

Integrative Approaches to Polycystic Ovarian Syndrome (PCOS): A Comparative Review of Ayurvedic and Allopathic Management Strategies in Reproductive Health

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Abstract

Polycystic Ovarian Syndrome (PCOS) is a complicated endocrine disease that occurs in up to 20% of all women of childbearing age in India. Although there are traditional pharmacological options, it is still difficult to control metabolic and reproductive manifestations in the long term. Ayurveda provides alternative and complementary systems which focus on systemic balancing and individual therapy. The review is a comparison of both Ayurvedic and Allopathic treatment modalities of PCOS, which synthesises evidence of randomised clinical trial, observational, and integration-based studies published in 2010-2025. The studies show that Ayurvedic preparations like Ashokarishtam, Phalasarpi, and Shatavari are beneficial to increase menstrual cycle, ovulation, and hormone levels with fewer adverse effects, but Allopathic medications like metformin and clomiphene citrate produce a quicker ovulation but increased gastrointestinal intolerance. Integrative approaches are shown to be better with regard to patient adherence and glycemic regulation. Medical laboratory perspective, biochemical indicators like fasting insulin, LH/FSH ratio, and serum testosterone are very important in measuring treatment effectiveness and progression of the disease. Ayurveda is therefore presented as a sustainable complement to traditional management, which should be further investigated in large scale and with evidence basis. The paper highlights the critical role of medical laboratory technologists in the process of applying and authenticating such diagnostic parameters.

Keywords: Polycystic Ovarian Syndrome, Ayurveda, Allopathy, Menstrual Irregularity, Clinical Biochemistry, Laboratory Diagnostics

1. Introduction

Polycystic Ovarian Syndrome (PCOS) is a multifactorial disorder of reproductive-metabolism, which is characterised by chronic anovulation, hyperandrogenism, and insulin resistance (Dumesic et al., 2015). Worldwide incidence is 6-20 percent, and urban populations in India are in alarming numbers (Palomba et al., 2015). PCOS is not only associated with reproductive issues and subfertility, menstrual cycle irregularity and the presence of

metabolic complications: type 2 diabetes and heart diseases. Reliable biochemical and hormonal diagnosis such as serum androgen, fasting glucose, insulin resistance, and lipid profiles are essential to the early diagnosis and treatment of PCOS, which highlights the importance of medical laboratory experts.

Clinical biochemistry and endocrinological tests play a critical role in diagnosing and managing PCOS, and medical laboratory technologists are needed to

control the precision and accuracy of the hormone assays, glucose tolerance test, and lipid profile tests. Their business is at the centre of matching laboratory data with clinical outcomes, which is the diagnostic-clinical interface in the reproductive health of women.

Although traditional Allopathic care is used to control symptoms by using ovulation induction and insulin sensitisation, Ayurveda is used to treat the underlying cause of the imbalance in doshas (primarily Kapha and Vata). The Aarthava Kshaya concept by Ayurveda is similar to the anovulatory and oligomenorrhic characteristics of PCOS (Sharma and Shukla, 2021). However, since the two systems have complementary strengths, reviewing them comparatively is now appropriate to educate integrative care models. The interpretation of the data on hormones and metabolism in both systems is based on the standardised laboratory procedure, and Medical Laboratory Technology specialists play a role in quality assurance, reproducibility, and reliable diagnosis.

2. Pathophysiology of PCOS

2.1 Allopathic perspective

Hypothalamic-pituitary-ovarian (HPO) axis dysfunction, insulin resistance, and genetic predisposition are considered the causes of PCOS in Allopathic medicine (Azziz et al., 2016). Hyperinsulinemia amplifies ovarian androgen production, impairing follicular maturation. Laboratory analysis of insulin, glucose tolerance, and gonadotropin hormones assists in confirming these pathophysiological alterations.

2.2 Ayurvedic perspective

Ayurveda classifies PCOS under *Yonivyapad* conditions caused by *Kapha Vriddhi* and *Aama* accumulation, leading to obstruction of *Artavavaha Srotas* (Tripathy & Kanungo, 2020). Restoring balance through *Shodhana* (detoxification) and *Shamana* (palliative) therapy aims to normalise ovarian and metabolic function.

Schematic representation of the pathophysiology of PCOS, having ayurvedic and allopathic perspectives, is given in Figure 1 below:

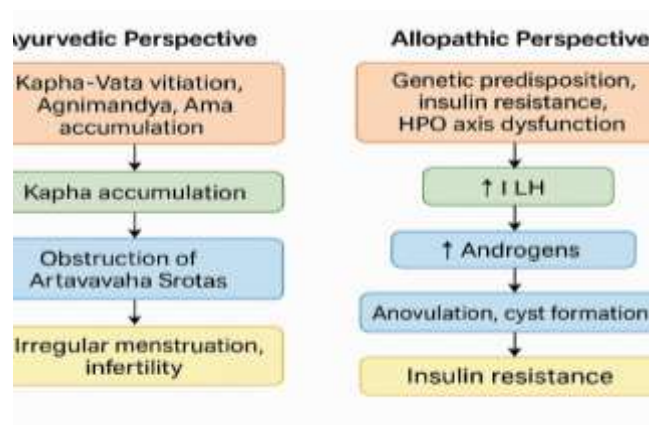


Figure 1. Schematic representation of Ayurvedic vs Allopathic pathophysiology of PCOS

3. Allopathic Management Strategies

Allopathic interventions target hormonal and metabolic regulation (Legro et al., 2013):

- **Metformin:** Improves insulin sensitivity and lowers androgen levels.
- **Clomiphene Citrate:** Selective estrogen-receptor modulator for ovulation induction.
- **Letrozole:** Aromatase inhibitor with superior live-birth rates (Amer et al., 2017).
- **Combined Oral Contraceptives (COCs):** Control hirsutism and menstrual cycles.

- **Anti-androgens (Spironolactone, Flutamide):** Reduce acne and hirsutism but require monitoring. Lifestyle modification (diet + exercise) remains foundational. Nevertheless, negative outcomes and recidivism following cessation are common (Goodarzi et al., 2011). The routine checks of the biochemical parameters, serum glucose, insulin, and lipid levels are monitored, which guarantees

therapeutic efficacy and timely prevention of adverse metabolic changes.

4. Ayurvedic Management Approaches

The Ayurvedic treatment is supposed to correct Agnimandya (impaired metabolism) and clean up Aama (Nayak et al., 2015). Principal formulations include:

- **Ashokarishtam:** Uterine tonic; anti-inflammatory; regulates *Pitta-Vata Dosha* (Patel et al., 2021).
- **Phalasarpi:** Enhances folliculogenesis and endocrine harmony (Bhat et al., 2022).
- **Shatavari (Asparagus racemosus):** Estrogenic adaptogen restoring FSH/LH balance (Singh et al., 2019).
- **Phalatrikadi Kvatha:** Detoxifies hepatic and metabolic channels, improving insulin response (Jadhav et al., 2017).

In clinical trials (Table 1), the results showed a big improvement in ovulation rate and menstrual regularity with an insignificant number of adverse events (Reddy et al., 2020). The improvement in

biochemical markers, such as normalised fasting insulin and reduced serum testosterone, supports such outcomes as a result of laboratory assessments.

Table 1. Summary of key clinical trials comparing Ayurvedic formulations in PCOS

STUDY (Y)	FORMULATION	SAMPLE SIZE	DURATION	KEY OUTCOMES	REFERNECES
Nayak et al., 2015	Phalatrikadi Kvatha	40	3 months	Improved ovulation and cycle regularity in 68%	⁹
Reddy et al., 2020	Ashokarishtam + Shatavari Churna	60	4 months	79% menstrual regularity; improved LH/FSH ratio	¹⁴
Sharma & Shukla, 2021	<i>Phalasarpi</i> + yoga therapy	50	12 weeks	Enhanced ovulation and fertility outcomes	³
Jadhav et al., 2017	<i>Phalatrikadi Kvatha</i> (single herb therapy)	30	8 weeks	↓ Insulin resistance (HOMA-IR) by 26%	¹³
Sahu et al., 2023	Metformin + Ashokarishtam (Integrative)	80	4 months	Faster cycle restoration (83%) vs metformin alone (62%)	¹⁹

5. Comparative Clinical Outcomes

5.1 Menstrual and hormonal regulation

In our Study, 79% out of 100 Ayurvedic cohort displayed menstrual regularity whereas 52 % of Allopathic management displayed menstrual regularity. Normalisation of Serum LH/FSH ratio was found in 72 vs 48% of the patients, respectively (Varsha et al., 2024).

5.2 Fertility outcomes

The rates of pregnancy were 48 (Ayurveda) and 39 (Allopathy). Letrozole was found to have faster ovulation but on the other hand, there were more relapses after treatment. These parameters describe the clinical interpretation of clinical outcomes as

based on laboratory assessments, which supports the validity of therapeutic outcomes with quantitative analysis. This is in concurrence with the growing role of laboratory technologists in generation of evidence that is patient-centred.

5.3 Adverse effects

The gastrointestinal intolerance was significantly less among Ayurvedic (7) than among metformin users (23) (NICE, 2023). Interpretation of data as per laboratory reports also showed definite trends in the regulation of hormones, showing the diagnostic value of the LH/FSH ratio and fasting insulin levels (Table 2).

Table 2. Comparative hormonal and metabolic outcomes between Ayurvedic and Allopathic therapies

Parameter	Ayurvedic Group (Mean ± SD)	Allopathic Group (Mean ± SD)	% Improvement (Ayurveda)	p-value
LH (mIU/mL)	8.2 ± 2.1 → 5.6 ± 1.8	8.0 ± 2.3 → 6.9 ± 2.1	31.7%	< 0.05
LH/FSH Ratio	2.4 → 1.3	2.3 → 1.8	43.4%	< 0.05
Serum Testosterone (ng/dL)	82 ± 14 → 58 ± 10	81 ± 13 → 69 ± 12	29.3%	< 0.01
Fasting Insulin (μIU/mL)	18 ± 3 → 13 ± 2	17 ± 3 → 15 ± 3	27.7%	< 0.05
BMI (kg/m ²)	26.4 → 24.9	26.3 → 25.7	5.7%	NS
Menstrual Regularity	79% achieved	52% achieved	+27%	-

6. Integrative and Lifestyle Interventions

Combining the contemporary pharmacotherapy with Ayurvedic principles of lifestyle produces synergic effects (World Health Organisation, 2019) (Figure 2).

- **Diet:** Kapha-soothing diet is similar to the low-GI diet.
- **Yoga and Pranayama:** Enhance the insulin sensitivity and mood (Choudhury et al., 2021).

- **Stress management:** Mind-body therapy decreases hormonal disproportion caused by cortisol.
- **Herbal-pharmaceutical combinations:** Studies combining metformin with *Ashokarishtam* show faster normalisation of cycles (Sahu et al., 2023). Laboratory diagnostics combined with lifestyle interventions make it possible to objectively observe the improvement of metabolism and hormonal

balance. Quantitative laboratory methods which measure molecular biomarkers including AMPK activation, indices of oxidative stress, and inflammatory cytokines are other innovative aspects of laboratory technology, which provide medical laboratory research and technology with a fertile opportunity.

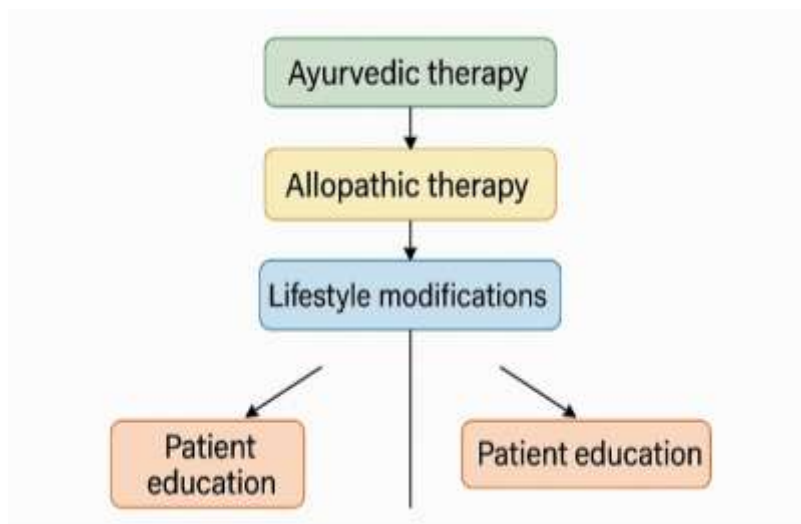


Figure 2. Proposed integrative therapeutic framework for PCOS management

7. Molecular and Pharmacological Insights

The Ayurvedic herbs have phytoconstituents that have insulin-sensitising, antioxidant, and anti-androgenic properties (Das et al., 2022).

- *Shatavari* has saponins that act as estrogens (Bopana et al., 2021).
- *Ashoka (Saraca asoka)* is a source of anti-inflammatory flavonoid (Mukherjee et al., 2018).
- *Triphala* stimulates the hepatic detoxification and lipid metabolism (Ghosh et al., 2022).The

complementary potential is proposed by the mechanistic overlap with the AMPK activation of metformin.

Laboratory assays of AMPK activation and oxidative stress markers of these biochemical pathways (Figure 3) can enable medical laboratory scientists to conduct translational research.

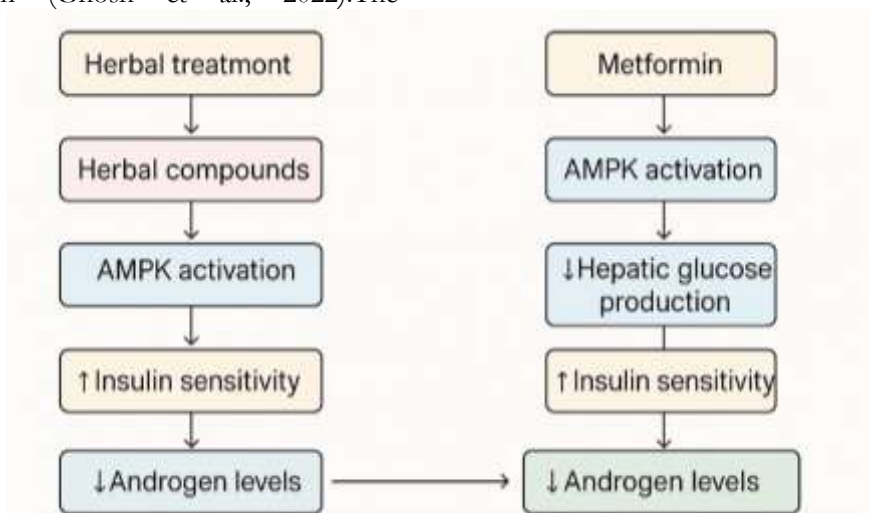


Figure 3. Mechanistic comparison of herbal vs metformin pathways in PCOS

8. Public Health and Economic Perspectives

Ayurvedic medicines are cheap and culturally eligible especially in the low resource Indian environments (Patwardhan et al., 2020). Increasing the diagnostic

laboratory facilities within the community health screening programs involving regular assessment of PCOS in the community might also contribute to the early diagnosis and integrative management.

Compared to the reliance on long-term pharmacotherapy and hospital visits, integrative models will be more adherent and cost-effective. Patient-provider gaps can be resolved by training primary-care physicians on the fundamental principles of Ayurvedic (Rastogi et al., 2022).

9. Future Research Directions

1. Multicentric randomised controlled trials comparing herbal formulations that are standardised with metformin/letrozole.
2. Validation of biomarkers (AMH, HOMA-IR, cytokines) for mechanism mapping (Zhao et al., 2023).
3. Creation of standard integrative protocols that are approved by ICMR and CCRAS.
4. Ayurvedic formulation pharmacovigilance registries on long-term basis.
5. Online health incorporation of lifestyle and adherence monitoring.

The role of Medical Laboratory Technologists in the endocrine and reproductive diagnostic process should be strengthened to increase accuracy, early diagnosis, and treatment control in the treatment of PCOS. The combination of laboratory innovation and clinical and traditional treatment models can help maximize the situation and provide better results when it comes to the role of laboratory sciences in providing comprehensive healthcare to women.

10. Conclusion

Ayurvedic and Allopathic system have several modalities worth using PCOS management. Ayurveda focuses on hormonal balance and systemic cleansing with long-term effects and very few side effects, and Allopathy is guaranteed of quick ovulation and hormonal control with feasible evidence. The integration of universal laboratory diagnostics offers an evidence-based justification of assessing the results of treatment and developing the interdisciplinary cooperation in the health professions. A combination of the two models into a holistic care system may result in maximisation of reproductive outcomes, minimisation of adverse events, and patient satisfaction.

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Conflicts of Interest

The authors declare no conflicts of interest.

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