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Integrative Management of Lean Polycystic Ovary Syndrome: A Patient-Centric Case Study

Dr. Shalini P Y[1], Dr. Praveen Kumar[2], Dr. Dileep P[3], Dr. Shradha MK[4]

[1]PG Scholar, Department of clinical naturopathy, Alva's college of naturopathy and yogic sciences.
[2]PG Scholar Department of Rasa shastra and bhaishajya kalpana,
BVVS Ayurveda medical college and hospital, Bagalkot, Karnataka
[3]Assistant Professor Dept of Kayachikitsa, Cauvery Ayurvedic Medical College & Hospital Mysuru.
[4]PG Scholar, Department of clinical naturopathy, Alva's college of naturopathy and yogic sciences.

Abstract

Objective:
To evaluate the effects of a multimodal intervention—including nutrition, yoga therapy, hydrotherapy, Ayurvedic support, and psychological counselling—on reproductive, metabolic, and psychological outcomes in a patient with lean PCOS.

Methods:
A multimodal diagnostic framework was applied, incorporating endocrine testing, metabolic screening, autonomic and psychological assessment, and traditional-system evaluation. The intervention included a structured low–glycaemic, anti-inflammatory diet; daily yoga (pelvic-opening asanas, Chandra Namaskara, Nadi Shodhana, Bhramari, relaxation); hydrotherapy (cold hip bath, abdominal pack); Shatavari administration; and cognitive–mindfulness–based counselling. Outcomes were monitored through cycle tracking, symptom reporting, sleep patterns, and emotional indicators.

Results:
Menstrual cycles shortened from 40–60 days to two cycles during the intervention period, indicating improved ovulatory function. The patient reported reduced postprandial fatigue, enhanced energy, and improved sleep onset following dietary and autonomic-regulating practices. Anxiety, rumination, and physiological arousal decreased with combined yoga, hydrotherapy, and counselling. Shatavari was associated with smoother menstrual flow and reduced premenstrual symptoms. Improvements appeared synergistic across metabolic, neuroendocrine, and emotional domains.

Conclusion:
A comprehensive, integrative therapeutic program addressing multisystem imbalances demonstrated meaningful improvements in menstrual regularity, psychological wellbeing, and functional symptoms in lean PCOS. This case supports the potential value of personalized, multimodal care in managing lean PCOS. Larger controlled studies are warranted to validate these findings and clarify underlying mechanisms.

Keywords: Lean polycystic ovary syndrome, Integrative medicine, Multimodal intervention, Yoga therapy, Psychological counselling, Menstrual regulation

1. Introduction

Polycystic Ovary Syndrome (PCOS) is a PCOS is a psychoneuroendocrine disorder that impacts hormonal, neurological, and psychological health in women of reproductive age, characterized by hormonal imbalances, irregular menstrual cycles, ovarian cysts, and metabolic complications. It is a multifactorial condition influenced by genetic, environmental, and lifestyle factors. PCOS is associated with hyperandrogenism, ovulatory dysfunction, and insulin resistance, which can contribute to infertility, obesity, type 2 diabetes, and cardiovascular risks (1).

PCOS affects 5% to 26% of women worldwide, depending on diagnostic criteria. In India, the prevalence ranges from 9% to 22%, with an increasing trend due to sedentary lifestyles, dietary changes, and genetic predisposition. The condition is often undiagnosed or mismanaged, particularly in urban populations and among adolescents (2).

PCOS presents in four phenotypes based on clinical, biochemical, and ultrasonographic findings. Classic PCOS (Phenotype A) includes hyperandrogenism, ovulatory dysfunction, and polycystic ovaries, making it the most severe form with significant metabolic risks. Ovulatory PCOS (Phenotype B) involves hyperandrogenism and ovulatory dysfunction without polycystic ovarian morphology. Non-hyperandrogenic PCOS (Phenotype C) features ovulatory dysfunction and polycystic ovaries but lacks elevated androgen levels. Mild or norm androgenic PCOS (Phenotype D) is characterized by polycystic ovarian morphology and ovulatory dysfunction without hyperandrogenism (3).

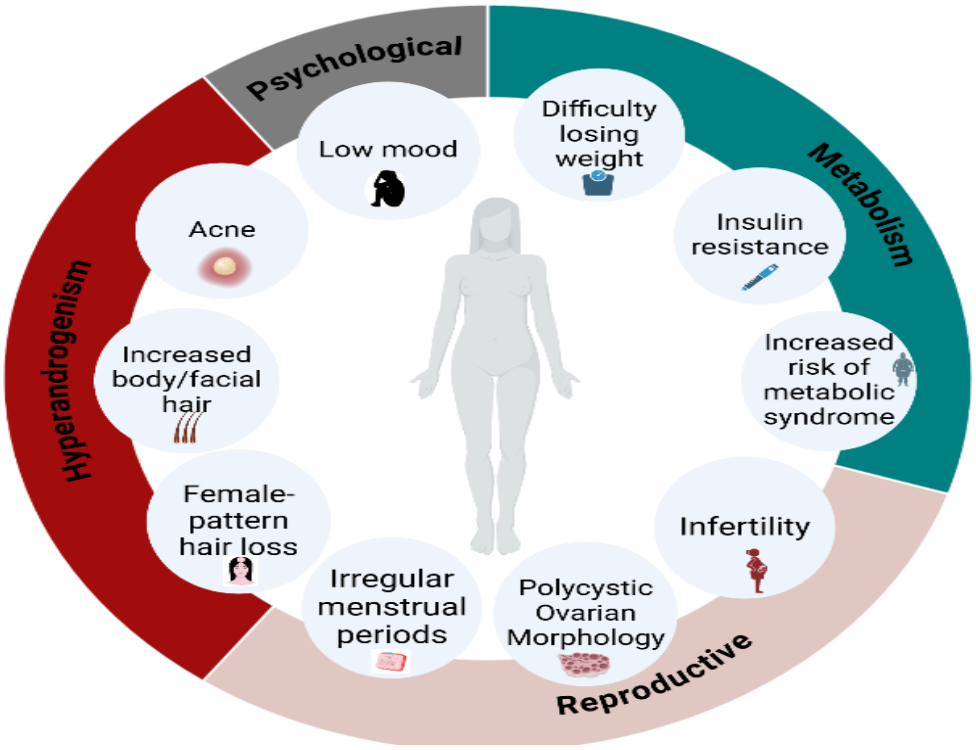

Figure 1. Multisystem Clinical Features Associated with Polycystic Ovary Syndrome (PCOS)

Lean PCOS is a subtype where affected women have a normal body mass index (BMI) but still exhibit symptoms such as irregular periods, hyperandrogenism, and insulin resistance. Unlike classic PCOS, lean PCOS is not associated with obesity but can still lead to metabolic dysfunctions like dyslipidaemia and an increased risk of type 2 diabetes. Due to the absence of obesity, lean PCOS is often underdiagnosed, and conventional PCOS management strategies like weight loss may not be effective. Treatment focuses on lifestyle modifications, insulin-sensitizing agents, and hormonal therapies to regulate menstrual cycles and reduce androgen levels (4).

Materials and method

Case Description / Patient Profile

Demographic Information

A 27-year-old married woman from an urban background presented with a 3-year history of irregular menstrual cycles, Inability to conceive and 1-year history of disturbed sleep and anxiety. She reported progressive fatigue, palpitations, and declining self-confidence, accompanied by social withdrawal and emotional distress.

Chief Complaints

- Irregular menstrual cycles for 3 years
- Inability to conceive
- Sleep disturbance for 1 year
- Anxiety, restlessness, and palpitations
- Fatigue and low confidence

Menstrual and Reproductive History

The patient attained menarche at 13 years of age, with initially regular 28–30-day cycles. Over the past three years, her menstrual pattern became irregular, ranging from 40–60 days, with occasional amenorrhea. Flow was moderate and lasted 6–8 days without intermenstrual bleeding. She has been married for three years, had regular unprotected intercourse, and no prior fertility treatments. Obstetric history revealed $G_0P_0A_0L_0$. There was no reported sexual dysfunction.

Medical, Surgical, and Family History

There was no personal history of diabetes mellitus, thyroid disorders, hypertension, tuberculosis, or major medical or surgical illnesses. She had no known allergies. Family history was non-contributory for infertility, metabolic, or psychiatric disorders.

Lifestyle and Personal History

The patient followed a mixed diet with inconsistent meal timings and minimal physical activity. She denied the use of tobacco, alcohol, or any other substances. Sleep was disturbed, with difficulty initiating and maintaining sleep, leading to morning fatigue. Bowel and bladder habits were normal.

Psychological and Social History

The patient reported increasing emotional distress over the previous year, primarily related to infertility-associated social and familial pressure. She described persistent worry, restlessness, and irritability, along with low energy and self-esteem. Personality assessment suggested anxious-avoidant traits with a people-pleasing pattern. Psychosocial stress was rated as high, with strained interpersonal relationships and reduced social interaction.

Mental Status Examination

The patient appeared well-groomed and cooperative. Psychomotor activity and speech were normal. Mood was anxious with congruent affect. Thought processes were goal-directed, and no perceptual abnormalities (hallucinations or delusions) were noted. Cognitive functions, orientation, and judgment were intact.

Provisional Diagnosis

Based on the clinical and investigative findings, the provisional diagnosis included:

- Lean Polycystic Ovarian Syndrome (PCOS)
- Secondary Infertility
- Generalized Anxiety Disorder (GAD)

Investigations

Hormonal Profile:

Luteinizing hormone (LH) was mildly elevated at 11.2 mIU/mL, while follicle-stimulating hormone (FSH) was within normal limits (5.1 mIU/mL), yielding an LH/FSH ratio of 2.1:1, consistent with PCOS. Total and free testosterone (38 ng/dL and 2.1 pg/mL, respectively) and dehydroepiandrosterone sulfate (DHEA-S) were within normal ranges. Prolactin was 13 ng/mL, and estradiol levels were normal. Anti-Müllerian hormone (AMH) was elevated at 5.6 ng/mL.

Thyroid Profile:

TSH (2.8 µIU/mL) and free T_3/T_4 were within normal reference ranges.

Metabolic Profile:

Fasting glucose was 86 mg/dL, fasting insulin 13 µIU/mL, HbA1C 6.3, indicating early insulin resistance (HOMA-IR = 2.7). Lipid profile revealed mild dyslipidaemia.

Ultrasound Pelvis:

Transvaginal ultrasonography revealed increased antral follicle count and bilateral polycystic ovarian morphology with normal endometrial thickness.

Psychological Assessment:

Standardized scales indicated moderate anxiety (GAD-7), poor sleep quality (PSQI), and high perceived stress (PSS).

The patient's clinical presentation—characterized by irregular menstrual cycles, secondary infertility, sleep disturbance, and moderate anxiety—was evaluated using conventional investigations alongside naturopathic, Ayurvedic, and TCM-based diagnostic frameworks. Laboratory findings showed elevated LH/FSH ratio, increased AMH, and early insulin resistance despite a normal BMI, confirming Lean PCOS (Phenotype D) with associated neuroendocrine dysregulation (10).

Naturopathic assessment revealed vital force depletion, autonomic imbalance, and stress-related HPO-axis suppression, compounded by mild digestive irregularity and subclinical inflammatory load. Ayurvedic evaluation indicated a predominant Vata–Pitta aggravation, with Apana Vata Dushti, Artava Vaha Srotas disturbance, and Manovaha Srotas involvement, explaining both reproductive and psychological manifestations (11).

TCM pulse and tongue findings supported a pattern of Kidney deficiency, Liver Qi stagnation, and Shen disturbance, consistent with stress-induced reproductive dysfunction. Facial mapping further indicated under-eye darkness (Kidney depletion), chin-zone congestion (hormonal imbalance), and dryness around cheeks (Vata elevation).

Psychological analysis revealed an anxious-avoidant coping style, emotional suppression, and chronic stress related to infertility, contributing to sympathetic overactivity and sleep-onset insomnia. Yogic pranic assessment suggested Swadhisthana and Manipura chakra depletion, linking reproductive and metabolic imbalance with emotional sensitivity.

Across diagnostic systems, a coherent pattern emerges:

"Neuroendocrine instability driven by Vata–Pitta dysregulation, chronic stress, autonomic imbalance, and early metabolic dysfunction manifesting as Lean PCOS with secondary infertility and generalized anxiety disorder."

This integrative diagnostic synthesis forms the foundation for a multidisciplinary treatment plan combining naturopathy, Ayurveda, yoga therapy, and lifestyle medicine.

Intervention

A three-month integrative lifestyle intervention was implemented for women with lean polycystic ovary syndrome (PCOS) using a non-pharmacological model combining diet, hydrotherapy, herbal supplementation, yoga, and psychological counselling. The intervention aimed to improve ovulatory function, regulate autonomic activity, reduce metabolic and inflammatory strain, and enhance emotional wellbeing.

Dietary modification formed the core component of the intervention and was structured to stabilise glycaemic response, support circadian rhythm, and improve gastrointestinal function. The diet emphasised whole grains, legumes, vegetables, nuts, seeds, and moderate protein intake. Functional foods including millets, flax seeds, sesame seeds, fenugreek sprouts, beetroot, and leafy greens were incorporated for their roles in estrogen metabolism, antioxidant activity, and follicular health. The nutritional strategy focused on metabolic optimisation rather than weight reduction.

Hydrotherapy was applied daily as a supportive physical modality. A cold hip bath (10–15 minutes) was used to induce reflex vasomotor responses and enhance pelvic circulation, while a cold abdominal pack

applied in the evening aimed to reduce sympathetic activation, promote vagal tone, and support digestion and sleep. Hydrotherapy interventions were suspended during menstruation and ovulatory phases to minimise discomfort.

Herbal support consisted of *Asparagus racemosus* (Shatavari), administered as one teaspoon with milk twice daily (morning and evening) to support reproductive and endocrine balance.

Pushyanuga Churna, a classical Ayurvedic polyherbal formulation, was included as an internal therapeutic intervention in the present case. It was administered orally in a dose of **1–3 g once or twice daily**, along with **Tandulodaka (rice-washed water) and honey** as adjuvants, before or after meals. The intervention was continued for a duration of **2–3 months**, with regular monitoring.

Yoga therapy was practiced almost daily and included loosening exercises, pelvic-mobilising asanas (Chakki Chalanasana, Baddha Konasana, Upavistha Konasana), and Chandra Namaskara to facilitate pelvic circulation and autonomic calming. Pranayama practices included brief, conservative Kapalabhati for abdominal stimulation, followed by Nadi Shodhana and Bhramari to reduce sympathetic dominance and enhance emotional regulation. Sessions concluded with guided relaxation or mindfulness practices. These components are associated with reduced cortisol levels, improved insulin sensitivity, and enhanced menstrual regularity in PCOS.

Psychological counselling was integrated to address infertility-related distress, anxiety, sleep disturbances, and maladaptive cognitive patterns, with the aim of improving emotional resilience and adherence to lifestyle modifications.

A structured daily routine supported consistent intervention delivery. Morning sessions included 45–60 minutes of yoga practice, followed by a millet-based breakfast. Hydrotherapy was performed in the afternoon, followed by light physical activity, an early vegetable-based dinner, and evening application of a cold abdominal pack with relaxation. Sleep was encouraged before 22:00 hours in a low-stimulus environment. The temporal sequencing of interventions was designed to optimise circadian alignment, metabolic regulation, and autonomic recovery.

The intervention was expected to result in improved menstrual regularity, increased ovulatory frequency, reduced anxiety and sleep disturbance, and enhanced metabolic stability. Therapeutic effects were anticipated to arise from the cumulative interaction of multiple modalities addressing the neuroendocrine and psychosocial dimensions of lean PCOS.

Sample Daily Schedule (Diet + Yoga + Hydrotherapy)

Time	Intervention Component	Description
06:00 h	Wake-up routine	**Awakening followed by brief exposure to natural sunlight to support circadian alignment**
06:15–07:15 h	Yoga therapy session	**Loosening practices followed by Chakki Chalanasana, Baddha Konasana, Upavistha Konasana, Chandra Namaskara, Nadi Shodhana pranayama, Bhramari pranayama, and guided relaxation**
08:00 h	Breakfast	**Breaking fast with 1 tsp shatavari with milk followed by Millet-based idli or dosa with chutney, accompanied by seasonal fruit**
10:30 h	Mid-morning intake	**Coconut water or buttermilk, with nuts or seeds**
13:00 h	Lunch	**Rice or millet roti with dal, cooked vegetables, leafy greens, and a small portion of curd**
15:00 h	Hydrotherapy	**Cold hip bath (10–15 minutes)**
17:00 h	Evening snack	**1 tsp shatavari with milk followed by Roasted chana or fruit**
18:00 h	Physical activity	**Gentle walking or cycling**
19:00 h	Dinner	**Light meal consisting of soup, vegetables, and dal; paneer or fish included if preferred**
20:30 h	Hydrotherapy and relaxation	**Cold abdominal pack (approximately 20 minutes) followed by relaxation or mindfulness practice**
22:00 h	**Sleep**	**Bedtime**

Table 1. Multidisciplinary Integrative Treatment Model for Lean PCOS**.**

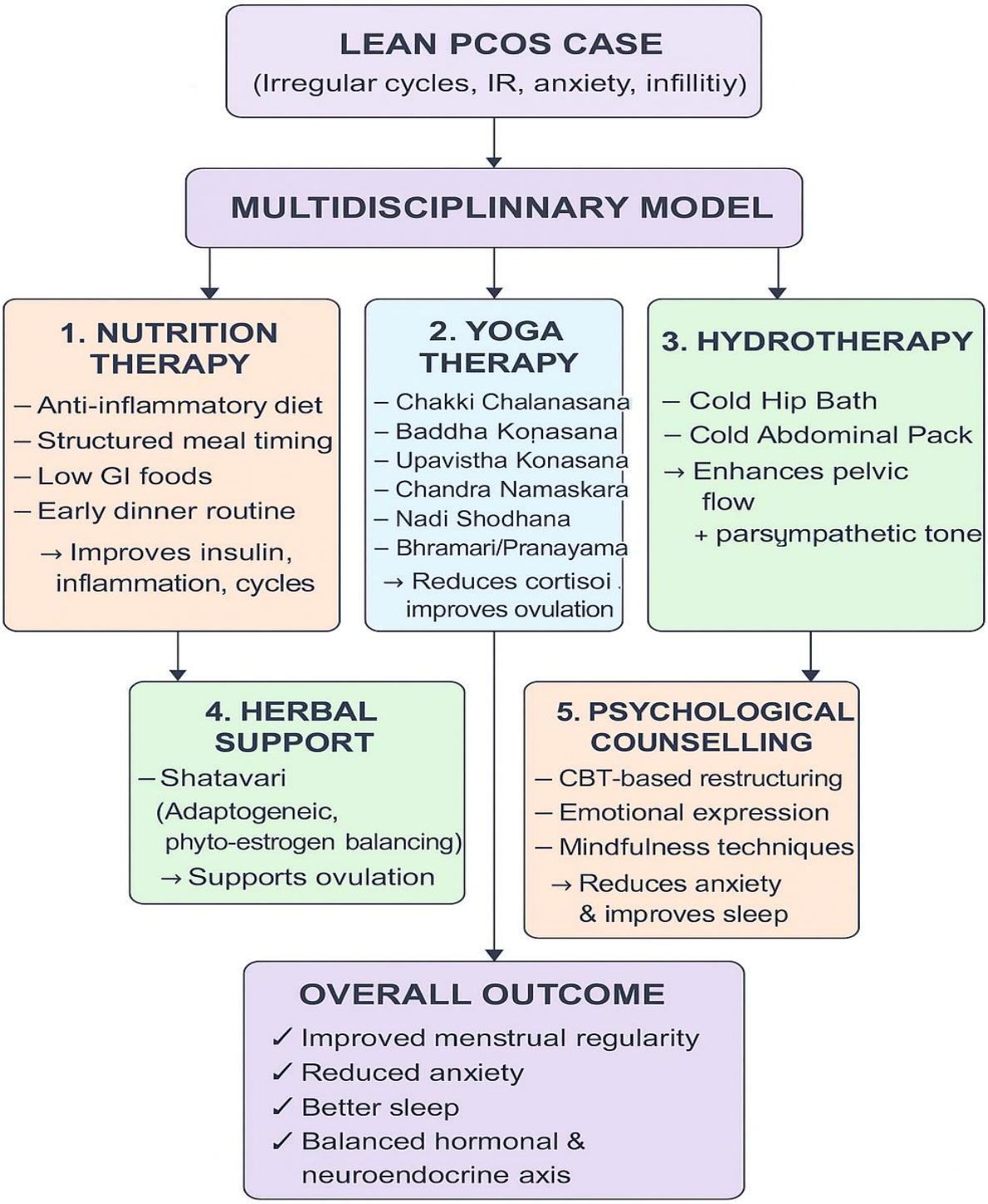

Figure 2. Multisystem Clinical Features Associated with Polycystic Ovary Syndrome (PCOS)

Results

Baseline Findings

At baseline, the patient exhibited clinical features of lean PCOS, including irregular menstrual cycles (40–60 days), secondary infertility, sleep disturbance, and moderate anxiety. Biochemical evaluation showed a mildly elevated LH/FSH ratio (2.1:1), elevated AMH, and early insulin resistance despite normal BMI. Pelvic ultrasonography confirmed bilateral polycystic ovarian morphology. Psychological scales indicated moderate anxiety, poor sleep quality, and high perceived stress.

Post-Intervention Outcomes

Following the three-month integrative intervention, the patient demonstrated meaningful clinical, biochemical, and psychological improvements. Menstrual cyclicity improved, with two spontaneous cycles occurring during the intervention period, indicating improved ovulatory rhythm. Subjective symptoms such as anxiety, sleep disturbance, fatigue, and pelvic discomfort were reduced, and emotional coping improved.

Repeat laboratory evaluation showed partial normalization of the LH/FSH ratio, a reduction in AMH levels, and improved insulin sensitivity, reflected by reduced fasting insulin and HbA1c. Lipid parameters showed improvement, and no adverse endocrine or metabolic changes were observed. Psychological reassessment demonstrated reduced anxiety, improved sleep quality, and lower perceived stress.

Table: Pre- and Post-Intervention Clinical and Biochemical Outcomes

Table 2. Comparison of Baseline and Post-Intervention Findings

Domain	Parameter	Pre-Intervention	Post-Intervention	Change
Menstrual Health	Cycle length	40–60 days	Two cycles in 3 months	**Improved regularity**
	Menstrual flow	Irregular, discomfort	Improved flow, less PMS	**Improved**
Hormonal Profile	LH (mIU/mL)	11.2	↓ (towards normal)	**Reduced**
	FSH (mIU/mL)	5.1	Stable	**Maintained**
	LH/FSH ratio	2.1:1	↓	**Improved**
	AMH (ng/mL)	5.6	↓	**Improved ovarian dynamics**
	Testosterone / DHEA-S	Normal	Normal	**Maintained**

Metabolic Profile	Fasting glucose (mg/dL)	86	Stable	**Maintained**
	Fasting insulin (µIU/mL)	13	↓	**Improved**
	HbA1c (%)	6.3	↓	**Improved**
	HOMA-IR	2.7	↓	**Reduced insulin resistance**
	Lipid profile	Mild dyslipidaemia	Improved	**Improved**
Ultrasound	Ovarian morphology	PCOM bilaterally	No worsening	**Stable**
Psychological	Anxiety (GAD-7)	Moderate	Mild	**Reduced**
	Sleep quality (PSQI)	Poor	Improved	**Improved**
	Perceived stress (PSS)	**High**	**Reduced**	**Improved**

DISCUSION

This case demonstrates that a structured, multimodal intervention may positively influence clinical symptoms, biochemical parameters, and psychological wellbeing in women with lean polycystic ovary syndrome (PCOS). Although lean PCOS is often perceived as a less metabolically severe phenotype, increasing evidence indicates that insulin resistance, neuroendocrine dysregulation, and chronic stress may occur independently of obesity and contribute significantly to ovulatory dysfunction and infertility [1,2].

At baseline, the patient exhibited hallmark features of lean PCOS, including an elevated LH/FSH ratio, increased AMH levels, early insulin resistance, and polycystic ovarian morphology, despite a normal BMI. These findings are consistent with previous reports showing that lean PCOS patients may exhibit altered gonadotropin secretion, subtle metabolic dysfunction, and oxidative stress even in the absence of overt adiposity [3,4]. The improvement in menstrual cyclicity observed following the intervention corresponds with partial normalization of endocrine markers, particularly the LH/FSH ratio and insulin indices, supporting the central role of insulin–gonadotropin interaction in PCOS pathophysiology [5,6].

Dietary restructuring emphasizing low–glycaemic load, anti-inflammatory foods, and early meal timing likely contributed to improved insulin dynamics. Hyperinsulinaemia is known to stimulate ovarian androgen production and impair follicular maturation, even in women with normal body weight [7,8]. The observed reduction in fasting insulin and HbA1c aligns with lifestyle intervention studies demonstrating improved metabolic and reproductive outcomes in PCOS through dietary modulation alone [1,9].

Yoga-based therapy and pranayama practices may have facilitated autonomic rebalancing and HPA-axis modulation, reflected clinically by reductions in anxiety, improved sleep quality, and enhanced emotional regulation. Randomized trials have demonstrated that yoga interventions reduce cortisol levels, improve insulin sensitivity, and enhance menstrual regularity in women with PCOS [10–12]. Reduced psychological stress may further support ovulatory recovery by decreasing stress-induced inhibition of hypothalamic–pituitary–ovarian (HPO) axis signaling.

Hydrotherapy modalities, including cold hip baths and abdominal packs, may have contributed to autonomic calming and improved pelvic circulation through reflex vasomotor mechanisms, as suggested by physiological studies on hydrotherapy and autonomic function [13]. Herbal support with *Asparagus racemosus* (Shatavari) was used as a reproductive tonic rather than a targeted hormonal agent. Experimental and clinical studies suggest that Shatavari possesses mild phytoestrogenic and adaptogenic properties, potentially supporting follicular development and endocrine balance [14–16].

From an Ayurvedic perspective, Pushyanuga Churna exhibits **rakta-stambhaka (haemostatic)**, **kashaya (astringent)**, and **pitta-shamana** properties, which help in controlling excessive bleeding and abnormal vaginal discharge. Its **grahani-balya and krimighna** actions support gut–genital axis regulation and help reduce infective and inflammatory pathology. Collectively, these actions contribute to restoration of **yonidosha balance**, improvement in mucosal integrity, and reduction of recurrent infective symptoms, thereby supporting overall gynaecological health.

Psychological counselling addressed infertility-related distress, maladaptive coping, and ruminative anxiety. Cognitive–behavioural and mindfulness-based interventions have been shown to reduce stress, improve emotional wellbeing, and enhance treatment adherence in women with PCOS and infertility [17–19]. The parallel improvement in psychological measures and menstrual regularity observed in this case underscores the bidirectional relationship between stress regulation and reproductive function.

Collectively, these findings suggest that lean PCOS represents a phenotype in which stress-related neuroendocrine dysregulation and early metabolic disturbance coexist, necessitating a broader therapeutic approach beyond weight-centric strategies.

Strengths

This case study has several strengths. It adopts a comprehensive, integrative, and individualized approach targeting metabolic, endocrine, autonomic, and psychological domains simultaneously, reflecting the multisystem nature of lean PCOS. The intervention was non-pharmacological, feasible, and well tolerated, making it particularly relevant for women seeking fertility-preserving or lifestyle-based management options. Additionally, outcomes were assessed using a combination of clinical symptoms, biochemical markers, imaging findings, and standardized psychological scales, providing a multidimensional evaluation of treatment response.

Limitations

The primary limitation of this report is its single-case design, which limits generalizability and precludes causal inference. The absence of a long-term follow-up period restricts assessment of the sustainability of menstrual and metabolic improvements. Objective biomarkers were not measured at multiple intermediate time points, limiting detailed mechanistic interpretation. Furthermore, due to the multimodal nature of the

intervention, the independent contribution of each component could not be isolated. Placebo effects and expectancy bias cannot be excluded.

Conclusion

This case suggests that an integrative, multimodal lifestyle-based intervention may improve menstrual regularity, metabolic stability, and psychological wellbeing in women with lean PCOS. By addressing concurrent disturbances in insulin regulation, HPO-axis function, autonomic balance, emotional health, and traditional-system imbalances, the intervention created a supportive internal environment for reproductive normalization. The findings highlight the need for a broader therapeutic framework for lean PCOS beyond weight-focused approaches alone. While preliminary, this case supports the feasibility, safety, and potential clinical value of integrated non-pharmacological care models. Future controlled studies with larger samples, standardized biomarkers, and extended follow-up are warranted to validate these findings and clarify underlying mechanisms.

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