ISSN: 2320-2831

International Journal of Pharmacy and Analytical Research (IJPAR)

IJPAR |Vol.14 | Issue 3 | Jul - Sept -2025

www.ijpar.com

DOI: https://doi.org/10.61096/ijpar.v14.iss3.2025.842-854

Research

Phytotherapy in the Management of Polycystic Ovarian Disease (PCOD): A Review of Evidence-Based the Herbal Approach to Efficacy, Safety, and Future Directions

P. Mohana Krishnan*, R. Sathya, P. Sandhiya, V. Shahina, Vigneshwaran. L.V

Department of Pharmacognosy, RKP College of Pharmacy, Krishnagiri, Tamil Nadu, India.

*Corresponding author: Mr. P.Mohana Krishnan M. Pharm
Email: mohanakrishnan.pharmacist@gmail.com

Published on: 27 Sep 2025

Published by:
Futuristic Publications

Abstract

Syndrome of polycystic ovaries an issue during a woman's pregnancy is COD. The ethology well-known. The diagnosis of polycystic ovary syndrome remains challenging, even with straightforward diagnostic standards. Providing health care and solid evidence supporting the use of herbal treatment is the goal of this study. Syndrome of Polycystic Ovarian The three main characteristics of a disorder that contains polyphenolics that can enhance reproductive health are irregularities, hyperandrogenism, and infertility. A review of the key medicinal herbs mentioned in relation to PCOS, sedentary lifestyle, Punica granatum, Curcuma longa, Cinnamomum nickum, and Terrestris has been attempted. Particular attention is paid to the potential advantages of PCOS.

Keywords: polycystic ovarian syndrome, oligomenorrhea, herbal remedies, medicinal herbs.

1. INTRODUCTION

PCOS, also known as PCOD, is a condition where a woman's hormones are not balanced. If left untreated, it can eventually result in major health issues like diabetes and heart disease. Ignorance and a lack of awareness among young women can contribute significantly to the rise in PCOS in our society. Infertility may result from PCOS that is not identified. Approximately 5-10% of women between the ages of 15 and 44 who are of reproductive age suffer from PCOS. Polycystic Ovarian Syndrome (PCOS) is the most common endocrine disorder in women. PCOS, also known as PCOD, is a condition where a woman's hormones are not balanced. If left untreated, it can eventually result in major health issues like diabetes and heart disease. Ignorance and a lack of awareness among young women can contribute significantly to the rise in PCOS in our society. Infertility may result from PCOS that is not identified. Approximately 5-10% of women between the ages of 15 and 44 who are

of reproductive age suffer from PCOS. Polycystic Ovarian Syndrome (PCOS) is the most common endocrine disorder in women.

The presence of enlarged ovaries with many small cysts and hyper vascularized androgen-secreting stroma are indicators of this condition. Among the clinical indicators are irregular menstruation, polycystic ovaries, obesity, infertility, hair, acne, and hyperandrogenism. 116 million women worldwide (3.4%) suffered from PCOS in 2023, according to the World Health Organization (WHO). PCOS is a complicated disorder that affects 5-10% of women who are the presence of enlarged ovaries with many small cysts and hyper vascularized androgen-secreting stroma are indicators of this condition. Among the clinical indicators are irregular menstruation, polycystic ovaries, obesity, infertility, hair, acne, and hyperandrogenism. 116 million women worldwide (3.4%) suffered from PCOS in 2023, according to the World Health Organization (WHO). PCOS is a complicated disorder that affects 5-10% of women who are of reproductive age and whose cause is unknown. High levels of androgen (male hormone), irregular menstrual cycles, and small ovarian cysts are the hallmarks of this condition. PCOS is believed to be caused by both genetic and environmental factors, though the exact cause is still unknown3). It was originally known as Stein-Leventhal syndrome. In this severe condition, which affects women, the ovaries enlarge with many cysts, which are actually small, immature follicles.

PCOS, which has no known cause and affects people of reproductive age. Tiny ovarian cysts high levels of androgen (male hormone), and irregular menstrual cycles are the hallmarks of this condition. PCOS is believed to be caused by both genetic and environmental factors, though the exact cause is still unknown3). Stein-Leventhal syndrome is the original name for it. The ovaries expand with numerous cysts, which are actually tiny, immature follicles, in this severe condition that affects women.

Hypergonadotropic, hirsutism, irregular and challenging menstrual cycles, amenorrhea, different types of ovarian sores, and anovulation are the hallmarks of PCOS, which is frequently linked to infertility 15. Experts estimate that 10% of Indian women have PCOS. PCOS is inextricably linked to the pathophysiology of many specific conditions, which can be broadly categorized as metabolic dysfunction, endocrine dysfunction, regenerative dysfunction, and capacities, as well as higher androgen discharge, and may in fact be more susceptible to the development of PCOS. Hypergonadotropic, hirsutism, irregular and challenging menstrual cycles, amenorrhea, different types of ovarian sores, and anovulation are the hallmarks of PCOS, which is frequently linked to infertility 15. Experts estimate that 10% of Indian women have PCOS.

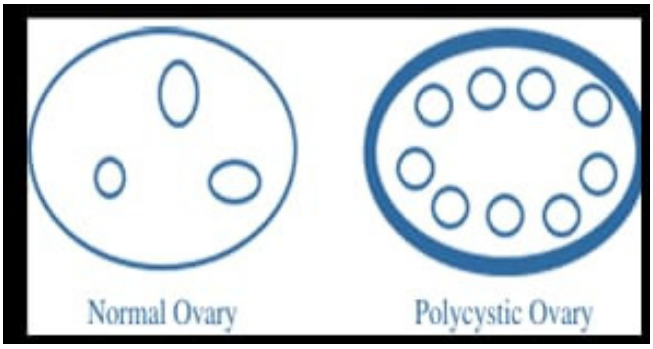
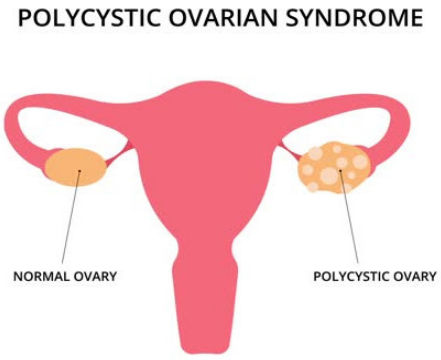


Fig 1: Normal and polycystic Ovary

The biochemical brokenness of an individual. It has also been linked to problems with mental health, such as temperament disorders and depression. Most women with PCOS have poorer metabolic and regenerative genetic and natural factors, which are also linked to the progression of PCOS, in addition to being overweight or stout. Hereditary factors include early sexual development, early fatal improvement, and a family history of PCOS in first-degree relatives. The biochemical brokenness of an individual. It has also been linked to problems with mental health, such as temperament disorders and depression. Most women with PCOS have poorer metabolic and regenerative genetic and natural factors, which are also linked to the progression of PCOS, in addition to being overweight or stout.

Due to the high expense and numerous adverse effects of using allopathic methods, herbal medications are becoming more and more popular. Since ancient times, medicinal solutions have been made from domestic plants. PCOS is unquestionably linked to some of the Ayurvedic Classics Artavakshaya, Pushpa Ghani, Katharine, and Kaphavataj Artavdushti cases when considering the symptoms and indicators listed above. Among these, Artavakshaya is a condition known in ordinary science as oligomenorrhea that occurs when the monthly cycle does not occur within a month and there is either a reduced stream of Artava (menstrual blood) or a stream that

lasts for less than three days because of a shortfall sum of Artava (menstrual blood/hormonal exercises). Which is in ordinary science called as Oligomenorrhoea.



POLYCYSTIC OVARIAN VIEW

HISTORY

Although polycystic ovaries were first identified in the 19th century, PCOS syndrome was not identified and given a name until 1935, hence its original name, Stein-Leventhal syndrome. This is due to the fact that Stein-Leventhal was the first to associate polycystic ovaries with obesity, hirsutism, and amenorrhea in seven patients. Their 1721 study found that young married women who were infertile and slightly overweight had larger-than-normal ovaries, which were not understood at the time. Although polycystic ovaries were first identified in the 19th century, PCOS syndrome was not identified and given a name until 1935, hence its original name, Stein-Leventhal syndrome. This is due to the fact that Stein-Leventhal was the first to associate polycystic ovaries with obesity, hirsutism, and amenorrhea in seven patients.

They found that young married women who were infertile and a little overweight had larger-than-normal ovaries, which were not known at the time of their 1721 study. Although Choureau first reported the sclerostin changes in ovaries in 1844, Stein and Leventhal's extensive investigation was required to identify them. They found that young married women who were infertile and a little overweight had larger-than-normal ovaries, which were not known at the time of their 1721 study. Although Choureau first reported the sclerostin changes in ovaries in 1844, Stein and Leventhal's extensive investigation was required to identify them.

In 1985, Adams and his associates carried out additional research and discovered polycystic ovaries with an unusually high number of follicles. This condition was dubbed multifollicularity. They believe that ovaries with more than ten peripherally organized cysts, ranging in diameter from 2 to 8 mm, are considered polycystic.

ETIOLOGY

The three main causes of PCOS are insulin resistance, abnormal gonadotropin discharges, and ovarian and adrenal hyperandrogenism. Uncontrolled gonadotropin-releasing hormone (GnRH) regulation can lead to follicle arrest, increased anti-Mullerian hormone (AMH), decreased FSH, increased luteinizing hormone (LH), and increased testosterone secretion. Estradiol and dehydroepiandrosterone the three main causes of PCOS are insulin resistance, abnormal gonadotropin discharges, and ovarian and adrenal hyperandrogenism. Uncontrolled gonadotropin-releasing hormone (GnRH) regulation can lead to follicle arrest, increased anti-Mullerian hormone (AMH), decreased FSH, increased luteinizing hormone (LH), and increased testosterone secretion. Estradiol and dehydroepiandrosterone.

These disorders may disrupt the synthesis of ovarian steroid hormones, which may be especially evident in women with polycystic ovarian syndrome and lead to an increase in circulating androgens. Hyperinsulinism and hypogonadism are conditions where insulin tends to increase the production of androgens in the gonadal and adrenal glands. One important PCOS risk factor is hyperinsulinism. The development of mature follicles was observed in PCOS as LH levels increased and FSH levels decreased.

Similarly, androgen synthesis increased while aromatase levels in the blood decreased. Dyslipidaemia and hyperinsulinemia can result from PCOS's excess androgens caused by excess abdominal fat. Sex hormone binding globulin (SHBG) is reduced in response to hyperinsulinemia and increased cell androgen synthesis, which raises blood testosterone levels. All of these could speed up the illness's progression. Similarly, androgen synthesis increased while aromatase levels in the blood decreased. Dyslipidaemia and hyperinsulinemia can result from PCOS's excess androgens caused by excess abdominal fat. Sex hormone binding globulin (SHBG) is reduced in response to hyperinsulinemia and increased cell androgen synthesis, which raises blood testosterone levels.

PATHOGENESIS

The onset of PCOS occurs during early puberty. The majority of relevant data, however, has come from clinical trials involving adult women, with referral bias favouring the more severe phenotypes. Excessive androgen production by the ovaries and/or adrenal glands is a hallmark of PCOS. 13] The onset of PCOS occurs during early puberty. The majority of relevant data, however, has come from clinical trials involving adult women, with referral bias favouring the more severe phenotypes. Excessive androgen production by the ovaries and/or adrenal glands is a hallmark of PCOS.

Major Organs Involved in PCOS

The Pathophysiology of PCOS involves the following organs:

1. Ovary: a female reproductive organ situated on either side of the uterus, the ovary releases the main hormones progesterone and estrogen.
2. The organ that produces insulin for our bodies is the pancreas.
3. Adrenal gland: Located above both kidneys, PCOS patients have an excess of adrenal hormone produced by this gland.
4. The pituitary gland controls the release of all hormones. Ovary: a female reproductive organ situated on either side of the uterus, the ovary releases the main hormones progesterone and estrogen.
5. Pituitary gland: this gland regulates all hormone releases.

SYMPTOMS

Numerous tiny cysts, rarely larger than 0.5 cm, are frequently found in the ovaries of women with PCOS. Women with PCOS may experience different symptoms, and some may experience more than others.

Symptoms can include any of the following:

1. PCOS, the most prevalent cause of infertility, which results from a lack of ovulation; and depression and anxiety. irregular or absent menstruation, or irregular menstruation; heavy periods, particularly those that occur late;
2. Pain in the pelvis (distention, heaviness, stabbing pain); Pain during ovulation or menstruation.
3. Bleeding during a cycle.
4. Physical changes (usually later, but not always): thinning hair (which resembles male baldness), acne, dandruff, weight gain around the waist, increased hair growth on the face, chest, stomach, back, thumbs, or toes.
5. Numerous ovarian cysts were discovered during an ultrasound.

Conventional medicine can effectively treat PCOS; gel's polysaccharide components include anti-inflammatories, though prolonged use may have some adverse effects. Women with PCOS may look for alternative therapies to address these infertility problems. Therefore, the primary objectives of the current scientific study were to summarize the importance of herbal medications in polycystic ovarian syndrome and

identify the validated data from preclinical evaluation. Numerous ovarian cysts were discovered during an ultrasound.

Conventional medicine can effectively treat PCOS; gel's polysaccharide components include anti-inflammatories, though prolonged use may have some adverse effects. Women with PCOS may look for alternative therapies to address these infertility problems.

Therefore, summarizing the significance of herbal medications in polycystic ovarian syndrome and identifying the validated data from preclinical evaluation were the main goals of the current scientific study.

CAUSES OF PCOS

Following is few important causes of PCOS.

1. Genetic predisposition
2. Strong stimulation in adrenals in childhood
3. Raised insulin levels
4. Contraceptive pills
5. Hormonal imbalance
6. Stress
7. Strong stimulations in adrenal glands in childhood
8. Accumulation of toxins
9. Inflammation to uterus and ovaries.

AYURVEDIC HERBAL REMEDIES FOR PCOS

Ayurvedic medicine employs a multimodal approach to treat obesity, prevent high cholesterol, and balance hormones. Address insulin resistance. The aim of herbal treatment is to let the body bring the excess hormone levels down to more "normal" levels so that the menstrual cycle can happen in a "normal" way. 13 Herbs contain a wide range of pharmacological substances, including alkaloids, cardiac glycosides, anthraquinones, flavonoids, mucilage, and enzymes. These can be used to treat PCOS herbs alone or in combination. This article discusses a few of the botanicals and commercial preparations.

1. ALOE

Synonym(s): Aloe barbadensis Mill., Aloe indica Royle • Biological Source: The biological source is the dried juice from the leaves of various Aloe species.

Family: Asphodelaceae (formerly Liliaceae).

Fig 2: ALOE

Aloe vera, also known as Aloe arborescens, is a perennial herbaceous plant. This plant contains vitamins A, C, and E. It also has antioxidant properties that result from reducing the level of lipid peroxidation. A variety of polysaccharides, enzymes, tannins, salicylic acid, minerals, and nutrients are found in aloe vera. Aloe vera gel is mostly composed of water and polysaccharides, which are derivatives of pectin, cellulose, hemicellulose, glucomannan, and mannose. Aloe vera, also known as Aloe arborescens, is a perennial herbaceous plant. This plant contains vitamins A, C, and E. It also has antioxidant properties that result from reducing the level of lipid peroxidation. A variety of polysaccharides, enzymes, tannins, salicylic acid, minerals, and nutrients are found in aloe vera. Water as well as polysaccharides, which include cellulose, pectin.

Aloe vera gel is mostly composed of three substances: hemicellulose, glucomannan, and mannose. The active ingredients in the gel and leaves of this plant are aloe, asmodin, barbaloin, and poly monosaccharides like sterols and organic acids. A variety of polysaccharides, enzymes, tannins, salicylic acid, minerals, and nutrients are found in aloe vera. Water as well as polysaccharides, which include cellulose, pectin.

Aloe vera gel is mostly composed of three substances: hemicellulose, glucomannan, and mannose. The active ingredients in the gel and leaves of this plant are aloe, asmodin, barbaloin, and poly monosaccharides like sterols and organic acids are the active components found in this plant's gel and leaves. One study looked into the effects of aloe vera gel on PCOS rats. Female rats were given letrozole orally for five months, and nonsteroidal aromatase inhibitors did not cause PCOS. One millilitre of aloe vera gel was then given to the animals for 45 days. Stress, glucose sensitivity, and steroidogenic activity in ratscycle was evaluated. The results showed that the administration of aloe vera gel along with a stimulant (letrozole) inhibited the development of PCOS in the rats. Because aloe vera gel contains plant chemicals like phytosterols and phytophenols, it has a preventive effect against PCOS by restoring ovarian steroid status and changing steroidogenic activity. Key enzymes like 3ß HSD are directly impacted by aloe vera gel, which lowers enzyme activity and modifies the production of estradiol. Five groups of rats were used in another study to assess the effectiveness of aloe vera hydroalcoholic extract in treating PCOS. Because aloe vera gel contains plant chemicals like phytosterols and phytophenols, it has a preventive effect against PCOS by restoring ovarian steroid status and changing steroidogenic activity. Key enzymes like 3ß HSD are directly impacted by aloe vera gel, which lowers enzyme activity and modifies the production of estradiol.

Another study evaluated the efficacy of aloe vera hydroalcoholic extract in treating PCOS in five groups of rats. These groups comprised treatment groups 1, 2, and 3, the PCOS group (which was administered a daily intramuscular dose of 4 mg/kg estradiol valerate), and the control group. Each group received 4 mg/kg of estradiol+ valerate intraperitoneally along with 100, 200, and 400 mg/kg of yellow aloe extract received 100, 200, and 400 mg/kg of yellow aloe extract intraperitoneally, in addition to 4 mg/kg of estradiol valerate. The aloe vera gel formulation safeguards against the PCOS phenotype by reestablishing the ovarian steroid status and altering significant steroidogenic action. The aloe vera gel formulation safeguards against the PCOS phenotype by reestablishing the ovarian steroid status and altering significant steroidogenic action.

2. CINNAMON

Fig 3: Cinnamon

Synonyms: Ceylon cinnamon, Kalmi-DalchiniCinnamon is derived from the dried inner bark of the shoots of coppiced Cinnamomum zeylanicum Nees trees.
Family: Lauraceae.

Cinnamon is among the best natural remedies for PCOS and its symptoms. The Dalchini tree's bark has been used for a variety of traditional and modern medicinal purposes as well as a spice in food all over the world. At least 250 species of Dalchini are currently known to exist, and cinnamon trees can be found all over the world. Since its Because of its high fibre content, it can lessen sudden hunger pangs and help regulate the monthly menstrual cycle. Although cinnamon is frequently used as a spice and offers a number of health advantages, it's It works well for PCOS because it can increase insulin sensitivity. It encourages weight loss and helps control blood sugar levels.

It was found that cinnamon extract significantly improved IR and increased insulin activity. By decreasing insulin resistance by increasing P13-K activity, it impacts the insulin signalling pathway mainly. A Its effects were investigated in a randomized study trial. In this investigation,15Women with PCOS were selected and administered 333 mg of Oral capsules containing cinnamon extract taken three times a day, then eight weeks of a placebo. It was found that cinnamon extract significantly improved IR and increased insulin activity. By decreasing insulin resistance by increasing P13-K activity, it impacts the insulin-signalling pathway mainly. A Its effects were investigated in a randomized study trial. Women with PCOS consequently encounter fewer risk factors and adverse effects.

3. FENNEL

Synonyms: Feukel and Fructus foeniculum.

Biological source: It is made up of dried ripe fruit from the plant of Foeniculum vulgare.

The Umbelliferae family.

Fig 4: FENNEL

It has antioxidant, diuretic, analgesic, and antipyretic properties. Attributes. Sadrefoza et al.examined the Reno protective effectiveness of Foeniculum vulgare extract in a female rat model of experimental PCOS. Five groups of animals were used. Estradiol was administered to three groups to induce PCOS; the other two groups did not experience PCOS development. An extract from Foeniculum vulgare was administered to one of the non-PCOS groups, and the other group served as a control.

Two PCOS groups of rats were given an extract from Foeniculum vulgare. The rats were killed after four weeks, and Their serum biochemical properties were evaluated, and their kidneys were prepared for light microscopy. According to the findings, PCOS rats' serum urea levels decreased after receiving 150 mg of Foeniculum vulgare per body weight. The histopathological changes of kidney samples in PCOS rats were comparable between groups that received the extraction procedure. Two PCOS groups of rats were given an extract from Foeniculum vulgare. The rats were killed after four weeks, and Their serum biochemical properties were evaluated, and their kidneys were prepared for light microscopy and their serum biochemical characteristics were assessed.

In PCOS rats, the histopathological alterations of kidney samples were similar between groups that received the extract treatment. At a dose of 150 mg per kilogram of body weight, Foeniculum vulgare aqueous extract improved the renal function of PCOS rats. 3Transanethole, a chemical that has been introduced as an estrogenic active agent, is the most significant and prevalent component found in fennel. In PCOS rats, the histopathological alterations of kidney samples were similar between groups that received the extract treatment. At a dose of 150 mg per kilogram of body weight, Foeniculum vulgare aqueous extract improved the renal function of PCOS rats. 3Transanethole, a chemical that has been introduced as an estrogenic active agent, is the most significant and prevalent component found in fennel.

Estragole, fenchone, Di anethole, photo anethole, and p-anisaldehyde are among the other aromatic chemicals found in fennel that function as physiologically active estrogenic substances. PCOS can be well managed with the use of Foeniculum vulgare seeds as a supplement. Phytoestrogens are abundant in them. Foeniculum vulgare seed extract's anti-fertility impact was investigated.

Fennel and metformin were tested on uterine tissue and progesterone and estrogen blood levels in rats with PCOS. Forty female rats were split into five groups:

(1) A control group that was given normal food and water.
(2) A PCOS group that was given an intramuscular injection of estradiol valerate at a dose of 4 mg/kg body weight to induce Fennel and metformin were tested on uterine tissue and progesterone and estrogen blood levels in rats with PCOS. Forty female rats were split into five groups.
(3) A PCOS group that received 150 mg/kg body weight of fennel after polycystic ovarian syndrome was induced.
(4) AS PCOS group that received 100 mg/kg body weight after PCOS induction.
(5) A PCOS group that received 111 mg/kg body weight of metformin. After receiving treatment for sixty-three days, all rats had blood samples taken for biochemical analysis and uterine tissue removed for histological examination.

Fennel was found to increase progesterone and uterine endometrial thickness while decreasing estrogen and uterine epithelial thickness in rats with PCOS. Therefore, fennel may have protective effects on uterine tissue in rats with PCOS.

4. SAW PALMETTO

Synonyms include shrub palmetto, Juzhong, and palmier.

Saw palmetto is a botanical extract derived from the fruit of the Serenoa repens palm tree, native to the southeastern United States.

Family: Palm family (Arecaceae).

Fig 5: Saw Palmatto

In PCOS, saw palmetto (Serenoa repens) is an excellent hormone balancer. Additionally, it supports the genitourinary health of both men and women, thereby offering assistance with pelvic pain syndrome, chronic nonbacterial prostatitis, and sexual Vigor. Investigations into the impacts of saw on PCOS, addressing specific symptoms and indicators of the condition, using palmetto plant extract. According to research, it has androgenic properties that can lower androgen activity.

These traits improve balance, promote regular ovulation, and reduce testosterone levels, all of which increase the chance of conception. In people with PCOS, this may lessen hirsutism and other androgen-related symptoms. While it may exacerbate the symptoms, inflammation is not the cause of PCOS. The effects of herbal remedies on PCOS-related variables have been clarified by studies on saw palmetto in rodents.

The antioxidant properties of saw palmetto may enhance general health by lowering inflammation and PCOS symptoms. 221 Animal studies have shown that saw palmetto normalizes the suppression of ovulation, follicle maturation, and cyst formation in the PCOS ovary, which is brought on by elevated prolactin. Saw palmetto prevents the high prolactin-induced ovarian changes by inhibiting the ovarian prolactin receptor and reducing the K+ channels and protein kinase C basal activity involved in the prolactin transduction signals.Additionally, the anti-inflammatory properties of saw palmetto extract may help women with PCOS combat bloating low-grade systemic inflammation and pelvic pain.

5. BERBERINE

Synonyms: Berberina, Umbellatine.

Berberine (BBR) is a phytogenous alkaloid that can be extracted from a variety of plant species, including barberry (Berberis), meadow rue (Thalictrum), celandine (Chelidonium), goldenseal (Hydrastis canadensis L.), and Phellodendron amurense.

Family: Berberidaceae.

Fig 6: Berberine

Berberine has been recommended by medical professionals in trusts of making highlights the potential affront resistance that patients with PCOS. 2 The documented application of berberine traditional medicine and

recited stories about restorative potential in lowering testosterone levels prompted the logical analysis of this plant-based substance in individuals with having polycystic ovary syndrome. Rondanelli et al. carried out a Take into consideration the twelve PCOS patients who experienced Berberine therapy.

A reduction in the levels of free testosterone, free androgen file, and expanded sex hormone-binding globulin appeared to be factually significant. Surprisingly, the inventors were the first to survey skin breakouts in the first place. status using two widely recognized tools for assessing the severity of skin breakouts and their impact on patients' lives: the Cardiff Skin Breakout Incapacity File framework and the Worldwide Skin Breakout Reviewing Framework (Chokes).

For PCOS patients, the improvement in skin breakout status as demonstrated by a drop from Direct to Gentle in Chokes and from Tall to Moo in CADI is of significant importance because the evident effects of hyperandrogenism can negatively impact their mental health and various aspects of their lives.

These findings suggest that berberine may be a promising treatment option for PCOS patients' dermatological conditions. 24 Patients with PCOS have elevated levels of various androgens, including T, dehydroepiandrosterone sulphate (DHEAS), and pro-androgens androstenedione (A4). In addition, the amount of some androgen- Additionally, activating substances like 3β-hydroxysteroid dehydrogenase (3β-HSD) grew.

Patients with PCOS have 20 times the total amount of androgen produced by their theca cells compared to normal people. Humans or creature considers utilizing AR opponents or long – term blocking of AR signals and ponders in transgenic mouse models with noiseless androgen impacts have affirmed androgen – driven impacts, especially AR interceded neuroendocrine mechanisms. BBR has been affirmed to diminish androgens levels in mice and ladies with PCOS.

6. GINGER

Synonyms: Rhizoma. Zingiberis, zingibere, and ginger
Biological source: The ginger is a Zingiber rhizome. officinale and Roscose are dried in the sun.
The family name is Zingiberaceae.

Fig 7: Ginger

Ginger is the common name for Zingiber officinalis. Between 60 and 65 distinct components make up ginger essential oil. Ascorbic acid, β-carotene, p-coumaric acid, geraniol, gingerol, curcumin, α-curcumene, geranial, neral, linalool, zingiberon, shogaol, and caffeic acid are the primary active phytochemicals. Additionally, ginger contains flavonoids and phenolics that are beneficial for PCOS.

Gingerol, shogaol, zingerone, and a small amount of oily resin ginger are potent antioxidants that have been shown to have an anti-prostaglandin effect by inhibiting the production of arachidonic acid and prostaglandins. The amount and motility of male sperm, the weight of the testes and seminal vesicles, the fertility index, and the serum testosterone level will all rise when ginger is consumed.

The phenolic and flavonoid components of ginger have their own physiological and pharmacological effects, and they may also help maintain the balance of progesterone and estrogen while regulating blood sex hormones. Ginger contains phytoestrogen, which balances the ratio of estrogen to progesterone and can be used to treat PCOS.

7. TURMERIC

Synonyms: Curcuma domestica, Indian saffron, and Haldi (Hindi).
Biological source: Turmeric comes from the dried rhizome of the Curcuma longa plant.
Family: Zingiberaceae.

Fig 8: Turmeric (Curcuma Longa)

Turmeric's bioactive ingredient, curcumin, has been studied for possible health benefits like anti-inflammatory, antioxidant, and metabolic properties. Curcumin has been connected to several illnesses, even though it isn't a direct treatment for PCOS. Its powerful antioxidant properties help combat the oxidative stress associated with PCOS, and its strong anti-inflammatory properties can help lessen PCOS symptoms.

According to some research, curcumin helps control blood sugar levels and improves insulin sensitivity. Individuals with PCOS who are insulin-resistant and susceptible to type 2 diabetes should focus especially on this l221. Curcumin is found in the rhizomes of Curcuma longa. It is an anti-inflammatory, antioxidant, antihyperlipidemic, and hypoglycemic dietary supplement.

Curcumin was able to control serum testosterone levels and the reduced progesterone levels, returning them too normal. 4 Reddy and associates evaluated the efficacy of curcumin in female Wistar rats with PCOS in 2016. Five groups were formed from the animals. Letrozole was used in order to induce PCOS. The outcomes of giving the mice curcumin were contrasted with those of clomiphene citrate, a drug used to treat PCOS. Biochemical evaluations of the lipid profile, glycosylated haemoglobin, and fasting blood glucose were performed.

Catalase and superoxide dismutase were used to evaluate curcumin's antioxidant activity. The results showed that curcumin caused a decrease in fasting blood glucose and glycosylated haemoglobin levels. Furthermore, the sex steroid and serum lipid profiles returned to normal. Curcumin showed promising results in female Wistar rats with PCOS induced by letrozole.

8. MACA (Lepidium meyenii)

Synonyms: Lepidium peruvianum, Ayak Chichira, Maka. Maca is an herbaceous biennial plant.
That grows at elevations between 13,000 and 14,800 feet. Maca's fleshy hypocotyl is fused with a taproot, which is then dried and used as powder or flour.
Family: Brassicaceae.

Fig 9: MACA

Lepidium meyenii, a member of the Brassicaceae family, is a traditional herbal remedy for menopausal symptoms. It also stimulates the endocrine system, acts as a natural hormone balancer, and has no negative side effects. 5. Because maca balances the body's levels of progesterone and estrogen, it may help maintain a healthy menstrual cycle. Maca contains 50 phytochemicals that have been shown to balance hormone levels in addition to its traditional use as an energy-producing plant that boosts libido and reduces stress.

If a woman has either too high or too low estrogen levels, she may have problems ovulating and becoming pregnant. A woman's production of estrogen and progesterone must therefore be balanced in order to

enhance fertility and reproductive health and lessen PCOS symptoms like irregular menstrual cycles and excessive hair growth. 31 Lepidium meyenii helps men regain their testosterone levels.

Future Directions for PCOD (Polycystic ovarian disease):

Transvaginal Ultrasound (TVUS) in PCOD:

One diagnostic imaging method for viewing the uterus and ovaries is transvaginal ultrasound (TVUS). It aids in identifying endometrial abnormalities, numerous tiny cysts, enlarged ovaries, and increased ovarian volume in PCOD.

The patient prepares by emptying their bladder. Prior to the procedure, consent is acquired. Positioning: The patient lies with their feet in stirrups and their knees bent on the examination table. Preparing the Probe: A thin ultrasound probe is wrapped in gel and a protective sheath. Insertion: A few centimetres into the vagina, the probe is carefully placed. Imaging: The monitor displays real-time pictures of the ovaries and uterus. Endometrial thickness, follicle count, and ovarian size are measured.

Time: Typically, the process takes ten to twenty minutes.

Patient Instructions:

1. Empty bladder before the procedure
2. Wear comfortable clothing
3. Inform the doctor about pelvic pain, vaginal bleeding, or pregnancy.
4. Relax and breathe normally; slight discomfort may be felt but the procedure should not be painful.
5. No special aftercare is required normal activities can be resumed immediately.

Safety

TVUS is safe, non-invasive, and does not use radiation. Mild discomfort may occur, but complications are extremely rare.

Magnetic Resonance Imaging (MRI) in PCOD

Polycystic ovaries, anovulation, and hormonal imbalance are the hallmarks of PCOD, a complex endocrine disorder. A powerful tool for advanced diagnosis and treatment planning is magnetic resonance imaging (MRI).

Role of MRI in PCOD

MRI provides high-resolution imaging without radiation exposure. It helps in evaluating ovarian morphology, stromal volume, and vascularity. Compared to ultrasound, MRI offers better soft tissue characterization and 3D reconstruction.

Future Prospects of MRI in the Management of PCOD

Changes in the hypothalamic-pituitary-ovarian axis can be studied using functional magnetic resonance imaging (fMRI). Diffusion-weighted imaging (DWI) to evaluate the microstructure of ovarian tissue. microstructure—MR spectroscopy for ovarian tissue metabolic profiling. Artificial Intelligence (AI) and MRI integration for automated diagnosis and treatment response prediction.

Benefits of MRI-Based Methods

It is radiation-free and non-invasive. Better visibility of the extraovarian and ovarian structures. The possibility of identifying issues like endometrial hyperplasia early. - AI-integrated personalized treatment planning.

Difficulties and Restrictions

Expensive and hard to get in low-resource environments. For PCOD, standardized imaging procedures are required. Skilled radiologists and interdisciplinary cooperation are necessary.

The future of PCOD diagnosis and treatment could be greatly influenced by MRI. Advances in spectroscopy, functional imaging, and AI integration could make MRI a key component of individualized PCOD treatment.

Role of Anti – Mullerian Hormone (AMH) in PCOD

Polycystic Ovarian Disease (PCOD/PCOS) Overview. The significance of biomarkers in directing therapy; the difficulties facing treatment today.

Basics of Anti-Müllerian Hormone (AMH)

1. Ovarian follicle granulosa cells sequester it.
2. The indicator of ovarian reserve.
3. Elevated in PCOD-afflicted women.
4. Ovarian dysfunction and follicle count correlation.

AMH in the Diagnosis of PCOD

1. AMH is a diagnostic indicator that is high.
2. Sensitivity and cut-off values.
3. Comparison with the LH/FSH ratio and ultrasound.

AMH and Methods of Treatment

-Personalized treatment according to AMH levels.

-Induction of ovulation (gonadotropins, letrozole, and clomiphene).

-ART (Assisted Reproductive Technology): dosage modification guided by AMH to avoid OHSS.
- Laparoscopic and ovarian drilling procedures: Using AMH to predict response.
- Lifestyle interventions and metformin: tracking changes in AMH.

Prospective Paths

The use of AMH as a predictive biomarker for individualized PCOD care.
-Integration with treatment planning algorithms based on AI.
-The potential for new treatments that focus on AMH pathways.
-Part of methods for preserving fertility.

Limitations and Difficulties

1. The assay is not standardized.
2. Differences between populations.
3. Longitudinal studies are required.

Conclusion: AMH and personalized medicine -Guided interventions could lead to better results. Clinical applications will be improved by future studies.

CONCLUSION

The review underscores the growing relevance of herbal and phototherapeutic approaches in managing Polycystic Ovarian Disease (PCOD), especially given the limitations and side effects of conventional allopathic treatments. Medicinal plants such as Aloe vera, Cinnamon, Fennel, Saw Palmetto, Berberine, Ginger, Turmeric, and Maca have demonstrated promising effects in regulating hormonal imbalances, improving insulin sensitivity, and alleviating PCOD symptoms in both preclinical and clinical studies.

Furthermore, the integration of advanced diagnostic tools like MRI and Anti-Müllerian Hormone (AMH) profiling offers new avenues for personalized treatment strategies. These innovations, combined with evidence-based herbal remedies, point toward a holistic, safer and more accessible future for PCOD management. Continued research, standardization of herbal formulations, and interdisciplinary collaboration will be key to translating these findings into effective clinical practice.

Despite a great deal of research over the past half century, we still don't fully understand the complex etiology of PCOD, a common disorder. Still, we have a lot more information now regarding the diagnosis and consequences of this disease. The ultimate objective of all gynaecologists is to serve women with positive reproductive health care. To improve quality of life, alternative treatment approaches have been applied in this situation. Treatments using Unani medicine include Tadeel Mizan, Idrar Haiz, loss of body mass, for those with this crippling condition, some drugs, like insulin sensitizers, can be helpful.

Furthermore, because the medicinal plants used to treat PCOS contain phytoestrogens, which are weak antagonists of estrogen, some research reported that these plants have no notable adverse effects. Because these phytoestrogens have more potent estrogenic effects when PCOS patients' bodies have lower estrogen levels, they are safe and appropriate for widespread use in PCOS treatment. The reason herbs work so well for PCOS is that they can strengthen the immune system and control the menstrual cycle without changing hormone levels.

REFERENCES

1. Anjali, C. S., George, M., Das, P., & Soji, S. (2019). PCOD in female reproductive age: A review. World J Pharm Res, 9(1), 677-84.
2. Shah, N., Kumari, M., Sadhu, P., &Zanwar, A. (2023). Herbal Remedies for Polycystic Ovarian Syndrome (PCOS). Natural Product Research, 63.
3. Patel A, Jacob A, Thomas R. A Comprehensive Review on Treatments for Polycystic Ovarian Syndrome (PCOS). Nur Primary Care. 2024;8(1):1-7.
4. Kamble AV, Dhamane SP, Kulkarni AS, Potnis VV. Review on effects of herbal extract for the treatment of polycystic ovarian syndrome (PCOS). Plant Archives (09725210). 2020 Oct 1;20(2).
5. Pachiappan S, Ramalingam K, Balasubramanian A. A review on phytomedicine and their mechanism of action on PCOS. Int. J. Cur. Res. Rev. 2020 Dec;12(23):81.
6. Siddiqui S, Mateen S, Ahmad R, Moin S. A brief insight into the etiology, genetics, and immunology of polycystic ovarian syndrome (PCOS). Journal of assisted reproduction and genetics. 2022 Nov;39(11):2439-73.
7. Krishna KV, Sharma A, Krishnan K, Javalgikar A, Kar NR, Sahoo NK, Bagal DK, Pandey K, Vigneswari S. Polycystic ovarian syndrome: a brief review on the role of allopathic and herbal treatment.
8. Gaiju, L., & Kapil, S. (2021). A Case Study on Management of PCOS With an Herbal Formulation. International Research Journal of Ayurveda and Yoga, 4(6), 37-47.

9. Dhankani MA, Patil HJ, Dhankani AR. A systematic review: ayurvedic herbal medicine for women with polycystic ovary syndrome. InMedical Sciences Forum 2023 (Vol. 21, No. 1, p. 46). Multidisciplinary Digital Publishing Institute.
10. Azin F, Khazali H. Phytotherapy of polycystic ovary syndrome: A review. International Journal of Reproductive BioMedicine. 2022 Feb 18;20(1):13.
11. Minocha N. Polycystic ovarian disease or polycystic ovarian syndrome: how to identify and manage-a review. Archives of Pharmacy Practice. 2020;11(2-2020):102-6.
12. Lakshmi JN, Babu AN, Kiran SM, Nori LP, Hassan N, Ashames A, Bhandare RR, Shaik AB. Herbs as a source for the treatment of polycystic ovarian syndrome: A systematic review. BioTech. 2023 Jan 3;12(1):4.
13. Ande SN, Pavitrakar KN, Bakal RL, Kochar NI. A comprehensive review on promisable herbal drugs for mitigation of polycystic ovarian syndrome. Innovations in Pharmaceuticals and Pharmacotherapy. 2022;10(2):35-40.
14. Zeng LH, Rana S, Hussain L, Asif M, Mehmood MH, Imran I, Younas A, Mahdy A, Al-Joufi FA, Abed SN. Polycystic ovary syndrome: a disorder of reproductive age, its pathogenesis, and a discussion on the emerging role of herbal remedies. Frontiers in Pharmacology. 2022 Jul 18; 13:874914.
15. Chitra V, Dhivya DP. Role of herbals in the management of polycystic ovarian syndrome and its associated symptoms. International Journal of Herbal Medicine. 2017;5(5):125-31.
16. Goswami PK, Khale A, Ogale S. Natural remedies for polycystic ovarian syndrome (PCOS): a review. Int J Pharm Phytopharmacol Res. 2012;1(6):396-402.
17. Manouchehri A, Abbaszadeh S, Ahmadi M, Nejad FK, Bahmani M, Dastyar N. Polycystic ovaries and herbal remedies: A systematic review. JBRA assisted reproduction. 2023 Jan;27(1):85.
18. Purohit A, Jain S, Nema P, Jain DK, Vishwakarma H, Jain PK. Asian Journal of Dental and Health Sciences. Health Sciences. 2022;2(1):27 32.
19. Kashani L, Akhondzadeh S. Herbal medicine in the treatment of polycystic ovary syndrome. Journal of Medicinal Plants. 2016 Aug 10;15(59):1-5.
20. Kumar V, Kumar N. Therapeutic Effect of Herbal Medicinal Plants on Polycystic Ovarian Syndrome: A Review. Asian Journal of Pharmaceutical Research and Development. 2022;10(6):153-60.
21. Meena M, Sharma M, Dhakar A, Singh C, Sharma L, Purvia RP. Role of Foeniculum vulgare in PCOS—A Review Article. World J Pharm Res. 2019 Jun 28;8(10):344-50.
22. Dr Nillohit Mitra Ray K. From nature to nurture: a review of herbal approaches to polycystic ovary syndrome (PCOS). OGF [Internet]. 2024 May 26 [cited 2025 Apr. 2];34(3s):1142-5.
23. Balen, A. H., Morley, L. C., Misso, M., Franks, S., Legro, R. S., Wijeyaratne, C. N., & Teede, H. J. (2016). The management of anovulatory infertility in women with polycystic ovary syndrome: an analysis of the evidence to support the development of global WHO guidance. Human Reproduction Update, 22(6), 687-708.

(1) 23.latrakis, G., Tsionis, C., Sakellaropoulos, G., & Kourkoubas, A. (2010). Magnetic resonance imaging in women with polycystic ovary syndrome. Gynecological Endocrinology, 26(5), 327-332. https://doi.org /10.3109/09513590903483658

24. Krishnan, A., & Muthusami, S. (2017). Hormonal alterations in PCOS and its influence on bone metabolism. Journal of Endocrinology, 232(2), R99-R113. https://doi.org/10 .1530/JOE-16-0405