the inflammatory markers for PCOS such as TNF-α and C-Reactive Protein (CRP) were reduced in the test group than the placebo group (Cheshmeh *et al*., 2022). *Elettaria cardamomum* has been shown in numerous other studies to have advantages in regulating hormone levels, enhancing glycemic indices through gene expression and reducing androgen levels. in women who are obese and suffer from PCOS (Cheshmeh *et al*., 2021).

Turmeric (*Curcuma longa*)

For millennia, the plant *Curcuma longa* has been used extensively in traditional medicine. Turmeric's anti-inflammatory, anti-microbial, antiangiogenic, anti-mutagenic, wound-healing and pro-apoptotic qualities are attributed to its active ingredient, curcumin (Sirotkin, 2021). PCOS, endometriosis and dysmenorrhea are the most prevalent reproductive disorders for which the effects of turmeric have been investigated experimentally and clinically (Patibandla *et al*., 2024). It has been found that curcumin reduces the development of human ectopic and eutopic stromal cells and Curcumin therapy also resulted in a decrease in the expression of Vascular Endothelial Growth Factor (VEGF). This leads to the conclusion that curcumin decreases endometriotic cell survival, as evidenced by a higher proportion of G1-phase cells and a lower proportion of S-phase cells (Cao *et al*., 2017). Curcumin has been reported to reduce the activity of Metalloproteinase (MMP)-9 which is generally increased in the case of endometriosis (Swarnakar and Paul, 2009).

Turmeric is also been investigated to be useful in the treatment of polycystic ovarian syndrome (Patibandla *et al*., 2024). In a mouse model of PCOS created by letrozole, Zahoor ul Haq Shah and Shrivastava discovered that the injection of turmeric extract reversed the effects of letrozole, which caused an increase in LH and a decrease in estrogen, progesterone, FSH and adiponectin. However, the study's sample size was so small that it might not be able to be generalized (Shah and Shrivastava, 2022). When a group of female PCOS patients were tested with metformin and a combination of metformin and curcumin, it was discovered that the patients who received the combination of metformin and curcumin nanomicelle performed significantly better than those who had taken metformin alone. They had higher HDL-C, lower total glycerides, LDL-C, HOMA-IR and fasting insulin (Sohrevardi *et al*., 2021). Additionally, curcumin has demonstrated potential in the treatment of primary dysmenorrhea. Young adult females with dysmenorrhea who received treatment with turmeric water and cinnamon tea reported significantly less pain after the test than before, Turmeric water and cinnamon tea were equally effective at lowering pain levels (Dyawapur *et al*., 2018).

Tulsi (*Ocimum tenuiflorum*)

Native to the Indian subcontinent, Tulsi (*Ocimum tenuiflorum)*, often known as holy basil, is a fragrant herb in the *Lamiaceae* family, With a history spanning over 3,000 years, Ayurvedic medicine (Sethi and Bhadra, 2020). The phytochemical components of Tulsi plants include phenolics, flavonoids, terpenoids, fatty acids, mucilage, polysaccharides, linoleic acid, sitosterol, eugenol, carvacrol and the sesquiterpene hydrocarbon caryophyllene (Sahoo *et al*., 2022). In female albino rats, the antifertility effects of Tulsi leaf extract and eugenol, one of the plant's powerful bioactive components, were investigated. Eugenol and Tulsi leaf extract were given orally to healthy rats for 15 days. The study discovered that eugenol administration prolonged the estrous cycle, but Tulsi leaf extract had no discernible effect. Tulsi extracts only raised progesterone levels, but eugenol increased both estrogen and progesterone. However, as previously noted, despite the presence of eugenol in Tulsi leaf extract, the extract by itself did not alter the length of the estrous cycle, indicating potential complicating factors (Poli and Challa, 2019).

Tulsi plant extract also exhibits some effectiveness in treating PCOS; when 100 mg/kg and 200 mg/kg doses of Tulsi were administered to female Wistar rats with letrozole-induced PCOS, it was observed that the effects of the letrozle were reversed back to their baseline levels, that the subcapsular cysts that developed in the rats treated with letrozole disappeared and that the incidence of pyknotic granulosa cells was reduced. The effects of the leaf extract were similar to the gold standard clomiphene citrate, which is used to induce ovulation in PCOS patients (Farhana *et al*., 2018).

Ginger (*Zingiber officinale*)

Ginger (*Zingiber officinale*) possesses antioxidant capabilities due to the presence of several phytochemicals such as gingerols, shogaols, paradols and zingerone that inhibit xanthine oxidase, which is involved in the formation of reactive oxygen species (Akimoto *et al*., 2015; Li *et al*., 2022). Nowadays, Clomiphene citrate is mostly used to treat infertility, which has several adverse symptoms including bloating, mood swings and depression (Joshi et. al., 2021). Ginger has been shown to improve long-term implantation at lower doses and may have potential as a natural

alternative or adjunct with minimal side effects in boosting fertility, as evidenced by higher antral follicle count and ovarian stromal VEGF levels in the 10-day low-dose ginger treatment group given to rats (Joshi RK, 2016). Ginger honey administration in stress-induced rats was also found to considerably raise estrogen and glutathione levels while not affecting cortisol levels (Choi *et al*., 2005; Usman *et al*., 2021; Yilmaz *et al*., 2018).

Higher doses of ginger (*Zingiber officinale)* are useful in regulating estrogen, progesterone and Follicle-Stimulating Hormone (FSH), all of which are dysregulated in PCOD (Atashpour *et al*., 2017). Regular ginger intake for 12 weeks, combined with regular exercise (pilates), has been shown to alleviate the symptoms of PCOD (Bonab, 2020). Ovarian cancer is the deadliest gynecologic carcinoma, asking considerable prevention and treatment problems. Ginger has been found to be therapeutic for the treatment of ovarian cancer because its component 6-shogaol showed exceptional growth inhibition in epithelial ovarian cancer cells. Ginger treatment inhibited NF-κB activation and lowered release of angiogenic factors, indicating its potential for treating and preventing ovarian cancer (Rhode *et al*., 2007). Ginger tea and vitamin E can effectively reduce dysmenorrhea symptoms and pain. Whereas all pharmaceuticals have the disadvantage of not being prescribed or ingested during pregnancy due to serious fetal side effects, herbal medicine has a competitive advantage, as ginger is effective in treating nausea and vomiting during pregnancy with no side effects (Thomson *et al*., 2014; Viljoen *et al*., 2014).

Ashwagandha (*Withania somnifera*)

Ashwagandha is a herbaceous plant from the Solanaceae family (Lopresti *et al*., 2019). The primary components of ashwagandha are alkaloids and lactones (Mirjalili *et al*., 2009). Research suggests that combining ashwagandha and garlic extract might effectively treat endometriosis, outperforming ciprofloxacin drugs (Rahi *et al*., 2013). Ashwagandha is beneficial in the treatment of premenopausal symptoms when a group of women were treated with it its effects were assessed using the Menopause Rating Scale (MRS), hot flash score and changes in FSH, LH and testosterone levels. (Gopal *et al*., 2021). Withaferin A, a compound found in ashwagandha, has been shown to inhibit TGF-β by modulating TGF-β signaling and inhibiting TGF-β-dependent smad2 phosphokinase, resulting in ashwagandha inhibiting the growth of human endometrial cancer cells. (Xu *et al*., 2021). Over eight weeks, ashwagandha demonstrated significant potential for improving sexual function in healthy women in the areas of desire, arousal, lubrication, orgasm, satisfaction, pain and FSFI and FSDS scores (Dongre *et al*., 2015).

Traditional Chinese Medicine (TMC)

TCM is a holistic approach for diagnosing and treating acute and chronic illnesses, as well as for preventative health care and maintenance. TCM's perspective of the human body is founded on Daoism's holistic understanding of the universe and illness is treated primarily through syndrome diagnosis and differentiation. TCM philosophy is incredibly sophisticated, having evolved thousands of years ago via diligent observation of nature, the universe and the human body. The major TCM theories are the Yin-yang, Five Elements, Qi and Blood and Zang-fu organ theories. The Complete Book of Effective Prescriptions for Diseases of Women, published in 1237 A.D., was the first book dedicated completely to gynecology and obstetrics in Chinese medicine.

TCM offers great benefits for treating gynecological diseases. Endometriosis, infertility, dysmenorrhea, abnormal uterine bleeding, premenstrual syndrome, menopausal syndrome, uterine fibroids, chronic pelvic inflammation, polycystic ovarian syndrome (PCOS), cervicitis and vaginitis are some of the gynecological disorders that CHM and acupuncture have successfully treated (Zhou and Qu, 2009).

Infertility

TMC has been used to treat infertility since 200 AD. According to TMC, infertility is caused by inadequacies in the liver and kidneys, along with dysregulation of the endocrine system, which causes a hormonal imbalance in the body and leads to infertility. Another idea in TMC reflects the source of infertility, which is the stagnation of Qi (energy) and blood in the body, resulting in hormonal disruption and infertility. The damp-heat syndrome can potentially induce infertility by causing obstructions. Traditional Chinese medicine offers a wide range of therapies that include over 100 different plants and sophisticated formulations (Zhou and Qu, 2009).

TCM can influence the action of Gonadotropin-Releasing Hormone (GnRH), which regulates ovulation, enhances blood supply to the uterus and causes changes in the endometrium during menstruation. When 64 individuals with anovular infertility were treated with a Chinese formula containing *Semen cuscutae, Herba leonuri, Fructus lycii*, etc. together with Western medicine, the efficacy of treatment increased (up to 81%)(S.-T. Huang and Chen, 2008). Several Chinese medical herb compositions are been proven to treat infertility such as Yangjing Zhongyu Decoction (YZD), a traditional Chinese medicine that is also useful in inducing fertility as it soothes the liver and kidney, the major organs associated with infertility according to TCM and it also increases the expression of MMP-9 gene expression in the endometrium, which aids in blastocyst implantation (R. J. Wu and Zhou, 2004). In addition to that Nuzhen Yunyu Decoction (NYD) is a Chinese medical herb composition that has been shown to improve ovulation and pregnancy rates by regulating menstruation, promoting growth and follicle development, strengthening endometrium and improving blood supply to the uterus and ovaries (Xia *et al*., 2004). Xiokang wan, which has been proven to influence fertility

when combined with dexamethasone, vitamin E and vitamin C. Xiokang is a combination of *Radix salviae miltiorrhizae, Rhizoma anemarrhenae, Radix scutellariae* and others (Xia *et al*., 2004). Certain Chinese herbs, such as *Radix aconiti, Lateralis preparata, Herba epimedii, Rhizoma polygonati*, etc., have been reported to lower testosterone levels and induce ovulation via regulating sex glands and adrenal glands (Gui *et al*., 1998).

Abnormal Uterine Bleeding

According to TMC Abnormal uterine bleeding is caused by insufficient kidney Qi, a lack of control over menstruation via the Chong and Ren meridians and excessive sexual intercourse. It has been observed that insufficient kidney Qi is the cause of this condition in puberty age group patients. In contrast, liver stagnation is the cause of abnormal uterine bleeding in patients of childbearing age and the development of this condition in perimenopause patients is due to a deficiency of kidney and liver Qi or a deficiency of spleen Qi. The gong-fu mixture is a Chinese medicine compound that both prevents and treats chronic abnormal uterine bleeding (Liao *et al*., 1999). Yaoliuan Capsule (YLAC), which contains *Radix angelica, Colla corii asini, Pollen typhae, Herba laonuri, Radix suctellaria* and other ingredients, is similarly effective in reducing post-abortion hemorrhage (Zhao *et al*., 1999).

Uterine Fibroids

Uterine fibroid is a disorder characterized by the development of smooth muscle tissue in the uterine wall. TCM can eliminate the need for surgery, the typical method used in such circumstances. Certain Chinese medicines have been shown to reduce the growth of fibroids without causing any negative effects (Y. Y. Huang, 2003). Isoliquiritigenin (ISL), a flavonoid, can inhibit the growth of leiomyoma cells by causing cell cycle arrest and initiating apoptosis, hence ISL can be utilized as an alternative to chemotherapy for the treatment of uterine leiomyoma (Kim *et al*., 2008). *Herba scutellariae barbatae* (SB) has anti-inflammatory and anti-tumor effects and it has been proposed that it can inhibit HCG-induced proliferation of myometrial and leiomyomal cells (Zhou and Qu, 2009). Acupuncture therapy is also the main principle of TCM and it has been found that body acupuncture therapy (Lan and Li, 1997) can regulate numerous glands such as the pituitary and thyroid, as well as the central nervous system and thus considered a viable therapy for uterine fibroids.

Chronic Pelvic Inflammation

In the event of chronic pelvic inflammation, the uterus is frequently positioned posteriorly, resulting in lump formation and peripheral tissue constriction. Chronic pelvic inflammation is characterized by low-grade fever, stomach pain, infertility, irregular menstruation and other symptoms. In TCM, various therapeutic practices are dedicated to the treatment of chronic pelvic inflammation, one of which is acupuncture combined with moxibustion, which warms Qi and blood, increases immunity, reduces swelling and shrinks the lump, thereby reducing chronic pelvic inflammation, which cannot be treated as a whole due to the influence of multiple conditions. Along with that Qi Jie granule is a good cure for chronic pelvic inflammation because it increases blood thickness and controls T-lymphocyte subsets (Zhang *et al*., 2004). Penyanqing Capsules (PYQC) include a variety of herbs, including *Radix salviae miltiorrhizae, Radix paeoniae rubra, Fructus aurantii immaturus, Radix ilicis pubescentis* and others, which have been shown to alleviate pelvic inflammation caused by Qi stagnation. It can lower patients' hemorheological indexes (Bi-qiong *et al*., 2005). Vitamin K3 acupoint injection at Sanyinjiao (SP-6) has been shown to relieve pelvic discomfort caused by chronic pelvic inflammatory illness effectively (Wen-jie *et al*., 2003).

PCOS

TCM is successful in fixing menstruation and producing ovulation in PCOS patients (Hou *et al*., 2000; Yu, 2004), particularly when combined with electroacupuncture. and numerous Chinese medical herbal formulations, such as Taingui fang when given along with metformin, can lower insulin levels in patients while also curing infertility (Hou *et al*., 2000)Another Chinese medicine formula, Bushen Houxue (BSHX), combined with ultrasound-guided follicle aspiration is thought to be safe for treating PCOS.

List of Certain Indian Medical Plants that Help in the Treatment of Various Disorders and Conditions Related to Female Reproductive

(Source: Imppat: Indian Medicinal Plants, Phytochemistry And Therapeutics, Mohanraj et al., 2018; Vivek-Ananth et al., 2023).

Ovaries

Disorder/ conditions	Plants	Plant parts	Phytochemicals
Ovarian neoplasms	*Hymenocallis littoralis*	bulb	Hippeastrine, Lycorine, Galantamine, Narciclasine.
	Taxus baccata	Bark, fruit, leaf,	Beta-Sitosterol, Eschscholtzxanthone, Rhodoxanthin, Myristic acid.

Disorder/ conditions	Plants	Plant parts	Phytochemicals
	Polygonum cuspidatum		
Infertility			
	Acacia farnesiana	Flower, fruit	Farnesol, Digallic acid, Ellagic acid.
	Artocarpus heterophyllus	Bark, fruit,	Acetoin, 1-Butanol, Octanal, Betulinic acid.
	Curcuma longa	Flower, leaf	alpha-Curcumene, 2-Heptanol, Elemicin.
	Dicranopteris linearis	Whole plant	Beta-Sitosterol, Afzelin, Isoquercitrin.
	Hyoscyamus niger	Seeds	Myristic acid, Cannabisin D, 1,24-Tetracosanediol diferulate.
	Mimusops elengi	Bark	Cubebin, Pentadecanoic acid, beta-Amyrin acetate, Quercetin, Stearic acid.
	Moringa concanensis	Leaf, root	Stearic acid, 1-Hexacosanol. Palmitic acid, beta-Sitosterol.
	Musa paradisiaca	root	Myrcene, 2-Carboxy-D-arabinitol, Citric acid, (1S,3R,7S,8S,11S,12S,15R,16R)-15-[(2R,5S)-5,6-dimethylhept-6-en-2-yl]-7,12,16-trimethylpentacyclo[9.7.0.01,3.03,8.012,16]octadecan-6-one.
	Ocimum gratissimum	leaf	Myrtenol, beta-Bisabolene, Carvacrol, Elemicin, Pinocarvone.
PCOS			
	Gymnema sylvestre	Leaves, Flowers and bark	Conduritol A, 6,10,14-Trimethylpentadecan-2-one, Gymnestrogenin, Quercitol, gamma-Aminobutyric acid.
	Mentha spicata	Fresh or dried plant, Leaves, spearmint oil	Myrcenol, Limonene, Premnaspirodiene,3-Octanone, beta-Copaene.
	Pergularia daemia	Arial parts, Stem bark, Leaves, Roots, fruit, Latex	Calactin, Calotropin, Uzarigenin, beta-Sitosterol, Uzarigenin, Coroglaucigenin, alpha-Amyrin.
	Withania somnifera	Root Leaves, Flowers, seeds	Withanolide Q, Withanolide R, Withanolide M, Withasomidienone, Somniferine, Withanolide M.
	Rubia cordifolia	Roots	Rubiatriol, Dihydromollugin, Furomollugin, Munjistin, Lucidinprimeveroside, Nordamnacanthal.
	Cinnamomum verum	Aerial part	Benzyl Alcohol, Methyl oleate, Copaene, Limonene
	Linum usitatissimum	Flower, seed	Malvidin, Peonidin chloride, Delphinidin, Matairesinol.
	Glycyrrhiza glabra	Areal part	Genistein, Galangin, Pinocembrin, Glabranin, Retinol.
Menstruation cycle disturbances			
	Acanthospermum hispidum	fruit	Alpha-Copaene, Caryophylladienol, Allo-Aromadendrene.
	Achillea millefolium	Whole plant	Choline, Luteolin, Betonicine, Stachydrine.
	Achyranthes aspera	Leaf, root	20-Hydroxyecdysone, Ecdysone, Oleanolic acid, Betaine.

Disorder/ conditions	Plants	Plant parts	Phytochemicals
	Aloe vera	Leaf, whole plant	Chrysophanol, d-Tartaric acid, Isoaloesin, Galactomannan, Aloesin.
	Alpinia japonica	Flower	Pinocarvone, alpha-Fenchene, alpha-Santalol, Verbenone.
Menstruation-inducing agents			
	Abelmoschus manihot	Bark	Myricetin, Heptatriacontanoic acid.
	Abroma augusta	Root	Betaine, Choline, D-Glucuronic Acid, Vanillic acid, Friedelin.
	Achillea millefolium	Whole plant	Friedelin, Betaine, Choline, Luteolin, Betonicine, Desacetoxymatricarin.
	Acorus calamus	Rhizome, root	Kessane, Myristic acid, Elemicin, Khusiol.
	Adiantum capillus-veneris	Leaf, whole plant	Stigmasterol, Rutin, Adiantoxide, beta-Sitosterol, Quercetin, Adiantone.
Menstruation			
	Abrus precatorius	Bark	Kaempferol, Quercetin, D-Xylose, Methyl abrusgenate.
	Cicer arietinum	Seed	Sodium pangamate, Retinol, Dammaradienol, Stearic acid.
	Cichorium intybus	Seed	Lactucine, Oleic acid, Linoleic acid.
	Citrullus colocynthis	Root	Nonyl palmitate, Stearic acid, Malonic acid, Hentriacontane, Lanosterol.
	Cucurbita maxima	Leaf	Luteolin, beta-Carotene, Linolenic acid.
	Curculigo orchioides	Root	Docosanoic acid, Palmitic acid, 3-Methoxy-5-acetyl-31-tritriacontene.
	Cymbopogon citratus	Aerial part	Myrtenol, Carvacrol, 2-Tridecanone, Nonanal.
	Ficus religiosa	Seed	Stigmasterol, 1-Octacosanol, Methyl oleanolate, beta-Sitosterol.

Uterus

Disorder	Plants	Plant parts	Phytochemicals
Endometriosis (Balan *et al.*, 2021)			
	Asparagus racemosus	Bark, flower, fruit,	Cyanin, Quercetin, Sarsaspogenin, hyperoside, rustin, beta- sitosterol, stigmasterol, D-glucose.
	Angelica sinensis	Flower	Myrcene, gamma-terpinene, p-cymene, butylphthalide, thymol, tricyclene and eucalptol.
	Achillea biebersteinii		Flavonoids, monoterpenes and sesquiterpenes [142]
	Artemisia princeps		flavonoids, terpenoids, sterolic acids and coumarins (146)
	Allium sativum	Bulb	Thiamine, beta-bisabolene, Riboflavin, Protopine, Thymoquinone, Crvacrol, Elemicin, Thymol methyl, Dimethyl disulfide, Dially sulfide.

Disorder	Plants	Plant parts	Phytochemicals
	Astragalus membranaceus		formononetin, adenosine, saccharose, calycosin, ononin, calycosin-7O-beta-D-glucoside, daucosterol and 9,10-dimethoxypterocarpan-3-O-beta-D-glucoside. It has been reported as a useful anti-proliferative and antioxidant agent.
	Curcuma longa	Flower	Beta-bisabolene, myrcene, alpha-fenchene, gamma-terpinene, Bisacumol, curlone, p-cymene, germacrone, Tricyclene,
	Prunella vulgaris	Aerial part	Isiorientin, Heptacosane, Beta- copaene, beta-Bourbonene, alpha-patchoulene, Luteolin, Umbelliferone, hexanal, beta-Ionone, cuparene
	Rhizoma sparganii		
	Salvia miltiorrhiza	Arial part, leaf	Corosolic acid, isophytol, jasmone, bicyclogernacrene, Methyl linoleate, eicosane, methyl palmitate, palmitic acid.
	Paeonia lactiflora		
	Viburnum opulus	Bark and fruit	Anthocyanin, hydroquinone, methylarbutin, Arbutin, Scopoline, Scopoletin, Chlorogenic acid, Caffeic acid, Flavylium, Ascorbic acid, Chlorogenic acid.
	Cyperus rotundus		Flavonoids, ascorbic acids and phenolic acids.
	Euterpe oleracea	Arial part	Cyperol, isocyperol, cyperene, d-Borneol, Cyperrotundone, Alpha-cyperone, Humulene, Delta-cadinene, alpha-pinene
	Pinus pinaster	Bark	Myrcene, p-cymene, juniperol, d-borneol, Terpinolene, Humulene, Delta-candinene, Camphor, alpha-Pinene, beta-Pinene.
	Urtica dioica	Flower	Isohamnetin-3-O-neohesperidoside, Kaempferol, Quercetin, Isorhamnetin, Scopoletin, isorhamnetin-3-O-glucoside, Nicotiflorin, Isoquercitrin, Naecissin, Quercetin-3-glucosidase.
	Zinguber officinale		Shagaols
	Dolichos lablab l		Cyanidol, Procyanidin B1, luteolin, cosmetin, apigen, arachic acid, D- Camphene, Isoborneol.
	Aauropi folium		
	Radix salviae		
	Impatiens Balsamina		
	Rubi fructus		
	Campsis flos		
	Caulis akebiae		
	Hippophae fructus		
	Mori fructus		
Dysmenorrhea			

Disorder	Plants	Plant parts	Phytochemicals
	Abroma augusta	Bark	Friedelin, 1,28-Octacosanediol, beta-Sitosterol.
	Achyranthes aspera	Leaf	Betaine, 20-Hydroxyecdyson, Ecdysone, Oleolic acis.
	Aconitum napellus	Leaf,	Aconite, myristic acid, 14-Acetylneoline, Acontine, HokbusineA, Mesaconitinem Plamic acid, Fuziline.
	Acorus calamus	Rhizome	Acolamine, Mthyleugenol, Acetyleugenol, Palmitic acid, Telekin, Azulene.
	Ailanthus excelsa	Bark	Glaucarbinone, Glaucarbol, Vitexin, Beta-siosterol, Myristic acid.
	Aloe vera	Leaf	Chrysophanol, Aloesin, Lupeol, Campesterol.
	Ambroma augusta	Root	Betaine, choline, beta-sitosterol, stigmasterol.
Uterine cervical erosion			
	Cnidium monnieri	Fruit	Osthole, cniforin A, Methoxsalen, Coumarin, 2,3-Diphenylbenzofuran.
Uterine cervical neoplasm			
	Actaea cimicifuga	Rhizome	Actein, angelicain, 26-Deoxyactein, salicylic acid, Tannin, Ferulic acid, Actein.
	Curcuma aromatica	Whole plant	Germacr-1(10)-ene-5,8-dione
Uterine cervicitis			
	Centella asiatica	Aerial part	Beta- Bisabolene, 2,3-Dihydrobenzofuran, Asiaticoside, Asiatic acid, beta-Sitosterol.
Uterine diseases			
	Abroma augusta	Root	Betaine, choline, D-glucuronic acid, 1-Octacosanol, vanillic acid, Friedelin.
	Abrus precatorius	Seed	Tetracosanoic acid, Pentacosanoic acid, Hypapahorine.
	Acacia catechu	Leaf	Wuercetin, Hyperoside, Quercitrin
	Acacia farnesiana	Bark	Tryptamine, digallic acid, ellagic acid, Mthyl gallate.
	Acacia nilotica	Bark	Diagallic acid, catechol, Quercetin, Naringetol, Epigallocatechin, Tannic acid.
	Actaea racemosa	Root	Actein
	Actaea spicata	Root	Tannic acid, citral, Geranoil
	Aerva lanata	Aerial part, leaf, root	Canthin-6-one, Moupinamide, Ervoside.
	Ageratum conyzoides	Leaf	Beta-Bisabolene, Dillapiol, Myrcene, Eugenol, Bicyclogermacrene.
Uterine hemorrhage			
	Achyranthes aspera	Leaf, root, seed, whole plant	Betaine, 20-Hydroxyecdysone, Ecdysone, Oleanolic acid, steric acid, laucric acid.
	Aloe succotrina	Leaf	Barbaloin

Disorder	Plants	Plant parts	Phytochemicals
	Amaranthus spinosus	Bark, root, leaf, seed	Hentriacontane, linoleic acid, D-glucuronic acid, Hentrailcontane
	Ardisia japonica	Aerial part	Pulegone, embelin, Quercetin. Maesanin, d-Borneol
	Bauhinia variegata	Bark	Stigmasterol, hentriacontane,
	Bergenia ciliata	Rhizome	Bergenin, Tannic acid, Gallic acid, Afzelechin, beta-Sitosterol, Cianidanol.
	Bidens tripartita	Whole plant	Catechol,luteolin, umbelliferone, isocorepsin, Scopletin.
	Boerhavia diffusa	leaf, root, seed, whole plant	Punarnavoside, stearic acid, punarnavoside,
	Eclipta prostrata	Leaf	4beta-Hydroxyverazine, Ecliptalbine, veramiline
Uterine neoplasm			
	Borassus flabellifer	Flower, root	Galactomannan, Amylotetraose; Fujioligo 450; alpha-1,4-Tetraglucose
	Boswellia serrata	Seed	Myrcene, beta-Boswellic acid, p-Cymene.
	Capsella bursa pastoris	Aerial part, flower, bark	Camphor, Luteolin 7- rutinoside, Hesperidin, Quercetin 7-rutinoside
	Cinnamomum verum	Bark	Eugenol, Citronellal, Dihydrocarveol
	Ecballium elaterium	Leaf, root	Cucurbitacin H, Myristic acid, Cucurbitacin E, Elasterol, Cucurbitacin D
	Erysimum cheiri	Flower	Quercetin, Rhamnetin, Vincetoxicoside B, Kaempferol
	Mimosa pudica	Aerial part, leaf, whole part	Crocetin dimethyl ester, beta-Sitosterol,
	Plantago lanceolata	Leaf	Chrysophanol, Syringic acid, 2,5-Dihydroxybenzoic acid, Catalpol

Vagina

Disorder	Plants	Plant parts	Phytochemicals
Vaginal diseases			
	Allium cepa	Bulb	Hexadecane, Peonidin-3-glucoside, Diphenylamine, Octadecane.
	Areca catechu	Seed	Arecaidine, Guvacine, Isoguvacine, Arecoline, Procyanidin B2.
	Boswellia serrata	Plant exudate	3-Acetyl-11-keto-beta-boswellic acid, 3-Acetyl-beta-boswellic acid, Cadinane, Ursane.
	Butea monosperma	Bark, flower	Lupeol, Tetracosanoic acid, Coreopsin.
	Caesalpinia bonduc	Seed, wood	delta-Caesalpin, Linoleic acid, Bonducellin, Caesalpin F.
	Careya arborea	Flower	Careyagenol D, beta-Sitosterol, Theasapogenol B
	Carthamus tinctorius	Leaf	1-Pentadecene, Cynaroside,

Disorder	Plants	Plant parts	Phytochemicals
	Cynodon dactylon	Aerial part, whole plant, leaf	Syringic acid, 6,10,14-Tri methylpentadecan-2-one, beta-Sitosterol, Tricin
	Dichrostachys cinerea	Root	Friedelin, Epifriedelanol, beta-Amyrin, beta-Sitosterol, Palmitic acid.
	Ficus microcarpa	Bark, leaf	Glutinol, Epifriedelanol, Lupeol acetate.
	Ficus racemosa	Fruit	beta-Sitosterol, Lupeol acetate, Hentriacontane, alpha-Amyrenyl acetate.
	Ficus religiosa	Bark	Bergaptol, Bergapten, 1-Octacosanol, Methyl oleanolate.
	Getonia floribunda	Leaf	Proanthocyanidin, Calycopterin, Quercetin, Ellagic acid
	Gmelina arborea	Fruit	Hexadecane, Isobutyl butyrate, Octanal, Isovaleric acid.
	Gossypium herbaceum	Fruit	Herbacitrin, Gossypin, Furfural.
	Holarrhena pubescens	Bark	Dihydroisoconessimine, Irehdiamine B, Conessimine, Conarrhimine.
	Mangifera indica	Leaf	Myrtenol, beta-Bisabolene, Bornylene, Carotol, Propanol.
	Mimosa pudica	Leaf, root, whole plant	Myristic acid, Stearic acid, Palmitic acid, Docosanol.
Vaginitis			
	Diospyros malabarica	Bark	Betulin, 1-Triacontanol, Betulinic acid.
	Ficus benghalensis	Bark	Flavylium, Leucopelargonidin, 20-Tetratriacontene-2-one, Tiglic acid.
	Glossocardia bosvallia		Eugenol, p-Cymene, Methyleugenol, Eucalyptol.
	Gmelina arborea	Fruit	Hexadecane, Isobutyl butyrate, Octanal, Isovaleric acid.
	Melia azedarach	Bark	Kulinone, Kulactone, Kulolactone, Cyproheptadine hydrochloride.
	Momordica charantia	Root	Simiarenol, Cucurbitadienol
	Nymphaea alba	Flower, rhizome, seed	Kaempferol, Quercetin, Myricitrin, beta-Sitosterol.
	Nymphaea nouchali	Flower	beta-D-Xylopyranose, Gallic acid, Linoleic acid.

Breast

Disorder	Plants	Plant parts	Phytochemical
Breast diseases			
	Achyranthes aspera	Leaf	Betaine, 20-Hydroxyecdysone.
	Ambroma augusta	Bark, Leaf, Root,	Stigmasterol, beta-Sitosterol, Choline, Lupeol, Betaine.
	Arundo donax	Rhizome	5-Methoxy-N-methyltryptamine, Dehydrobufotenine, N,N-Dimethyltryptamine.
	Asparagus racemosus	Root	Asparagamine A, Stigmasterol, D-Galacturonic Acid, Sarsasapogenin
	Boswellia serrata	Plant exudate, seed	3-Acetyl-11-keto-beta-boswellic acid, 3-Acetyl-beta-boswellic acid, Myrcene.
	Cajanus cajan	Fruit, leaf, seed	(2s)-5-Hydroxy-7-methoxyflavanone, beta-Acoradiene, Pyridoxine, Riboflavin.
	Capparis zeylanica	Bark	Ferulic acid, beta-Sitosterol, Rutin.
	Euphorbia neriifolia	Bark, leaf	Ingenol triacetate, Friedelanol, Taraxerol.
	Helicteres isora	Seed	Diosgenin
	Ipomoea aquatica	Whole plant	Lutein 5,6-epoxide, Hentriacontane, Lutein.
	Jasminum grandiflorum	Flower	Isophytol, Jasmone, Vanillin, Benzyl Alcohol.
	Leonotis nepetifolia	Seed	Myristic acid, Stearic acid, 5,6-Octadecadienoic acid.
	Leonurus sibiricus	Root	Linolenic acid, Arachidic acid.
Breast neoplasms	*Abrus precatorius*	Seed	Hypaphorine, Pentacosanoic acid, Pelargonidin 3-glucoside, Abricin.
	Annona montana	Seed	beta-Sitostenone, Emodin, Physcion.
	Bellis perennis	whole plant	Echinocystic acid, L-(+)-Arabinose, Tiglic acid.
	Catharanthus roseus	aerial part, bark, flower	Leurosine, Javlor, Dotriacontane.
	Derris elliptica	Root	Deguelin, alpha-Toxicarol, Rotenone.
	Elytraria acaulis	Root	Syringic acid, Sinapic acid, Apigenin, Isovitexin.
	Glycosmis pentaphylla	Root	Glycosolone, Noracronycine, 3-Methyl-9H-carbazole
	Heliotropium indicum	Leaf	1,4-Diaminobutane, 5'-Acetyllasiocarpine, Rapanone.

Pregnancy and reproductive health

Conditions	Plants	Plant parts	Phytochemicals
Postpartum hemorrhage			
	Baccharoides anthelmintica	Leaf, root	Germacranolide, (2Z,4E)-5-[(1S)-1-hydroxy-2,6,6-trimethyl-4-oxocyclohex-2 -en-1-yl]-3-methylpenta-2,4-dienoic acid, Butein.
	Bergenia ciliata	root	Methyl gallate, Bergenin, Cianidanol, Catechin gallate.
	Boerhavia diffusa	Leaf	Ascorbic acid, Phytic acid, Oxalic acid, beta-Carotene.
	Breynia vitis-idaea	Leaf	Tetracosanoic acid, Dotriacontane, Pentacosanoic acid, Octacosanoic acid.
	Croton bonplandianus	Root	Sparsiflorine, Pronuciferine.
	Dioscorea hispida	Tuber	(1R,4R,5R)-2,4'-dimethylspiro[2-azabicy clo[2.2.2]octane-5,2'-3H-pyran]-6'-one.
Postpartum period			
	Myristica dactyloides	Fruit	Stearic acid, Palmitic acid.
Pre-eclampsia			
	Moringa oleifera	Seed	Myristic acid, Heptadecanoic acid, Tetracosanoic acid, Lauric acid.
	Senecio scandens	Aerial part	beta-Sitosterol, Daucosterol, Hyperoside.
Pregnancy complications			
	Amaranthus tricolor	Root	beta-Sitosterol, Oleic acid.
	Amorphophallus paeoniifolius	Tuber	beta-Sitosteryl palmitate, Triacontane, Betulinic acid.
	Butea monosperma	Root	Jalaric ester II, Laccijalaric ester II, Jalaric ester I.
	Calendula officinalis	Root	Chikusetsusaponin iva, Inulin, Calenduloside A, Calenduloside E.
Premenstrual syndrome			
	Azadirachta indica	Leaf	6-Deacetylnimbin, Azadirachtanin, Isomargosinolide, Nimbinene, Isoazadirolide.
	Crocus sativus	Flower	Thiamine, Hexadecane, Riboflavin, Petunidin.
	Glycyrrhiza glabra	Leaf	Benzoic acid, Methoxsalen, Kaempferol.
Prenatal care			
	Alpinia nigra	Rhizome	Myrtenol, Carotol, Pinocarvone.
	Aristolochia indica	Root	Tetracosanoic acid, Glycerides, C14-18, Hexacosanoic acid, Ishwarone.
	Azadirachta indica	Seed	Nimbidiol, Myristic acid, 6-Deacetylnimbin.
	Hemidesmus indicus	Root	Myrtenol, Syringic acid, Vanillin, Pinocarvone.

Conditions	Plants	Plant parts	Phytochemicals
	Justicia adhatoda	Root	Pyrrolo(2,1-b) quinazolin-9(1H)-one, 2,3-dihydro-3,7-dihydroxy-, (3S)-, Vasicinol, Deoxyvasicinone, Vasicol.
Reproductive health			
	Helminthostachys zeylanica	Rhizome	5-hydroxy-2-(4-hydroxy-3-methoxyphenyl)-12,12-dimethyl-8a,9,10,11,12a, 13-hexahydro-8H-chromeno[7,8-c] [2] benzoxepin-4-one, Ugonin C, Galactitol

CONCLUSION

Female reproductive disorders rank as a leading cause of death among women worldwide. However, traditional treatments for these issues often come with a variety of negative side effects that could result in long-term health complications for patients. Thus, it is essential to investigate alternative therapeutic options that can also reduce side effects. The use of several herbal remedies illustrates this potential, as seen in medical traditions like Ayurveda and traditional Chinese medicine, which utilize various medicinal herbs, such as *Ocimum tenuiflorum* (Tulsi), *Zingiber officinale* (Ginger) and *Withania somnifera* (Ashwagandha),*Herba scutellariae barbatae*, Yaoliuan Capsule (YLAC), etc. These herbs contain numerous phytochemicals recognized for their therapeutic properties in addressing various female reproductive disorders, including PCOS, endometriosis, ovarian cancer, premenstrual syndrome, vaginal infections and dysmenorrhea, as highlighted in the paper. Moreover, additional research is required on phytochemicals as promising options for treating female reproductive concerns, as they may pave the way for personalized medicine for patients.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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