



## POLY CYSTIC OVARIAN SYNDROME- A HERBALISTIC APPROACH

**M. Karthick\*, V. Rajeshwari and K. Ramya**

Department of Pharmacognosy, K.K.College of Pharmacy, (The Tamil Nadu Dr.M.G.R.Medical University),  
Chennai-37, Tamil Nadu, India.

**Corresponding Author: M. Karthick**

Department of Pharmacognosy, K.K.College of Pharmacy, (The Tamil Nadu Dr.M.G.R.Medical University), Chennai-37, Tamil Nadu, India.

Article Received on 10/02/2022

Article Revised on 30/02/2022

Article Accepted on 20/03/2022

### ABSTRACT

PCOS and PCOD have become the more familiar terms among the modern women. Fertility centres are gaining the prime position in these recent times as infertility issues are more common in majority of people. Women are much affected by polycystic issues due to multiple reasons. This article reviews the various herbal researches which were proved to be successful in most of the cases.

**KEYWORDS:** Pcod Herbal Treatment, Weight Loss, Regular Exercise.

### INTRODUCTION

#### **Herbal medicine is man's rightful medicine- the power of herb can't be denied**

Traditional medicine has been the trend for the present; on realizing the enormous health benefits (unlike allopathy deals with the root cause of the infirmity) of the precious herbs, it is always better to switch over from synthetic chemicals to natural medicine (herbal drugs). Traditional herbs which were in use for centuries with no room for inefficiency still remains sub-standardized due to the lack of clinical data, and unexplored chemical features.

Junketing and dining out was also seen prevalent nowadays, as a result of being over-motivated to adapt western food style (high calories, high fat diet) and the factor associated with the food processing industries (using growth hormone in chicken rearing and enormous others) has increased the probability of developing PCOS and other hormonal dysfunction. For developing a better treatment option, we aim to provide an optimal drug regimen based on traditional medicine.

#### **What is PCOS?**

In these recent years, women of all ages have been facing problem with gynaecological issues, especially in their teenage. PCOS is an endocrine hormonal disorder due to continued stimulation of ovary by Luteinizing hormone of adenohypophysis. In this condition most of the women faces the obesity problem which make them prone to reproductive issues.

#### **Do Life Style changes modify PCOS levels?**

Obesity is responsible for an increased risk of developing insulin resistance. As a result, insulin level in blood become unbalanced leading to floating of glucose, which is sent to liver and transformed to excess body fat. Nowadays, PCOS patients approaches Turmeric, cinnamon bark to regulate the menstrual cycle and also performs yoga to reduce anxiety symptoms in girls with PCOD. Yoga poses (asanas) like butterfly pose, bharadvaja's twist etc., regularises menstrual cycle.

It is a complex disease with multiple reasons, probably lifestyle change, lack of exercise, lack of adequate sleep, stress and false diet. Diet also plays important role to treat PCOS. Eating healthy foods like nuts, legumes, grains, seeds, green leafy vegetables etc., could be the better preventive measures against Polycysts. Avoiding excess salt, artificial sweeteners, fast food, alcohol are also suggested.

Let us discuss the eight essential herbs which were proved to be efficacious against PCOS. A combined extract of these drugs could be the better option. The formulation has to be standardised well so that it will not only improves patient compliance but also it will set a standard in the global outreach.

#### ***Trifolium pratense* (Red clover)**

Red clover consists of more antioxidant activity than clomiphene citrate. On the administration of letrozole, serum testosterone level of the rat gets increased and it restores to normal on utilizing red clover.

Oral administration of red clover and clomiphene citrate showed a significant increase in estradiol levels. In PCOS induced group, the level of TC, TG and FBG increased. However LDL and HDL levels were restored.

Treatment with red clover decreased the MDA and NO levels. Administration of letrozole decreased the SOD, CAT and GSH levels in PCOS rats and on administration of red clover, it increases the SOD and CAT activities and it successfully restores the GSH levels. By long term administration of herbal extract containing phytoestrogen compound, reduces the testosterone level leads to decrease in body weight.

Red clover with anti-androgenic properties and high content of phytoestrogens such as isoflavones may reduce androgen levels. Phytochemical compounds of red clover such as Genistein and daidzein interfere with steroid formulation in rat adrenal and decreased testosterone levels.

Treatment with red clover significantly reduced oxidative stress such as MDA and NO and increased the level of potent antioxidant markers. PCOS closely related to oxidative stress and chronic low grade inflammation. MDA is an indicator of lipid peroxidation that increased in PCOS and red clover is able to restore it. Consumption of clomiphene and red clover significantly reduces the ovarian weight. The volume of ovary, medulla, cortex and number of cysts were significantly increased in PCOS patient and the numbers of oocytes were increased.<sup>[1]</sup>

#### ***Aloe barbadensis***

Letrozole induced PCOS rat model induce drug inhibited aromatase with an increasing ovarian androgens leading to hyperandrogenism. Also, weight gain is found in letrozole treated PCOS compared to control rats which were attributable to deposition of abdominal fat and it also leads to hyperglycemia and metabolic syndrome. Thus insulin resistance may be a major problem of increased truncal fat and high levels of free fatty acids.

The aloe treated PCOS rats should be returned to normoglycemic condition from hyperglycemic condition. This is due to the presence of rich phytosterols and phytophenols present in the plant. In PCOS, excess production of androgen interferes with the follicular maturation and selection of dominant follicle during ova formation and it also promote early stage of follicular growth leading to the insulin resistance syndrome and fat distribution.

In aloe model, hyperinsulinemia is correlated with estrogen deficiency. As estrogen synthesis is inhibited by the use of inhibitor, the 3 $\beta$  HSD activity is higher compared to 17 $\beta$  HSD activity and androgen production will be higher than estrogen production. This will affect LH: FSH hormonal balance. Aloe treatment brought 3 $\beta$  HSD activity in rats back to normal levels.

Reversion of estrus cyclicity to normal treatment due to phytochemical components present in gel that maintain steroid status and enable fertility status to be regained. Phytosterols and polyphenols are active components in controlling hyperglycemic conditions and modulate steroidogenesis. The data from In-vitro study shows that aloe acts directly on 3 $\beta$  HSD, by decreasing enzyme activity and modulating estradiol formation.<sup>[2]</sup>

#### ***Moringa olifera***

When administration of *M. olifera* in 250mg/kg BW, 500mg/kg BW animal model showed decrease in BW. But, 500mg/kgBW showed significant decrease because quercetin in *M.olifera* redistributed and uptake fat. Comparing with metformin, *M.olifera* shows good decrease in BW. Metformin does not help in body weight loss, but redistribute fat.

Flavonol quercetin produce PI3K inhibition and directly influence target pathway in ovarian follicles, which decrease expression of CYP17A1 gene which in turn decreases activation of 17 $\alpha$  hydrolyase leading to decrease in the conversion of progesterone to androgen.<sup>[3]</sup>

#### **Wonder of Walnuts**

Polysaturated fatty oil (walnut oil) present in walnut facilitates the clearance of LDL by hepatocytes receptor mediated process. Walnut significantly reduces the total cholesterol, LDL, triglycerides level. A lipophilic antioxidant (vitamin -E) in walnut acts as first line of defense against lipid peroxidation.

Meta-analysis does not show any correlation between walnut ingestion and serum HDL level. Walnut basically reduces oxidative stress by scavenging free radical and by protecting antioxidant status, leading to decreased oxidative damage to lipid and proteins.

Here administration of metformin, improves glucose and lipid metabolism whereas utilization of walnut cause increased level of fasting serum sugar and does not affect fasting serum insulin. Frequent nut feeding minimizes the risk of type-2 diabetes mellitus, cardiovascular disease by improving glucose and lipid metabolism.<sup>[4]</sup>

#### **Cinnamon and Pcod**

Cinnamon has insulin potentiating factor. Cinnamon extract is enhancer of insulin receptor function and inhibit the enzyme that block insulin receptor attachment. Procyanidin polyphenol type-A polymer stimulate the auto phosphorylation of insulin receptor that inhibit protein tyrosin phosphatase-I which cause insulin resistance due to elevated tyrosin phosphatase activity.

Cinnamon also contains rutin, catechin, quercetin, kaempferol having insulin like activity. *In-vivo* studies proved that glucose tolerance is in a dose dependent manner whereas *in-vitro* studies, increase glucose

stimulated insulin secretion in isolated islets of Langerhans.

In clinical trial, cinnamon improves menstrual cyclicity and claimed to be an effective treatment option for some women with PCOS. Here the mechanism includes improved insulin sensitivity, insulin receptor mediate the pleiotropic action of insulin, insulin receptor substrate (IRS) protein act as a docking molecule to connect tyrosine kinase receptor activation and activation of PI-3kinase cascade or MAPK.

First randomized controlled trial shows that different dosage of cinnamon (1g, 3g, and 6g) lead to decrease fasting glucose triglycerides, LDL, total cholesterol with type-2 diabetic mellitus. A prospective placebo controlled pilot study of cinnamon shows reduction in fasting glucose, insulin resistance parameter after 8 weeks of oral administration of cinnamon extract of 1g/day.

DHEA is steroid hormone in the circulation which is used to induce PCOS mouse model. DHEA disturb menstrual cyclicity; produce multicystic ovaries and causes hyperandrogenism. In this study, cinnamon act to restore the cyclicity, regulate testosterone and improve the insulin sensitivity in DHEA induced PCOS mice. Hence, confirmed that effect of cinnamon in reduction of insulin resistance (reducing IGF-1), increased level of IGF BP-1 in plasma and ovarian tissues<sup>[5]</sup>

### Curcumin

Curcumin able to normalize the testosterone similar to clomiphene citrate and decrease serum level of progesterone and estradiol in PCOS induced group. Decrease in progesterone leads to anovulation and decrease in estradiol concentration lead to inhibition of aromatase in PCOS induced group that can be treated by repetitive administration of high dose (200mg/kg) of curcumin.

Oral administration of curcumin prevent rise in level of fasting blood glucose and HbA1c which indicates that curcumin is preventing the insulin resistance and diabetic complications. Curcumin showed its anti-hyperlipidemic action by decreasing serum total cholesterol, triglycerides, LDL and increased HDL level. Superoxide dismutase, catalase, glutathione activity were diminished in PCOS group.

Curcumin treatment leads to disappearance of cyst and decreased incidence of pyknotic granulosa cells. Varying number of corpus lutea were help in ovulation and normal estrous cyclicity. Curcumin showed many beneficial effects such as restoring hormone, lipid profile, antioxidant, glycemic status and ovarian morphology and also prevent ovarian cell dysfunction, ovulation thereby improving fertility.<sup>[6]</sup>

### Benefits of Broccoli

Numerous clinical studies have revealed the benefits of broccoli as antioxidant in different disease like diabetes. Estradiol valerate (EV) rat model was used in present study because it is similar to human in many aspects includes hormonal abnormalities, changes in ovarian tissues and systemic inflammation. Due to metabolic and physiological processes, cystic and atretic follicles decrease or absence of corpus luteum and other structural characteristics similar to those absorbed in woman can be found in this model.

The increase in androgen level in EV model was described that ratio of LH to FSH levels increases, the ovaries increase alternatively the synthesis of androgens. Insulin resistance associated with EV model might play a role in over expression of androgen level. High insulin level can enlarge the androgen level via affecting the insulin receptor, which increases androgen response of theca cells to LH, reducing production of sex hormone binding globulin (SHBG) in the liver and lowering production of the protein that stick to insulin like growth factor (IGF).

Many large cysts with very thin granulosa layer and thick theca layer and scanty corpora lutea were detected in EV treated group, these might be due to sudden increase in LH level which was considered an important process for ovulation. The theca cells layer was thickened and an increased quantity of collagen collected around follicle, which may mechanically inhibit follicle rupture and ovulation. Treatment with broccoli majorly decreased collagen fibers accumulate in the ovaries which might be attributed to anti-inflammatory capacity of broccoli.

In ongoing studies, the percentage of immune-positive cells of Ki-67 was essentially higher in granulosa cells and antral follicle in the control group compared to granulosa cells of ovarian cysts present in EV group, would be explained by high level of oxidative stress markers, which might increase apoptosis and reduced proliferations. EV rat models of PCOS does not explain all features with human PCOS; however, the results obtained from present study revealed that broccoli extract attenuated PCOS symptoms in this animal model.

### *Glycyrrhiza glabra*

Plasma TBARS concentration was significantly higher in letrozole induced PCOS rats when compared with normal control whereas the treatment with plant extract decreases the elevation of TBARS. Serum CRP concentration was higher in letrozole induced PCOS rats compared with normal control but treatment with *Glycyrrhiza glabra* shows reduced in CRP concentration in rats treated with letrozole.

*Glycyrrhiza glabra* capable of binding to oestrogen receptor. It contains triterpene saponin (glycyrrhizin), flavonoids, isoflavonoids, glabrone, genistein. Genistein is responsible for management of PCOS. Genistein and

isoflavones of *G.glabra* roots are powerful antioxidant and *G.glabra* root extract reduced lipid peroxidation and decrease in serum CRP compared to PCOS control groups.

### LIMITATION

Herbal medicine is widely used as complementary and alternative medicine (CAM) therapies worldwide. Though herbal medicines are with zero side-effects, the lack of standardisation and quality control protocol makes the common public to negotiate the use of herbs in every disease. Fast-running readymade world culture has made the minds of the public to think that they need everything to be done in a rocket speed which was not fulfilled by the traditional medical systems.

### CONCLUSION

Eight commonly used drugs that we use in our day-to-day life unknowingly possess excellent effect against PCOD. This cannot be ignored as such. Researches made in labs are to be familiarised and made as a formulation and must be available to the common people to enhance the confidentiality of the herbal medicine.

Hence, herbal approach is the best way to overcome most of the fertility issues prevalent among the women of these days. Government as well as researchers must focus on making it possible. The day is not so far where all the herbal researches will be standardised and patented by the Indian scientists.

### ACKNOWLEDGEMENT

Authors would like to acknowledge the Department of Pharmacognosy, K.K. COLLEGE OF PHARMACY.

### REFERENCES

1. Abbasian Z, Jafari Barmark et al. Therapeutic efficacy of *Trifolium pratense* L. on letrozole induced PCOD in rats. *Plant science today*. 2020; 7(3): 501-507.
2. Radha Maharajan et al. Effect of *Aloe barbadensis* mill. Formulation on letrozole induced polycystic ovarian syndrome rat model. *Journal of ayurveda and integrative medicine*, 2010; 1(4).
3. Immun, Endoc and Metab. An effect of *Moringa oleifera* on insulin level and folliculogenesis in PCOD model with insulin resistance. *Agents in Med. Chem*, 2018; 18: 22-30.
4. Rashid, and A.L. Mohammad et al. The metabolic effect of Walnut in PCOD. *International journal of drug delivery technology*, 2019; 9(4): 593 - 596.
5. Dou et al. The effect of Cinnamon on PCOD in mouse model. *Reproductive biology and endocrinology*, 2018; 16: 99.
6. P.Sushina reddy et al. Beneficial effect of Curcumin in letrozole induced PCOD. *Asian pacific journal of reproduction*, 2016; 5(2): 116 -122.
7. Nofal EA, El-Habeby MM, El-Kholy WB, El-Akabawy GF, Faried MA. Protective role of broccoli extract on estradiol valerate-induced polycystic ovary syndrome in female rats. *European Journal of Anatomy*, 2019; 23(2): 121-9.
8. Velvizhi, s, Annapurani, S. Effect of glycyrrhiza *glabra* roots in combating poly cystic ovarian syndrome (pcos) in letrozole induced inflammation in rats. *International Journal of Current Research*, 2017; 9(11): 61195-61198.