Phytoestrogens and Beyond: The Role of Natural Herbs in Women's Health and Hormonal Balance

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Abstract

Women, being nature's nurturers, face several challenges in their lives. These difficulties may involve a variety of medical, psychological, and reproductive problems. This review focuses on the great variety of natural herbs and their significant benefits for preventing and treating women's illnesses. The search includes several academic databases to gain information on herbs in traditional or clinical practices. Through the study of phytoestrogens' interactions with estrogen receptors, it was exploring how plant-based chemicals can mimic or modify the effects of estrogen, influencing reproductive health and alleviating menopausal symptoms. In addition, the phytochemicals are inhibiting pro-inflammatory cytokines, thus act on women's health and wellness by reducing inflammation in conditions like polycystic ovarian syndrome (PCOS) and other androgen-related disorders. The review emphasises the value of diet in maintaining and enhancing overall well-being. The role of vitamins B and E, omega-3 fatty acids, and omega-6 fatty acids is essential. We found that parsley, flaxseed, ginger, garlic, and pomegranate have nutritional and therapeutic value. The review highlighted the function of plants and their chemical components in regulating the physiology of hormonal balance. Phyto-oestrogens, which are natural, oestrogen-like substances present in Flaxseed, Soy, Pomegranate, Ginseng, Red Clover, etc., are beneficial in reducing the signs and symptoms of hormonal imbalance and also in polycystic ovarian disease. In total, 69 plants are mentioned in this review, 53 of which have been reviewed for their phytochemistry, traditional uses, or clinical applications in standard women's diseases. The effectiveness is due to its antioxidant and anti-inflammatory characteristics. We conclude that when traditional and contemporary scientific knowledge of the nutritional and therapeutic value of plant resources is integrated, the navigation of universal women's health and well-being will be achieved.

Keywords: Women's health, phytoestrogen, phytoconstituents, menstruation, osteoporosis, pregnancy, breast cancer, female fertility, fibroids, hormone replacement therapy, urinary infection, Vaginal Yeast Infection.

1. Introduction

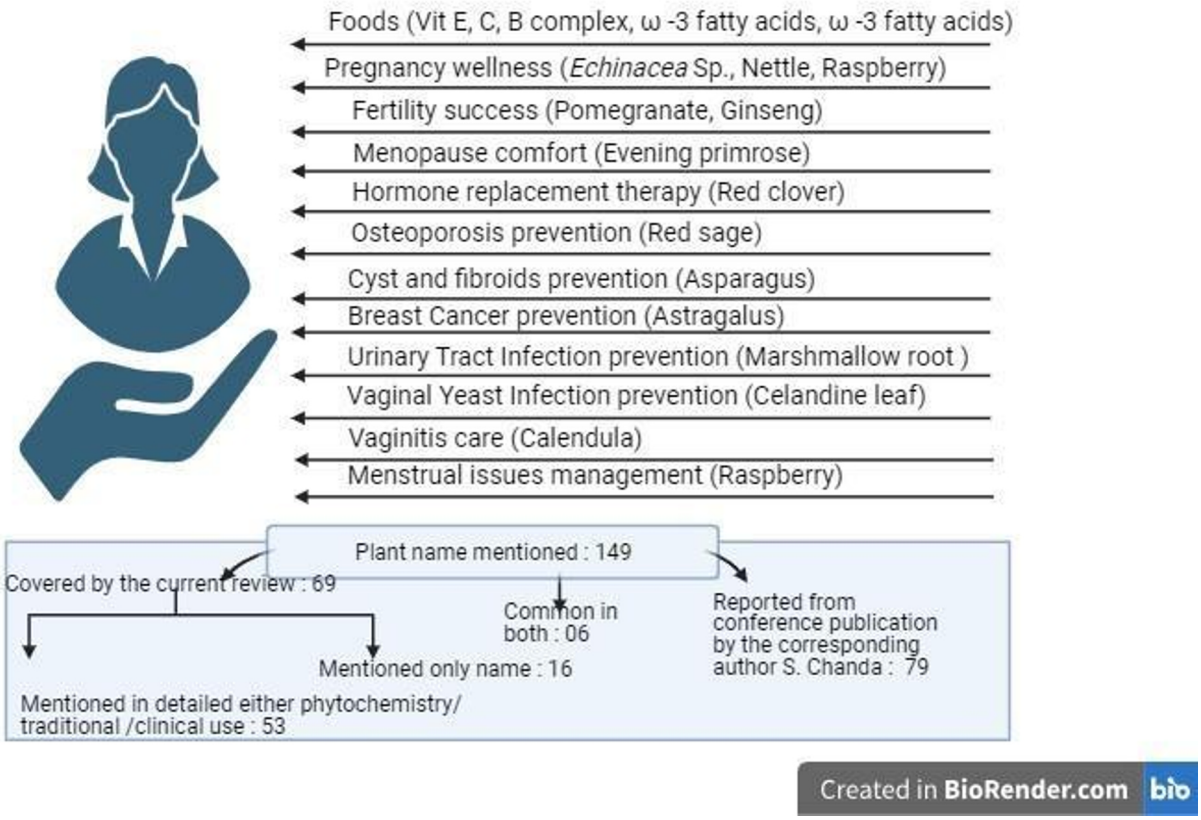
Women have an essential role in long-term growth and the quality of family life. However, in many parts of the world, they confront gender bias while seeking even basic healthcare treatments. The World Health Organisation (WHO) issued the "Madrid Statement," emphasising that "to achieve the highest standard of health, policies related have to acknowledge that women and men, due to biological differences and gender roles, have different needs, barriers, and opportunities". Women's reproductive health is inextricably tied to their physiological and hormonal constitution, with hormones influencing many elements of their well-being. Health issues, particularly menstrual abnormalities, can have a significant impact on women's quality of life, social integration, and educational opportunities. Hormones, including oestrogen (EST), progesterone (PST), and luteinizing hormone (LH), control critical physiological events in a woman's life, such as her menstrual cycle, fertility, pregnancy, and menopause. Such hormonal imbalances can cause menstruation irregularities, infertility, menopausal symptoms, polycystic ovary syndrome (PCOS) etc. Understanding and managing hormonal variations is crucial to improving women's reproductive health and well-being. Hormones regulate menstruation, fertility, pregnancy, and postpartum recovery from adolescence to menopause. Hormone replacement therapy (HRT) is a successful treatment for menopausal symptoms such as hot flashes, mood swings, and

vaginal dryness in women who are experiencing severe hormonal changes. However, because of the potential risks and side effects, it is essential to consult with a healthcare physician before using HRT.

Herbal medicine, with its naturalistic approach, can help the body's own healing abilities, providing a comprehensive approach to boosting women's health at all phases of life and allowing them to make educated reproductive decisions. Addressing hormone imbalances is critical, but natural solutions like herbal medicine are also required to assist the body's natural healing processes. Traditional remedies to manage women's health have been extensively researched globaly. Herbal medications, comprising plants, herbal preparations, and products, are still popular conventional medicine, with women being the primary users. Despite advances in modern medicine, many women's health issues remain unaddressed, and in some areas, access to modern care is limited. In such instances, herbs are an important alternative medicine for women's health [1]. Numerous herbs have long been used to treat a variety of women's health difficulties, including menstruation disorders, infertility, pregnancy dysfunctions, labour issues, urogenital diseases, PCOS and menopausal symptoms. According to reports, certain plants are especially good to the health of women. For example, Dioscorea villosa L. (Wild yam) has a variety of applications, including treating gynaecological disorders, increasing liver and kidney function, and treating dysmenorrhea and ovarian discomfort. It has antiinflammatory, antispasmodic, diuretic, and nutritional effects and diosgenin, a progesterone precursor. Similarly, soybean (Glycine max L.) and soy products have been shown to reduce cancer risk factors, cardiovascular risk, and menopausal symptoms in women due to their high isoflavone content, which has significant antioxidant effects, lowering hot flashes, and inhibiting tumour growth [2].

Women's reproductive health issues are frequently functional illnesses caused by dysregulation of cyclical events, physiological changes during pregnancy, and alterations at perimenopause, rather than infectious or surgical conditions for which most Western treatments have been produced. This could explain why herbal medications are so helpful at treating and managing women's reproductive health disorders [3]. Women's frequent usage of herbal medications to treat reproductive difficulties may be due to the assumption that they are milder and safer than pharmaceutical drugs.

This review explores how herbal medicine supports women's natural reproductive processes and promotes a holistic approach to healthcare. It examines the regulation of estrogen receptors and signalling pathways by phytoestrogens, antioxidant and anti-inflammatory mechanisms of herbs, and the modulation of hormone synthesis and metabolism by herbal constituents. Additionally, the effects of herbs on cell proliferation and apoptosis are included. Herbal therapies have been used to alleviate menopausal symptoms, maintain hormonal balance, and promote menstrual health. By combining evidence-based practices and natural remedies, women can take charge of their health and make informed reproductive decisions.



2. Mechanisms of Phytoestrogen Interaction with Estrogen Receptors

Phytoestrogens, compounds derived from plants structurally similar to estradiol, have a dual role as selective oestrogen receptor modulators (SERMs). This versatility allows them to either mimic or block EST actions, depending on the target tissue. Their ability to bind to oestrogen receptors (ERs) and influence estrogenic signalling pathways can significantly impact women's health and wellness, as it influences physiological systems [4]. Phytoestrogens activate the oestrogen receptor beta (ERβ), resulting in anti-proliferative and anti-inflammatory properties, and they show a stronger affinity for ERβ than ERα. This selective binding affects various reproductive tissues, perhaps leading to positive outcomes such as reduced menopausal symptoms and enhanced bone health. Depending on the dosage and type of phytoestrogen, these substances can function as EST agonists or antagonists [5]. They may activate ERs at low concentrations, but at more significant quantities, they may suppress the effects of endogenous EST. In the genomic pathway, phytoestrogens bind to ERs, producing a receptor-ligand complex that travels to the nucleus[6]. This complex then attaches to oestrogen response elements (EREs) on DNA, which influences the transcription of estrogen-responsive genes. They can also trigger signal transduction pathways that do not require direct gene activation and involve the fast activation of protein kinases and other signalling molecules, thereby triggering cellular responses. They also alter gene expression via epigenetic mechanisms such as DNA methylation and histone modification, which affects reproductive health.

Phytoestrogens, particularly isoflavones, have been shown to reduce hot flashes and other menopausal symptoms by compensating for a reduction in endogenous oestrogen levels [7]. This practical application of phytoestrogens can significantly improve the quality of life for women experiencing menopause [8] [9]. Additionally, phytoestrogens can improve bone health by modifying bone remodelling processes and lowering the risk of osteoporosis in postmenopausal women. The compounds provide a promising natural alternative for controlling several aspects of women's reproductive health by interacting with ERs. Understanding their mechanisms of action allows for developing specific dietary and treatment regimens that maximise their advantages while limiting potential dangers. Clinical studies highlight the importance of phytoestrogens in increasing quality of life and lowering the risks associated with hormone replacement treatment (HRT).

3. Inhibition of Pro-Inflammatory Cytokines by Herbs in Women's Health and Wellness

Herbs have substantial antioxidant and anti-inflammatory properties that help women maintain their health and wellbeing. Herbal antioxidants neutralise free radicals, lowering oxidative stress and preventing cell damage. This activity is primarily due to bioactive substances such as flavonoids, polyphenols, and terpenes [10]. Herbs can alter immune response by suppressing pro-inflammatory cytokines like TNF-α, IL-6, and IL-1β. They also have antioxidant qualities. The anti-inflammatory benefits are achieved via inhibiting NF-κB and activating the Nrf2 pathway, which controls antioxidant defences [11]. Herbal treatments can significantly improve women's health and well-being by suppressing pro-inflammatory cytokines. Herbs with anti-inflammatory properties, such as turmeric and black cohosh, can help with menstruation discomfort and menopausal symptoms [12]. Comparative studies show that antioxidant effectiveness varies between plants, underlining the importance of tailored selection in therapeutic applications. Clinical trials have shown that herbs can help women manage inflammatory disorders, improve cardiovascular health, and enhance overall wellness [13]. Women can manage chronic inflammatory diseases, alleviate menstrual and menopausal symptoms, and improve general health by learning and using the anti-inflammatory characteristics of herbs such as turmeric, ginger, green tea, Boswellia, and black cohosh [14].

4. Influence of Herbs on Androgen Metabolism in Women

Herbal ingredients significantly impact hormone synthesis and metabolism, which is critical for maintaining hormonal balance and improving women's health. Certain herbs influence the synthesis of essential hormones such as oestrogen, progesterone, and testosterone by altering the activity of steroidogenesis-related enzymes. For example, Vitex agnuscastus (chasteberry) modulates progesterone levels, whereas Tribulus terrestris influences androgen metabolism. Furthermore, herbal substances can change thyroid hormone levels, influencing metabolic rate and energy balance. Herbs such as Ashwagandha (Withania somnifera) modulate adrenal hormones, including cortisol, vital for stress management and overall adrenal health [15]. Clinical investigations support these hormonal effects, highlighting herbs' medicinal promise in treating illnesses such as monthly irregularities, menopausal symptoms, and adrenal fatigue.

5. Herbal Regulation of Reproductive Cell Cycle and Proliferation in Females

Female reproductive health is intricately linked to regulating the cell cycle and cellular proliferation within reproductive tissues. Herbs can significantly influence cell proliferation and apoptosis, particularly in conditions like polycystic ovarian syndrome (PCOS). Herbs have traditionally been used to support female reproductive health, and modern research has started to uncover the mechanisms by which these herbs influence the cell cycle and proliferation in reproductive cells [16]. Bioactive compounds in herbs regulate the cell cycle, inhibiting uncontrolled cell proliferation and inducing apoptosis in ovarian tissues [17]. These effects are mediated through key signalling pathways such as the PI3K/Akt and MAPK pathways. In animal models of PCOS, herbs like Berberis vulgaris (barberry) and Cinnamomum cassia (cinnamon) have demonstrated efficacy in reducing ovarian cysts and normalising hormonal imbalances [18]. Clinical trials further support the use of herbs in managing PCOS, with evidence showing improvements in ovulation, menstrual regularity, and metabolic parameters. Comparative analyses highlight the potential of herbal treatments as adjuncts or alternatives to conventional therapies, offering a natural and holistic approach to managing PCOS [19].

6. Functional Foods and Phytominerals for Women's Reproductive Health and Wellness

Proper care must be given to women when discussing balance and a healthy diet, as it affects health, nutrition, and behaviour. This naturally affects how they produce and prepare food and their social responsibilities to raise and care for children. Therefore, food consumption and intake play a crucial role in a woman's lifestyle and her belongings, directly or indirectly. The foundation of good health for a person is a balanced diet. Certain foods are exceptionally nutritious for women's health, in addition to a balanced diet.

6.1 Vitamins and fatty acids for Women’s Health

A diet high in fibre, calcium, vitamin B complex, and complex carbs is usually beneficial in cramps. Several beneficial components, like vitamin E and omega-3 fatty acids, aid crucial advantages in women’s diets, healthy lifestyles, and quality of life. The Unani system of medicine practiced in Asian region advises taking 400 IU b.i.d. of vitamin E every day for at least three cycles. Numerous clinical studies have demonstrated the value of vitamin E in treating cystic

fibrosis, reducing pelvic discomfort, and generally improving the health of women, especially in cases of dysmenorrhea. Green leafy vegetables, almonds, whole grains, and certain vegetable oils, including safflower, olive, and sunflower, are high in vitamin E. [20]. Besides this, other food components, like omega-3 fatty acid-rich foods like flaxseed, chia seeds, walnuts, salmon, or other marine fish, are suitable for maintaining health. Numerous clinical studies have demonstrated the value of omega-3 fatty acids in growth and development, along with improving women's quality of life. Diets that include Omega-3 supplements lower blood testosterone levels and enhance premenstrual syndrome and dysmenorrhea severity. As per Ayurveda, talking about healing foods, three herbs ginger, onion, and garlic play crucial roles in regulating health. According to Pravin Rahnama et al., a randomised and controlled trial study on ginger rhizome (Zingiber officinale Roscoe) significantly relieved dysmenorrhea pain intensity and duration significantly at a 500mg dose of ginger root powder in capsules [21]. According to Giti Ozgoli et al., ginger is just as efficient at easing menstrual discomfort as Novafen. The authors conducted a crossover clinical trial research study with 168 patients. Furthermore, several other studies also revealed the effectiveness of ginger in relieving dysmenorrhea discomfort compared to pain-relieving molecules like mefenamic, ibuprofen, and paracetamol [22]. .

Allium sativum L., often known as garlic, significantly impacts women's health. It demonstrated hormonal and immunological balance in PCOS patients [23]. The usefulness of garlic in reducing pregnant woman's amniotic fluid's odour is discussed by author J. A. Mennella [24]. A pre-clinical investigation of garlic extract demonstrated its neuroprotective properties against lead-induced damage to the mother's and the foetus's cerebellum. The extract can also reduce serum high-sensitivity C-reactive protein and enhance plasma glutathione in pregnant women at risk for pre-eclampsia. [39]. A further double-blind, randomised, controlled clinical investigation demonstrated garlic's effectiveness in treating endometriosis and premenstrual pain [25]. Despite the lack of data showing its efficacy, specific individuals in India use garlic as a galactagogue. However, overeating garlic might make breast milk smell like garlic. Some infants find this unpleasant, so they may eat less frequently. [26].

Flaxseed (Linum usitatissimum L.) is recognised for its nutritional benefits. Flaxseed and soy contain bioactive components and are mainly considered abundant sources of polyunsaturated fatty acids (PUFA), particularly the omega3 and omega-6 groups, in the form of lignans, which are phytochemical hormone precursors with phytoestrogenic qualities. According to author Romina Tanideh, flaxseed oil can imitate the effects of oestrogen and may be used to treat hormone replacement therapy (HRT) [27]. In postmenopausal women, the oil also changes the metabolism of oestrogen [28]. A staple vegetarian meal historically consumed in Asian nations is soy. It is regarded as a remarkable source of protein, especially for the vegetarian population, due to its high protein content and low amount of carbohydrates. Soy isoflavones have shown several therapeutic benefits, and experts feel that they are helpful during the menopausal transition. However, its high phytoestrogen content also raises concerns regarding its safety. The safety of soy and its isoflavones, notably genistein (GEN), for postmenopausal breast cancer (BC) has come under scrutiny in recent research [29].

Salvia officinalis L., a member of the Lamiaceae family, is another name for the sage plant, which is regarded as a particular spice in Ayurveda. Sage is a phytosterol-containing spice that balances hormones. In 2022, the author Manal M. Sabry experimented on immature Wistar rats with ovariectomies to evaluate the traditional usage of sage to alleviate postmenopausal symptoms [30]. The abundance of flavonoids, such as ferulic acid, may indicate that these compounds have estrogenic properties. Sage has steroidogenesis and folliculogenesis properties that make it a potential treatment for females in cases of infertility issues [31]. There is a contraindication to breastfeeding women, although it can help lower lactation when a woman first ceases breastfeeding.

Scientifically named Petroselinum crispum Mill. (Fuss) (family Apiaceae), parsley is a culinary herb usually used fresh as a salad garnish or cooked as a flavouring ingredient. Its juice is highly beneficial for renal health and reduces water retention. It is mainly used to treat mastalgia and breast engorgement [32]. Clinical proof supporting the traditional use of parsley during weaning is lacking. The methanol extract of the aerial parts among these active herbs had vigorous estrogenic activity comparable to soybean isoflavone glycosides. The flavone glycosides 6-acetylapiin and petroside extracted using methanol from the plant's aerial portion, exhibited estrogenic action which is comparable to that of isoflavone and genistein [33].

According to anecdotal evidence, oatmeal (Avena sativa L.) is one of the finest meals for increasing milk production. Additionally, it is an excellent source of nutrients crucial for mothers nursing their infants. Iron, magnesium, zinc, and fibre are some of these nutrients. According to the Department of Family Medicine and Community Health at the University of Wisconsin, oatmeal's high iron content may account for its appeal to nursing mothers. Low iron levels may decrease milk production. Many Asian dishes always call for fenugreek seeds (Trigonella foenum-graecum L.). These are also well-liked treatments for increasing breast milk production. According to previous research, consuming three cups of fenugreek tea daily significantly increases breast milk production compared to taking a placebo.

However, not all studies back up this conclusion. Fenugreek, according to the National Centre for Complementary and Integrative Health (NCCIH) Trusted Source [34], may result in diarrhoea, aggravation of asthma symptoms, and development of a "maple-like" odour in breast milk, urine, and sweat.

6.2 Herbal Support for Pregnancy Wellness

Pregnancy-health-enhancing herbs preferably start before conception and should be undertaken by both men and women. Echinacea (E. Angustifolia DC; E. purpurea (L.) Moench and E. pallide (Nutt) Nutt.) and its products are one of the choices to treat colds and other respiratory tract infections during pregnancy. There is a shortage of trustworthy information on Echinacea safety during pregnancy. It can be used for no more than seven days, which is safe and recommended. No proof using Echinacea while pregnant (even in the first trimester) increases the risk of fetal distress, abnormalities, preterm birth, and low birth weight. As a supplemental therapy for prenatal care, aromatherapy employing plant-derived essential oils is also gaining popularity [35]. Some examples of traditionally used plants in pregnancy include red raspberry (Rubus idaeus R.) leaves with high nutritional content and Urtica dioica leaves rich in vitamins and minerals, especially iron and calcium. The traditional usage of black cohosh (Actaea racemosa L. belonging to family Ranunculaceae; earlier known as Cimicifuga racemose L. (Nutt.) to start labour in late pregnancies is another example. The use of herbal medications during pregnancy has been the subject of numerous reviews; nonetheless, significant clinical trials demonstrating their safety in pregnancy are still urgently required. There is always favourable sentiment and social acceptance towards the use of herbals in pregnancy, regardless of whether the drugs are used or not. The most typical and well-known application of ginger is, without a doubt, its use in treating nausea and vomiting symptoms. When used in moderation while pregnant, ginger is usually regarded as safe. Ginger was used in a double-blind, randomised, controlled trial study demonstrating its ability to reduce postoperative nausea and vomiting [36]. In late pregnancy, raspberry leaf tea is frequently consumed to support uterine tone. However, the author also reported that raspberry leaf patients require more caesarean sections, forceps deliveries, or vacuum extractions than those in the control group [37]. Due to the presence of catechins, which serve as antioxidants, green tea, scientifically known as Camellia sinensis (L.) Kuntze is among the most popular drinks recognised for its possible health advantages. Although several studies support the use of green tea during pregnancy, there is not much data available regarding any potential safety issues. Due to the adverse effects of green tea extract, including the possibility of neurodevelopmental problems in the foetus, special precautions should be taken. Any herbs during pregnancy should be used under the guidance and supervision of a healthcare professional only.

7. Phytoestrogens and Menopausal Symptom Relief

Menopause is not an illness. Women can experience this phase of life as pleasantly and meaningfully as any other. However, it comes with physiological changes, some of which may be uncomfortable. During menopause, significant hormonal shifts occur, leading to various physical and psychological challenges. While hormone therapy is a common medical approach to managing menopause symptoms, many women seek natural remedies for relief. Herbal medicine can effectively address these discomforts. Evening primrose, scientifically known as Oenothera biennis L., is a native plant to central and eastern North America. This blooming plant treats menopausal symptoms, including hot flashes, night sweats and bone loss, with seed oil. Research shows that taking fish oil or primrose oil supplements can help postmenopausal women minimise their risk of thrombotic events. One of the most extensively researched herbal treatments for several menopause symptoms is black cohosh. It has a long history of traditional use for reducing menopausal symptoms such as hot flashes, nocturnal sweats, and mood swings. It relieves emotional instability and symptoms of vasomotor dysfunction by acting as an oestrogen substitute and interacting with serotonin receptors. [38]. Furthermore, Chasteberry (Vitex agnus –Castus L.) also exhibits favourable effects on perimenopause and premenstrual syndrome [39].

8. Role of phytoconstituents in hormone replacement therapy

Hormone replacement therapy (HRT) is a medical procedure used to supplement or replace deficient hormones in female patients. These treatments often aim to balance oestrogen and progesterone. HRT is mainly used during and after menopause and for any other condition related to hormonal imbalances or deficiencies. If a health situation justifies using HRT, its drawbacks and side effects must also be considered. Some practices like exercise, nutrition, and herb use must be adopted to facilitate the condition for which HRT is recommended. Natural hormone therapy, sometimes referred to as phytoestrogen therapy, is also used to treat hormonal disorders. One of the most well-known phytoestrogens is an isoflavone, which is present in red clover (Trifolium pratense L.) and other legumes, including

soybeans and soy products like tofu and soy milk [40]. Flaxseed, sesame, and whole grain lignans all had modest estrogenic effects. When consumed, gut flora may transform these lignans into enterolignans.

Fennel blossom or kalonji, scientifically known as Nigella sativa L., belongs to the family Ranunculaceae. Its tiny, black blossoms and bear seeds are high in antioxidants. Due to the presence of the plant chemical thymoquinone, a type of phytonutrient, these seeds offer therapeutic qualities. Researchers are studying nigella seed's therapeutic and preventive properties in people with PCOS. In animal experiments, nigella seed extracts have helped control the levels of thyroid hormone, testosterone, luteinising hormone, insulin, and other hormones. Additionally, the extract demonstrates oestrogenic activity, which means it behaves similarly to the body's natural oestrogen. Moreover, in vivo, studies are investigating whether nigella seed extracts might replace hormone replacement therapy (HRT) during menopause when the body typically generates less oestrogen than it did previously [41]. Supplements made from this plant are becoming increasingly popular, and they are occasionally sold under the names "black seed" or "black cumin seed." Postmenopausal symptoms can also be alleviated with the prescription of hormone replacement therapy (HRT). According to current research, black cohosh may be used to treat menopausal symptoms such as anxiety, sleeplessness, sweating excessively, and hot flashes. Such effects of this plant may also contribute to its use in cases of HRT. However, research also demonstrates its non-estrogenic property; therefore, more study is still needed to understand its effectiveness fully [42]. A clinical pilot study focused on the challenges associated with hormonal fluctuations during the perimenopausal phase without relying on traditional HRT methods. This study offers a glimpse into the potential of pre-gelatinized Maca (Lepidium peruvianum Chacon) as a natural, hormone-free intervention for improving the quality of life during the perimenopausal transition [43]. Compared to modern HRT, herbal treatments may take longer to deliver results, and their effectiveness depends on factors such as the type of herb used, the dose, and the patient's general health.

9. Role of phytoconstituents in Fertility Wellness

The first and most crucial step in addressing infertility is maintaining fundamental health. If a couple is having infertility issues, nutritional and general glandular tonics must be the first initial choice. Herbal remedies can effectively treat specific infertility-related illnesses, but it is essential to identify the exact condition. The recommendations (examples include the usage of vitamin C and zinc supplements) for enhancing a man's sperm motility will differ from those for managing a woman's cycle or preparing the uterus.

A macronutrient-rich diet that includes carbohydrates, proteins, and healthy fats promotes hormone production and improves reproductive health. Micronutrients that promote fertility and shield reproductive cells from oxidative stress include folic acid, iron, zinc, and antioxidant vitamins E and C. By modulating hormones and lowering inflammation, omega-3 fatty acids—found in foods like fatty fish and seeds have been linked to increased fertility. Specific dietary changes can be beneficial when a woman's infertility is related to medical disorders, including PCOS or endometriosis. The mechanism of phytochemicals in blocking progression of PCOS is shown in Figure 1. Women who have PCOS may benefit from eating a diet with a lower glycemic load to control their insulin levels. In contrast, those with endometriosis may relieve their symptoms by eating a diet low in inflammatory foods and high in antioxidants and omega-3 fatty acids [44]. Traditional medicine has long been utilised in many cultures to treat infertility problems, especially among women. Pomegranate, or Punica granatum L., is a tasty and nutritious fruit that can be included in a balanced diet while pregnant. It is high in vitamin C, water, and polyphenols such as anthocyanins, punicalagin's, ellagic, and gallic acids. Phytoestrogens are found in pomegranate seeds, including genistein, daidzein, coumestrol, glutamic amino acids, and aspartic acids. Pomegranate extract, which contains phytoestrogens, has been shown in animal research on PCOS-affected rats to be able to control and lessen PCOS symptoms. This plant extract thickens the uterine wall and promotes mucus output by boosting uterine blood flow (vasodilatation). On the other hand anti-inflammatory mechanisms and rise in mucosal secretions increases the implantation rate [45]. The lipid profile and blood levels of sex hormones (including testosterone) were also shown to be enhanced by pomegranate fruit extract in a randomised controlled triple-blind parallel trial investigation on 23 women with PCOS. Pomegranate fruit extract was observed to raise blood oestrogen levels and lessen symptoms after 81 days in a trial on PCOS-induced rats [46].

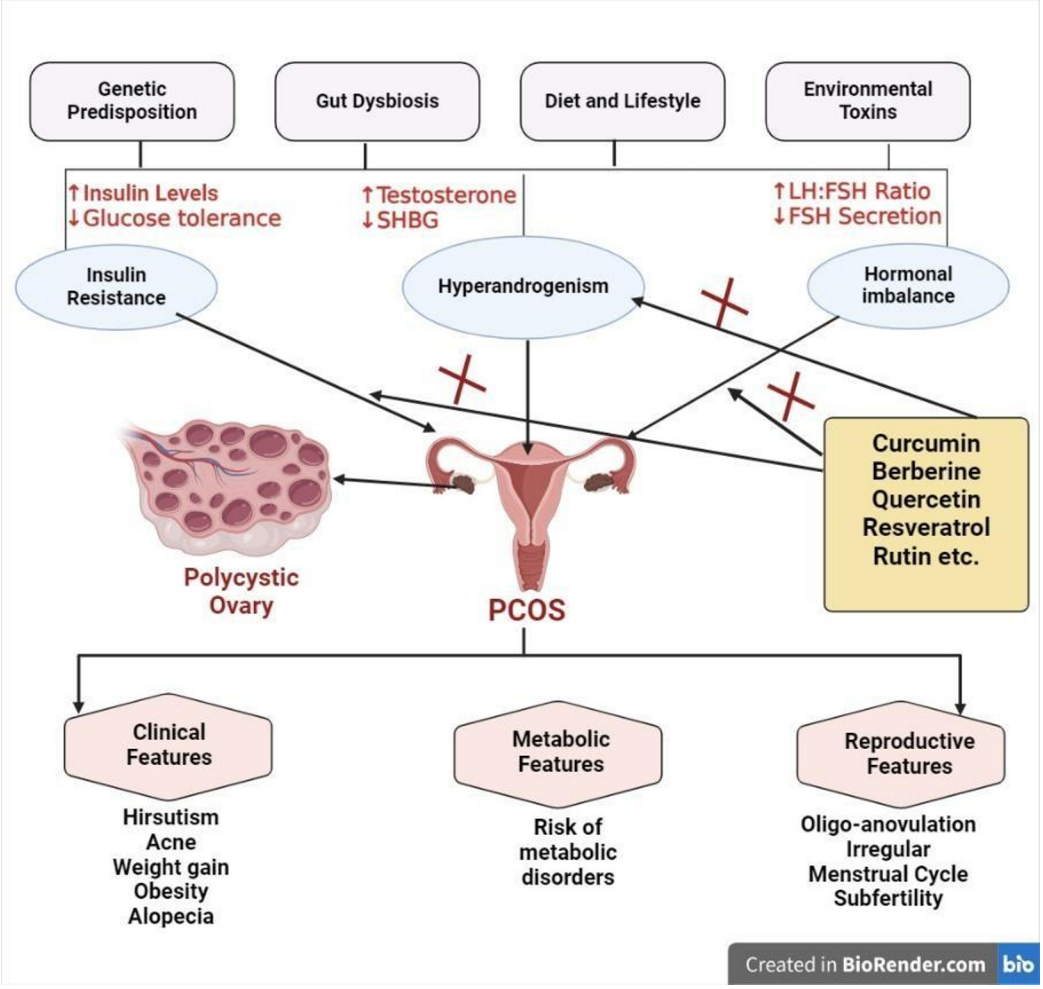


Figure 1: Mechanism of phytochemicals in blocking progression of PCOS

In many ways, Women's reproductive health has long been supported by ginseng, especially Panax ginseng C. A. Mey and Panax quinquefolius L. It has been researched for potential effects on oestrogen and androgen receptors and sex steroid hormone receptors. Chronic stress can affect the release of luteinising hormone (LH), follicle-stimulating hormone (FSH), and gonadotropin-releasing hormone (GnRH) from the hypothalamus, which is essential for ovulation and the menstrual cycle in women. Ginseng may also be regarded as an herb for infertility due to its potent phytoestrogen content and high levels of antioxidant and anti-stress activity. Studies showed that it protects the process of folliculogenesis. Another promising plant is Ashwagandha (Withania somnifera L. Dunal), which is thought to have adaptogenic characteristics that may help women regulate hormonal imbalances and thus be used in treating infertility [47]. Some other herbs are thought to help women's reproductive health, including Red Raspberry Leaf for uterine health and Chasteberry (Vitex agnus-castus) for hormonal balance. However, proper medical advice about their safety and efficacy must be discussed before using these herbs.

9.1 Role of Herbs in Osteoporosis

Dietary modifications and lifestyle changes are commonly part of conventional treatments for osteoporosis in female patients. Such natural techniques aim to increase calcium absorption, reduce fracture risk, and strengthen bones. The following are some common treatments for osteoporosis in women that conventional methods can supplement. The plant red sage (Salvia miltiorrhiza Bunge), also known as Danshen in Chinese herbal medicine, has been proven to cause improvements in osteoporosis. Red sage cured and improved over eighty per cent of osteoporosis patients, according to an analysis of 36 randomised trials [48]. It consists of magnesium lithospermate B, tanshinones, and salvianolic acid, which improve and maintain bone health. Salvianolic acids contain anti-inflammatory and anti-free radical characteristics that stop generating free radicals linked to bone resorption. These substances may also promote bone development. Additionally, red sage is an excellent source of vitamin K, essential for strong bones. This herb may be put into tea and is available as a pill or tincture. Long-term usage of this plant raises safety issues; thus, it should

only be used sparingly. Due to potential side effects and drug interactions, such herb shouldn't be used by pregnant women or people on blood thinners. More studies are required to determine the ideal dose for osteoporosis [49].

The enormous, tree-like perennial plant known as horsetail (Equisetum arvense L.) can be found in several regions of North America, Europe, Asia, and the Middle East. It has been used medicinally since ancient Rome and Greece. Horsetail contains antioxidants quercetin, oleanolic acid, and ursolic acid. These substances could raise calcium levels and promote bone formation [50]. Silica is a substance that is also found in horsetail and is responsible for increasing bone mineral content and strength [51]. Horsetail is available in tinctures, pills, and dried forms of the plant that may be used topically or put into tea. This herb may result in a lack of vitamin thiamin (B1) by lowering thiamin levels. Pregnant women and those with diabetes, gout, heart conditions, and renal disorders may experience damage from horsetail [52]. Horsetail has been linked to various advantages, but it might not be an ideal choice. It could be more advantageous for bone health to consume adequate calcium. In research involving 122 postmenopausal women, taking a calcium supplement for one year increased bone density more effectively than horsetail [53].

The perennial plant red clover (Trifolium pratense L.) represents a member of the legume family. In the past, it has been used as a supplemental treatment for a range of ailments, including cancer, respiratory issues, and skin conditions, as well as menopausal symptoms like hot flashes [54]. Red clover can be eaten orally, topically, or as a component in herbal tea, tinctures, capsules, and extracts. Red clover and osteoporosis are subjects of conflicting research. In 2015 research, 60 menopausal women received 150 milligrams of red clover daily for 12 weeks, and the outcomes were compared to those of a control group that received a sham (a drugless substance). According to the researchers, the ladies who took red clover had higher bone mineral density [55]. Other research, however, did not reveal a difference in bone health [56].

The ginger family (Zingiberaceae) includes the yellow perennial root turmeric (Curcuma longa L.), indigenous to South Asia. For the last 4,000 years, its anti-inflammatory and antibacterial characteristics have made it crucial to herbal therapy. Turmeric has been used to treat digestive problems, arthritis, and menstruation symptoms. The active component of turmeric, curcumin, may help to reduce poor bone density. According to a preliminary study, 57 individuals with poor bone density significantly improved after taking a curcumin supplement for six months. Turmeric is available as a dried powder for cooking and as a tincture, liquid, or pill [57]. When consuming turmeric for over a year or in excessive quantities, undesired effects have been reported [58]. In addition to allergies, turmeric can cause trouble for those with diabetes, gallbladder problems, and blood disorders. Longer trials are required to prove the overall efficacy and safety of curcumin and turmeric in the treatment of osteoporosis.

The Mediterranean region is home to the plant thyme (scientifically known as Thymus vulgaris L.), which belongs to the mint (Lamiaceae) family. This little, slow-growing shrub is a well-liked culinary spice. It has been used as a medicine since ancient times. Thyme was historically used to improve immune response and cure heart, neurological, and respiratory problems [59]. A research study reported the impact of providing 1,000 mg of thyme per day for six months on forty postmenopausal women. Researchers discovered that thyme ingestion regularly enhanced bone mineral density more effectively than calcium and vitamin D3 supplements. Thyme may work best when combined with sage and rosemary. Compared to thyme alone, the levels of bone mineral density were greater with this mixture. Thyme also contains a good supply of calcium, vitamin K, magnesium, manganese, and zinc, which can strengthen bones. It is an herb that may be found in both fresh and dried form [60]. When used sparingly, thyme is regarded as safe [61]. This plant has adverse effects when used in high dosages. For those with blood disorders and hormone-sensitive diseases, thyme may be dangerous [62]. Those sensitive to other Lamiaceae plants, such as oregano, sage, and lavender, may also develop allergies [63]. This plant has potential as an osteoporosis therapy, but further research is required to determine how it will affect bones in the long run.

9.2 Role of Herbs in Cyst and Fibroids

Cysts and fibroids, two common diseases, can affect women's reproductive organs, including the uterus and breasts. Even though these conditions are primarily benign, depending on their size, location, and symptoms, they may be painful and call for medical attention. The liver plays a significant role in the body's detoxification process and hormone metabolism. It helps the bloodstream get rid of extra hormones, notably oestrogen. Oestrogen dominance, which occurs when the hormone levels of oestrogen and progesterone become unbalanced, commonly causes cysts and fibroids to grow and increase. If the liver fails to function optimally, hormonal problems brought on by the inability of the liver to adequately metabolise and eliminate excess oestrogen may result in cysts and fibroids. Cysts and fibroids, namely in the hepatic and reproductive systems, are indicators of energy flow abnormalities in the body, as per Traditional Chinese

Medicine (TCM). According to TCM, herbal formulations like Guizhi Fuling is widely used to treat fibroids because they encourage blood circulation, eliminate stagnation, and diminish the size of the tumours [64].

Any treatment plan would include anti-Kapha medicines, meals, and lifestyle choices since, in Ayurveda, situations of excessive growth or tissue buildup are thought to be indicative of kapha. Shatavari (Asperagus racemosus Wild.) would be suggested for hormone balance, along with astringent herbs like Haritaki (Terminalia chebula Retz), black walnut bark (Juglans nigra L.), turmeric (Curcuma longa L.), gotu kola (Centella asiatica (L.) Urb.) etc. Turmeric is regarded as an anti-inflammatory and antioxidant in Ayurveda and TCM. It has been demonstrated that the well-known turmeric compound curcumin inhibits the development of leiomyoma cells [65]. Catechins of Camellia sinensis may be beneficial for polycystic ovarian syndrome (PCOS), as reported by Hong et al. Catechins markedly enhanced the breakdown of glucose and decreased insulin resistance in PCOS mice treated with insulin and hCG. They also markedly reduced the LH/FSH ratio, E2, FSH, and LH blood levels, and the ovary and uterus organ coefficients. Catechins may significantly reduce both the p-NF-kB p65 expression in the uterus and pro-inflammatory factors (IL-1, IL-6, and TNF-α) with their protein expressions [66]. Scutellaria barbata D. Don, a perennial plant in traditional Chinese medicine, is also used to treat tumours, hepatitis, and bacterial infections. The herb has an inhibitory impact on the growth of uterine leiomyoma cells [67].

9.3 Role of Herbs in Breast Cancer

Women must regularly check the health of their breasts using mammography and self-examinations. Globally, 685,000 individuals will pass away in 2020, and 2.3 million women will be diagnosed with breast cancer, according to the WHO. Because the breast may be a symbol of femininity, beauty, or sexuality, breast cancer is a highly emotional issue that strongly impacts many women. As a result, women may suffer some terror related to breast cancer. Dietary fat consumption and the likelihood of breast cancer are linked in a complex and multidimensional way. While a high intake of unhealthy fats may raise the risk, an equitable and moderate approach to fat intake, concentrating on better fats, may aid in a healthy diet and possibly reduce the risk of breast cancer. Certain dietary variables, particularly those linked to fat consumption, may have an impact on a person's risk of getting breast cancer [68]. Recent studies have focused on plants' potential to prevent and treat illnesses like breast cancer. Plants have long been used as a form of medicine and healing. In-depth research has been done on various plant compounds because they may have anti-cancer properties. Even the commonly consumed fruits and vegetables have several beneficial effects on women’s health, as depicted in Figure 2, which shows that even the commonly occurring cancers in females, such as breast cancer, could be lowered by plants and their constituents.

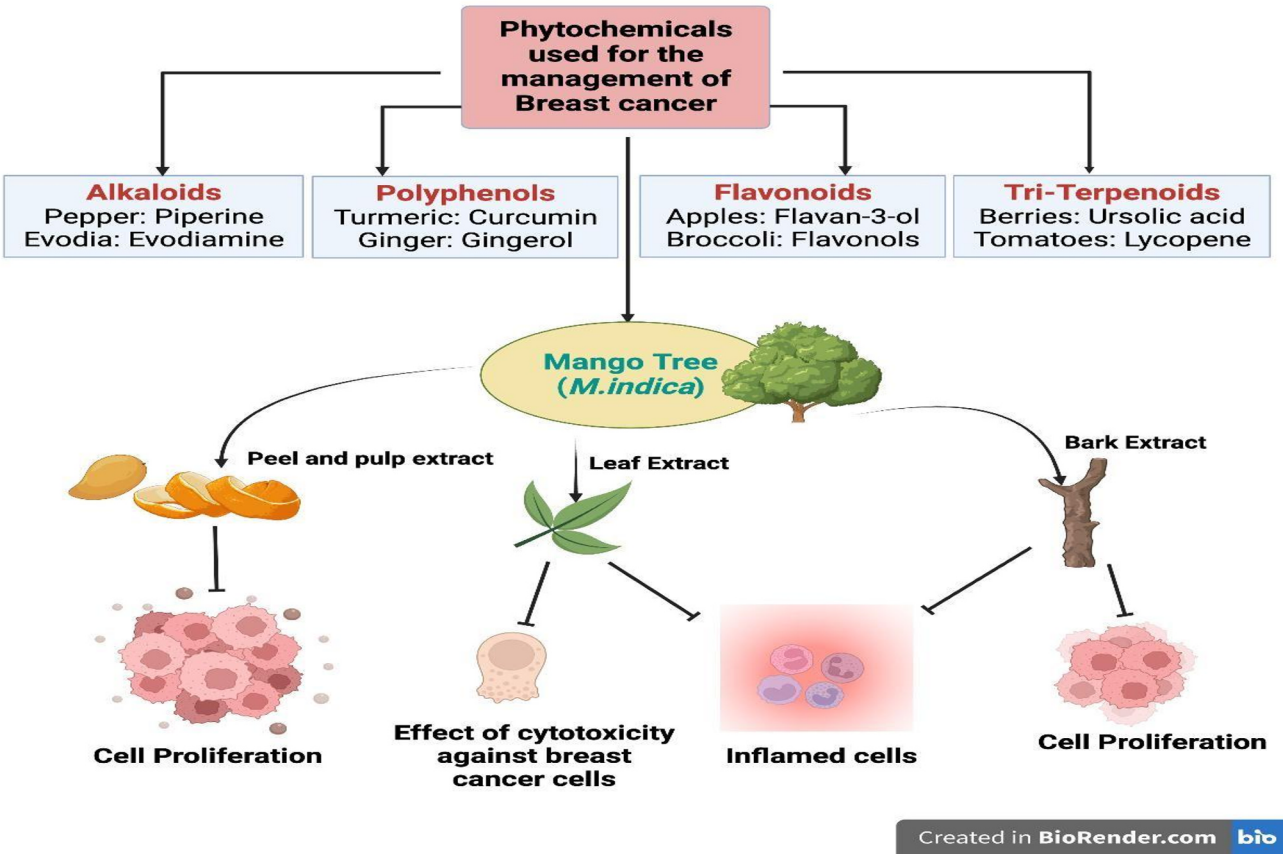


Figure 2: Plants and phytoconstituents effective in the prevention of the prognosis of breast cancer in females

Polyphenols are a large group of phytochemicals found in various plant-based foods, including fruits, vegetables, whole grains, nuts, and seeds. These compounds have attracted attention due to their potential health benefits, including potential anti-cancer properties. Polyphenols' anti-inflammatory and antioxidant characteristics could help prevent cell damage and reduce cancer risk [69]. Two polyphenols that have demonstrated promise in preclinical studies for their potential anti-cancer activities, notably those against breast cancer, are resveratrol and epigallocatechin gallate (EGCG), which are both present in red wine and grapes [70]. Flavonoids, a subclass of polyphenols, are present in various plant-based meals. Flavonoids have been extensively studied for their potential to enhance health, notably their ability to combat cancer. Several flavonoids' anti-inflammatory and antioxidant properties, such as curcumin and quercetin and apigenin, which can be discovered in parsley, celery, and chamomile, may suggest their potential significance in preventing breast cancer [71].

Another method of treating breast cancer is administering immunomodulators, which regulate the immune system that reacts to cancer cells. Breast cancer treatment may benefit from discovering herbal and plant-based constituents as effective immunomodulators. The use of phytoconstituents in breast cancer treatment has gained attention recently due to their potential for a more comprehensive safety margin and the likelihood that they may cooperate with conventional chemotherapeutic drugs. A notable example is the Astragalus root (Astragalus membranaceus Bunge), used for generations in traditional Chinese medicine. Research has shown that Astragalus extract suppresses breast cancer cell growth and induces apoptosis. Further investigation revealed that the extract included isoflavone substances such campanulin, ononin, calycosin, and formononetin [72]. A well-known immunomodulatory herb is Echinacea (Echinacea purpurea L. Moench). It has bioactive components such as polysaccharides, flavonoids, and alkamides with immune-stimulating properties. By stimulating the production of cytokines, boosting immune cell activity, and generally enhancing immunological function, echinacea may aid the body's battle against breast cancer [73]. Mistletoe extract (Viscum album L.), another herbal immunomodulator, has generated interest in treating breast cancer. Mistletoe extract (Iscador) has been demonstrated to enhance immune cell activation and increase cytokine production. Since it has been demonstrated to have a direct cytotoxic effect on cancer cells, it could serve as a dual-action therapeutic technique. Phytoconstituent as immunomodulators increase the immune system's ability to recognise and eliminate cancer cells, which holds great potential for boosting the efficacy of conventional therapies for breast cancer. The root extract of parsley is scientifically known as Petroselium crispum Mill. (Fus) effectively showed antiproliferative activity in MCF-12-A and MCF-7 cells [74]. Studies have also shown that phytosterols (ferulic acid, gallic acid, and quercetin) found in other spices from Petroselinum have an estrogenic effect. Thus, it could also be used for infertility in women [75].

9.4 Role of Herbs in Urinary Tract Infection

Millions of women worldwide suffer from urinary tract infections (UTIs), which are a very prevalent health problem. These are among the most frequent reasons for consulting a doctor. From 1990 to 2019, fatalities increased by 2.4 times [76]. Germs that enter the urinary tract defeat the body's natural defence mechanisms, causing infection and inflammation. Herbal UTI therapies target different facets of this pathophysiological process. For instance, herbs with antibacterial characteristics, such as Arctostaphylos uva-ursi (L) Spreng and Hydrastis canadensis L., can assist in preventing bacterial invasion and colonisation. Herbs that enhance urine output, such as horsetail and corn silk, help to wash away pathogens from the urinary system. Additionally, herbs like cranberries and garlic may stop germs from sticking to the walls of the urinary system, thus lowering the chance of infection. Green tea contains polyphenols that also have an antimicrobial effect. Several herbs are specifically therapeutic and supportive of the bladder in addition to clearing the bacteria, and this may be done for both acute infections and long-term strengthening and protection. Mullein leaf (Verbascum thapsus L.), buchu leaf (Agathosma betulina P. J. Bergius) and Agathosma crenulata (L.) Pillans), corn silk (Zea mays L.), boldo (Peumus boldus), etc. are a few examples of bladder tonics. The herb Uva ursi (Arctostaphylos uva-ursi (L.) Spreng) is highly recommended for treating bladder irritation and UTIs. In addition to bladder tonification, it possesses antibacterial properties. Uva ursi tea can also be used daily to treat an acute infection. According to research, using this plant to treat UTIs is more beneficial than using NSAIDs and antibiotics [78]. Buchu plant is a diuretic with antibacterial and anti-inflammatory effects [79]. Due to diosphenol irritating the gall bladder and stimulating urine output, Buchu has diuretic properties. It has long been used to prevent UTIs and promote urinary tract health. By increasing urine flow, buchu aids in the removal of microorganisms from the urinary tract system [80]. Marshmallow root, scientifically known as Althaea officinalis Ten., is widely recognised for its calming effects on the mucosa lining [81]. According to Rezaei et al. the antibacterial properties may also have some protective benefits that might be used to alleviate the discomfort caused by UTIs in the urinary tract [82]. Creating a protective shield-like layer over the mucous membranes, especially those in the urinary system, decreases inflammation and speeds up recovery. Horsetail, or Equisetum arvense L. is an herbal diuretic that may cause more urine to be produced, which would aid in removing bacteria from the urinary bladder. Additionally, it could be anti-inflammatory, reducing irritation and inflammation in the urinary tract [83]. Modern healthcare and the proper drugs are frequently required in cases of severe complications with UTIs to clear the infection successfully. Long-term, untreated UTIs can move to the kidneys, where they may become a much more dangerous infection that can lead to unpleasant side effects, too.

9.5 Role of herbs in Vaginal Yeast Infection

Vaginal yeast infections, commonly known as vaginal candidiasis, also trouble someone and occur more frequently as UTIs. It is primarily brought on by a fungus called Candida albicans overgrowth. Although the vaginal flora naturally contains Candida, an excess can cause an infection. Women who commonly experience one sort of fungus assault also frequently experience other types. The cycle is made worse by using antibiotics for UTIs, having a compromised immune system, and taking medicine for illnesses like HIV/AIDS. Yeast infection is one of the most significant health issues that can affect AIDS patients since it can spread to other organs and cause catastrophic illness. Due to a lack of immunity, the body cannot defend itself against even typically innocuous microorganisms. Any yeast overgrowth, whether vaginal or elsewhere, is a symptom of a compromised immune system. In addition to prompt therapy, immune system boosters and anti-microbial drugs may permanently resolve such issues. Individuals with uncontrolled diabetes may have higher sugar levels in vaginal secretions, which might create an ideal habitat for yeast development [84]. The vaginal environment might be affected and made more vulnerable to yeast infections by hormonal changes during pregnancy, menstruation, or when taking birth control pills. Traditionally, over-the-counter antifungal topical creams or suppositories like miconazole, clotrimazole, or tioconazole are used to treat such infections. Oral antifungal medicines may be administered for yeast infections that are more severe or recurring. Such drugs are messy to use and do not provide a long-term cure for the underlying health problem. The most uncomplicated strategy to eliminate the symptoms is to boost the body's defences so the human body can manage the yeast population. The following herbs work well for short-term yeast suppression and immunological support.

Chelidonium majus L., often known as Celandine leaf, is a rare and inexpensive herb with some pharmacologically potent ingredients. Its applications in acute infections were discovered through research. Chelidonii's isoquinoline alkaloids primarily have antibacterial, antifungal, antiviral, and anti-inflammatory properties. The herb's vaginal medication delivery method was effectively tested using lyophilised extract. The herb's aerial portion, which is alkaloid-rich, has anti-Candida effects too.

The plant Eleutherococcus senticosus (Rupr. & Maxim) Maxim., sometimes known as Siberian ginseng or eleuthero root, has been traditionally used for such infections. It is indigenous to Northeast Asia and has a lengthy usage history

in Chinese and Russian herbal traditions. Despite its paramount reputation as a strength builder, it possesses anti-yeast and immune-supporting properties [85].

The Fagaceae plant Quercus infectoria G., Olivier is used as a douche and for treating acute infections. Due to the presence of tannins, it has astringent properties and has been used historically to treat vaginal discharge [86].

Since removing yeast from our bodies is impossible, it is essential to build a solid defence that enables us to coexist, at the very least, tolerably, with these organisms. Herbs like Astragalus membranaceus Bunge, Echinacea purpurea (L.) Moench, Terminalia chebula Retz, Curcuma longa L., Panax ginseng C.A. Mey, Angelica sinensis (Oliv) Diels, Glycyrrhiza glabra L., Ligusticum lucidum Mill., Pannax pseudoginseng Wall, Allium sativum L, and Zingiber officinale Roscoe, etc. can effectively support our immune system and prevent long-term illness.

9.6 Role of herbs in Vaginitis

Although yoghurt is not a medicinal plant, it contains probiotics that can help restore the balance of the vaginal flora. Vaginal infections, especially those brought on by yeast overgrowth, are already discussed in Section 9.5. Such diseases can also be treated and prevented with the use of probiotics, which are beneficial microorganisms. The flowering plant Calendula officinalis L., a member of the family Asteraceae, has been used in traditional medicine for various purposes, including its ability to lessen inflammation and hasten the healing of wounds. It is typically sold as oils, lotions, or ointments. Numerous clinical studies have supported the use of the herb in the treatment of vaginal candidiasis. Gum benzoin (Styrax benzoin var. benzoin), commonly known as benzoin resin, is primarily used in various products for flavouring, aromatherapy, and topical therapies. Due to its effects on reducing inflammation and curing wounds, it has long been used in traditional medicine. The adhesive qualities of benzoin tincture allow it to be applied topically. It effectively treats candida and acts as an anti-microbial when combined with black walnut husk. Myrrh gum (Commiphora myrrha (T.Nees) Engl.) fights against yeast and cleanses the blood. Myrrh encourages an appropriate number of "good" bacteria in the vaginal region to avoid yeast overgrowth. Numerous studies have examined the impact of myrrh gums and its oil on a variety of vaginal infections, including trichomoniasis and Candida sp. infections [87].

9.7 Role of herbs in Menstrual issues

According to Ayurveda, menstruation is a bodily cleaning process, and the cycle is thought to last 29 and a half days. According tos Ayurveda, menstrual blood is a by-product of lymph, or rasa dhatu. The rasa depends on a healthy lifestyle that balances nutrition, exercise, and the supplements that we take regularly. Anything that goes beyond a small amount to a certain extent is regarded as a rasa dhatu imbalance sign. According to both the Ayurveda and Chinese systems of medicine, women's health issues are caused mainly by uneven blood circulation to the organs and pelvis. This is one of the most significant health markers for women.

Over the past two centuries, tea made from Rubus idaeus L. (red raspberry) leaves and Rubus occidentalis L. (black raspberry) has been used historically to calm the uterus. The use of the plant and its extract is explained in both the French and British Herbal Pharmacopoeia. Herbal literature documents its usage to ease menstrual cramps and facilitate parturition. However, no conclusion was reached about the efficacy of dosage. A double-blind, randomised, placebo controlled experiment supports the safety of herb usage in pregnancy. These herbs might be used for brief cycles as cooling energetics. A preclinical investigation also substantiated its usage in folklore. Despite its historical usage as a relaxant, several investigations have found that it has a contractile impact on the smooth muscles of the uterus. The alkaloidal metabolite fragrine contributes to such activity [88]. Leonurus japonicas Houtt., a member of the Labiatae family, is a prominent traditional plant in China. This plant is also listed in the nation's Pharmacopoeia. Numerous studies have highlighted its application for a variety of women's conditions. Experimental studies on the ethanol extract of the plant's aerial portion revealed that metabolites such as cyclopeptides and alkaloids caused the uterine smooth muscle to contract. In contrast, the presence of flavonoids inhibited this contraction [89].

For gynaecological problems, various herbal preparations, including tablets, capsules, and soft gels of black cohosh are sold on the US market. This plant contains hormone precursors whose main therapeutic application is the alleviation of premenstrual and menstrual discomforts, particularly those related to menopause. Numerous clinical studies have demonstrated that the preparation is safe and efficient to use in managing menopausal hormones and enhancing quality of life [90].

9.8 Role of herbs in Excessive bleeding (Menorrhagia)

Extensive bleeding is another unavoidable sign of an unhealthy woman's menstrual cycle. A frequent gynaecological ailment, heavy menstrual bleeding (HMB) has a variety of pathophysiological causes and numerous aetiologies. One of the main factors contributing to the low quality of a woman`s life and the lack of iron anaemia in women is heavy menstrual bleeding.

Capsella bursa-pastoris (L.) Medik, often known as shepherd's purse, has been prized as a health food in Asia for millennia and has been identified as having the isothiocyanate sulforaphane. In a randomised clinical investigation, hydroalcoholic extracts of the plant capsule showed promise for reducing menstrual bleeding [91]. Plants containing flavonoids might be the reason for such activity. In a double-blind, randomised, controlled experiment, Punica granatum L. flower reduced menstrual blood loss and decreased the duration of bleeding. Another well-liked traditional plant used in India, China, Africa, Korea, and America is Mimosa pudiaca L. belonging to the family Fabaceae. According to Ayurveda, the root has a bitter and acidic flavor characteristic. Several studies and clinical evidence support the use of an aqueous extract from the plant's root in cases of dysfunctional uterine bleeding. Additionally, the root extract is said to have anti-fertility properties. FSH decreases in the proestrus and estrus periods, keeping the oestrus level high. . The efficiency of the powdered root Mimosa in the oestrous cycle and ovulation is also guaranteed by Valsal et al [92].

9.9 Role of herbs in Dysmenorrhoea

Dysmenorrhoea is another serious concern in women's menstrual cycles. Many women suffer from dysmenorrhea or menstrual cramps. It interferes with everyday activities like other ailments and can be treated with mild herbal treatment. Examples like Wild yam and black cohosh are excellent herbal remedies for this problem. Black cohosh is frequently used to treat menopausal symptoms; however, it may also be effective for PMS issues, including mood swings, irritability, and hot flashes.

9.10 Role of herbs in Pre-menstrual syndrome

Premenstrual syndrome (PMS) is a group of both particular and general symptoms that women experience around the beginning of their menstrual cycle. The imbalance in hormones is the primary cause of this. The woman's health, age, food, and, occasionally, genetics all play a role in its intensity. The current scenario calls for a natural remedy to treat these symptoms because synthetic medications like antidepressants, non-steroidal anti-inflammatory drugs, hormonal contraceptives, etc. include the danger of addiction in addition to adverse effects. Chamomile (scientifically known as Matricaria chamomilla L.) is one of the best herbs for premenstrual mood problems. This plant is native to Europe, Africa, and Asia. The plant's usefulness in treating different menstrual discomforts was demonstrated in a recent doubleblind, controlled clinical trial using chamomile capsules (250 mg of dried chamomile powder). It supports more restful sleep during PMS and helps to reduce anxiety and irritability. The flavonoids and camazolines' components present in the plant responsible to raise progesterone levels and lower anxiety levels, respectively. The presence of molecules with psychostimulant-like action, such as bisabolol oxide A (28%), bisabolol oxide B (17.1%), (Z)-Farnesene (15.9%), and bisabolol, may contribute to situations like poor mood during PMS, according to the authors [93]. The plant's antispasmodic, analgesic, and anti-inflammatory properties might be helping to ease pain, which in turn reduces PMS discomfort [94].

Chesteberry is also effective in treating PMS. It performs various activities, including regulating glandular activity and relieving PMS. It boosts the synthesis of progesterone, which boosts LH's secretion and inhibits FSH. An increase in progesterone to oestrogen may improve many PMS symptoms of discomfort. Due to its action in elevating prolactin, this plant is also used in cases of amenorrhoea and is advantageous in mastalgia. Chesteberry looks to be calming, antispasmodic, and promotes hyperprolactinemia; as a consequence, it alleviates PMS and menopausal symptoms and is beneficial in treating difficulties with the leutal phase. Oenothera biennis L., often known as evening primrose, contains beneficial elements, mostly in the seeds, such as fatty acids, gamma-linolenic acid (GLA), an omega-6 fatty acid sterol, polyphenols, and liphatic alcohols [95]. Such ingredients demonstrated anti-inflammatory properties and were helpful for menstrual cramps. The presence of an omega-6 fatty acid like gamma-linolenic acid (GLA) might help lessen PMS-related breast discomfort, bloating, and irritability. Clinical investigations demonstrated the plant's efficacy in treating both menstruation symptoms and premenstrual syndrome. Hypericum perforatum L., belonging to the family Clusiaceae, is used in several herbal formulations, mainly to treat anxiety, depression, and wounds. Numerous clinical studies on the plant have suggested that it can reduce PMS-related somatic and behavioural symptoms. Echium amoenum Fisch. & C.A. Mey flower decoction is also effective for treating PMS. It appears that a fatty acid by the

name of GLA has a role in the functioning mechanism of the plant part. It may have an antioxidant impact since GLA may contain anti-inflammatory properties [95].

9.11 Role of herbs in Amenorrhoea

The condition in which there is a lack or cessation of menstruation in women of reproductive age is medically referred to as amenorrhea. Stress, deficient fat levels, a poor diet, hormones or medications that interfere with the body's regular hormonal cycles, and many other factors can cause it. The ebb and flow of specific hormones control the cycle of the menses. The formation or shedding of the uterine lining is prevented if oestrogen and progesterone are not released at the proper times and in the right amounts or ratios to one another. Oestrogen levels climb from the start of menstruation until ovulation. Oestrogen should decrease, and progesterone should increase at ovulation when the egg leaves the ovary and is ready for fertilisation. Missed periods and other PMS symptoms can occur if something interferes with or alters this finely calibrated hormonal relay. Tradition holds that if the body were adequately fed, amenorrhoea would not always happen. However, it is also believed that women with little body fat should anticipate quitting their periods since certain sex hormones are fat-soluble and are kept in the body's fat layers. Therefore, there is a possibility that women with a low BMI generate less oestrogen, which may result in an irregular menstrual cycle. However, studies have also shown that hyperandrogenism can cause irregular menstruation.. Numerous foods and substances can rebalance these hormones and trigger menstruation naturally. In most cases, the herbs act as tonics that may be used to treat a variety of premenstrual and menstrual discomforts and can maintain and correct hormonal balance. Many communities, including Dominica's rural areas, do not view menstruation as an issue. These herbs are analgesic, anti-nociceptive, antiinflammatory, muscle-relaxing, anti-spasmodic, anti-coagulant, anti-stress, or other sedative action is the underlying mechanism behind this phenomenon, which lessens the discomfort of menstruation [95].

10. Discussion and Conclusion

Throughout a woman’s life, her health needs evolve, presenting unique challenges at each stage. This review article has extensively examined the role of natural herbs and phytoestrogens in addressing these needs, highlighting their influence on hormonal balance and overall wellness. Phytoestrogens interact with estrogen receptors, notably estrogen receptor beta (ERβ), exhibiting anti-proliferative and anti-inflammatory properties. These interactions result in the inhibition of inflammation and proliferation, thereby alleviating menopausal symptoms. The mechanisms also involve alterations in DNA methylation and histone modification, influencing gene expression via epigenetic pathways. This can support fertility improvement and hormone replacement therapy (HRT). Phytoconstituents like flavonoids, terpenes, and polyphenols play a crucial role in these processes by lowering oxidative stress and inhibiting cell damage. Herbs like chasteberry, black cohosh, red clover, garlic, ginger, turmeric, and green tea suppress pro-inflammatory cytokines, inhibit NF-kB, and activate Nrf2. This leads to better bone health, which is advantageous for conditions following menopause. Herbs that influence the PI3K/AKT and MAPK pathways, such as cinnamon and barberry, can also control cell proliferation and trigger apoptosis in diseases like polycystic ovarian syndrome (PCOS).

Functional foods high in fiber, calcium, and vitamin B, like sunflower seeds, almonds, oats, flaxseeds, chia seeds, and soy, can help ease cramps. Considered phytoestrogenic, fatty acids such as omega-3, lignans, and isoflavones lower testosterone levels, improve the severity of dysmenorrhea and premenstrual syndrome (PMS), and support hormone replacement therapy (HRT). Nevertheless, as phyto-progesterone has two roles—that of an agonist and an antagonist of estrogen—high levels of it may cause breastfeeding mothers to be concerned.

Other important phytoconstituents that are estrogenic and stimulate steroidogenesis and folliculogenesis are petroside, acetylpinoresinol, ferulic acid, and flavone glycosides. The functions of iron, magnesium, zinc, and fiber are vital for nursing mothers. In addition to amino acids like glutamic acid, phytoestrogens like genistein, daidzein, and coumestrol are essential for fertility because they thicken the uterine wall, have anti-inflammatory qualities, boost mucosal secretion, and facilitate implantation—all of which improve fertility.

Furthermore, herbs with adaptogenic qualities, such as ashwagandha, may aid in hormone balance. Antioxidant and anti-inflammatory properties of phytoconstituents like ursolic acid, oleanolic acid, and quercetin have been related to a decrease in bone resorption. the plants Thyme, Sage, and Rosemary work well together to promote bone mineral density. Additionally, phytoconstituents such as apigenin, quercetin, resveratrol, and epigallocatechin gallate have demonstrated promise in the fight against breast cancer, and substances like chamazulene, which elevate progesterone, can lessen anxiety. This review concludes by highlighting the potential of phytoestrogens and herbal medicine in treating a range of women's health conditions and fostering hormonal balance. Further research is necessary to ensure the safety and efficacy of these natural remedies, as they offer a comprehensive approach to women's health when combined with conventional treatments.

Authorship Contribution Statement

Data collection: Silpi Chanda, Lucy Mohapatra; Design of the study: Silpi Chanda; Analysis and interpretation of the data: Silpi Chanda, Drafting the manuscript: Silpi Chanda, Lucy Mohapatra and Manisha Singh; Critical revision of the manuscript Silpi Chanda, Lucy Mohapatra and Manisha Singh

Declaration of Author Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The author not received any financial support either from internal or external organization.

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Figure Legends

Figure 1: Mechanism of phytochemicals in blocking progression of PCOS

Figure 2: Plants and phytoconstituents effective in the prevention of the prognosis of breast cancer in females