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A Review on Phytomedicine for Polycystic Ovary Syndrome

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Abstract: *Polycystic ovarian syndrome (PCOS) is characterized by gynaecological, endocrine, and metabolic abnormalities in women of reproductive age. It has been demonstrated that hyperandrogenism, insulin resistance, menstrual irregularities, and prolonged absence of ovulation in polycystic ovary are frequently related with symptoms. It may indicate a multidisciplinary approach to PCOS treatment. Conventional medical care focuses on a specific ailment and is frequently associated with side effects, which may be contraindicated and ineffectual in some cases. So far, women with PCOS have stated a preference for alternative medication. Ayurvedic medicine is becoming increasingly popular for several health conditions, including PCOS. In this review, an attempt has been made to study the use and mode of action of potential Ayurvedic drugs for the treatment of PCOS*

Keywords: Medicinal Plants, PCOS, Anti-androgenic, Insulin resistance, Menstrual irregularity

I. INTRODUCTION

Polycystic ovary syndrome (PCOS) is a complex endocrinal reproductive disorder in a coalition with metabolic abnormalities of women at reproductive stages. PCOS characterized by hypergonadotropism, hirsutism, irregular and painful menstrual cycles, amenorrhea, multiple cysts in ovaries, anovulation which is commonly associated with infertility.(1) It is also character ized by multiple metabolic abnormalities, such as insulin resistance, hyperinsulinemia, high incidence of impaired glucose tolerance, obesity, inflammation, endothe lial dysfunction, hypertension, and dys lipidemia resulting in an increased risk for dia betes and cardiovascular disease.(2-4) The treatment options for PCOS are restricted because many PCOS women have contraindications, experience treatment failure in certain cases, and may suffer from severe side effects. These limitations in current therapy for PCOS in women have sparked interest in an alternative approach known as Ayurvedic treatment, which offers a natural way to address the condition without causing significant side effects.(5-6) Diet, lifestyle, and exposure to specific environmental toxins can have a negative impact on PCOS. PCOS has a direct effect on fertility, but if left untreated, it can lead to serious health consequences.(7) PCOS is characterized by elevated levels of luteinizing hormone (LH) in the bloodstream, an increased LH/FSH ratio, and heightened amplitude and frequency of LH secretion.(8) At present, the standard care for PCOS includes lifestyle changes and medication. Lifestyle changes involve modifying diet, increasing physical activity, and achieving weight loss. Medication options consist of antiandrogens (Spironolactone, Flutamide), insulin-lowering agents (Metformin and Thiazolidinediones), and a combination of estrogen and progestin (Oral contraceptives). However, this treatment comes with significant costs and potential side effects, such as irregular periods, gastrointestinal issues, weight gain, and increased insulin resistance.(9) The identification and management of side effects of these medications are crucial in dealing with PCOS. As a result, numerous studies, such as randomized controlled trials, case studies, and animal experiments, have concentrated on investigating the use of herbal medicines. Consequently, this review has delved into the potential of different medicinal plants as an alternative approach to treating PCOS. It has also outlined the impact of medicinal plants on reproductive endocrinology for the treatment of women experiencing irregular menstruation, hyperandrogenism, hyperinsulinemia, and PCOS.

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MEDICINAL PLANTS FOR PCOS

1. Asparagus Racemosus (Shatavari)

In Indian medicine, asparagus racemosus is traditionally utilized in Ayurvedic treatments. Because of its phytoestrogen (natural estrogen derived from plants), it helps to promote correct development of ovarian follicles, regulate menstruation cycle, and revive the female reproductive system. It also aids in the fight against hyperinsulinemia.(10) In addition to the action mentioned above, A. racemosus has a variety of pharmacological benefits that include improving mental function, preventing ageing, lengthening life, and improving immunity as well as effects on neuropathy, hepatopathy, inflammation, dyspepsia, tumors, antiulcer, antioxidant, and antidiarrheal.(11)

Tinospora Cordifolia (Guduchi)

The herb tinospora cordifolia has strong anti-inflammatory properties. The underlying cause of ovarian cysts and insulin imbalance is chronic inflammation in the tissues. It aids in reducing insulin resistance, reviving every bodily tissue, and naturally increasing metabolism.[12] The hypoglycemic properties of the well-known medicinal herb Tinospora cordifolia[13]

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Foeniculum vulgare (Shatapushpa)

Seeds from the Apiaceae plant, Foeniculum vulgare, are a useful complement for PCOS treatment. They contain a wealth of phytoestrogens. The phytoestrogens in fennel contribute to lowering PCOS inflammation and insulin resistance. Additionally, it is thought to lessen cellular imbalance, which causes metabolic problems in PCOS.[14] These days, a variety of ailments, especially those affecting the digestive system, are treated with various portions of this plant.

Additionally, it works well for treating kidney stones, diabetes, bronchitis, persistent cough, nausea, and vomiting.[15]

Ocimum tenuiflorum (Holy Basil)

Tulsi is the popular name for Ocimum tenuiflorum L. (Lamiaceae), a traditional herbal remedy.There is a chance that occimum tenuiflorum will help with polycystic ovarian syndrome. Excellent anti-androgenic qualities help it reduce the synthesis of androgens (Hyperandrogenism).[16] . They show promise in the treatment of obesity and its co-morbidities and are also employed against a variety of illnesses.[17]

Actaea racemosa (Black Cohosh)

Actaea racemosa, also known as Ranunculanae, is used to treat a variety of female reproductive system illnesses, including anovulation, infertility, and hormone imbalance all of which are significant problems in PCOS. Women with polycystic ovarian syndrome (PCOS) can trigger ovulation using black cohosh.[18] Actaea Racemosa was well-known as

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a menstrual cycle and childbirth treatment for women. Treatment for amenorrhea, leucorrhea, dysmenorrhea, and other uterine and menstrual disorders proved beneficial. [19]

Lepidium meyenii (Maca)

A traditional herbal remedy called Lepidium meyenii, which belongs to the Brassicaceae family, is used to treat menopausal symptoms. It also acts as a natural hormone balancer without causing any negative side effects by stimulating the endocrine system. The body's progesterone and estrogen hormones aid in promoting a regular menstrual cycle. It's a superfood that increases fertility and an adaptogen. Lepidium meyenii helps men's testosterone levels return to normal.[20]

Grifola frondosa (Maitake Mushroom)

Grifola frondosa (Meripilaceae) is a perennial fungus widely used in hypoglycemic effect, and May beneficial in the management of Diabetes.[21] Animal studies indicate that Grifola frondosa extract can promote ovulation in people with polycystic ovarian syndrome (PCOS). [22] Grifola frondosa's hypothesized mode of action involves regulating blood glucose levels and increasing insulin sensitivity.[23]

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Taraxacum officinale (Dandelion Root)

Taraxacum officinale (Asteraceae) stimulates bile flow and helps detoxify the liver. It cleanses the liver and removes excess hormones. Cleansing the liver can increase the production of SHGB, which reduces free testosterone levels in the blood. This is utilized in PCOS treatment to address monthly abnormalities caused by excess hormones. It removes toxins from the body, benefiting ladies with reproductive issues and menstruation irregularities.[24]

Pergularia Daemia (Veli paruthi)

Pergularia daemia (Asclepiadaceae) is called as "Veliparuthi" in Tamil and "Uttaravaruni" in Sanskrit. Pergularia daemia is commonly utilized for its pharmacological properties.[25] It can help normalize menstrual abnormalities and regulate the estrous cycle. So, restoring the estrous cycle lowers the development of follicular cysts.[26] Poornima et al. found that PCOS-induced albino wistar rats exhibited lower levels of LDL, FSH, LH, Estrdiol, Progesterone, and testosterone. Supplementation with Pergularia deamia restored normal levels of LH and FSH.[27]

Galega officinalisi (Goats Rue)

More clinical research is needed to determine the potential benefits of Galega officinalisi (Fabaceae) for women with polycystic ovarian syndrome. Galega officinalisi has been known since the medieval ages for alleviating the symptoms of diabetes mellitus; it came discovered to be guanidine, a chemical that reduces blood sugar by decreasing insulin resistance.[28] The natural source of guanidine is found in this herb, which is a member of the biguanides class and is used as an anti-diabetic drug.Metformin, a commonly prescribed drug for PCOS, is part of the biguanide class, making this herb worth considering for the treatment of polycystic ovarian syndrome.[29]

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Areca catechu (Betal Palm)

Areca catechu (Arecaceae) promotes healthy female hormone synthesis and reduces blood vessel congestion in the abdomen. Areca catechu promotes a healthy female reproductive system, eases the menopausal transition, and supports a healthy libido. It helps to increase the retentive ability of the uterus and is used to treat debility after childbirth.[30]

Cinnamomum zeylanicum

Cinnamomum zeylanicum is an excellent treatment for PCOS, improving both reproductive and metabolic symptoms. Cinnamon supplementation (1500 mg/day for 6 months) may alleviate menstruation disruption in women with PCOS, according to a clinical trial. The suspected mechanism is that it reduces menstrual irregularities by increasing insulin sensitivity. [31]

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Gymnema sylvestre

Gymnema sylvestre is a popular Ayurvedic medicine for managing diabetes and decreasing cholesterol levels.[32] It effectively reduces androgen levels and regulates irregular menstrual cycles in PCOS. The ethanolic leaf extract of Gymnema sylvestre reduces androgen levels in estradiol valerate-induced PCOS rats. Currently, no anti-androgenic methods have been studied.[33] A preclinical investigation found that an ethanolic leaf extract of Gymnema sylvestre at 400mg/kg/day improved menstrual irregularity in PCOS rats induced by estradiol valerate.
However, the report fails to describe the mechanistic method.[34]

Mentha spicata

Mentha spicata is recommended for PCOS ladies. M. spicata effectively treats both reproductive and metabolic problems of PCOS. The daily treatment of 300mg/kg of spearmint oil (Mentha spicata essential oil) for 20 days resulted in a significant reduction in body weight, serum testosterone level, number of atretic follicles, and ovarian cyst while also increasing the number of Graafian follicles in PCOS rats induced by letrozole.[35] Clinical studies show that ingesting spearmint tea (a cup of M. Spicata 5gm/250ml) twice a day for 30 days reduces free and total testosterone levels while increasing LH and FSH. M. spicata may be an effective antiandrogenic drug for female PCOS patients, lowering free and total androgen levels and reducing ovarian cysts.(36,37)

Saraka indica

One of the most popular Unani and Ayurvedic treatments for a variety of female illnesses, primarily gynecological disorders and menorrhagia, is Saraka indica dried barks and flowers. Excellent uterine and endometrial tissue stimulating action is exhibited by S. indica bark. It is also helpful in treating conditions that affect women, including as painful periods, internal bleeding, hemorrhoids, amenorrhea, menorrhagia, especially when caused by uterine fibroids, leucorrhoea, and acne.[38,39] Because it contains phytoestrogens, S. indica methanolic extract (200 mg/kg) in female rats was shown to have anti-estrogenic qualities. Because it prevents PCOS women's over expression of estrogen, it is therefore beneficial in treating hormonal and reproductive issues related to PCOS.[40]

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Saw palmetto (Serenoa repens)

Saw palmetto was recommended for benign prostatic hyperplasia, PCOS, and hormone abnormalities (e.g., testosterone/estrogen). It is also utilized to enhance genitourinary health in both genders, meaning it supports pelvic pain syndrome, chronic nonbacterial prostatitis, and sexual vigor.[41,42] The fatty acid liposterols found in saw palmetto berries have been shown to have a strong anti-androgenic effect in PCOS patients. By blocking the 5-α reductase enzyme, which transforms testosterone into its active form dihydrotestosterone (DHT) in the adrenal gland, it has anti-androgenic properties. Additionally, it lessens the 40% tissue absorption of androgens, including as testosterone and DHT.[43,44] These mechanisms demonstrated how Saw Palmetto may help with PCOS hyperandrogenism by decreasing 5-α reductase activity, which both boosts and decreases DHT breakdown and DHT generation. According to research on animals, saw palmetto balances the inhibition of follicle development, ovulation, and cyst formation in the PCOS ovary caused by increased prolactin. Saw palme tto inhibits the ovarian prolactin receptor by lowering the K+ channels and protein kinase C basal activity involved in the prolactin transduction signals, which in turn reduces the increased prolactin-induced ovarian alterations.[45] Saw palmetto extract's anti-inflammatory effects can reduce bloating, pelvic pain, and low-grade systemic inflammation in women with PCOS.[46] women's overexpression of estrogen, it is therefore beneficial in treating hormonal and reproductive issues related to PCOS.[40]

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II. CONCLUSION

PCOS is one of the most frequent reproductive illnesses among females. PCOS therapies focus on normalizing the ovary's functioning. Medications are used to control menstrual cycles, induce ovulation, treat insulin resistance, hyperandrogenism, and obesity-related PCOS. Different medicines are used to treat PCOS with various symptoms, however successful PCOS management remains a challenge. Some of the medicinal plants studied have shown promise in treating polycystic ovarian syndrome, insulin resistance, hyperandrogenism, oligo/amenorrhea, and obesity. As a result, further preclinical and clinical research are needed to investigate the efficacy of herbal medications in PCOS. This review highlights the potential benefits of medicinal herbs for treating and managing polycystic ovarian syndrome.

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