



A Comprehensive Overview Of Indian Herbal Options For The Management Of Polycystic Ovary Syndrome (Pcos)

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Abstract

Back ground

An irregular menstrual cycle is one of the hallmarks of PCOS, a neuroendocrine metabolic condition. Synthetic medication therapy is a successful treatment for PCOS. However, because allopathic medications have limits and natural treatments have great therapeutic outcomes, PCOS patients are drawn to natural solutions. In many rural places, medicinal plants play a major role in the healthcare of women. Modern medications have been created from plants that have historically been utilized as a starting point for the development of new drugs with therapeutic effective observations. Women can easily acquire affordable healthcare through kitchen cures. Women's dietary habits often mirror their awareness of their health. In this comprehensive review we addressed the function of various Indian herbs in PCOS in light of the importance of herbal therapies.

Materials & Methods: A comprehensive literature search and data mining was carried out about the efficacy of Ayurveda prescribed herbs supported by scientific efficacy and toxicity studies (preclinical and clinical) against PCOS by consulting the Scopus, PubMed, Google Scholar, Cross ref, database.

Results: In this study, we addressed the role of selective Indian herbs in PCOS treatment with mechanisms through scientific studies conducted in the last two decades.

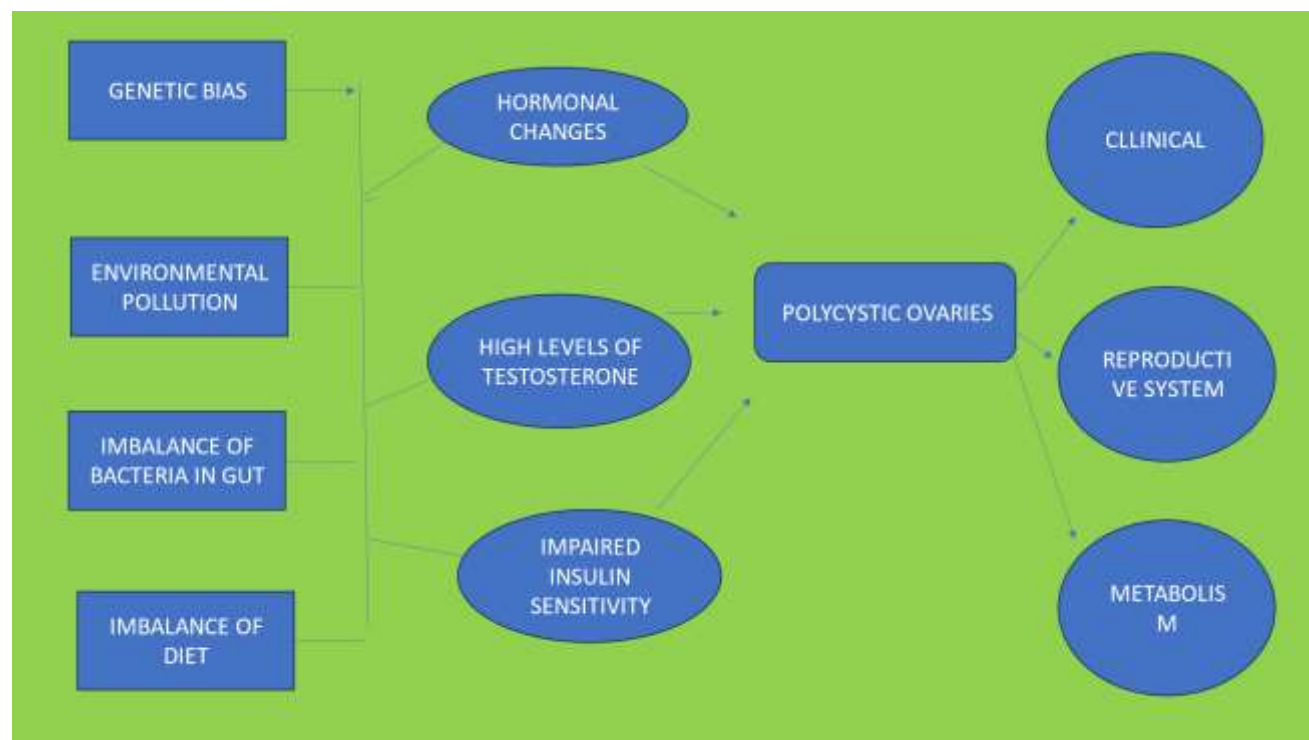
Keyword: PCOS, Cinnamon extract, fenugreek

Introduction:

A complicated and varied endocrine condition affecting many women, polycystic ovarian syndrome (PCOS) is a result of a mix of hereditary and environmental factors. Especially in the early to late reproductive stages (15–35 years old), PCOS affects women who are growing. It is characterized by elevated androgen levels and numerous ovarian cysts, leading to anovulation, infertility, and irregular menstrual cycles. PCOS is linked to other endocrine and metabolic abnormalities. Obesity, hirsutism, acne, diabetes, insulin resistance, and glucose impairment are associated with PCOS in terms of endocrine and metabolic disorders. In addition to

lifestyle changes, PCOS can be treated with Allopathic, Ayurvedic, natural, or herbal drugs. There are several reasons why herbal remedies are still in demand(1,2).

According to a comprehensive survey carried out throughout India in 2020, over 16% of female participants between the ages of 20 and 29 have polycystic ovary condition [3].



Methodology:

Systematically searching through all of the major databases, including MEDLINE, PubMed, ScienceDirect, ISI Web of Knowledge, Embase, Google Scholar, and Wiley, two reviewers conducted computer-assisted literature searches. We used the following search phrases as medical subject headings to locate papers that reported PCOS prevalence: The phrases "prevalence of PCOS," "epidemiology of PCOS," "PCOS in reproductive age," and "polycystic ovary syndrome" were combined in the search method. To find other studies, references in the found studies were also looked at. Any disagreements over the extraction of data were settled by consensus. Systematically searching through all of the major databases, including MEDLINE, PubMed, ScienceDirect, ISI Web of Knowledge, Embase, Google Scholar, and Wiley, a review is by conducted computer-assisted literature searches. The following subject headings for medical searches were entered:

Indian Medicinal plants for the effective treatment of PCOS:

1. *Cinnamomum zeylanicum* or *Cinnamomum cassia* stem bark:

This plant, which is in the Lauraceae family, is sometimes referred to as cinnamon. The bark of this plant is one of the traditional herbal remedies for managing diabetes. Stem bark contains several main components that have insulin-like properties, including as eugenol, safrole, and cinnamonaldehyde (4). Cinnamon extract raises insulin receptor phosphorylation, which raises insulin sensitivity by boosting glucose absorption and glycogen synthesis (5). The procyanidins and polyphenols in cinnamon are the responsible for

the hypoglycemic effect by stimulating the insulin signaling pathway. Moreover, cinnamon has been shown to reduce blood sugar and blood lipids, which can help with menstrual cycle regulation, gynecological issues, and respiratory and digestive illnesses (6). Wang, J.G., et al., reported that cinnamon daily intake will help to normalize the menstrual cycle and effectively suppress polycystic ovary syndrome. Cinnamon bark is used as adjunctive in the treatment of PCOS through oral supplementation during the luteal phase, where it could ameliorate progesterone levels (7).

2. *Trigonella foenum graecum* L. :

Trigonella foenum graecum L. also known as fenugreek is traditional culinary and medicine all over the world. The seeds of this plant are well known for its therapeutic properties in antidiabetic and gynecological disorders. The major compounds of seed are diosgenin, spirostan saponins and minor percentage of phytoestrogens. Diosgenin is widely studied regarding its biological activities in the female reproductive system due to its oestrogenic effects (8). Fenugreek seeds reduce blood glucose and insulin resistance by inhibiting α -amylase and sucrose activity (9). It is also reported that fenugreek extract reduces blood lipid and cholesterol storage by decreasing carbohydrates reabsorption and increase the secretion of natural sterols (10). Diosgenin compound in fenugreek seed extract is attributed to increase of progesterone levels in PCOS mice (11). Fenugreek seed extract enriched with 40% furostanolic saponins (Furocyst –capsules) significantly increased luteinizing hormone (LH) and follicular stimulating hormone (FSH) levels compared with baseline values of treatment group subjects. The study data also revealed that 46% of treated group showed reduction in cyst size, while 36% subjected showed complete dissolution of cyst. Another significant observation was 71% subjected reported the return of regular menstrual cycle on the end of 90 day treatment (12). Another recent clinical study on the same product – Furocyst reported that a significant reduction of the number of cysts, ovarian volume, hirsutism levels and finally normalized the menstrual cycle in furocyst supplemented subjects as compared to placebo (13). The same study claimed that furocyst significantly reduced luteinizing hormone (LH) and follicle stimulating hormone (FSH) levels. Thyroid stimulating hormone (TSH) levels, prolactin and SHBG levels also reduced. Furocyst significantly reduced the fasting blood glucose levels, HOMA Index, -cholesterol, LDL, and triglyceride levels as compared to the placebo group.

3. *Vitex agnus-castus*:

Vitex agnus castus also known as chaste berry shrub is of Verbenaceae family has been recommended as traditional medicine for women hormonal disorders. The Vitex fruits reported major compounds like monoterpenoids, labdane-type diterpenoids, iridoids and flavonoids. Vitex fruit diterpenoid 'viteagnusin' and flavonoids apigenin, 3-methylkaempferol, luteolin and casticin play a major role in suppressing the prolactin levels by inhibiting dopamine-2 (D-2) receptors and increasing the ovulatory cycles (14). Vitex fruit hydroalcoholic extract fed PCO induced rats showed decreased levels of serum estradiol and progesterone while testosterone and DHEA levels increased. No significant changes were observed in the hormone levels of the sham group compared to control (15). Recent studies stressed that *Vitex agnus -castus* extracts set right

the irregularities in menstrual cycles and improve fertility chances by ameliorating progesterone, FSH, LH, dopamine, CAMP, prolactin levels. Vitex extract flavonoids also convert testosterone to estradiol and decreases the serum testosterone level by increasing the activity of aromatase (16). Recent research indicated that *Vitex agnuscastus* significantly decreased concentration of FSH and Estradiol levels on ovulation day and claimed that vitex plant extract as a fertility promoting plant and appears to be safe (17).

4. *Tribulus terrestris* :

Tribulus terrestris commonly known as 'Gokhru' belongs to the family of Zygophyllaceae. Gokhru fruit bodies are traditionally prescribed for physical strength and performance in men. However recent studies reported that *T. terrestris* could improve the reproductive systems of both male and female by modulating endocrine system. In addition *T. terrestris* was recommended as complementary treatment to hormonal imbalance in elderly individuals. The major compound 'protodioscin' in *T. terrestris* is responsible for its therapeutic activity on female reproductive system (18). Recent study reported that saponin rich *T. terrestris* extract ameliorates inflammatory burden, insulin resistance, adipokine expression and other obesity related reproductive endocrine disorders (19). *Tribulus terrestris* optimized the glucose levels, serum triglyceride levels, serum cholesterol and also regularized the estrous cycle, hormonal disturbances and ovarian follicular growth. These studies advocated saponin rich *Tribulus terrestris* is ideal choice for women health and PCOS (20).

5. *Limusitissimum* (Flax seed):

L. usitatissimum popularly known as 'flax seed' belongs to the Linaceae family. Flax seed is rich in fiber, protein, fatty acids, amino acids, lignans and vitamins (21). Flax seed oil rich in omega -3- fatty acids, linolenic acid and mucilage (22). A recent clinical study claimed that flax seed powder, 30g/day for 12 weeks supplementation and life style modifications significantly improved anthropometric and clinical biochemical parameters. A significant reduction in insulin concentration, HOMA-IR, triglycerides levels, sensitivity C-reactive protein, interleukin 6 and leptin levels noticed in flax seed supplemented subjects compared to control group (23). Flax seed aqueous extract showed protective and curative potential by improving biochemical markers, histological changes and folliculogenesis in letrozole induced polycystic ovary syndrome rat model (24). Flax seed and its active compounds mediate the changes in reproductive hormones, intracellular signaling pathways including protein kinases, transcription factors regulating cell proliferation, apoptosis, angiogenesis (25). Several clinical studies supported the curative role of flaxseed in ameliorating PCOS symptoms by regulating metabolic, hormonal and anthropometric parameters (26).

6. *Mentha spicata* (spearmint):

M. spicata decrease free testosterone, total testosterone and increase luteinizing hormone and follicle stimulating hormones in PCOS patients (27). Hydroalcoholic extract of spearmint at the dose of 250mg/kg & 500mg/kg ameliorated the levels of luteinizing hormone, follicle stimulating hormone, testosterone and ovarian folliculogenesis in PCO induced rats (28). Mina Mehraban, et al., reported that a combination of spearmint and flaxseed extract significantly rise levels of progesterone and decreased testosterone and estradiol with no significant changes in dehydroepiandrosterone (DHEA) levels in test group compared with control rats. Also

in test group a significant increase in primary, pre-antral and antral follicles noticed (29). One clinical study of spearmint herbal tea twice a day for month claimed that a significant decrease in free and total testosterone and increased LH & FSH levels noticed. However no significant change noticed in the objective Feriman-Galwey ratings of hirsutism between trial groups (30).

7. *Foeniculum vulgare* (fennel):

Foeniculum vulgare is a member of Apiaceae, commonly known as ‘fennel’. In Iranian traditional medicine, fennel was known as ‘Razianaz’, Badian and ‘Marsoun’. The beneficial effects of fennel oil or extracts in gynecological problems of women are related to its phytoestrogen compounds such as diosgenin. Fennel’s analgesic and anti-spasmodic effect along with its estrogenic effects support the choice of fennel in the management of gynecological disorders (31). Fennel is known for normalizing menstruation in women with correcting estrogen balance in PCOS rats. Fennel extract at oral dose of 250, 500 and 1000mg/kg in rats increased estrogen and total antioxidant levels and reduced nitric oxide levels (32). Pariya Karampoor., *et al* study claimed that hydro-alcoholic extract of fennel increased FSH and decreased LH and testosterone in PCO induced rats (33). Fennel extract decreased serum estrogen concentrations and thickness of uterine epithelial tissue in PCO induced rats and increased progesterone hormone and uterine endometrial thickness (34).

8. *Asparagus racemosus* (shatavari-root)

A. racemosus popularly known as ‘shatavari’ in Ayurveda medicine belongs to Liliaceae family commonly grown in India. Ayurveda prescribes shatavarito women for ovarynourishment, balancing and maintaining reproductive hormones and libido of women. It is also called ‘uterine tonic’ (35). A recent study reported that ethanolic extract of shatavari root proved to be potential drug for the management of PCOS through their dual role of reducing hyperglycemia and hyperandrogenism (36). Ajay K Pandey *et al.*, reported that shatavari root extract by reducing oxidative stress levels and increasing antioxidant levels in the body, shatavari keeps the hormonal balance, follicular growth and development, oocyte quality and over all fertility (37).

9. *Saraca asoca* (Roxb.): bark , flowers

S. asoca commonly known as ‘Ashoka’ is an Indian medicinal plant belongs to the family of Fabaceae, which shows therapeutic effects against several gynecological disorders including regularization of menstrual cycle, hormonal balance, PCOS (polycysticovary syndrome) (38). Ethanolic extract of Asoka tree bark normalized the increased hormonal profile (serum testosterone, luteinizing hormone, insulin and malonaldehyde) and improved the ovary status by decreasing the cystic follicle and improving the ovulation status in dose dependent manner in Letrozole induced PCOS rats (39). Himaja Kuppachi, *et al.*, reported procyanidin B2 and Leucopelargonidin compounds of *S. asoca* are potential inhibitors of excess estrogen and testosterone biosynthesis in PCOS women through computational in-silico screening molecular docking study (40). *S. asoca* ‘flowers’ ethanolic extract reported uterotrophic effect and estrogenic potential in ovariectomized female albino Wistar rats (41). As Asoka possess oxytocic action which strengthens the endometrium of uterus and other uterus defects, Siddha medicine prescribes the bark and flowers of *S. asoca*

for uterine and menstrual disorders (42). Shahid AP, *et al.*, reported that *Saraka asoca* bark methanol extract reduced the thickening of endometrium and serum estrogen levels estradiol injected mice model(43).

Discussion

It is undeniably one of the most confounding illnesses damaging the health of women, perhaps because there are a variety of symptoms and no widely accepted diagnostic standards. The exact aetiology of PCOS is still unknown, although it may involve insulin resistance, malfunction of adipose tissue, aberrant steroidogenesis, and dysregulation of the hypothalamus, pituitary, and ovaries. The dysregulation of these diverse systems is likely influenced by genetic variations and epigenetic environmental variables, which opens up new study directions in the quickly developing field of PCOS.

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