

A Systematic Review: Ayurvedic Herbal Medicine for Women with Polycystic Ovary Syndrome [†]

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Abstract: The endocrine disorder polycystic ovarian syndrome (PCOS) is complicated. In India, two out of every ten women have PCOS. PCOS can also be identified with a polycystic ovary morphology and an ovulatory hyperandrogenism. PCOS, defined as one of the most common female endocrine diseases, affects about 20–25% of women of reproductive age, and is thought to be one of the primary causes of female infertility. Metabolic abnormalities, irregular periods, hypertension, and increased insulin levels are more prone to occur in women with PCOS. In addition, there are more sub-follicular cysts and increased androgen production, including testosterone from the ovaries. Low vitamin levels in PCOS women place them at a high risk for developing severe COVID-19, a risk that may be increased by limited sun exposure brought on by COVID-19 quarantine measures. Therefore, there is a greater need for the public awareness of PCOS. PCOS is a treatable illness that can be treated with safe and effective natural remedies, including the use of various herbs and seeds. To decrease the cost, length, and side effects of current treatments, polyherbal formulations must be developed based on the aforementioned variables. By altering a woman's diet, exercise, doing yoga asanas, and altering her lifestyle, PCOS can be controlled. An effort has been made to review the utilization of natural remedies for PCOS treatment.

Keywords: PCOS; hyperandrogenism; herbs; seeds; yoga asanas



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1. Introduction

According to the WHO (World Health Organization), 116 million women worldwide, or approximately 3.4 percent, have PCOS [1]. Polycystic ovarian syndrome (6.5–6.7%) is the most common endocrinopathy condition diagnosed in premenopausal women. Polycystic ovarian syndrome, first identified by Stein and Leventhal in 1935, is linked to chronic oligoanovulation, polycystic ovarian morphology, as well as psychological and metabolic abnormalities [2]. Acne, alopecia, hirsutism, obesity, and other related illnesses are frequently observed in women with PCOS due to the high levels of androgens present in their bodies [3]. Furthermore, prior studies in this area have shown that PCOS causes numerous physiological alterations in women's ovaries. According to American studies, 15% of women have type 2 diabetes mellitus (type 2 DM) and cardiovascular disease, which over time contributed to the emergence of PCOS symptoms throughout their reproductive years. [4]. According to twin and genomic research, PCOS, especially hyperandrogenism, is highly heritable. The most trustworthy PCOS gene candidate is a member of the TGF- β superfamily that codes for the extracellular matrix protein fibrillin 3, which is the most reliable PCOS gene candidate [5]. Traditional herbal remedies are receiving a lot of attention in discussions regarding global health. Promotional, preventative, curative, and rehabilitative roles for traditional medicine have been established [6–8]. The advantage of herbal therapy over conventional therapy is that it is safer with fewer side effects, and

the presence of multiple active compounds in medicinal herbs provides a potentiating effect [9,10]. Newly established rat PCOS models have since been developed and validated. These studies provide novel insights into the nature of chronic anovulation and polycystic ovaries. However, animal models of chronic anovulation and PCOS may not fully replicate the reproductive events observed in the human condition [11]. The goal of this study was to analyze the mechanism of action of plants that exhibit various pharmacological effects relevant to PCOS complications in order to increase their therapeutic acceptability and explore several common herbal and polyherbal formulations for PCOS.

1.1. Types

PCOS is a hormone-related disorder and affects irregular periods. PCOS is categorized into four main types:

1. Insulin-resistant PCOS;
2. Inflammatory PCOS;
3. Post-pill PCOS;
4. Hidden cause of PCOS.

1.2. Organs Involved in PCOS

1. Ovary—the female gonad organ presents at either side of the uterus;
2. Adrenal gland—the gland which is placed just above both of the kidneys;
3. Pancreas—the gland which produces insulin in our body;
4. Pituitary gland—the gland just below the brain, which is responsible for hormone control.

In PCOS, the ovaries produce more androgen, which inhibits the maturation of ovarian follicles. Anovulation results from an improperly formed and unreleased ovum. Therefore, if a woman has PCOS, she will have trouble getting pregnant as her ovum is unavailable [12].

1.3. Symptoms of PCOS [13–15]

The symptoms of PCOS can get worse if one is overweight or obese. While these symptoms can be Absent periods, insulin resistance, ovarian cysts, irregular periods, weight gain, acne, as shown in Figure 1.

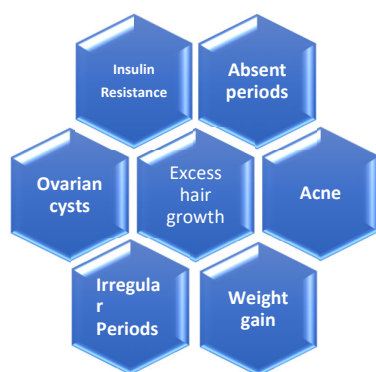


Figure 1. Symptoms of PCOS.

1.4. Causes of PCOS [14]

- Gene defect perturbs the biochemical pathway & leads to dysfunction of an ovary
- Contraceptive pills;
- Strong stimulation in adrenals in childhood;
- Raised insulin levels;
- Hormonal imbalance and stress.

1.5. Histological Features of PCOS

- (1) Whole ovarian hypertrophy, indicated with a thickened capsule ($>100\ \mu$);
- (2) Increased number of sub follicular cysts;
- (3) Scarcity of corporeal lutea or albicantia, hyperplasia, and fibrosis of the ovarian stroma [16].

1.6. COVID-19 Infection in PCOS Women

Obesity, hypertension, type 2 diabetes, metabolic syndrome, ethnic minority group, high cytokine level, high androgen level, and low vitamin D levels are all common risk factors for PCOS severity and cardiometabolic illnesses.

Vitamin D levels have been linked to the severity of several PCOS symptoms, including high testosterone, insulin resistance, and cardiometabolic disease.

Notably, according to statistical analysis data, vitamin D supplementation may significantly reduce total testosterone and C-reactive protein circulating levels in PCOS women.

1.7. Necessity to Study PCOS

Early diagnosis and treatment help prevent long-term complications, such as infertility, metabolic syndrome, obesity, diabetes, and heart disease as shown in Figures 2 and 3.

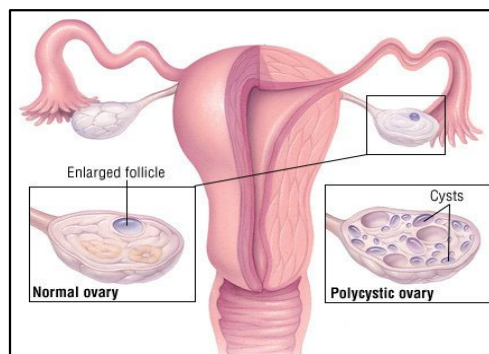


Figure 2. Polycystic ovary.

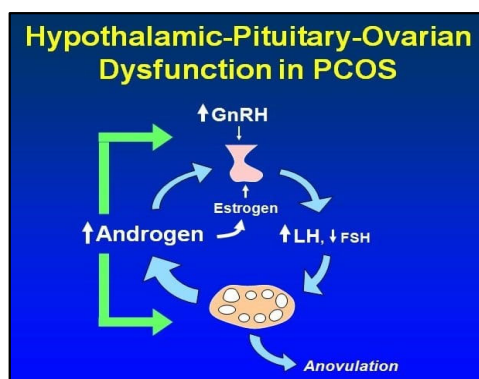


Figure 3. Hypothalamus involvement in PCOS.

In India, two out of every ten women have PCOS, according to a study by the PCOS Society. Overall, six teenage girls are diagnosed with PCOS out of every ten women. According to a study by the AIIMS department of endocrinology and metabolism, PCOS affects 20–25% of women of reproductive age. Although 60% of PCOS-afflicted females are obese, 35–50% have fatty livers. 70% of people have insulin resistance, 60% to 70% have elevated testosterone levels, and 40% to 60% have glucose intolerance, respectively. When compared to allopathy, ayurveda and homoeopathy are considered to be the most effective therapy for managing PCOS [2].

2. Genetic Propensity

There have been discussions on genes including CAPN10, cytochrome family p450, the insulin gene, AR, FTO, and FSHR. Recent research involving over 30,000 women has suggested that genetics may contribute to the development of PCOS [17].

2.1. Insulin Level

The body may create more insulin if cells become less responsive to the actions of insulin, which could raise blood sugar levels.

2.2. Excess Androgen

High levels of androgen cause high levels of hirsutism and acne, and they are produced by the ovaries [18].

3. Ayurvedic Herbal Remedies Available for PCOS

Ayurvedic medicine uses a multifaceted strategy to:

- Correct the hormonal imbalance;
- Treat obesity and avoid high cholesterol levels;
- Treat insulin resistance.

3.1. Aloe [19]

Synonym(s): *Kumari mussbar*.

Biological source: Dried latex of leaves of various species of aloes, mainly *Aloe barbadensis*.

Family: *Liliaceae*.

Part(s) used: Leaves and juice.

Aloe vera has been discovered to have “antimicrobial”, “anti-carcinogenic”, “anti-viral”, “immunomodulatory”, “anti-oxidant”, “anti-inflammatory”, “skin protecting”, and “wound healing” qualities, in addition to managing PCOS and being antidiabetogenic as shown in Figure 4.



Figure 4. Aloe.

Active components with its properties as shown in Table 1. Aloe vera contains 75 potentially active constituents like vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids.

Table 1. Functional compounds of aloe vera.

Compounds	Derivatives/Types
1. Vitamins	Vitamins A and C, thiamine, niacin, riboflavin, Vitamin B12, choline, and folic acid [20]
2. Enzymes	Amylase, lipase, carboxypeptidase, and bradykinase [21,22]
3. Sugar	Glucose, polysaccharides and glucomannans, pectin, hemicellulose, acemannan, and mannose derivatives [23]
4. Phytosterols	Campesterol, sitosterol, and lupeol
5. Anthraquinones	Anthraone-C-glycosides, chromones, and barbaloin (8-C-glucosyl-7-O-methylalordiol, 8-C-glucosyl-noreugenin, isoaloesin D, isorabaichromone, and neoaloesin A) [24,25]

3.2. Cinnamon

Synonym(s): *Cortex cinnamon*, *Ceylon cinnamon*, *Saigon cinnamon*, *Chinese cassia*, *Cinnamomum aromaticum*, and *Cinnamomum laurus*.

Biological source: Dried inner bark of the coppiced shoots of *Cinnamomum zeylanicum* Nees.

Family: *Lauraceae*.

Both the outer bark and the inner bark were used.

Cinnamon is commonly used even in cooking today and has also been linked to multiple metabolic and health benefits that may be particularly beneficial for women with PCOS [26].

- Benefits of cinnamon for PCOS [27]:
- Blood sugar management;
- Menstrual cycle regulation;
- Cardiovascular health support;
- Anti-inflammatory effects.

Best types of cinnamon for PCOS:

Ceylon cinnamon powder, Ceylon cinnamon sticks, cassia cinnamon powder, cassia cinnamon sticks, cinnamon extract/tincture, cinnamon tea, and cinnamon supplement as shown in Figure 5.



Figure 5. Cinnamon.

3.3. Liquorice

Synonym(s): *Jethi madh*, *Mulethi*, and *Glycyrrhiza*

Biological source: Peeled and unpeeled roots, stolons, or stems of *Glycyrrhiza glabra* Linn.

Family: *Leuminosae*.

Part(s) used: Liquorice.

Benefits of liquorice root for PCOS: [28]

Since ancient times, the root of the licorice plant (*Glycyrrhiza glabra*) has been used as a herbal remedy to treat a number of diseases, and more recently, it appears to be effective in treating PCOS.

- Reduced androgen levels;
- Adrenal gland support;
- Weight loss;
- Anti-inflammatory effects.

Best types of liquorice root for PCOS:

Liquorice root thalidomide root powder, liquorice root extract/tincture, liquorice root supplement, and liquorice root hard candy. As shown in Figure 6.



Figure 6. Liquorice.

3.4. Ashwagandha

Synonym(s): *Withania root*, *ashwagandha*, and *clustered wintercherry*.

Biological source: Dried roots and stem bases of *Withania somnifera* Dunal.

Family: *Solanaceae*.

Part(s) used: Ashwagandha powder, roots, barks, leaves, fruits, and seeds.

One such ayurvedic herb that has historically been recognized as a potent adaptogen is ashwagandha powder. Adaptogen herbs assist the body in harmonizing hormone levels, which may therefore lessen stress and PCOS symptoms [29] as shown in Figure 7.



Figure 7. Ashwagandha.

3.5. Shatavari

Synonym(s): *Asparagu Satmuli*.

Biological source: Dried tuberous roots of *Asparagus racemosus* Wild.

Family: *Liliaceae*.

Part of use: Dried roots.

PCOS and shatavari:

PCOS is brought on by a hormonal imbalance in a woman's body, as was previously described. According to previous research, when women take 5 grammes of shatavari, their hormones are balanced. Shatavari naturally boosts antioxidant levels in a woman's body, improves menstruation, and decreases fertility as a result as shown in Figure 8.

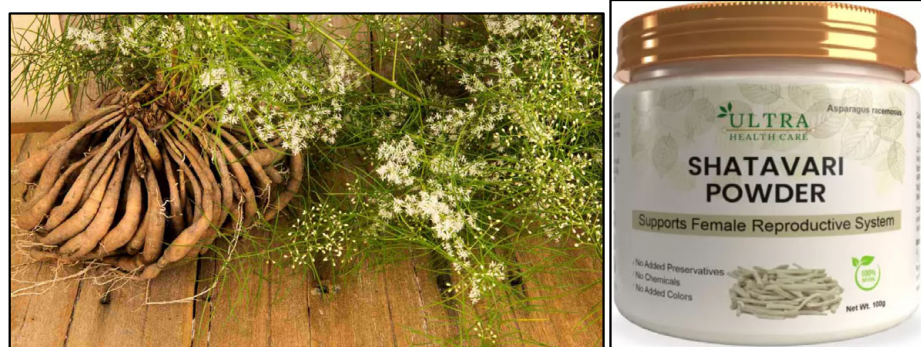


Figure 8. Shatavari.

Effect of shatavari on reproductive system:

- Stimulates the nervous system;
- Aids in the stimulation and maintenance of hormone levels in the body.

How it is helpful in PCOS?

- In the case of PCOS, we may require medications that dissolve cysts, such as Kanchnaar. However, Shatavari is an herb that helps to balance the hormones that are disrupted in PCOS, thereby maintaining hormone levels, and supports the HPO axis and plexus. Furthermore, shatavari promotes menstrual cycle duration (3 to 7 days), menstrual cycle interval (28 to 35 days), and blood flow during menstruation [30].

4. Management of PCOS [31–34]

Be active. Exercise helps lower blood sugar levels. If you have PCOS, increasing your daily activity and getting regular exercise may treat or even prevent insulin resistance. Being active may also help you keep your weight under control and avoid developing diabetes as shown in Figure 9.

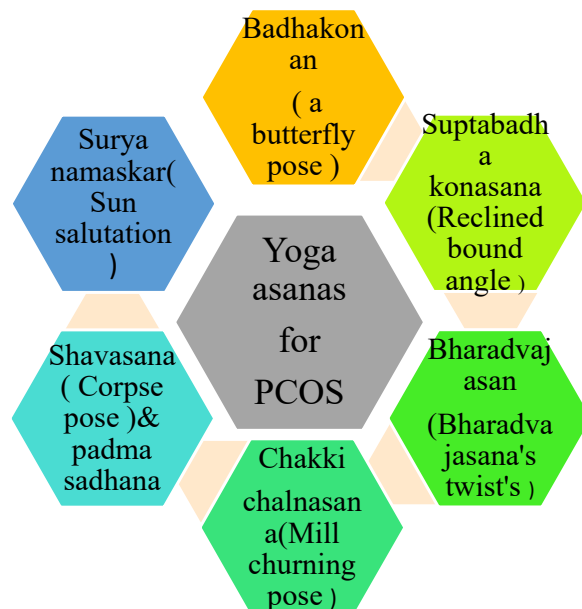


Figure 9. Yoga asanas for PCOS.

5. Conclusions

Polycystic ovarian syndrome (PCOS) is a common female endocrine disorder that can result in infertility. In India, two out of every ten women have PCOS, and 116 million women worldwide, equivalent to approximately 3.4%, have PCOS. PCOS is considered to be one of the main reasons of female subfertility manifested as a result of hereditary and environmental factors. PCOS has become a major health risk for women, with common symptoms including hirsutism, acne, cystic ovaries, obesity, and hair loss. It is similar to the metabolic syndrome in several ways, including in terms of presenting insulin resistance, obesity, and diabetes. Herbal drugs have a promising role in the treatment of PCOS, as they exhibit a consistent effectiveness with few side effects. Herbal drugs boost the body's immunity and help to regulate the menstrual cycle without causing hormonal fluctuations. A healthy diet, regular exercise, lifestyle changes, and medications can help manage PCOS. Moreover, yoga has been shown to benefit women with PCOS.

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