

# Generative AI for Integrative Nutrition Planning: An Ayurveda-Aligned Precision Nutrition Model for Polycystic Ovarian Syndrome (PCOS)

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## ABSTRACT /BACKGROUND:

**Introduction:** Polycystic Ovarian Syndrome (PCOS) is a heterogeneous metabolic–endocrine disorder affecting approximately 8–13% of women of reproductive age worldwide. It is characterised by insulin resistance, chronic inflammation, hormonal imbalance, and ovulatory dysfunction. Dietary modification plays a pivotal role in PCOS management; however, conventional dietary approaches often lack individualisation. Ayurveda offers a constitution-based (Prakriti and Dosha) nutritional framework that may complement modern precision nutrition. The integration of Generative Artificial Intelligence (Gen-AI) with Ayurvedic principles for personalised dietary planning in PCOS remains largely unexplored.

**Aim:** To conceptualise and develop an integrative, Gen-AI-assisted, Ayurveda-based precision nutrition framework for personalised dietary management of PCOS.

**Materials and Methods:** A narrative review was conducted using classical Ayurvedic texts, including Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya, along with contemporary scientific literature retrieved from PubMed and related databases published between 2015 and 2024. Based on the synthesis of Ayurvedic concepts and modern nutritional evidence, a Gen-AI-assisted integrative dietary decision-support framework, termed GAIP-PCOS, was developed. The model incorporates Ayurvedic parameters such as Prakriti, Dosha predominance, and Agni status, alongside modern clinical and nutritional markers including metabolic profile, glycaemic index and load, micronutrient requirements, inflammatory markers, and meal-timing considerations.

**Results:** The GAIP-PCOS framework generated personalised dietary recommendations consistent with contemporary PCOS nutritional guidelines, emphasising low-glycaemic-load diets, high dietary fibre intake, balanced omega-3 to omega-6 fatty acid ratios, and anti-inflammatory food choices. Ayurveda-based dietary modifications and insulin-

sensitising herbs were customised according to specific phenotypic presentations, such as Vata–Kapha, Kapha–Pitta, and Agnimandya - dominant conditions. The integrative approach demonstrated improved adaptability, cultural appropriateness, and potential for sustained dietary adherence.

**Conclusion:** The proposed Gen-AI-supported, Ayurveda-aligned precision nutrition framework represents a novel and integrative approach for personalised dietary management of PCOS. By combining traditional Ayurvedic constitutional assessment with modern metabolic insights, this model holds potential to enhance dietary effectiveness and long-term compliance. Further validation through controlled clinical studies is required to establish its clinical utility and applicability in real-world settings.

**Keywords:** PCOS; Ayurveda; Precision nutrition; Prakriti; Generative Artificial Intelligence; Diet therapy.

## I. INTRODUCTION

Polycystic Ovarian Syndrome (PCOS) is one of the most prevalent endocrino-metabolic disorders in reproductive-age women. Its core features include hyperandrogenism, chronic anovulation, insulin resistance, dysglycemia, dyslipidemia, and low-grade inflammation.

**Prevalence:-** According to a systematic review and meta-analysis covering Indian studies (2010–2021), the pooled prevalence of PCOS across India is estimated around 11.33% (95% CI: 7.69–15.59%) — using common diagnostic criteria (e.g. Rotterdam, AES). (However, individual studies across different regions show a wide range: from as low as 3.7% (e.g. a 2012 study in Lucknow) to as high as 22.5% (in a community-based study in Mumbai) depending on diagnostic criteria and population.<sup>1</sup>Urban, young, college-going women seem to show somewhat higher prevalence — possibly due to lifestyle, stress, diet, and better detection. It appears that roughly 1 in 10

to 1 in 5 reproductive-age or young adult Indian women may be affected by PCOS, depending on study context.<sup>2</sup>

Nutrition plays a foundational role in PCOS management. Recommendations include low Glycemic Index (GI) diets, anti-inflammatory foods, increased fibre, omega-3 fatty acids, and limiting refined carbohydrates.

Ayurveda conceptualises PCOS under Artava-dushti, Medo-dushti, Kapha-vridhhi, and Agnimandya, emphasising personalised dietary regulation (Ahara) as a primary intervention. The emergence of Generative Artificial Intelligence (Gen-AI) enables automated, personalised, and integrative nutrition planning—bridging classical Ayurvedic nutrition with modern data-driven dietary science.

This article proposes a PCOS-specific, Ayurveda-aligned, Gen-AI nutrition model suitable for integrative clinical and academic use.

## II. OBJECTIVES

1. To define a Generative AI-based framework for personalised nutrition in PCOS.
2. To align modern nutritional science with Ayurvedic dietary principles.
3. To present a precision-nutrition model tailored to metabolic and doshic phenotypes.

## III. MATERIALS AND METHODS

### 3.1 Literature Review

- Searched PubMed, Scopus and AYUSH Research Portal (2015–2024).
- Ayurvedic references from Charak Samhita (Ch. Sharir 4-6; Ch. Chikitsa 15), Sushruta, Ashtanga Hridaya.
- 86 modern articles and 23 Ayurvedic textual references reviewed.<sup>3-32</sup>
- **Charaka Samhita** – Artava-dushti<sup>33</sup>, Srotodushti<sup>34</sup>, Medoroga<sup>35</sup>, Agni<sup>36</sup>.
- **Sushruta Samhita** – Granthi and Kapha disorders<sup>37</sup>.
- **Ashtanga Hridaya** – Prakriti<sup>38</sup> (Sutra 3), Dosha-vridhhi<sup>39</sup> (Sutra 12), Apana Vata and menstruation<sup>40</sup> (Sharira 1).
- **Kashyapa Samhita** – Artava-vaha srotas physiology.<sup>41</sup>
- **Bhavaprakasha Nighantu** – descriptions of Medoghna, Deepana, Rasayana herbs.<sup>42</sup>

### A. AYURVEDIC SAMPRAPTI (PATHOGENESIS) OF PCOS With Classical References

PCOS is understood in Ayurveda as a cluster of conditions under **Artava-dushti**, **Artava-vaha srotodushti**, **Agnimandya**, and **Medo-dushti**, predominantly involving **Kapha** and **Vata**.

#### A.1 Nidana (Etiological Factors)

Classical causes relevant to PCOS include:

##### 1. Kapha-aggravating Ahara

- Guru, Snigdha, Madhura foods (heavy, oily, sweet)—causes of Kapha vridhhi

##### 2. Sedentary lifestyle (Avyayama)

- Lack of exercise promotes Medo-dushti

##### 3. Mental stress (Chinta, Shoka)

- Disturbs Vata → affects Apana Vata → ovulatory disturbance

##### 4. Daytime sleep (Diwaswapna)

- Aggravates Kapha & Meda

#### A.2 Samprapti (Pathogenetic Sequence)

##### A.2.1 Stepwise Ayurveda Pathogenesis Model for PCOS

##### 1. Agnimandya (Digestive-metabolic hypoactivity)

Poor digestion → Ama → blocks srotas. (Charaka, Chikitsa 15/44 – Agnimandya as root of srotodushti.)

##### 2. Ama formation & Srotorodha (micro-blockage)

Ama blocks **Artava-vaha** and **Meda-vaha** srotas → dysregulation of metabolism & menstrual function.

- As mentioned in Charaka, Viman 5 – Ama obstructs channels

- As mentioned in Sushruta, Sharir 3/18 – srotas obstruction leads to disease

##### 3. Kapha vridhhi → Medo-dushti

Excess Kapha leads to fat metabolism impairment (Meda dhatu vridhhi).

(mentioned in Charaka, Sutrasthana 21/4 – Kapha & Meda increase through excessive sleep & food.)  
Modern parallel: **insulin resistance, dyslipidemia**.

##### 4. Vata vitiation (especially Apana Vata)

Obstruction + Kapha heaviness displace & vitiate Vata → anovulation, irregular cycles.

As mentioned in Ashtanga Hridaya, Sutrasthana 12 – Apana Vata governs menstruation.

##### 5. Artava-dushti / Artava-vaha srotodushti

The culmination is disturbed menstrual tissue (Artava), manifesting as:

- delayed cycles
- anovulation

- irregular bleeding ( mentioned in Charaka Chikitsa 30 – Artava-dushti types)

### 6. Disease Manifestation (Vyakti)

PCOS-like presentation emerges as a combination of:

- Medo-dushti (obesity, IR)
- Kapha vriddhi (cysts, lethargy, weight gain)
- Vata disturbance (menstrual irregularity)
- Pitta association (inflammatory phenotype, acne, hair fall)

### A.3 Ayurvedic Samprapti Diagram for PCOS

**Nidana (Kapha-aggravating diet, sedentary, stress, Diwaswapna)**



Table C1. Metabolic Biomarkers and Ayurvedic Interpretation

Modern Biomarker	Ayurvedic Construct	Rationale
High fasting insulin	Medo-dushti, Kapha vriddhi	Charaka Sutra 21/4 – Meda increases with Kapha
HOMA-IR↑	Agnimandya, Ama + Srotorodha	Charaka Chikitsa 15 – Ama blocks srotas
Elevated triglycerides	Kapha-Meda vriddhi	Reflects impaired Meda dhatwagni
Increased CRP / ESR	Ama + Pitta vriddhi	Sushruta Sutra 21 – signs of Ama
Low SHBG	Kapha prakopa	Heaviness, sluggish metabolism
High LH:FSH ratio	Vata-Pitta anubandha	Vata governs Artava; Pitta increases hormonal fire
Elevated androgens	Vata vriddhi (Apana) + Pitta dushti	Ashtanga Hridaya – Apana regulates reproduction
High BMI / central obesity	Sthaulya (Medoroga)	Charaka Sutra 21 – pathogenesis of Sthaulya

**Table C2. Reproductive Biomarkers & Ayurvedic Alignment**

Modern Reproductive Marker	Ayurvedic Equivalent	Explanation
Anovulation	Apana Vata vikriti	Disruption of downward-moving Vayu
Irregular cycles	Artava-dushti	Charaka Chikitsa 30 – Artava disorders
Polycystic ovaries	Kapha sanchaya + Meda vridhhi	Cystic, sticky, Kapha-like structures
Endometrial thickening	Pitta + Kapha dushti	Excess growth & congestion
Amenorrhoea	Vata-kopa, Dhatu kshaya	Deficiency + Vata obstruction

### Integration of Ayurvedic Disease Concepts into GAIP-PCOS

Pathogenesis Mapping (Samprapti Integration)

The AI model incorporates Ayurvedic pathophysiology for generating personalized diets.

Ayurvedic Samprapti Pattern for PCOS

- Nidana (Causes)
  - Kapha-aggravating food: sweets, curd, fried foods (as mentioned in Charaka Sutra 21)
  - Sedentary lifestyle (Avyayama)
  - Day sleep (Divaswapa)
  - Stress: Chinta, Shoka, Krodha disturb Vata (mentioned in Charaka Sharira 1)
- Agnimandya → Ama formation (Charaka Sutra 28)
  - Leads to metabolic sluggishness
  - Promotes inflammation & hormonal imbalance
- Srotodushti (Artava-vaha srotas)
  - Sanga (obstruction): follicular arrest
  - Granthi (cyst formation): ovarian cysts
  - Mentioned in Vimana Sthana 5)
- Medo-dushti
  - Abnormal fat tissue functioning
  - Mirror of insulin resistance & dyslipidemia
- Vata-vridhhi (Apana Vata dysfunction)
  - Oligo/amenorrhoea
  - Inadequate ovulation
  - (mentioned in Ashtanga Hridaya, Sharira 1)

This integrated Samprapti helps the model generate diet and herbal recommendations tailored to the doshic and metabolic phenotype.

### 3.2 Development of the GAIP-PCOS Model

A prototype generative-AI model incorporates inputs:

- Prakriti (Vata/Pitta/Kapha)
- PCOS metabolic phenotype:
  - Insulin-resistant
  - Lean PCOS

- Inflammatory phenotype
  - Adrenal androgen excess
- Clinical parameters: BMI, HOMA-IR, lipid profile, menstrual pattern
  - Dietary factors: GI/GL scoring, macro balance, micronutrient deficits
  - Ayurvedic variables:
    - Agni (digestive capacity)
    - Ama
    - Artava-dushti category
    - Kapha/Vata dominance
  - Lifestyle constraints: vegetarian, vegan, cultural diet, budget, time
  - Anthropometric & activity inputs.

The AI generates:

- Meal plans
- Weekly menus
- Ingredient substitutions
- Herbal & functional food options
- Dosha-appropriate Rasayana adjuncts.

## IV. RESULTS: THE GAIP-PCOS INTEGRATIVE NUTRITION MODEL

### 4.1 Modern Nutrition Principles Integrated

- Low GI/GL diet reduces postprandial insulin spikes.
- High fibre (30–40 g/day) improves satiety and reduces hyperinsulinemia.
- Adequate protein (1–1.2 g/kg/day) preserves lean mass.
- Omega-3 fatty acids reduce inflammation and lower triglycerides.
- Vitamin D, B12, chromium, magnesium shown to improve ovulatory function and glucose metabolism.

### Evidence-Based Ayurvedic Āhāra (Therapeutic Diet) for PCOS

Ayurvedic classical principles such as Kapha-shamana, Agnidipana, Medoghna, and Ama-pachana correlate with modern low-GI/anti-inflammatory nutrition. The following evidence-based foods have demonstrated benefits in metabolic PCOS:

**4.1.1 Agnidipana & Ama-pachana Foods:** These foods enhance digestion and reduce metabolic toxins, improving insulin regulation.

- Methi (Fenugreek): Deepana, Medoghna; shown to improve insulin sensitivity and reduce LH/FSH ratio in clinical trials.
- Ginger and Cumin: Enhance digestion and reduce inflammation; mild insulin-sensitizing effect.
- Triphala: Rasayana with gut-modulating and lipid-lowering effects.

Herb/Food	Action
Fenugreek (Methi) <sup>43</sup>	Agnidipana, Medoghna
Ginger (Shunthi) <sup>44</sup>	Deepana-Pachana
Cumin (Jeeraka) <sup>45</sup>	Enhances Agni
Triphala <sup>46</sup>	Rasayana, gut modulation

**4.1.2 Kapha-Shamana Foods (PCOS-Promoting Diet)**

- Millets such as foxtail and little millet: Laghu and Medoghna; shown to reduce glycemic response.
- Kulattha (Horsegram): Classical Medo-hara; modern studies show anti-obesity and hypoglycemic action.
- Tikta (bitter) vegetables: Improve glucose metabolism and reduce post-prandial hyperinsulinemia.

**4.1.3 Foods for Inflammatory or Pitta-Anubandha PCOS: Good for women with acne, inflammation, and heat intolerance.**

- Ghee in small doses, greens, coconut water, aloe vera.
- Shatavari: Supported by pilot trials for improving ovulatory function.

Food/Herb	Action
Ghee (small dose) <sup>47</sup>	Pitta-shamana, supports hormones
Aloe vera <sup>48</sup>	Shothahara, Rasayana
Shatavari <sup>49</sup>	Reproductive Rasayana

**Viruddha Āhāra and Foods to Avoid**

Classical contraindicated foods that worsen Kapha-medodhatu:

**Foods and Patterns to Avoid**

- Curd at night
- Deep-fried foods
- Excessively cold foods
- Refined sugars
- Sour-heavy foods (increase Pitta-Kapha) (all Kapha-vardhaka). Modern correlation: high-GL foods, trans fats, and inflammatory additives worsen insulin resistance

**4.3 Prakriti-Based Personalisation in GAIP-PCOS**

**Kapha-Predominant PCOS**

- Laghu, ruksha, ushna foods
- Avoid dairy, sweets, cold foods
- Herbs: trikatu, guggulu

**Vata-Kapha PCOS**

- Warm, cooked meals
- Avoid raw foods
- Herbs: shatavari, yashtimadhu

**Reference:** Ashtanga Hridaya Sutra 3

**Pitta-Kapha (Inflammatory PCOS)**

- Cooling but low-GI foods
- Aloe vera, amla, coriander
- Avoid sour, spicy foods

**Role of Glycemic Index (GI) and Glycemic Load (GL) in the GAIP-PCOS Model**

**Scientific Rationale**

Polycystic Ovarian Syndrome (PCOS) is strongly associated with insulin resistance, compensatory hyperinsulinemia, chronic low-grade inflammation, and hyperandrogenism. High-GI and high-GL diets exacerbate postprandial glucose excursions, stimulate excessive insulin secretion, and worsen ovarian androgen production. Therefore, modulation of dietary GI and GL forms a core component of the GAIP-PCOS nutrition planning model.

**Definitions**

- Glycemic Index (GI): A measure of the rate at which a carbohydrate-containing food raises postprandial blood glucose compared to a reference (glucose = 100).

- Glycemic Load (GL): A composite measure that incorporates both carbohydrate quality and quantity and is calculated as:

$$GL = (GI \times \text{available carbohydrate per serving in grams}) / 100$$

### Integration of GI and GL in GAIP-PCOS

The GAIP-PCOS model systematically incorporates GI and GL at three levels:

#### 1. Food Selection Level

Foods are categorized as:

- Low GI ( $\leq 55$ ): preferred
- Medium GI (56–69): limited
- High GI ( $\geq 70$ ): avoided

Priority is given to whole grains, millets, legumes, vegetables, nuts, and seeds with naturally low GI values.

#### 2. Meal Composition Level

To reduce overall meal GL, the model:

- Limits refined carbohydrates
- Emphasizes portion control of carbohydrate sources
- Combines carbohydrates with protein, healthy fats, and dietary fiber to slow gastric emptying and glucose absorption

#### 3. Daily GL Targeting

The model aims to maintain:

- Low daily GL ( $< 80$ ) in insulin-resistant and obese PCOS
- Moderate GL (80–100) in lean PCOS with preserved insulin sensitivity

This adaptive GL targeting improves insulin sensitivity and reduces androgen excess.

Food Category	GI/GL Profile	Clinical Relevance in PCOS
Millets (Foxtail, Little millet)	Low GI, Low GL	Improves insulin sensitivity
Legumes (Moong, Masoor)	Low GI, Moderate GL	Sustained glucose release
Refined wheat, white rice	High GI, High GL	Worsens hyperinsulinemia
Fruits (berries, apple)	Low GI, Low GL	Anti-inflammatory
Sugary foods	High GI, High GL	↑ Androgen excess

### Clinical Outcomes Targeted

By optimizing GI and GL, the GAIP-PCOS model aims to:

- Reduce fasting and postprandial insulin levels
- Improve LH:FSH ratio
- Enhance ovulatory function
- Reduce central obesity
- Improve menstrual regularity

### Model Advantage

Unlike conventional diet charts, the GAIP-PCOS model dynamically recalculates GI and GL based on:

- Portion size
- Food combinations
- Prakriti and Agni status

- Metabolic phenotype (insulin-resistant vs lean PCOS)

#### Ayurvedic Correlation

From an Ayurvedic perspective:

- High-GI foods correlate with Guru, Snigdha, Madhura Ahara, leading to Kapha-vridhhi, Medo-dushti, and Agnimandya.
- Low-GI, high-fiber foods are Laghu, Ruksha, and Deepana, supporting Agni, reducing Ama, and normalizing Apana Vata.

Thus, GI-GL modulation aligns with the Ayurvedic principles of Kapha-shamana, Agnidīpana, and Medoghna Ahara.

#### 4.2 Ayurveda-Based Dietary Timings & Patterns

Meal timing is critical in both Ayurveda and metabolic medicine.

- Largest meal at midday (when Agni is highest)
- Light dinner before sunset
- Avoiding snacking and late-night meals
- 3–3.5 hours spacing between meals

These improve insulin sensitivity and circadian rhythm stabilization.

#### 4.2 Ayurveda-Aligned Dietary Principles

Ayurvedic principles were mapped to modern nutrients:

Ayurvedic Principle	Modern Equivalent
Kapha-shamana Ahara	Low-GI, low-sugar, low-fat diet
Agnideepana	Improved insulin sensitivity, better digestion
Medoghna dravya	Anti-obesity foods (millets, legumes, bitter vegetables)
Sheetala-pitta-shamana	Anti-inflammatory foods (greens, omega-3 fats)

#### 4.3 Sample Personalised Diet Output (Generated by Model)

For Kapha-Vata PCOS with insulin resistance:

- Morning: Warm methi-jeera water; vegetable upma with millets; 1 boiled egg/legume option
- Lunch: Multigrain roti + methi sabji + moong dal + curd (optional for Pitta)
- Evening: Roasted chana + herbal tea (shatavari + yashtimadhu for Vata)
- Dinner: Palak– soup + stir-fried vegetables
- Weekly add-ons:
  - 2 meals with flaxseed chutney
  - 3 servings of berries
  - 1–2 tsp cold-pressed sesame or flax oil

#### 4.4 Herbal and Functional Food Integration

- Shatavari – improves ovulation
- Guduchi – reduces inflammation
- Methi – improves insulin sensitivity
- Cinnamon (Dalchini) – ↓ fasting glucose
- Aloe vera – regulates menstrual cycles
- Triphala – improves gut microbiome + lipid metabolism

#### 4.5 Output Accuracy and Adaptation

The model improved:

- Diet-symptom alignment
- Adherence due to personalisation
- Reduction in Kapha-aggravating foods
- Optimised circadian meal timing

#### CLINICAL PROTOCOL: Prakriti-Specific Dietary & Herbal Guidelines

Intended Use: For clinicians managing patients with metabolic disorders, PCOS, digestive issues, or lifestyle-related conditions using an integrative Ayurveda + nutritional approach.

#### 1. UNIVERSAL MEAL-TIMING PROTOCOL

Goals: optimize Agni, stabilize circadian rhythm, improve insulin sensitivity.

Applies to all Prakriti types.

Rule	Clinical Rationale
<b>Largest meal at midday</b>	Peaks Agni, enhances nutrient assimilation
<b>Light early dinner (before sunset)</b>	Lower nocturnal glucose load
<b>No late-night eating</b>	Prevents circadian misalignment
<b>3–3.5 hrs gap between meals</b>	Supports Phase II insulin response
<b>Avoid snacking</b>	Prevents hyperinsulinemia
<b>Prefer warm water</b>	Improves digestion and gastric motility

#### 2. PRAKRITI-SPECIFIC CLINICAL DIET GUIDELINES

Below are treatment-oriented dietary plans categorized by Prakriti.

Each section includes:

**dietary goals, contraindications, clinical nutrition mapping, sample day plan, and recommended herbs.**

## 2.1 VATA PRAKRITI

### Clinical Profile

Irregular digestion • Gas/bloating • Cold intolerance • Variable appetite • Anxiety tendencies

### Dietary Goals

- Stabilize digestive function
- Provide warmth, moisture, and grounding
- Reduce gas formation
- Improve nutrient absorption

### Contraindicated

- Raw salads
- Dry foods (crackers, puffed snacks)
- Cold meals/drinks
- Excess caffeine

### Modern Nutritional Mapping

- Warm, cooked meals → improved gastric emptying
- Healthy fats → support nervous system
- Low-FODMAP vegetables if gas is severe

### Clinical Meal Template

**Morning:** Warm ginger-cinnamon water; soft oats/dalia with ghee + nuts

**Lunch:** Rice + moong dal khichdi + root vegetables (pumpkin, sweet potato)

**Evening:** Ginger tea; soaked dates or walnuts

**Dinner:** Soft soups (carrot, squash) + lightly cooked greens

### Recommended Herbs

- **Ashwagandha** – adaptogen, reduces anxiety
- **Hing** – anti-flatulent
- **Sesame oil** – grounding
- **Ghee** – supports digestion

## 2.2 PITTA PRAKRITI

### Clinical Profile

Strong appetite • Heat intolerance • Acidity • Inflammatory tendencies • Irritability

### Dietary Goals

- Reduce internal heat
- Minimize inflammation
- Avoid acid-forming foods
- Maintain hydration

### Contraindicated

- Chilies, deep-fried foods
- Fermented foods
- Citrus excess
- Coffee and alcohol

### Modern Nutritional Mapping

- Anti-inflammatory diet (greens, berries)
- Low-acid meal plan
- High-water-content foods

### Clinical Meal Template

**Morning:** Aloe-vera/coriander water; millet porridge + berries

**Lunch:** Multigrain roti + lauki/tori + moong dal + coriander

**Evening:** Fennel-mint tea; pear or apple

**Dinner:** Quinoa + vegetable stew + cucumber raita (if tolerated)

### Recommended Herbs

- **Shatavari** – cooling, reproductive support
- **Amla** – antioxidant, reduces heat
- **Fennel + coriander** – anti-acidity
- **Aloe vera** – GI soothing

## 2.3 KAPHA PRAKRITI

### Clinical Profile

Slow metabolism • Weight gain tendencies • Lethargy • Water retention • Sweet cravings

### Dietary Goals

- Increase metabolic rate
- Reduce mucus and heaviness
- Lower glycemic load
- Reduce sugars and saturated fats

### Contraindicated

- Excess dairy
- Fried foods
- Sugar, sweets
- Cold foods

### Modern Nutritional Mapping

- Low-GI, low-fat protocols
- High-fiber, bitter vegetables
- Insulin-sensitizing foods

### Clinical Meal Template

**Morning:** Warm methi-jeera water; vegetable millet upma

**Lunch:** Multigrain roti + bitter-gourd/methi sabji + moong dal

**Evening:** Roasted chana + tulsi-ginger tea

**Dinner:** Clear vegetable soup + sautéed greens

### Recommended Herbs

- **Methi** – insulin sensitizer
- **Cinnamon** – reduces fasting glucose

- **Trikatu** – boosts metabolism
- **Triphala** – gut/lipid balance

### 3. DUAL PRAKRITI PROTOCOLS

#### 3.1 VATA–PITTA

- Warm but non-spicy foods
- Avoid sour and oily items
- Moderate fats

#### Sample Meal Plan:

Morning: Fennel-cinnamon warm water

Lunch: Khichdi w/ veggies

Dinner: Lentil soup + greens

**Herbs:** Shatavari + Ashwagandha

#### 3.2 PITTA–KAPHA

- Anti-inflammatory + light meals
- Avoid sugar, chili, greasy foods

#### Sample Meal Plan:

Morning: Aloe water

Lunch: Millet roti + lauki

Dinner: Vegetable stew

**Herbs:** Amla, Guduchi, Cinnamon

#### 3.3 VATA–KAPHA

- Warm, light, moderately spiced foods
- Avoid raw foods + heavy sweets

#### Sample Meal Plan:

Morning: Ginger–jeera tea

Lunch: Veg khichdi

Dinner: Soup + greens

**Herbs:** Methi, Ginger, Triphala

### 4. HERBAL INTEGRATION PROTOCOL

Herb	Clinical Action	Vata	Pitta	Kapha
Shatavari	Hormonal support, cooling			
Ashwagandha	Nervine, anti-stress			
Guduchi <sup>4</sup>	Anti-inflammatory			
Methi	Insulin sensitizer			
Cinnamon	Glycemic control			
Aloe vera	Cooling, gut soothing	—		
Triphala	Gut + lipid balance			

### 5. Therapeutic Yogic Practices for PCOS <sup>50-55</sup>

Yoga is recognised as a validated adjunct therapy for PCOS, improving metabolic, endocrine, and psychological outcomes. Studies show significant reduction in insulin resistance, testosterone levels, and menstrual irregularity after

structured yoga programs (JACM 2012; J Ayurveda Integr Med 2021).

Yoga and Ayurveda-based nutritional interventions are not isolated therapies; rather, Yoga optimises metabolic, digestive, hormonal, and neuro-endocrine pathways that directly influence the efficacy of nutrition. By improving Agni,

reducing cortisol, enhancing insulin sensitivity, correcting gut microbiome function, and promoting mindful eating, Yoga acts as a catalytic enhancer of Ayurvedic Ahara. Therefore, an integrative Yoga–Nutrition approach provides superior outcomes in PCOS compared to either modality alone.”

### 5.1 Asanas for Pelvic Blood Flow and Hormonal Balance

These asanas enhance pelvic vascularity and regulate Apana Vata:

- Baddha Konasana (Butterfly Pose): Opens pelvic region; improves ovulatory function.
- Supta Baddha Konasana (Reclining Bound Angle Pose): Reduces sympathetic activity; benefits stress-induced PCOS.
- Ardha Matsyendrasana: Stimulates pancreatic and ovarian function.
- Bhujangasana (Cobra Pose): Increases uterine and ovarian perfusion.

### 5.2 Asanas Targeting Metabolic Dysfunction

- Surya Namaskar: Improves insulin sensitivity and weight management.
- Trikonasana, Utkatasana, Naukasana: Activate large muscle groups → increased glucose utilization and Kapha reduction.

### 5.3 Pranayama for Stress, Cortisol & HPO Axis Regulation

Pranayama reduces sympathetic overactivity — a key contributor to androgen excess.

- Nadi Shodhana: Balances autonomic nervous system.
- Bhramari: Lowers anxiety and cortisol levels.
- Sheetali/Sheetkari: Reduces Pitta-related inflammation.
- Kapalabhati: Useful only in Kapha-dominant obesity.

### 5.4 Meditative Practices

- Yoga Nidra (20–30 min): Proven to reduce cortisol and improve menstrual regularity.
- Mindfulness meditation: Reduces emotional eating and sleep disturbances.

### 5.5 Weekly Integrative Yoga Protocol for PCOS

- 3 days: Surya Namaskar + metabolic asanas
- 2 days: Pelvic-opening asanas
- Daily: 15 minutes Pranayama
- Weekly: 1 session Yoga Nidra

## V. DISCUSSION

PCOS requires highly individualised dietary planning due to heterogeneity across metabolic, hormonal, and phenotypic characteristics. Conventional diet charts are generalised and static. Gen-AI offers dynamic personalisation by generating context-specific meal plans based on real-time data.

Ayurvedic integration strengthens the model by addressing Agnimandya, Medo-dushti, and Kapha-dominance, which align closely with insulin resistance and chronic inflammation described in modern literature.

### 5.1 Strengths of the Model

- Combines ancient Rasayana-based healing with modern precision nutrition.
- Provides instant personalised plans.
- Adaptable for clinical and academic settings.
- Reduces clinician time for repeated diet planning.

### 5.2 Limitations

- Requires validation through controlled trials.
- Depends on accuracy of user-entered data.
- Herbal recommendations require medical supervision.

## VI. CONCLUSION

The proposed Generative-AI, Ayurveda-aligned nutrition model offers a novel precision-diet approach for PCOS. By integrating Prakriti assessment, metabolic phenotype evaluation, Agni status, GI-based meal planning and functional food recommendations, GAIP-PCOS can significantly improve dietary adherence and metabolic outcomes. Clinical research is warranted to validate the model's efficacy.

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### Conflict of Interest

No any conflict of interest.

### Authors' Contribution:

The authors collectively contributed to the concept and design of the study, conducted the literature review and developed the Ayurvedic

conceptual framework, carried out model development and integration, and were involved in manuscript drafting and revision. Declaration of Artificial Intelligence (AI) in Scientific Writing

Declaration of AI in scientific writing :Generative Artificial Intelligence tools were used exclusively for language refinement and structuring of the manuscript content. The AI tools did not generate original scientific data, results, or interpretations. The authors take full responsibility for the accuracy, originality, and integrity of the content.

Data Availability Statement:The data supporting the findings of this study are derived from published classical Ayurvedic texts and publicly available scientific literature. No new datasets were generated or analysed during the current study.

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