Modifications Therapeutic Strategies for PCOD: Assessing Pharmacotherapy to Lifestyle Changes

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Abstract:

Background: *Polycystic Ovarian Disease (PCOD) is one of the most common endocrine disorders affecting women of reproductive age. It is characterized by menstrual irregularities, hyperandrogenism, polycystic ovaries, insulin resistance, obesity, and infertility. The condition is associated with significant reproductive, metabolic, and psychological complications. While conventional medicine primarily focuses on symptomatic management, Ayurveda emphasizes a holistic approach aimed at addressing the underlying causes of the disease.*

Objective: *This review aims to evaluate the Ayurvedic perspective on the etiology, pathogenesis, and management of PCOD and to compare the effectiveness of conventional pharmacotherapy and lifestyle modification strategies in its management.*

Methods: *A comprehensive review of classical Ayurvedic literature and contemporary scientific studies was conducted. Therapeutic approaches assessed included pharmacological interventions such as oral contraceptive pills, metformin, ovulation-inducing agents, and anti-androgen drugs, as well as non-pharmacological interventions including dietary modifications, physical activity, weight management, stress reduction, and behavioral therapy.*

Results: *Pharmacological therapies were found to be effective in regulating menstrual cycles, improving fertility, and controlling hormonal and metabolic abnormalities. However, prolonged use may be associated with adverse effects and variable patient adherence. Lifestyle modifications demonstrated significant benefits in improving insulin sensitivity, hormonal balance, ovulatory function, body weight, and psychological well-being. From an Ayurvedic perspective, PCOD can be correlated with conditions such as Artava Kshaya, Nashtartava, and Pushpaghni Jataharini, and management focuses on correcting Dosha imbalance, improving metabolism, and restoring reproductive health.*

Conclusion: *Current evidence suggests that an integrated therapeutic approach combining conventional pharmacotherapy, sustainable lifestyle modifications, and Ayurvedic principles offers superior and long-term outcomes in PCOD management. Personalized treatment strategies may improve symptom control, fertility outcomes, metabolic health, and overall quality of life in affected women.*

Keywords: *Polycystic Ovarian Disease, PCOD, Ayurveda, Artava Kshaya, Lifestyle Modification, Pharmacotherapy, Insulin Resistance, Reproductive Health.*

1. Introduction:

PCOD has emerged as a major lifestyle disorder due to increasing stress, unhealthy dietary habits, and sedentary lifestyles. It commonly presents with irregular menstrual cycles, acne, hirsutism, obesity, and infertility. Modern medical management primarily involves hormonal therapy, insulin sensitizers, and symptomatic treatment; however, these approaches may not address the underlying metabolic dysfunction. In contrast, Ayurveda emphasizes a holistic and individualized approach, focusing on correcting metabolic imbalance, detoxification, and restoration of normal physiological functions. PCOD not only affects reproductive health but also has profound implications on metabolic, psychological, and social well-being. The chronic nature of PCOD makes it a lifelong condition requiring sustained management strategies.

Furthermore, PCOD is now recognized as a multisystem disorder involving endocrine, metabolic, and inflammatory pathways. Therefore, understanding PCOD from both modern and traditional perspectives is essential for developing comprehensive treatment approaches. Recent advances in therapeutic approaches have emphasized the importance of holistic care, combining medical treatment with behavioral and nutritional interventions. Early and appropriate therapeutic management can help reduce complications such as infertility, type 2 diabetes, cardiovascular disorders, and psychological distress associated with PCOD. Therefore, understanding the range and effectiveness of available therapeutic interventions is essential for improving patient outcomes and long-term health.

Inflammation and Oxidative Stress in PCOD:

Chronic low-grade inflammation is increasingly recognized as a key factor in the pathophysiology of PCOD. Women with PCOD often exhibit elevated levels of inflammatory markers, which contribute to insulin resistance and hormonal imbalance. Oxidative stress, characterized by an imbalance between free radicals and antioxidants, further exacerbates metabolic dysfunction.

The presence of oxidative stress can impair ovarian function and negatively affect oocyte quality, thereby contributing to infertility. The use of antioxidant-rich herbs and dietary components plays a significant role in reducing oxidative stress. Herbs such as Guduchi and turmeric possess potent anti-inflammatory and antioxidant properties, which help in mitigating these effects. Therefore, targeting inflammation and oxidative stress is an important aspect of PCOD management.

Role of Gut Health in PCOD:

Emerging evidence highlights the importance of gut microbiota in the regulation of metabolic and hormonal processes. Dysbiosis, or imbalance in gut flora, has been associated with insulin resistance, obesity, and chronic inflammation, all of which are central features of PCOD. The gut microbiome influences the metabolism of estrogen and other hormones, thereby playing a role in maintaining hormonal balance.

In Ayurveda, gut health is directly linked to the strength of Agni. Impaired digestion leads to the formation of Ama, which can circulate throughout the body and contribute to disease. Therefore, maintaining a healthy digestive system through proper diet, use of probiotics, and herbal formulations is essential in managing PCOD.

PCOD and Infertility:

Infertility is one of the most significant complications associated with PCOD, primarily due to chronic anovulation. The hormonal imbalance in PCOD disrupts the normal maturation and release of ova, making conception difficult.In Ayurveda, infertility related to PCOD can be understood in terms of Artava Dushti and dysfunction of Apana Vayu. Proper functioning of Apana Vayu is essential for ovulation and menstruation. Any disturbance in its normal flow can lead to reproductive disorders.Ayurvedic therapies aim to restore ovulation through correction of metabolic imbalance, detoxification, and strengthening of reproductive tissues. Herbal formulations, Panchakarma therapies, and lifestyle interventions collectively help in improving fertility outcomes.

Ayurvedic Concept of PCOD:

Although PCOD is not explicitly mentioned in Ayurvedic classics, its clinical presentation closely resembles conditions such as Artava Dushti and Artava Kshaya. It is primarily considered a disorder involving Kapha and Vata dosha, along with Medo Dhatu Vriddhi (increase in adipose tissue). The accumulation of Kapha leads to obstruction in body channels (Srotorodha), while Vata imbalance disrupts the normal functioning of the reproductive system.Thus, PCOD can be understood as a disorder of metabolic and reproductive imbalance involving multiple dhatus, especially Rasa, Rakta, and Artava.

Sleep and Circadian Rhythm in PCOD:

Sleep plays a vital role in maintaining hormonal balance and metabolic health. Disturbances in sleep patterns, such as late sleeping habits and inadequate rest, have been linked to increased risk of PCOD. Disruption of circadian rhythm affects the secretion of hormones such as cortisol, insulin, and melatonin, which can contribute to metabolic dysfunction. Poor sleep quality is also associated with increased stress levels, further aggravating hormonal imbalance. Ayurveda emphasizes the importance of proper sleep (Nidra) as one of the pillars of health. Maintaining a regular sleep schedule, avoiding late-night activities, and ensuring adequate rest are essential components of PCOD management.

Hormonal Imbalance in PCOD:

PCOD is fundamentally characterized by a complex hormonal imbalance involving multiple endocrine axes. The hypothalamic-pituitary-ovarian (HPO) axis plays a central role in regulating the menstrual cycle, and any disruption in this axis can lead to ovulatory dysfunction. In PCOD, there is an increased secretion of luteinizing hormone relative to follicle-stimulating hormone, which results in excessive androgen production by ovarian theca cells. This hormonal imbalance prevents normal follicular maturation and leads to the formation of multiple immature cysts within the ovaries.

In addition to ovarian hormones, insulin also plays a critical role in the pathophysiology of PCOD. Hyperinsulinemia enhances androgen production and reduces levels of sex hormone-binding globulin, thereby increasing the bioavailability of free androgens. This contributes to clinical manifestations such as hirsutism, acne, and menstrual irregularities. From an Ayurvedic standpoint,

this imbalance reflects a disturbance in the coordination between Vata and Kapha doshas, where Kapha contributes to accumulation and obstruction, while Vata disrupts normal physiological flow.

Role of Liver Function in PCOD:

The liver plays a crucial role in maintaining hormonal balance by metabolizing and eliminating excess hormones from the body. Impaired liver function can lead to accumulation of estrogen and androgens, thereby contributing to hormonal imbalance observed in PCOD. Additionally, the liver is involved in glucose metabolism, and its dysfunction can exacerbate insulin resistance.

In Ayurveda, the liver is closely associated with Pitta dosha and Rakta Dhatu. Any disturbance in these components can affect metabolic and hormonal processes. Accumulation of toxins and impaired Agni can hinder liver function, leading to systemic imbalance. Therefore, therapies aimed at improving liver health, such as detoxification and use of hepatoprotective herbs, are considered beneficial in managing PCOD.

Menstrual Irregularities and Their Ayurvedic Interpretation:

Menstrual irregularities are one of the hallmark features of PCOD, ranging from oligomenorrhea to complete absence of menstruation. These disturbances arise due to anovulation and hormonal imbalance, which disrupt the normal cyclical changes in the endometrium.

In Ayurveda, normal menstruation is governed by the proper functioning of Artava Dhatu and Apana Vayu. Any disturbance in these factors leads to conditions such as Artava Kshaya or Nashtartava. Kapha-induced obstruction in Artavavaha Srotas prevents proper flow of menstrual blood, while vitiated Vata disrupts the timing and regularity of cycles. Understanding these mechanisms helps in designing appropriate therapeutic interventions that restore normal menstrual function.

Skin Manifestations in PCOD:

Skin-related symptoms such as acne, oily skin, and acanthosis nigricans are commonly observed in PCOD and are primarily linked to hyperandrogenism and insulin resistance. Increased androgen levels stimulate sebaceous gland activity, leading to excessive sebum production and acne formation. Acanthosis nigricans, characterized by darkened and thickened skin in certain areas, is considered a marker of insulin resistance. These dermatological manifestations not only indicate underlying metabolic disturbance but also contribute to psychological distress.

In Ayurvedic terms, these symptoms can be associated with vitiation of Pitta and Kapha doshas affecting the skin and Rakta Dhatu. Management includes purification therapies and use of herbs that purify blood and balance doshas.

Obesity and Metabolic Syndrome in PCOD:

Obesity is frequently associated with PCOD and plays a significant role in its progression. Excess adipose tissue contributes to insulin resistance and hormonal imbalance, thereby worsening the symptoms of PCOD. From an Ayurvedic perspective, obesity in PCOD is related to Medo Dhatu Vriddhi and Kapha Dosha aggravation. Impaired Agni leads to improper metabolism of nutrients,

resulting in accumulation of fat tissue. This not only affects physical health but also interferes with reproductive function.

2. **Etiology (Nidana):**

According to Ayurveda, the development of PCOD is associated with improper dietary and lifestyle habits. Excessive consumption of heavy, oily, and sweet foods, along with physical inactivity, mental stress, and irregular daily routines, contribute to the aggravation of Kapha dosha. These factors impair digestive fire (Agni), leading to the formation of Ama (toxins), which plays a central role in disease manifestation.

3. **Mechanism of Action:**

According to Ayurveda, PCOD can be correlated mainly with disorders involving imbalance of Kapha and Vata dosha along with impairment of Agni and formation of Ama. The pathology affects Artavavaha Srotas, leading to irregular menstruation, anovulation, obesity, infertility, and metabolic disturbances. Ayurvedic treatment aims to correct the root cause rather than only suppress symptoms. The mechanism of action of Ayurvedic therapies in PCOD includes the following aspects:

Correction of Dosha Imbalance:

Ayurvedic medicines and therapies help in balancing aggravated Kapha and Vata dosha. Kapha aggravation is responsible for cyst formation, obesity, insulin resistance, and blockage of channels, whereas Vata imbalance causes irregular menstruation and hormonal disturbances.

Improvement of Agni and Reduction of Ama:

Impaired digestive and metabolic fire (Agni) leads to accumulation of Ama, which obstructs body channels and disturbs hormonal regulation. Deepana and Pachana herbs improve digestion and metabolism, helping in detoxification and proper tissue nourishment. Removal of Ama enhances ovarian function and improves menstrual regularity.

Enhancement of Ovulation and Fertility:

Rasayana and Garbhashaya-balya drugs nourish reproductive tissues and improve ovarian health. These medicines promote healthy ovulation, improve quality of ovum, and enhance fertility potential in women suffering from PCOD.

Improvement of Insulin Sensitivity:

Many Ayurvedic formulations possess anti-diabetic and metabolic regulatory actions. They improve glucose metabolism, reduce insulin resistance, and help maintain healthy body weight. Better insulin sensitivity indirectly reduces excess androgen production and helps control symptoms like acne and hirsutism.

Anti-Inflammatory and Antioxidant Action:

Oxidative stress and chronic inflammation play an important role in the pathogenesis of PCOD. Ayurvedic herbs rich in antioxidants help reduce inflammatory changes, protect ovarian tissue from damage, and improve overall reproductive health.

Cleansing and Detoxification through Panchakarma:

Panchakarma therapies such as Vamana, Virechana, and Basti eliminate accumulated toxins and balance doshas. These procedures purify body channels, improve metabolism, and restore normal reproductive function. Uttara Basti is considered especially beneficial for disorders of the female reproductive system.

Stress Reduction and Mental Well-Being:

Mental stress aggravates hormonal imbalance in PCOD. Ayurvedic adaptogenic herbs and lifestyle modifications help reduce stress, improve sleep quality, and maintain emotional stability. This contributes to better endocrine regulation and menstrual health.

Weight Management:

Ayurvedic treatment emphasizes proper diet, exercise, yoga, and herbal support for reducing obesity, which is a major contributing factor in PCOD. Weight reduction improves menstrual regularity and decreases metabolic complications.

Restoration of Menstrual Regularity:

By correcting dosha imbalance, improving metabolism, and regulating hormones, Ayurvedic management restores normal menstrual cycles and reduces symptoms such as oligomenorrhea, amenorrhea, and dysmenorrhea.

Ayurvedic management of PCOD works by balancing Kapha and Vata dosha, improving Agni, and removing Ama from the body. Herbal medicines and Panchakarma therapies help regulate hormones, improve ovulation, and restore menstrual regularity. Ayurveda also enhances insulin sensitivity, reduces stress, and supports healthy weight management. Thus, it provides a holistic approach for improving reproductive and metabolic health in women with PCOD.

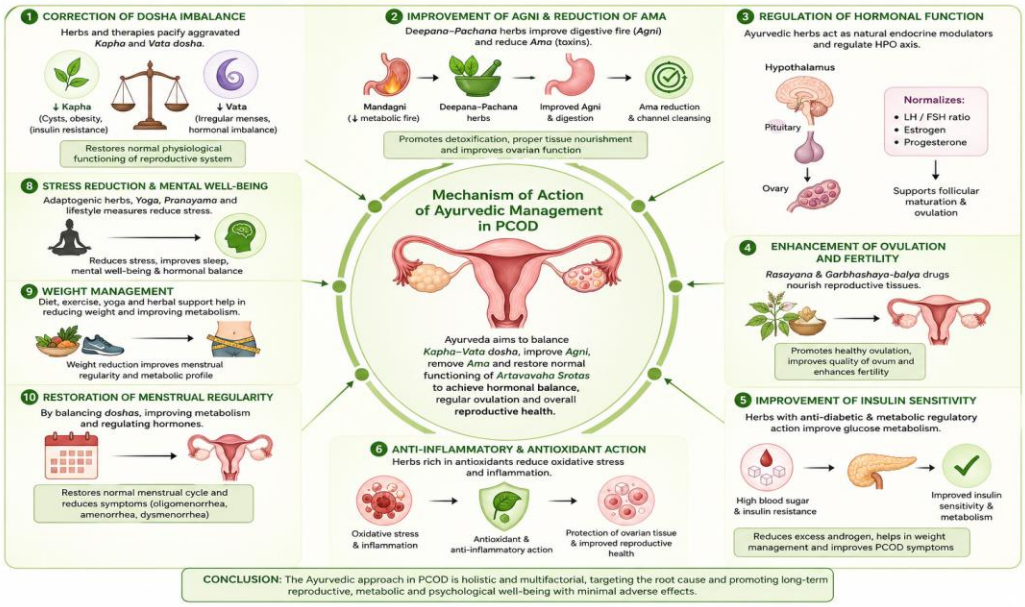

Figure1: Mechanism of Action of Ayurvedic Management in PCOD

4. **Pathogenesis (Samprapti):**

The pathogenesis of PCOD begins with Agni Mandya, resulting in incomplete digestion and formation of Ama. This Ama accumulates in the body and causes obstruction of channels, particularly the Artavavaha Srotas (reproductive channels). Kapha aggravation leads to cyst formation, while Vata imbalance results in irregular menstruation and ovulatory dysfunction. Hence, PCOD is considered a Kapha-Vata predominant disorder affecting metabolic and reproductive pathways.

Initially, due to Nidana Sevana (indulgence in causative factors), Agni Mandya occurs, leading to improper digestion. This results in the formation of Ama, which circulates throughout the body and accumulates in various Dhatus. Kapha Dosha, being dominant in structure and accumulation, causes Srotorodha (blockage of channels), particularly in Artavavaha Srotas. This obstruction prevents proper nourishment of Artava Dhatu, leading to menstrual irregularities. Simultaneously, Vata Dosha—especially Apana Vayu—gets vitiated due to obstruction. This leads to dysfunction in ovulation and irregular menstrual flow.

5. **Clinical Features (Lakshana):**

The clinical presentation of PCOD includes irregular or absent menstruation, weight gain, acne, hirsutism, and infertility. These manifestations reflect hormonal imbalance, metabolic dysfunction, and impaired ovarian activity.

Clinical Case Approach in Ayurveda:

The management of PCOD in Ayurveda is highly individualized and based on a detailed assessment of the patient. Factors such as Prakriti, Vikriti, Agni status, and severity of symptoms are considered while planning treatment. A typical clinical approach involves initial correction of digestion and metabolism, followed by elimination of toxins and balancing of doshas.

Regular follow-up and monitoring are essential to evaluate treatment response and make necessary adjustments. This personalized approach enhances the effectiveness of treatment and ensures better patient outcomes.

Environmental Factors and Endocrine Disruptors:

Exposure to environmental toxins and endocrine-disrupting chemicals has been suggested as a contributing factor in the development of PCOD. Substances such as pesticides, plastics, and industrial chemicals can interfere with hormonal function and disrupt endocrine balance.

These chemicals mimic or block natural hormones, leading to altered reproductive function. Chronic exposure may contribute to insulin resistance, obesity, and hormonal imbalance.

Economic and Social Impact of PCOD:

PCOD has significant economic and social implications, particularly in developing countries. The cost of long-term treatment, diagnostic procedures, and management of complications can impose a financial burden on patients and healthcare systems.

Socially, the condition may affect marriage prospects, fertility expectations, and overall quality of life. Women with PCOD may face stigma and psychological stress due to visible symptoms and reproductive challenges.

Addressing these issues requires a comprehensive approach that includes medical management, psychological support, and social awareness. Ayurveda, with its emphasis on holistic well-being, can contribute to improving both physical and mental health outcomes.

Table 1: Pharmacological Profile of Herbs Used in PCOD Management:

S. No.	Medicine/Herb	Botanical Name	Uses in PCOD
1	**Shatavari**	**Asparagus racemosus**	Acts as a female reproductive tonic, helps in hormonal balance, improves ovulation and fertility
2	**Ashoka**	**Saraca asoca**	Regulates menstrual cycle, strengthens uterus, reduces excessive bleeding and pain
3	**Lodhra**	**Symplocos racemosa**	Reduces Kapha, helps in cyst reduction, improves menstrual regularity
4	**Guduchi**	**Tinospora cordifolia**	Enhances immunity, reduces inflammation, supports metabolism

S. No.	Medicine/Herb	Botanical Name	Uses in PCOD
5	**Kanchanar Guggulu**	**Polyherbal formulation**	Reduces ovarian cysts, improves glandular swelling, balances hormones
6	**Ashokarishta**	**Fermented formulation**	Improves uterine health, regulates menstruation, reduces hormonal imbalance
7	**Triphala**	**Combination of 3 fruits**	Detoxifies body, improves digestion, aids weight management
8	**Turmeric**	**Curcuma longa**	Anti-inflammatory, improves insulin sensitivity, reduces oxidative stress
9	**Cinnamon**	**Cinnamomum verum**	Helps regulate blood sugar levels, improves insulin resistance
10	**Aloe vera**	**Aloe barbadensis**	Supports hormonal balance, improves metabolism, aids digestion
11	**Fenugreek**	**Trigonella foenum-graecum**	Improves insulin sensitivity, helps in weight management
12	**Neem**	**Azadirachta indica**	Blood purifier, helps in acne and skin issues in PCOD
13	**Musta**	**Cyperus rotundus**	Improves digestion, regulates menstruation, reduces Ama and Kapha imbalance
14	**Daruharidra**	**Berberis aristata**	Anti-inflammatory, improves insulin resistance, beneficial for skin issues like acne
15	**Manjistha**	**Rubia cordifolia**	Blood purifier, improves skin conditions, reduces inflammation and hormonal imbalance
16	**Yashtimadhu**	**Glycyrrhiza glabra**	Supports hormonal balance, reduces excess androgens, improves reproductive Punarnava

SHATAVARI:

Biological Source

- **Botanical Name:** *Asparagus racemosus* Willd.
- **Family:** Asparagaceae
- **Common Name:** Shatavari
- **Part Used:** Roots

Phytochemical Constituents

- Steroidal saponins (Shatavarins I–IV), Flavonoids, Alkaloids, Glycosides, Tannins, Vitamins

Traditional Uses

- Female reproductive health, Lactation enhancement, Fertility improvement, Hormonal balance, General health tonic, Stress management

Pharmacological Activities

- Adaptogenic, Immunomodulatory, Antioxidant, Anti-inflammatory, Antimicrobial, Anti-ulcer, Antidiabetic, Hepatoprotective, Anticancer

Therapeutic Applications

- Gastric ulcers, Diarrhea, Anxiety and stress, Menopausal symptoms, Urinary disorders, Immune enhancement

Mechanism of Action

- Scavenges free radicals, reduces oxidative stress, stimulates macrophage activity, enhances immune response, Maintains hormonal balance

ASHWAGANDHA:

Biological Source

- **Botanical Name:** *Withania somnifera* (L.) Dunal
- **Family:** Solanaceae
- **Common Names:** Ashwagandha, Indian Ginseng, Winter Cherry
- **Parts Used:** Roots and Leaves

Phytochemical Constituents

- Withanolides, Alkaloids, Sitoindosides, Flavonoids, Steroidal lactones

Traditional Uses

- Rasayana (rejuvenating tonic), Stress and anxiety management, Enhancement of vitality and longevity, Improvement of sleep quality, General health tonic

Pharmacological Activities

- Adaptogenic, Antioxidant, Anti-inflammatory, Immunomodulatory, Neuroprotective, Analgesic, Anti-stress, Endocrine- modulating

Therapeutic Applications

- Stress and anxiety disorders, Insomnia and fatigue, Alzheimer's disease, Parkinson's disease, Arthritis and musculoskeletal disorders, PCOD management, Fertility enhancement, Immune support, Muscle strength and physical performance

Mechanism of Action

- Regulates cortisol levels, enhances adrenal function, reduces oxidative stress, modulates immune responses, protects neuronal cells, Improves hormonal balance

Adverse Effects

- Gastrointestinal discomfort, Drowsiness, Diarrhea, Allergic reactions, Use with caution during pregnancy and chronic illnesses

GUDUCHI:

Biological Source

- **Family:** Menispermaceae
- **Common Names:** Guduchi, Giloy, Amrita
- **Parts Used:** Stem, Roots, Leaves

Phytochemical Constituents

- Alkaloids, Glycosides, Diterpenoid lactones, Flavonoids, Steroids, Polysaccharides

Key Compounds: Tinosporin, Cordifolioside, Berberine, Magnoflorine, Giloin

Traditional Uses

- Rasayana (Rejuvenator), Immunity booster, Fever management, Vitality enhancer, Disease prevention.

Pharmacological Activities

- Immunomodulatory, Antioxidant, Anti-inflammatory, Antipyretic, Hepatoprotective, Antidiabetic, Antimicrobial, Anti-allergic, Anti-stress

Therapeutic Applications

- Fever and infections, Diabetes mellitus, Arthritis and gout, Liver disorders, Asthma and bronchitis, Digestive disorders, Chronic inflammatory diseases

Mechanism of Action

- Enhances immune response, reduces oxidative stress, protects liver cells, regulates blood glucose, Improves insulin sensitivity

Adverse Effects

- Gastrointestinal discomfort, Blood sugar alterations, Caution in diabetes and autoimmune disorders

TRIPHALA:

Biological Source

Triphala is a polyherbal Ayurvedic formulation composed of:

Emblica officinalis (Amla)

Terminalia chebula (Haritaki)

Terminalia bellirica (Bibhitaki)

Phytochemical Constituents

- Tannins, Flavonoids, Gallic acid, Ellagic acid, Vitamin C, Polyphenols, Glycosides

Traditional Uses

- Rasayana (Rejuvenator), Detoxification, Digestive tonic, Health promotion, Longevity enhancement

Pharmacological Activities

- Antioxidant, Anti-inflammatory, Antimicrobial, Immunomodulatory, Laxative, Antidiabetic, Anticancer

Therapeutic Applications

- Constipation, Indigestion and bloating, Gastrointestinal disorders, Diabetes mellitus, Obesity and weight management, Arthritis, Oral health, Wound healing, Eye health, Skin disorders, Immune support.

Mechanism of Action

- Scavenges free radicals, reduces oxidative stress, improves digestion and metabolism, enhances bowel movements, regulates blood glucose levels, supports lipid metabolism, Strengthens immune response

Adverse Effects

- Diarrhea, Abdominal discomfort, Dehydration (excessive use), Use with caution during pregnancy and chronic illnesses

ALOE VERA:

Biological Source

- Aloe vera consists of the fresh or dried juice and gel obtained from the leaves of Aloe barbadensis Miller.
- **Family:** Liliaceae (Asphodelaceae according to modern classification).
- **Common name:** Aloe vera.

Phytochemical Constituents

- Anthraquinones (Aloin, Aloe-emodin, Barbaloin), Polysaccharides (Acemannan, Glucomannan), Vitamins (A, C, E, B-complex), Minerals (Calcium, Magnesium, Zinc, Potassium), Amino acids, Enzymes (Amylase, Catalase, Peroxidase), Saponins, Flavonoids, Phenolic compounds

Traditional Uses

- Skin care and beauty enhancer, Wound healing remedy, Digestive aid, Natural laxative, Health tonic, Traditional remedy for burns and skin irritation

Pharmacological Activities

- Antioxidant, Anti-inflammatory, Antimicrobial, Antifungal, Antiviral, Immunomodulatory, Antidiabetic, Antiulcer, Hepatoprotective, Wound-healing

Therapeutic Applications

- Burns and wounds, Skin disorders and acne, Constipation, Gastric ulcers, Indigestion and digestive disorders, Diabetes mellitus, Obesity and metabolic disorders, Oral and dental infections, Menstrual irregularities, Immune support

Mechanism of Action

- Promotes collagen synthesis and tissue regeneration, Scavenges free radicals and reduces oxidative stress, inhibits inflammatory mediators, Enhances wound contraction and

healing, improves glucose metabolism and insulin sensitivity, provides antimicrobial protection against pathogens, Supports gastrointestinal mucosal healing**.**

Adverse Effects

- Diarrhea, Abdominal cramps, Electrolyte imbalance, Dehydration (excessive use), Potassium depletion, Excessive latex consumption should be avoided, Use with caution during pregnancy and chronic illnesses

Pharmaceutical Applications

- Gels, Creams, Ointments, Lotions, Shampoos, Herbal formulations, Oral care products (mouthwash, toothpaste)

KANCHNAR GUGGULU:

Biological Source

- **A classical Ayurvedic polyherbal formulation containing:**
  - Bauhinia variegata (Kanchnar)
  - Commiphora mukul (Guggulu)
  - **Triphala:**
    - Emblica officinalis (Amla)
    - Terminalia chebula (Haritaki)
    - Terminalia bellirica (Bibhitaki)
  - **Trikatu:**
    - Piper longum (Pippali)
    - Piper nigrum (Maricha)
    - Zingiber officinale (Shunthi)

Phytochemical Constituents

- Guggulsterones, Tannins, Flavonoids, Alkaloids, Essential oils, Phenolic compounds, Terpenoids, Glycosides

Traditional Uses

- Management of glandular swellings, Detoxification of the body, Treatment of cysts and benign tumors, Support of thyroid function, Improvement of metabolism, Balancing Kapha and Vata doshas

Pharmacological Activities

- Anti-inflammatory, Antioxidant, Antimicrobial, Detoxifying, Hypolipidemic, Anti-obesity, Immunomodulatory, Endocrine-supportive

Therapeutic Applications

- Thyroid disorders, Lymphadenopathy, Polycystic Ovarian Disease (PCOD), Ovarian cysts, Uterine fibroids, Obesity, Hyperlipidemia, Glandular enlargement, Chronic inflammatory conditions, Metabolic disorders

Mechanism of Action

- Reduces glandular swelling and abnormal tissue growth, enhances metabolic activity, supports hormonal balance, reduces oxidative stress through antioxidant action, improves lipid metabolism and fat utilization, modulates inflammatory mediators, supports detoxification and digestive function, Helps maintain endocrine health

Adverse Effects

- Gastric irritation, Acidity, Abdominal discomfort, Nausea (rare), Allergic reactions in sensitive individuals, Excessive use may cause digestive disturbances, Use with caution during pregnancy and under medical supervision in chronic illnesses

LODHRA:

Biological Source

- Lodhra consists of the dried stem bark of **Symplocos racemosa**.
- Family: **Symplocaceae**

Phytochemical Constituents

- Alkaloids, Flavonoids, Glycosides, Tannins, Phenolic compounds, Symplocoside, Loturine and Colloturine alkaloids

Traditional Uses

- Female reproductive health tonic, Management of excessive menstrual bleeding, Treatment of leucorrhea, Uterine support and strengthening, Wound healing, Skin care and complexion enhancement, Management of inflammatory conditions.

Pharmacological Activities

- Anti-inflammatory, Antioxidant, Antimicrobial, Astringent, Wound-healing, Hemostatic (reduces bleeding), Uterine tonic, Anti-acne activity.

Therapeutic Applications

- Menorrhagia (excessive menstrual bleeding), Leucorrhea, Polycystic Ovarian Disease (PCOD), Menstrual irregularities, Uterine disorders, Skin disorders, Acne and pimples, Wound healing, Inflammatory conditions, Minor infections, Weight management support.

Mechanism of Action

- Exerts astringent action that helps reduce excessive secretions and bleeding, modulates inflammatory mediators and reduces inflammation, Scavenges free radicals and decreases oxidative stress, promotes tissue repair and wound healing, supports uterine health and hormonal balance, inhibits growth of certain microorganisms, Contributes to metabolic regulation.

Adverse Effects

- Gastrointestinal discomfort, Mild constipation (with excessive use), Nausea in sensitive individuals, Allergic reactions (rare), Use with caution during pregnancy unless prescribed by a qualified practitioner

NEEM:

Biological Source

- Neem consists of the leaves, bark, seeds, flowers, and oil obtained from **Azadirachta indica**.
- Family: **Meliaceae**

Phytochemical Constituents

- Azadirachtin, Nimbin, Nimbolide, Nimbidin, Limonoids, Flavonoids, Tannins, Glycosides, Phenolic compounds, Essential oils

Traditional Uses

- Blood purification, Skin disease management, Wound healing, Oral and dental care, Detoxification, Fever management, Immune support, General health promotion

Pharmacological Activities

- Antimicrobial, Anti-inflammatory, Antioxidant, Antidiabetic, Immunomodulatory, Antifungal, Antiviral, Antiparasitic, Hepatoprotective, Wound-healing

Therapeutic Applications

- Acne, Eczema, Psoriasis, Fungal skin infections, Wounds and ulcers, Dental plaque and gingivitis, Diabetes mellitus, PCOD and metabolic disorders, Fever and infections, Chronic inflammatory conditions, Immune support

Mechanism of Action

- Inhibits the growth of bacteria, fungi, viruses, and parasites, Scavenges free radicals and reduces oxidative stress, suppresses inflammatory mediators, enhances immune response,

Helps regulate blood glucose levels and improves insulin sensitivity, Promotes wound healing and tissue repair, Supports detoxification and blood purification

Adverse Effects

- Gastrointestinal disturbances, Nausea and vomiting, Allergic reactions, Liver toxicity (with excessive use), Neem oil toxicity if consumed in large quantities, Use with caution during pregnancy and in young children.

CINNAMON:

Biological Source

- Cinnamon is the dried inner bark obtained from Cinnamomum verum and related species such as Cinnamomum cassia.
- **Family:** Lauraceae

Phytochemical Constituents

- Cinnamaldehyde, Eugenol, Cinnamic acid, Coumarin, Flavonoids, Polyphenols, Tannins, Essential oils, Procyanidins

Traditional Uses

- Digestive tonic, Management of indigestion and bloating, Relief from nausea, Treatment of common cold and cough, Improvement of circulation, General health promotion, Traditional remedy for metabolic disorders

Pharmacological Activities

- Antioxidant, Anti-inflammatory, Antimicrobial, Antidiabetic, Hypolipidemic, Cardioprotective, Antifungal, Gastroprotective, Immunomodulatory

Therapeutic Applications

- Diabetes mellitus, Insulin resistance, Polycystic Ovarian Disease (PCOD), Obesity and metabolic syndrome, Hyperlipidemia, Cardiovascular disorders, Indigestion, Bloating and flatulence, Nausea, Bacterial and fungal infections.

Mechanism of Action

- Improves insulin sensitivity and glucose uptake, Helps regulate blood glucose levels, reduces oxidative stress by scavenging free radicals, inhibits inflammatory mediators, Suppresses the growth of bacteria and fungi, supports lipid metabolism and cholesterol regulation, Enhances digestive function and gastric motility

Adverse Effects

- Gastrointestinal irritation, Allergic reactions, Mouth and mucosal irritation, Liver toxicity with excessive consumption (due to coumarin content, especially in cassia cinnamon), May interact with antidiabetic and anticoagulant medications, Excessive intake should be avoided during prolonged use.

FENUGREEK:

Biological Source

- Fenugreek consists of the dried ripe seeds and fresh leaves of Trigonella foenum-graecum.
- **Family:** Fabaceae

Phytochemical Constituents

- Diosgenin, Trigonelline, Alkaloids, Saponins, Flavonoids, Galactomannan (soluble fiber), Proteins and amino acids, Mucilage, Polyphenols

Traditional Uses

- Digestive tonic, Appetite stimulant, Management of diabetes, Support of lactation in nursing mothers, Improvement of general health, Hormonal balance, Traditional remedy for weakness and metabolic disorders

Pharmacological Activities

- Antioxidant, Anti-inflammatory, Antidiabetic, Hypolipidemic, Antimicrobial, Cardioprotective, Galactagogue (promotes milk production), Immunomodulatory

Therapeutic Applications

- Diabetes mellitus, Insulin resistance, Polycystic Ovarian Disease (PCOD), Obesity and weight management, Hyperlipidemia, Digestive disorders, Loss of appetite, Lactation support, Cardiovascular disorders, Inflammatory conditions

Mechanism of Action

- Improves insulin sensitivity and glucose utilization, Delays glucose absorption due to high fiber content, regulates blood glucose levels, reduces oxidative stress by scavenging free radicals, modulates inflammatory pathways, improves lipid metabolism and lowers cholesterol levels, supports hormonal balance and lactation, Enhances digestive function

Adverse Effects

- Gastrointestinal discomfort, Diarrhea, Flatulence and bloating, Allergic reactions in sensitive individuals, May cause hypoglycemia when used with antidiabetic medications, use with caution during pregnancy unless advised by a healthcare professional.

6. Psychological Aspects of PCOD:

PCOD is not only a physical and metabolic disorder but also has a significant psychological impact on affected individuals. Women with PCOD frequently experience emotional disturbances such as anxiety, depression, mood swings, and reduced self-esteem. These psychological issues often arise due to visible symptoms like acne, hirsutism, obesity, and infertility, which can affect body image and social confidence. The chronic nature of the disorder further contributes to mental stress, creating a cycle that may worsen hormonal imbalance.

From an Ayurvedic perspective, mental health is closely linked with the balance of doshas, particularly Vata, which governs the nervous system. Aggravation of Vata due to stress, irregular lifestyle, and emotional instability can further disrupt hormonal regulation and menstrual cycles. Therefore, management of PCOD must include attention to mental well-being through practices such as meditation, mindfulness, and sattvic lifestyle. Incorporating psychological counseling and stress reduction techniques alongside Ayurvedic therapies can significantly improve overall treatment outcomes.

Role of Exercise and Physical Activity:

Regular physical activity plays a crucial role in the management of PCOD by improving metabolic function and hormonal balance. Sedentary lifestyle is one of the major contributing factors in the development of PCOD, as it leads to weight gain, insulin resistance, and impaired ovarian function. Engaging in consistent exercise helps in reducing body weight, enhancing insulin sensitivity, and regulating menstrual cycles.

In Ayurveda, physical activity is considered essential for maintaining equilibrium of doshas and promoting proper digestion. Exercise helps in reducing Kapha accumulation and improving Agni, thereby preventing the formation of Ama. Activities such as brisk walking, jogging, and yoga are particularly beneficial for women with PCOD. Regular movement also supports mental health by reducing stress and improving mood, which indirectly contributes to hormonal regulation. Thus, exercise should be considered an integral component of both preventive and therapeutic strategies in PCOD.

Detailed Role of Yoga in PCOD Management:

Yoga provides a comprehensive approach to managing PCOD by addressing both physical and psychological aspects of the disorder. The practice of yoga enhances endocrine function, improves blood circulation to reproductive organs, and helps in regulating hormonal balance. It also reduces stress levels, which is a major contributing factor in PCOD. Certain yogic practices stimulate the hypothalamic-pituitary-ovarian axis, thereby improving ovulation and menstrual regularity. Regular practice of asanas improves flexibility, reduces abdominal fat, and enhances metabolic

efficiency. In addition to physical benefits, yoga promotes mental calmness and emotional stability through controlled breathing and meditation techniques. This dual action makes yoga an effective adjunct therapy in PCOD management.

Pranayama, in particular, plays a vital role in regulating the autonomic nervous system and reducing stress-induced hormonal imbalances. Techniques involving slow and deep breathing help in improving oxygen supply and calming the mind. When practiced consistently, yoga contributes significantly to improving quality of life in women with PCOD.

Quality of Life in PCOD Patients:

PCOD significantly affects the quality of life of affected individuals due to its physical, emotional, and social impact. Symptoms such as weight gain, acne, and infertility can lead to reduced self-esteem and social withdrawal. Chronic health issues and long-term treatment further add to the burden. Assessment of quality of life is important in evaluating treatment effectiveness. Improvement in physical symptoms, mental health, and social functioning indicates successful management. Ayurvedic treatment, with its holistic approach, aims to improve overall well-being rather than focusing solely on symptom relief. This contributes to better quality of life in patients with PCOD.

Complications of Untreated PCOD:

If left untreated, PCOD can lead to several complications affecting both reproductive and general health. These include infertility due to anovulation, increased risk of type 2 diabetes mellitus, dyslipidemia, hypertension, and cardiovascular diseases. Additionally, prolonged hormonal imbalance may result in endometrial hyperplasia and increased risk of endometrial carcinoma. From an Ayurvedic perspective, chronic Kapha accumulation and Ama can further aggravate metabolic disorders and lead to long-term dhatu imbalance, emphasizing the need for early intervention.

7. Comparative Analysis: Ayurveda vs Modern Medicine:

Modern medicine primarily focuses on symptomatic management of PCOD through hormonal therapy and metabolic control. While these methods provide quick relief, they often fail to address the underlying cause and may have side effects with long-term use.

In contrast, Ayurveda adopts a holistic approach by correcting metabolic dysfunction, eliminating toxins, and restoring doshic balance. It emphasizes individualized treatment, dietary regulation, and lifestyle modification, which not only manage symptoms but also prevent recurrence. However, Ayurvedic treatment requires longer duration and patient compliance, which may limit its acceptance in some cases.

8. Preventive Aspects (Nidana Parivarjana):

Prevention plays a vital role in Ayurveda, and Nidana Parivarjana (avoidance of causative factors) is considered the first step in disease management. In the context of PCOD, avoiding unhealthy dietary habits, maintaining regular physical activity, managing stress, and following a disciplined

daily routine can significantly reduce the risk of disease development. Adopting a healthy lifestyle from an early age is particularly important in preventing PCOD among adolescents.

9. **Summary:**

Ayurveda offers a comprehensive and individualized approach to PCOD management by addressing the root cause rather than merely treating symptoms. Unlike modern medicine, which relies heavily on hormonal therapy, Ayurveda emphasizes detoxification, metabolic correction, and lifestyle modification. Several studies have indicated that Ayurvedic therapies, particularly Shodhana and herbal formulations, can improve menstrual regularity, reduce cyst size, and enhance fertility. However, more large-scale clinical trials are required to establish standardized treatment protocols and validate these findings scientifically.

The management of PCOD requires a multidimensional approach that addresses both metabolic and reproductive aspects of the disorder. Ayurveda provides a unique perspective by emphasizing the role of Agni, Ama, and doshic imbalance in disease pathogenesis. This approach not only helps in symptom management but also targets the root cause, thereby reducing the risk of recurrence. The incorporation of lifestyle interventions, including diet, exercise, and stress management, aligns well with modern recommendations for PCOD management. This highlights the relevance of Ayurvedic principles in contemporary healthcare. However, the need for evidence-based validation remains crucial for wider acceptance.

Recent studies have demonstrated the effectiveness of Ayurvedic therapies in improving menstrual regularity, reducing cyst size, and enhancing fertility. Nevertheless, further research involving larger sample sizes and standardized methodologies is required to strengthen these findings.

10. Future Scope and Research Directions:

The integration of Ayurveda with modern medical science offers a promising approach for the management of PCOD. Future research should focus on conducting randomized controlled trials to evaluate the efficacy and safety of Ayurvedic therapies. Standardization of herbal formulations and development of evidence-based treatment protocols are essential for wider acceptance.

Additionally, interdisciplinary approaches combining Ayurveda, nutrition, and lifestyle medicine can provide more effective and sustainable outcomes in PCOD management.

11. Conclusion:

PCOD is a multifactorial disorder that requires a holistic approach for effective management. Ayurveda provides a safe and sustainable solution by focusing on detoxification, dietary regulation, herbal medication, and lifestyle modification. Early diagnosis and consistent adherence to Ayurvedic principles can help restore hormonal balance, improve reproductive health, and prevent long-term complications.

In addition to its physical manifestations, PCOD significantly affects metabolic, psychological, and reproductive health, making it a complex disorder requiring comprehensive management. The

Ayurvedic approach, with its emphasis on individualized treatment, dietary regulation, detoxification, and lifestyle modification, offers a sustainable and holistic solution.

By integrating traditional knowledge with modern scientific understanding, more effective and patient-centered treatment strategies can be developed. Continued research and awareness are essential to improve early diagnosis, enhance treatment outcomes, and reduce the overall burden of PCOD.

12. References :

1. Azziz, R., et al. (2009). The polycystic ovary syndrome: A comprehensive review. Fertility and Sterility. https://pubmed.ncbi.nlm.nih.gov/19174452/.
2. Arentz, S., et al. (2017). Herbal medicine for the management of polycystic ovary syndrome. BMC Complementary and Alternative Medicine. https://pubmed.ncbi.nlm.nih.gov/28503717/.
3. AI and mental health in PCOS. (2026). arXiv. https://arxiv.org/abs/2604.14356.
4. Balen, A. H. (2003). Polycystic ovary syndrome and infertility. Human Reproduction Update. https://pubmed.ncbi.nlm.nih.gov/15790607/.
5. Barber, T. M. (2012). Obesity and polycystic ovary syndrome. Clinical Endocrinology. https://pubmed.ncbi.nlm.nih.gov/22717738/.
6. Bozdag, G. (2016). Prevalence of PCOS. Human Reproduction. https://pubmed.ncbi.nlm.nih.gov/22884828/.
7. Chikhalekar, S., & Bansode, R. (n.d.). Ayurvedic management of PCOD: A review. Ayurlog. https://ayurlog.com/index.php/ayurlog/article/view/165.
8. Deswal, R. (2019). The prevalence and burden of PCOS in India. Annals of Medical and Health Sciences Research. https://pubmed.ncbi.nlm.nih.gov/31640835/.
9. Diamanti-Kandarakis, E. (2006). Insulin resistance in polycystic ovary syndrome. Endocrine Reviews. https://pubmed.ncbi.nlm.nih.gov/16882750/.
10. Dunaif, A. (2006). Insulin resistance and the polycystic ovary syndrome. Endocrine Reviews. https://pubmed.ncbi.nlm.nih.gov/16520452/.
11. Ehrmann, D. A. (2005). Polycystic ovary syndrome. New England Journal of Medicine. https://pubmed.ncbi.nlm.nih.gov/16382064/.
12. Escobar-Morreale, H. F. (2007). Polycystic ovary syndrome: Metabolic aspects. Endocrinology and Metabolism Clinics. https://pubmed.ncbi.nlm.nih.gov/17484999/.
13. Fauser, B. C. J. M. (2008). Ovarian dysfunction in PCOS. Endocrine Reviews. https://pubmed.ncbi.nlm.nih.gov/18495620/.
14. Franks, S. (2010). Polycystic ovary syndrome in adolescents. International Journal of Obesity. https://pubmed.ncbi.nlm.nih.gov/20046022/.
15. González, F. (2012). Inflammation in polycystic ovary syndrome. Endocrine Reviews. https://pubmed.ncbi.nlm.nih.gov/22948236/.
16. Goodarzi, M. O., et al. (2011). Genetics of polycystic ovary syndrome. Endocrine Reviews. https://pubmed.ncbi.nlm.nih.gov/19375173/.
17. Grant, P. (2007). The effect of cinnamon on polycystic ovary syndrome. Fertility and Sterility. https://pubmed.ncbi.nlm.nih.gov/18054717/.

18. Hoeger, K. M. (2008). The impact of lifestyle modification on polycystic ovary syndrome. Fertility and Sterility. https://pubmed.ncbi.nlm.nih.gov/19389863/.

19. Hull, M. G. R. (1985). Epidemiology of infertility. British Medical Journal. https://pubmed.ncbi.nlm.nih.gov/6419997/.

20. Jain, A., et al. (n.d.). Ayurvedic approach in PCOD: Case study. International Journal of Ayurveda and Pharma Research. https://ijapr.in/index.php/ijapr/article/view/2256.

21. Joshi, B. (2013). Lifestyle disorders and PCOS. Journal of Clinical and Diagnostic Research. https://pubmed.ncbi.nlm.nih.gov/23326007/.

22. Kelly, C. C. (2002). Low-grade chronic inflammation in polycystic ovary syndrome. The Journal of Clinical Endocrinology & Metabolism. https://pubmed.ncbi.nlm.nih.gov/15292300/.

23. Kotwani, J., et al. (n.d.). Ayurvedic management of infertility in PCOS. Journal of Ayurveda and Integrated Medical Sciences. https://www.jaims.in/jaims/article/view/3252.

24. Legro, R. S. (2007). Evaluation and treatment of polycystic ovary syndrome. Fertility and Sterility. https://pubmed.ncbi.nlm.nih.gov/16478763/.

25. March, W. A. (2010). The prevalence of PCOS. Human Reproduction. https://pubmed.ncbi.nlm.nih.gov/22446640/.

26. Marsh, K. A. (2010). Effect of diet on PCOS. Nutrition Reviews. https://pubmed.ncbi.nlm.nih.gov/17449579/.

27. Machine learning in PCOS diagnosis. (2023). arXiv. https://arxiv.org/abs/2303.14401.

28. Moran, L. J. (2008). Dietary composition in the treatment of polycystic ovary syndrome. Fertility and Sterility. https://pubmed.ncbi.nlm.nih.gov/18487679/.

29. Murri, M., et al. (2013). Oxidative stress and polycystic ovary syndrome. Clinical Endocrinology. https://pubmed.ncbi.nlm.nih.gov/22288917/.

30. Network pharmacology of herbs. (2026). arXiv. https://arxiv.org/abs/2601.21643.

31. Nidhi, R. (2011). Prevalence of PCOS in Indian adolescents. Journal of Pediatric and Adolescent Gynecology. https://pubmed.ncbi.nlm.nih.gov/21720475/.

32. Norman, R. J. (2004). Ovulation disorders and PCOS. Lancet. https://pubmed.ncbi.nlm.nih.gov/14597560/.

33. Pasquali, R. (2009). Obesity and reproductive disorders in women. Human Reproduction Update. https://pubmed.ncbi.nlm.nih.gov/19770262/.

34. PCONet AI model. (2022). PCOS detection using artificial intelligence. arXiv. https://arxiv.org/abs/2210.00407.

35. Rahimi, R. (2012). A review of herbal medicines for PCOS. Phytotherapy Research. https://pubmed.ncbi.nlm.nih.gov/22070689/.

36. Rao, V. S., et al. (2023). Ayurveda studies in PCOS: A scoping review. Journal of Ayurveda and Integrative Medicine. https://pubmed.ncbi.nlm.nih.gov/36944117/.

37. Rathee, P., et al. (n.d.). PCOS in Ayurveda: A review. International Research Journal of Ayurveda and Yoga. https://journals.acspublisher.com/index.php/irjay/article/view/14729.

38. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. (2004). Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Human Reproduction, 19(1), 41–47. https://academic.oup.com/humrep/article/19/1/41/2356603.

39. Sharma, P. (n.d.). Ayurveda management of PCOD: Narrative review. ResearchGate. https://www.researchgate.net/publication/394494267.

40. Sharma, R. K., & Dash, B. (n.d.). Charaka Samhita (English translation). https://archive.org/details/CharakaSamhita.

41. Sirmans, S. M. (2013). Alternative therapies for polycystic ovary syndrome. Endocrine. https://pubmed.ncbi.nlm.nih.gov/24151211/.

42. Sruthi, O., et al. (n.d.). Ayurvedic perspective of PCOS. International Journal of Ayurveda and Pharma Research. https://ijapr.in/index.php/ijapr/article/view/2534.

43. Teede, H. J., et al. (2018). International evidence-based guideline for the assessment and management of polycystic ovary syndrome. Monash University. https://www.monash.edu/medicine/sphpm/mchri/pcos.

44. Thomson, R. L. (2008). Lifestyle management improves quality of life in PCOS. Fertility and Sterility. https://pubmed.ncbi.nlm.nih.gov/18056733/.

45. Tiwari, P. V. (n.d.). Ayurvedic concepts of gynecological disorders. https://archive.org/details/ayurveda-text.

46. Tripathi, P., & Gupta, P. (n.d.). Management of PCOD/PCOS through Ayurveda: A review. ResearchGate. https://www.researchgate.net/publication/384805751.

47. Unfer, V. (2018). Myo-inositol in polycystic ovary syndrome. International Journal of Endocrinology. https://pubmed.ncbi.nlm.nih.gov/29498933/.

48. Victor, V. M. (2011). Oxidative stress and mitochondrial dysfunction in polycystic ovary syndrome. Current Pharmaceutical Design. https://pubmed.ncbi.nlm.nih.gov/20807307/.

49. World Health Organization. (n.d.). Women's reproductive health overview. https://www.who.int.