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Medicinal plants for polycystic ovary syndrome: A review of phytomedicine research

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Abstract

Polycystic ovary syndrome (PCOS) is a highly prevalent endocrine-metabolic disorder characterised by polycystic ovaries, chronic anovulation and hyperandrogenism leading to symptoms of menstrual irregularity, infertility and hirsutism. Insulin resistance, obesity and elevated levels of male hormones (androgens) are associated with PCOS. The deskbound lifestyle, dietary variations, lack of exercise and stress etc. are also contributory factors. Many plants like *Asparagus Racemosus*, *Grifola frondosa*, *Lepidium meyenii*, *Tinospora Cordifolia*, etc., have been highly esteemed sources which have the advantages to reduce PCOS and also having hypoglycaemic and anti-obesity effect. In this review, some of the familiar medicinal plants and their bioactive extracts which plays a crucial role in treatment or prophylaxis of PCOS are summarized. It is concluded that the easily available beneficial herbs along with the lifestyle management is much effective in the prevention of PCOS than allopathic treatment.

Keywords: Polycystic ovary syndrome, medicinal plants, Insulin resistance, hyperandrogenism

1. Introduction

Polycystic ovary syndrome (PCOS) is an endocrine disorder characterized by anovulation, menstrual disorder, amenorrhea, hirsutism and infertility. PCOS is the most common disorder of reproductive age group women as well as premenopausal women. Women with PCOS have impaired metabolism of androgen, estrogen and also in the controlled production of androgen [1]. They have also been found to have low-grade inflammation, contributing to insulin resistance. PCOS negatively affected by diet, lifestyle and exposure to certain environmental toxins. PCOS directly impacts fertility, but has serious health implications if left untreated [2]. It is characterized by hyperandrogenism, polycystic ovaries and multiple metabolic aberrations such as insulin resistance, hyperinsulinaemia and obesity [3]. The characteristic neuro endocrine feature of PCOS includes increased serum concentration of luteinizing hormone (LH), LH/FSH ratio and increase in the amplitude, and frequency of LH secretion [4]. Currently the standard care treatment for PCOS ranges from lifestyle modification to pharmacological interventions. Lifestyle modifications are associated with diet, exercise and weight loss. Pharmacological interventions include; antiandrogens (Spironolactone, Flutamide), insulin lower agents (Metformin and Thiazolidinediones), and estrogen-progestin combination (Oral contraceptives). Though such treatment is associated with substantial cost and may cause various side effects, such as irregular menstruation, gastrointestinal symptoms, weight gain, and increased insulin resistance [5]. The side effects of these medicines and their identification have significant importance in PCOS management, so many studies including randomized controlled trials, case studies and animal experiments are focused on investigation of herbal drugs. Hence this review explored the potential of various medicinal plants as an alternative treatment for PCOS, and elucidated effect of 11 medicinal on reproductive endocrinology for the treatment of women with irregular menstruation, hyperandrogenism, hyperinsulinemia and PCOS.

2. Medicinal plants for PCOS

2.1 *Asparagus Racemosus* (Shatavari)

Asparagus racemosus, (Asparagaceae) is traditionally used in Indian medicine (Ayurveda). It helps in promoting normal development of ovarian follicles, regulates menstrual cycle and revitalizes the female reproductive system mainly due to its phytoestrogen (natural plant based estrogen). It also helps in combating the hyperinsulinemia [6].

Apart from the above effect, *A. Racemosus* has various pharmacological effects like nervous disorders, dyspepsia, tumors, inflammation, neuropathy, hepatopathy, antiulcer, antioxidant, antidiarrhoeal, immune modulatory activities, prevent ageing, increase longevity, and improves mental function [7].

2.2 *Tinospora Cordifolia* (Guduchi)

Tinospora cordifolia, (Menispermaceae) is a well known medicinal plant for its hypoglycemic effects [8]. *Tinospora Cordifolia* is a powerful anti-inflammatory herb. Chronic inflammation in tissues is the root cause for insulin imbalance and ovarian cysts. It helps in lowering insulin resistance, revitalizing all the body tissues and boosting a metabolism naturally [9].

2.3 *Foeniculum vulgare* (Shatapushpa)

Foeniculum vulgare, (Apiaceae) seeds are used as a good supplement for management of PCOS. They are rich source of phytoestrogens. Phytoestrogens content in fennel helps in reducing insulin resistance and in bringing down the inflammation in PCOS. It also believed that helps in reduce the cellular imbalance which leads to metabolic disturbances in PCOS [10].

These days, the different parts of this plant are used in treatment of many diseases, particularly digestive system. Also it is very useful in the treatment of diabetes, bronchitis, chronic cough, kidney stones, nausea and vomiting [11].

2.4 *Ocimum tenuiflorum* (Holy Basil)

Ocimum tenuiflorum L. (Lamiaceae) is a traditional herbal medicine commonly known as Tulsi. *Ocimum tenuiflorum* is potentially effective for polycystic ovarian syndrome. It has got excellent anti-androgenic properties to decreasing the androgen production (Hyperandrogenism) [12]. They also used against multiple ailments and holds promise in the management of obesity and its co-morbidities [13].

2.5 *Actaea racemosa* (Black Cohosh)

Actaea racemosa (Ranunculanae) is used in various disorders of female reproductive system viz. anovulation, infertility, hormonal balance which are important issues in PCOS. Black Cohosh has the ability to induce ovulation in women with polycystic ovarian syndrome (PCOS) [14]. *Actaea Racemosa* was renowned as a women's remedy associated with childbearing and the menstrual cycles. It was effective in treating amenorrhea, leucorrhoea, dysmenorrhea and other menstrual, and uterine conditions [15].

2.6 *Lepidium meyenii* (Maca)

Lepidium meyenii from Brassicaceae family is a traditional herbal medicine used in relieving menopausal symptoms, stimulates the endocrine system and act as natural hormonal balancer without side effects. Estrogen and progesterone hormones in the body help in encouraging a healthy menstrual cycle. It is an adaptogen and an incredible fertility super food. *Lepidium meyenii* restores the levels of testosterone in the males [16].

2.7 *Grifola frondosa* (Maitake Mushroom)

Grifola frondosa (Meripilaceae) is a perennial fungus widely used in hypoglycemic effect, and May beneficial in the management of Diabetes [17]. *Grifola frondosa* extract can able to induce the ovulation in women with polycystic ovarian syndrome (PCOS) in animal studies [18]. The proposed mechanism of action of *Grifola frondosa* is modulation of blood glucose levels and enhancement of insulin sensitivity [19].

2.8 *Taraxacum officinale* (Dandelion Root)

Taraxacum officinale (Asteraceae) is an effective bile flow stimulant and liver detoxifier. It is used to cleanse the liver and get rid of any build-up of hormones. This clean up can

stimulate the production of SHGB which reduce the free testosterone in the blood which is used in PCOS treatment because menstrual irregularities are often affected by the liver which is being backed up with excessive hormones. It also helps in removal of toxin from the body, thus helping the women who are experiencing fertility problems and menstrual issues [20].

2.9 *Pergularia Daemia* (Veli paruthi)

Pergularia daemia (Asclepiadaceae) known as "Veliparuthi" in Tamil, "Uttaravaruni in Sanskrit. Traditionally *Pergularia daemia* is used for its various pharmacological activities [21]. It has potential effect on normalizing menstrual irregularities and regularizing the estrous cycle. So the restoration of the estrous cycle reduces the development of follicular cyst [22]. Poornima *et al.*, reported that PCOS induced albino wistar rats had decreased level of LDL, FSH, LH, Estradiol, Progesterone and testosterone, which regained normal level of LH and FSH upon the supplementation of *Pergularia daemia* [23].

2.10 *Galega officinalis* (Goats Rue)

Galega officinalis (Fabaceae) requires more clinical studies to reveal its beneficial effect in women with polycystic ovarian syndrome. *Galega officinalis* has been known since the middle ages for relieving the symptoms of diabetes mellitus, it turned out into guanidine, a substance that decreases blood sugar by decreasing insulin resistance [24]. However, it is the natural source of guanidine which is an anti-diabetic drug from biguanides class. A commonly used drug for PCOS is Metformin which belongs to the biguanide class. This association alone should garner this herb as a second look for treating polycystic ovarian syndrome [25].

2.11 *Areca catechu* (Betel Palm)

Areca catechu (Arecaceae) tenderly maintains the healthy production of female hormones & relieves congestion of the blood vessels in abdominal area. *Areca catechu* maintains healthy female reproductive system, eases menopausal transition and helps in supporting healthy libido. It helps in increasing the retentive power of the uterus and used to remove debility after child birth [26].

3. Conclusion

Polycystic ovarian syndrome (PCOS) is one of the most common reproductive disorders in female. PCOS treatments are mainly focussed on the ovary for normalizing its functions. Medications are used to regulate the menstrual cycles, stimulate ovulation and insulin resistance, hyperandrogenism and obesity associated PCOS. Different drugs are used in the management of PCOS with different symptoms, but effective treatment to manage PCOS is still a challenging. The reviewed some medicinal plants have multi potential beneficial effects in polycystic ovarian syndrome, insulin resistance, hyperandrogenism, oligo/amenorrhea, and obesity. Hence, more pre-clinical and clinical studies are required to explore the effectiveness of herbal medicines in PCOS. This review is helpful in understanding the effectiveness of medicinal plants for the better treatment and management of polycystic ovarian syndrome.

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