

Potential Herbs for Management of Polyendocrine Metabolic Ovarian Syndrome and Clinical Studies

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Abstract

A common medical illness called Polyendocrine Metabolic Ovarian Syndrome (PMOS) is characterised by both metabolic and reproductive issues. PMOS is a complex, highly prevalent endocrine & metabolic disorder. PMOS characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology. PMOS affects an estimated 10-13% of reproductive aged women. It is estimated that upto 70% of women is affected with PMOS worldwide. Although a variety of conventional pharmaceutical interventions are currently used to manage Polyendocrine Metabolic Ovarian Syndrome (PMOS), their long-term efficacy is often constrained by poor patient compliance and adverse side effects. Consequently, there has been a notable surge in patient interest toward complementary and integrative healthcare models. Historically, traditional medical systems—most notably Traditional Persian Medicine (TPM) and Traditional Chinese Medicine (TCM)—have heavily relied on botanical therapies to manage reproductive and gynecological disorders. For centuries, diverse cultures globally have utilized specific medicinal herbs to alleviate the complex endocrine and metabolic symptoms associated with PCOS. The aim of this study is to conduct a comprehensive global review of the various herbal remedies and botanical formulations utilized in the management and therapeutic care of individuals with PCOS.

Compiling data from multiple clinical and preclinical studies reveals that various botanical therapies effectively modulate the multifaceted symptoms of PMOS. In particular, evidence highlights the therapeutic potential of *Cinnamomum verum*, *Trigonella foenum-graecum* L., and *Vitex agnus-castus* in mitigating metabolic complications such as obesity, impaired insulin sensitivity, and dyslipidemia. Furthermore, these specific medicinal plants demonstrate a capacity to restore endocrine balance by downregulating pathways associated with hyperandrogenism.

To summarize, botanical interventions offer a promising, multi-faceted therapeutic approach to mitigating the clinical manifestations of PMOS. However, while these natural remedies demonstrate considerable potential, additional rigorous clinical and laboratory research is essential to fully elucidate their precise molecular mechanisms, determine standardized dosing protocols, and confirm their long-term safety profiles.

1. INTRODUCTION

While historically classified as **Polycystic Ovary Syndrome (PCOS)**, a recent international consensus published in The Lancet has formally renamed the condition to **Polyendocrine Metabolic Ovarian Syndrome (PMOS)**. This updated terminology accurately transitions the clinical focus away from a cyst-centric ovarian model and toward the multi-systemic endocrine and metabolic dysfunction—such as insulin resistance and hyperandrogenism—that truly drives the pathogenesis of the disorder.[1]

Polyendocrine Metabolic Ovarian Syndrome (PMOS) is a widespread endocrine and metabolic disorder that profoundly disrupts both the female reproductive system and overall metabolic homeostasis. Clinically, the condition is primarily characterized by hyperandrogenism, chronic ovulatory dysfunction (anovulation), and irregular or infrequent menstrual cycles. According to the Rotterdam criterion, 28% of women have polycystic ovaries, compared to 10% who have PMOS. There is no one effective treatment for this disorder because the pathophysiology is still unclear, despite the fact that it likely has epigenetic roots [2,3].

For women with Polyendocrine Metabolic Ovarian Syndrome (PMOS), several pharmaceutical treatments are available, but complementary therapies might offer advantages due to concerns about side effects, patient adherence to long-term medication, limited efficacy, and specific contraindications [4].

Currently, oral contraceptives are a common treatment for PMOS. Their mechanism involves reducing free androgen levels in the blood and suppressing gonadotropin production. To induce ovulation, common

medications include clomiphene citrate, a non-steroidal selective estrogen receptor modulator (SERM), and letrozole, an aromatase inhibitor. While clomiphene citrate has been the traditional first-line treatment, emerging evidence suggests letrozole may be both safer and more effective for both the mother and the fetus [5,6].

Metformin is often prescribed for PMOS patients to address insulin resistance, a key factor in the Rotterdam criteria. Managing hyperandrogenism and insulin resistance can lead to overall improvements in hormonal, metabolic, and reproductive functions [7].

The number of adults who benefit from complementary therapies has increased recently, with about 40% of adults using them currently. Comparatively more women than men use complementary medicine, particularly for self-care [8].

According to research, compared to 37% and 28% of women who are pregnant or recently gave birth, 40% of women who are not pregnant or recently gave birth use complementary medicine [9].

While these pharmaceutical interventions are highly effective at mitigating specific symptoms, none are without physiological trade-offs. Each class carries a distinct profile of adverse drug reactions (ADRs)—ranging from transient gastrointestinal distress and fluid imbalances to severe, albeit rarer, risks like venous thromboembolism or teratogenicity. In clinical practice, these side effects frequently present a double-edged sword: they not only compromise patient quality of life but also serve as a primary driver for treatment non-compliance and premature discontinuation. [10, 11]

Side effects:

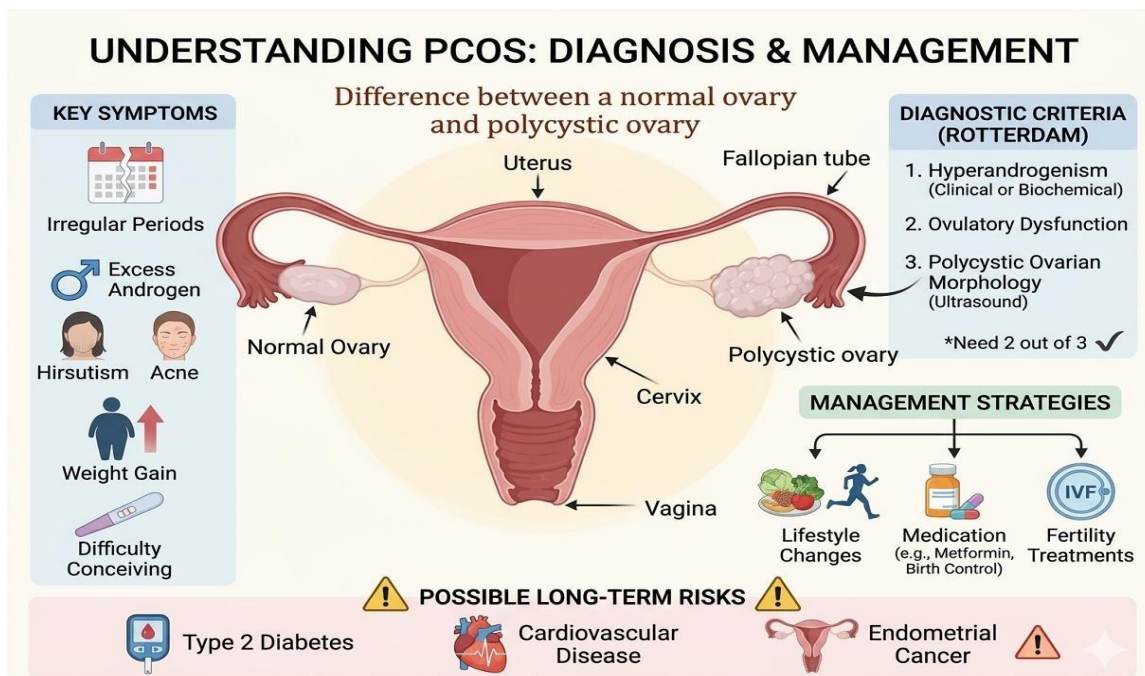
Medication Type	Used for	Most Common Side Effects	What Needs to be Monitored
Metformin	Lowering insulin, blood sugar, & weight	Stomach cramps, diarrhea, nausea, metallic taste	Kidney function, Vitamin B12 levels
Birth Control Pills	Regulating periods, acne, & hair growth	Mood swings, headaches, spotting, tender breasts	Blood pressure, blood clot risks
Spirolactone	Reducing excess face/body hair & hair loss	Dizziness, frequent urination, spotting	Potassium levels, strict pregnancy prevention
Fertility Meds (Letrozole / Clomiphene)	Stimulating ovulation to get pregnant	Hot flashes, bloating, mood swings	Ovarian swelling, multiple pregnancies (twins+)

2. HISTORICAL CONTEXT OF ALTERNATIVE INTERVENTIONS

Historical roots of botanical therapies trace back significantly to traditional Persian and Chinese medical systems, which pioneered the use of herbal interventions as complementary treatments. Within traditional Chinese

3. INFERTILITY AND OVULATORY DYSFUNCTION

Despite the clinical importance of infertility, dedicated research on the subject remains relatively limited. However, several botanical interventions show promise in managing ovulatory disorders. For instance, *Trigonella*



medicine, herbal formulations have a well-established history of addressing gynecological complications and subfertility specific to PMOS phenotypes. Similarly, in classical Persian medical paradigms, irregular or infrequent menstruation (oligo-amenorrhea) was recognized as a hallmark clinical indicator of what is modernly classified as PMOS. This historical recognition prompted the documentation and utilization of numerous medicinal plants specifically targeted at regulating menstrual frequency and restoring normal ovulatory cycles [12].

In this study, we reviewed various herbal medicine modalities for treating PMOS and looked at their effectiveness and mechanisms. Additionally, we investigated the direct impacts of herbal extracts on PMOS patients fertility, menstrual irregularities, hyperandrogenism, and metabolic disorders.[13] The cause of PCOS is still unknown. Numerous symptoms, including hormonal imbalance, impaired reproduction, and metabolic disorders, are displayed by this syndrome. The primary finding in PCOS is ovarian dysfunction. The results showed that a variety of herbal remedies had therapeutic effects on various PCOS aspects.[14]

These herbs may be beneficial for conditions related to excess androgen, such as hirsutism, lipid metabolism problems, obesity, insulin resistance, hyperinsulinemia, irregular menstruation, and ovarian dysfunction [15, 16].

4. ENDOCRINE REGULATION AND MENSTRUAL CYCLE STANDARDIZATION

Botanical therapies demonstrate substantial efficacy in modulating menstrual regularity, stabilizing hormone profiles, and managing reproductive disorders. For instance, long-term administration of cinnamon bark supplements, spanning at least six months, has been shown to restore regular ovulatory cycles. As a bioactive intervention, cinnamon lowers anti-Müllerian hormone (AMH) levels while presenting a superior side-effect profile compared to metformin.

foenum-graecum L. (fenugreek) has been demonstrated to improve ovarian function and restore menstrual regularity, which may subsequently enhance overall fertility. Similarly, *Linum usitatissimum* L. (flaxseed) powder and the traditional formula *Danzhi xiaoyao* have shown comparable positive effects on reproductive outcomes. Additionally, *Grifola frondosa* (maitake mushroom) has been noted for its ability to stimulate ovulation and support fertility [17].

Other medicinal herbs appear to influence fertility primarily when utilized as adjuvant therapies alongside conventional pharmaceuticals. For example, combining *Cimicifuga racemosa* (black cohosh) with clomiphene citrate can significantly boost fertility potential in patients diagnosed with PMOS. Conversely, alternative data indicates that prolonged use of *Cimicifuga racemosa* might act effectively as a phytoestrogen, potentially bypassing the requirement for clomiphene altogether [18].

In contrast, combinations of letrozole and berberine (*Coptidis rhizoma*) have failed to yield substantial improvements in live birth or pregnancy rates [19]. However, when berberine is paired with metformin, PMOS patients undergoing in vitro fertilization (IVF) exhibit highly encouraging clinical outcomes [20].

Furthermore, when cinnamon is co-administered with *Glycyrrhiza*

spp., *Paeonia lactiflora* Pall., and *Hypericum perforatum* L., a notable decrease in luteinizing hormone (LH) occurs, though no major impacts on follicle-stimulating hormone (FSH) or testosterone levels have been observed. These regulatory effects on menstrual and hormonal health appear consistent across various forms of cinnamon, including powders, extracts, and standardized supplements [21].

Beyond cinnamon, *Trigonella foenum-graecum* L. has proven highly effective in regulating menstrual cycles alongside delivering promising reproductive outcomes. In traditional East Asian medicine, the Chinese formulation *Tian gui* has demonstrated success in mitigating

hyperandrogenism by reducing circulating testosterone. Conversely, the Japanese herbal formula Unkei-to normalizes menstrual cycles via an alternative pathway: significantly depressing LH levels while concurrently elevating estradiol concentrations. Broadly, historical data indicates that the structured, routine consumption of multi-herb Chinese formulations significantly stabilizes menstrual patterns and enhances patient-reported well-being [22].

5. DIVERSE BOTANICAL IMPACTS ON HORMONAL BIOMARKERS

Research into *Linum usitatissimum* L. indicates it can effectively standardize menstrual cycles without inducing hirsutism or altering foundational hormone levels. In contrast, the regular consumption of marjoram tea actively improves overall hormonal status. Comparative clinical assessments reveal that *Vitex agnus-castus* achieves menstrual cycle regulation at an efficacy rate comparable to oral contraceptives, yet with a significantly lower incidence of adverse side effects; notably, *Vitex agnus-castus* does not alter baseline prolactin or testosterone levels. Additionally, interventions utilizing *Nigella sativa* L., *Apium graveolens* L., and *Pimpinella anisum* L. have successfully regulated cycles and lowered LH concentrations in PMOS patients experiencing oligoamenorrhea.[23,24]

6. ANTIANDROGENIC EFFECTS AND HIRSUTISM MANAGEMENT

Literature exploring the explicit antiandrogenic properties of herbs and their direct impact on hirsutism remains limited. However, targeted usage of spearmint tea, *Asparagus racemosus* Willd. *Anethum graveolens* L., and *Matricaria chamomilla* L. has been shown to decrease total testosterone and reduce the clinical severity of hirsutism. While both *Camellia sinensis* L. [51] and *Tian gui* are documented to lower systemic testosterone, data regarding their direct therapeutic effect on hirsutism is currently absent, underscoring the need for further clinical investigation.[25]

Finally, investigations into soy supplementation have yielded mixed outcomes. An 8-week course of soy showed no measurable impact on LH, FSH, or estradiol levels. Conversely, an extended 12-week intervention demonstrated a measurable, positive shift in hormonal status. Additionally, the phytoestrogen wood betony presents a viable alternative to medroxyprogesterone for managing abnormal uterine bleeding (AUB) secondary to PMOS [26].

7. BOTANICAL INTERVENTIONS FOR INSULIN RESISTANCE AND METABOLIC DYSFUNCTION

Clinical and pharmacological investigations into herbal therapies have yielded promising outcomes in managing the metabolic dysfunctions associated with Polyendocrine Metabolic Ovarian Syndrome (PMOS). For instance, a combination formula featuring cinnamon, *Glycyrrhiza* spp., *Paeonia lactiflora* Pall., and *Hypericum perforatum* L. demonstrated the ability to lower body mass index (BMI) and circulating insulin levels, though it exerted no measurable effect on fasting blood sugar (FBS) [27].

Similarly, the administration of *Nigella sativa* L. and *Cinnamomum zeylanicum* Blume resulted in significant reductions in serum insulin, triglycerides, total cholesterol, and low-density lipoprotein (LDL) cholesterol. Notably, these metabolic improvements were observed across all forms of *Cinnamomum* cassia, including standardized supplements, crude powder, and concentrated extracts. However, when the therapeutic duration extended beyond 12 weeks, the supplement form demonstrated

superior efficacy. Long-term interventions spanning six months with *Cinnamomum burmannii* and *Lagerstroemia speciosa* L. also led to significant reductions in patient BMI [28].

8. VARIABLE EFFICACY OF TEAS AND SPECIFIC EXTRACTS

The literature presents contrasting data regarding the effectiveness of various green tea species in treating metabolic abnormalities in PMOS patients. Research indicates that the co-administration of *Camellia sinensis* L. and *Punica granatum* L. juices can effectively lower serum insulin, decrease insulin resistance, and reduce clinical markers such as waist circumference, body weight, and overall BMI. Conversely, isolated consumption of Chinese green tea demonstrated no therapeutic impact on lipid profiles, BMI, or serum insulin concentrations.[29]

Aside from teas, a four-month course of *Nigella sativa* L. has been shown to successfully lower insulin, reduce triglyceride and cholesterol levels, and improve overall insulin resistance indices. Furthermore, the therapeutic impacts of *Tian-gui*, berberine, and *Vitex agnus-castus* on metabolic parameters were found to be comparable to the conventional pharmaceutical metformin.[30]

9. DIETARY COMPONENTS AND MULTI-HERB FORMULATIONS

Phytoestrogenic interventions, specifically soy isoflavone supplementation sustained for at least 12 weeks, successfully mitigated metabolic dysfunction by decreasing triglyceride levels and easing insulin resistance. Beyond isolated herbal extracts, specific dietary inclusions have shown measurable benefits. Consuming red onions (*Allium cepa* L.), flaxseed oil, walnuts, and almonds systematically aids in improving lipid profiles and alleviating metabolic strain in individuals with PMOS. Finally, both marjoram tea and the traditional multi-herb formula *Danzhi xiaoyao* have proven effective in lowering fasting serum insulin levels [31].

10. MITIGATION OF OXIDATIVE STRESS IN PCOS PATHOLOGY

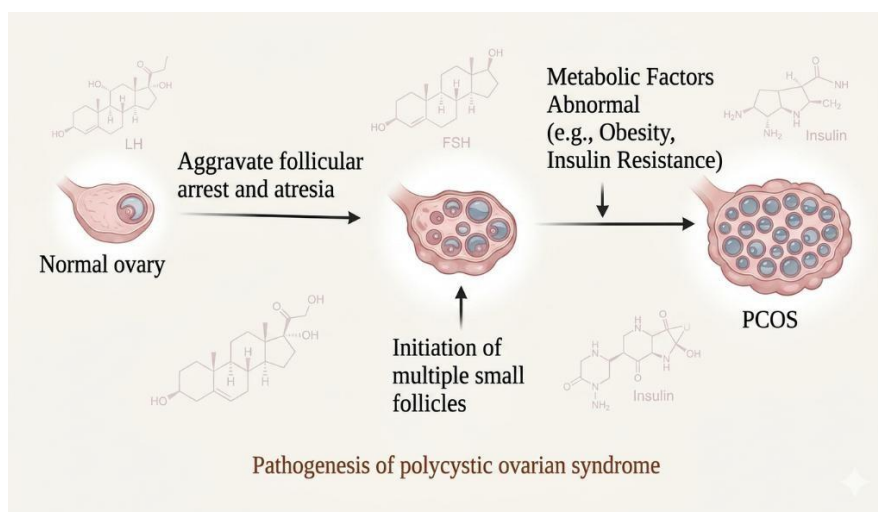
Attenuating oxidative stress represents a primary biochemical mechanism driving the therapeutic efficacy of various botanical interventions in Polyendocrine Metabolic Ovarian Syndrome (PMOS). While a substantial body of existing literature identifies antioxidant action as a central therapeutic pathway, comprehensive investigations into the precise molecular dynamics of this phenomenon remain relatively sparse.

Clinical data demonstrates that oral supplementation with cinnamon significantly elevates overall serum antioxidant capacity while concurrently depressing levels of malondialdehyde (MDA), a prominent marker of lipid peroxidation. At the tissue level, the administration of the traditional Chinese formula *Cangfu Congxian* decoction has been shown to alleviate oxidative strain within ovarian granulosa cells by actively suppressing the generation of destructive oxygen radicals.

Furthermore, systemic oxidative stress can be modulated through dietary interventions such as soy supplementation, which operates via two distinct biochemical pathways:

A. Downregulation of Lipid Peroxidation: By significantly reducing circulating levels of malondialdehyde.

B. Upregulation of Endogenous Antioxidants: By elevating total glutathione (GSH) concentrations, thereby reinforcing the body's cellular defense mechanisms [32].



11. OVARIAN MORPHOLOGY AND ULTRASOUND PARAMETERS

Given that ultrasound criteria are fundamental to identifying PMOS, evaluating how herbal interventions alter sonographic outcomes provides valuable clinical insight. For instance, two independent trials investigating the therapeutic efficacy of *Trigonella foenum-graecum* L. in PMOS patients noted a marked reduction in both ovarian dimensions and total cyst count. Parallel down-regulatory effects on ovarian volume and follicular counts were documented following the use of *Linum usitatissimum* L. [33].

In alignment with these observations, a three-month course of Tian-Gui capsule therapy was shown to successfully decrease ovarian volume. Furthermore, Unkei-to therapy yielded measurable improvements in the maturation and tracking of dominant follicles via ultrasound. A separate eight-week regimen of wood betony (*Stachys lavandulifolia*) similarly led to a substantial regression in the typical polycystic appearance of the ovaries [34].

When evaluating multi-targeted effects, the administration of *Asparagus racemosus* Willd. and *Anethum graveolens* L. not only reduced overall ovarian volume but also promoted an increase in endometrial thickness. Conversely, while an investigation into the effects of *Cinnamomum verum* J. Presl on PMOS patients demonstrated clear improvements in menstrual regularity,

endocrine profiles, and metabolic markers, it failed to produce any statistically significant changes in sonographic parameters [35].

12. SAFETY AND TOLERABILITY PROFILES

A notable limitation across the majority of reviewed literature is the lack of precise reporting regarding the adverse effect profiles of these herbal interventions. However, available data suggest that severe complications are rare, and the documented side effects are generally minimal. For context, three independent trials evaluating *Vitex agnus-castus* noted few adverse events. Similarly, when investigating *Lagerstroemia speciosa* L., *Cinnamomum burmannii*, and berberine, researchers found that their tolerability profiles were significantly superior to that of metformin, the standard pharmaceutical comparator. Furthermore, *Stachys lavandulifolia* (wood betony) was reported to precipitate fewer side effects than medroxyprogesterone acetate. In a trial involving 100 patients with PMOS, the adverse event profile of *Cimicifuga racemosa* was found to be comparable in safety to clomiphene citrate [36].

Longer-term data support these safety findings; a study tracking 664 patients over six months demonstrated that a combination of letrozole and berberine did not significantly alter the incidence or severity of side effects. Additionally, no clinical complications were reported following an eight-week regimen of spearmint tea or a three-month course of *Cinnamomum cassia*. While evaluating *Grifola frondosa*, only a negligible number of patients reported minor epigastric discomfort or mild pain [37].

Gastrointestinal symptoms represent the most frequent, albeit mild, complaints. For instance, single-agent berberine administration was associated with transient reports of nausea, constipation, and minor lower gastrointestinal upset. In a larger cohort survey of 122 patients evaluating a combination of cinnamon, *Glycyrrhiza* spp., *Paeonia lactiflora*, and *Hypericum perforatum* L., only two individuals experienced complications, one of which manifested as abnormal uterine bleeding. Crucially, any side effects associated with berberine, cinnamon, and *Grifola frondosa* completely resolved following a brief, temporary cessation of the therapy [38].

13. DISCUSSION

Polyendocrine Metabolic Ovarian Syndrome (PMOS) is a complex, multi-organ disorder characterized by diverse clinical manifestations, an elusive pathophysiology, and severe long-term complications. Effective management of PMOS necessitates a comprehensive, multidisciplinary strategy. Because conventional pharmacotherapies often present suboptimal efficacy coupled with unfavorable adverse effects, there is a critical need to explore more efficacious therapeutic alternatives that offer superior safety profiles. Consequently, medicinal plants have attracted widespread interest due to their rich composition of diverse bioactive compounds and lack of severe toxicities.

Extensive literature demonstrates that a broad spectrum of botanical therapies can successfully modulate both clinical and biochemical markers of PMOS, including lipid profiles, anthropometric indices, endocrine status, insulin resistance, menstrual irregularities, and ovulatory infertility. Although these herbs have been deployed either as monotherapies or as adjuvants alongside standard pharmaceutical agents, a review of historical data indicates that most applications have relied on individualized or isolated use.

In this context, the present study comprehensively evaluates the therapeutic potential of various medicinal plants in the management of PMOS. Collectively, evidence suggests that specific species—including *Foeniculum vulgare* Mill., *Vitex agnus-castus*, *Linum usitatissimum* L., and

various *Cinnamomum* species—exert beneficial regulatory actions on the menstrual cycle while optimizing metabolic and hormonal metrics.

While the exact primary mechanisms driving the therapeutic benefits of these medicinal plants remain to be fully elucidated, they appear to work synergistically by restoring the homeostatic balance of follicle-stimulating hormone (FSH), luteinizing hormone (LH), and testosterone, alongside mitigating metabolic dysfunction and oxidative stress. For example, *Vitex agnus-castus* has been shown to elevate midluteal progesterone levels, marginally suppress FSH release, and stimulate LH secretion, thereby enhancing fertility and restoring menstrual regularity. These actions are mediated through the inhibition of dopamine type II receptors, which subsequently triggers an increase in cyclic adenosine monophosphate (cAMP) and a downstream reduction in prolactin levels.[39].

At the molecular level, bioactive components derived from cinnamon promote glucose uptake, enhance insulin sensitivity, and stimulate glycogen synthesis. They achieve this by directly activating insulin receptors and preventing their inactivation via dephosphorylation. Furthermore, antioxidant-dense botanicals such as celery and cinnamon shield ovarian tissue from oxidative damage by suppressing lipid peroxidation, reactive oxygen species (ROS), superoxide dismutase (SOD), and glutathione peroxidase (GPx) activity.

Other botanicals exert targeted metabolic and endocrine control. *Trigonella foenum-graecum*

L. (fenugreek) diminishes insulin resistance and controls blood glucose levels by inhibiting the enzymatic actions of alpha-amylase and sucrase. Additionally, fenugreek extracts lower

circulating lipids and hepatic cholesterol storage by restricting intestinal carbohydrate reabsorption and promoting the excretion of endogenous sterols.

Regarding hormonal regulation, fenugreek constituents like linoleic acid suppress hypersecretion of LH by reducing the release of gonadotropin-releasing hormone (GnRH), nitric oxide, and leptin. Interestingly, *Trigonella foenum-graecum* L. seed extracts have been observed to increase progesterone concentrations in PMOS-induced murine models.

Other plants modify receptor signaling; for instance, *Cimicifuga racemosa* suppresses LH hypersecretion via the selective inhibition of alpha-estrogen receptors in PCOS patients.

Soybeans (*Glycine max*) also offer significant metabolic advantages. Soy components can ameliorate markers of insulin resistance by inhibiting protein tyrosine kinase, an enzyme that regulates insulin secretion from pancreatic beta-cells. Concurrently, soy reduces lipogenesis and lowers overall lipid synthesis by stimulating lipolysis (fat breakdown) and restricting the conversion of excess glucose into adipose tissue.

Furthermore, soy isoflavones act as phytoestrogens, binding to estrogen receptors to modulate the expression of critical steroidogenic enzymes, including 3-beta-hydroxysteroid dehydrogenase (3-beta-HSD) and P450 aromatase.

Ultimately, integrating selected botanicals, such as *Cimicifuga racemosa*, as adjuvants alongside conventional medical therapies like letrozole, metformin, and clomiphene citrate offers clear clinical advantages. These combined approaches yield significantly improved ovulation tracking, higher clinical pregnancy and live birth rates, increased endometrial thickness, and enhanced menstrual regularity, while presenting only mild, completely transient side effects.[40]

14. CONCLUSION

Based on available clinical data, the current study suggests that a number of medicinal plants, including *Vitex agnus-castus*, cinnamon species, *Cimicifuga racemosa* (L.) Nutt., and *Trigonella foenum-graecum* L., may be useful in the treatment of PCOS. However, there are certain limitations, like small sample sizes and short study durations, which make their effectiveness uncertain. Therefore, to assess the safety and pharmacological mechanisms of herbal medicines in PCOS, more preclinical and clinical studies with a larger sample size and a more structured methodology are required.

The specifications of the medicinal plants:

Plant	Scientific name	Family	Effective compound(s)
Aloe vera	<i>Aloe arborescens</i>	Liliaceae	Polysaccharide compounds
Chamomile	<i>Chamomilla matricaria</i>	Asteraceae	Flavonoids and antioxidants such as gallic acid, kamazelin, farnesene, matricin, coumarin derivatives, apigenin, and choline
Chaste tree	<i>Vitex agnus - castus</i> L	Verbenaceae	Flavonoids, aromatase enzymes
Cinnamon	<i>Cinnamomum zeylanicum</i>	Lauraceae	Phosphatidylinvestyl 4-kinase

Ginseng	Panax ginseng	Araliaceae	Glutathione and superoxide dismutase
Stachys	Stachys lavandulifolia	Lamiaceae	Flavonoid epigenin
Fennel	Foeniculum vulgare	Apiaceae	Trans anethole-, photoanethole, estragole, fenchine, and P-anisaldehyde Dianethole
Liquorice	Glycyrrhiza glabra L	Fabaceae	Glycyrrhiza
Flax	Linum usitatissimum	Linaceae	Lignan
Black cohosh	Cimicifuga racemosa	Black Cohosh	The primary active constituents are Flavonoids and triterpenses such as 27-deoxyactein.
N- acetylcysteine	N-acetylcysteine	Amino acids	Sulfhydryl
D-chiro- inositol	D-chiro-inositol	Inositols	D-chiro-inositol

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