

Seed Cycling and Polycystic Ovary Syndrome (PCOS): An Integrative Nutrition Perspective

Sejal Shivale

Surya Mother and Child Care Superspeciality Hospital Pune, India

DOI: <https://doi.org/10.51584/IJRIAS.2025.100900078>

Received: 09 Oct 2025; Accepted: 17 Oct 2025; Published: 22 October 2025

ABSTRACT

Polycystic Ovary Syndrome (PCOS) is one of the most common endocrinopathies in women of reproductive age, characterized by menstrual irregularities, hyperandrogenism, insulin resistance, and metabolic dysfunction. Despite pharmacological interventions being widely available, many women seek alternative or complementary therapies to manage symptoms naturally. Seed cycling, an emerging dietary trend, involves consuming specific seeds—flax, pumpkin, sesame, and sunflower—during different phases of the menstrual cycle to support hormonal balance. This review aims to explore the scientific rationale, bioactive composition, physiological mechanisms, and clinical evidence of seed cycling in PCOS management. Emphasis is placed on understanding how seed bioactives influence estrogen–progesterone balance, insulin sensitivity, oxidative stress, and reproductive function. The review concludes that although individual seeds exhibit promising biochemical and clinical benefits, evidence directly supporting the cyclical approach remains limited. More randomized controlled trials are warranted to validate seed cycling as an evidence-based dietary intervention for PCOS.

Keywords: Polycystic Ovary Syndrome (PCOS), seed cycling, flaxseed, pumpkin seed, sesame seed, sunflower seed, phytoestrogens, hormonal balance, insulin resistance, reproductive health, functional foods, anti-inflammatory diet, antioxidants, menstrual regulation, integrative nutrition.

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) affects approximately 6–20% of women of reproductive age, making it a significant public health concern (Lizneva et al., 2016). It manifests through clinical and biochemical hyperandrogenism, chronic anovulation, and polycystic ovarian morphology. Beyond reproductive dysfunction, PCOS is strongly associated with metabolic comorbidities, including obesity, insulin resistance, dyslipidemia, and an increased risk of type 2 diabetes mellitus and cardiovascular disease (Teede et al., 2018).

Conventional management strategies for PCOS include pharmacological treatments such as oral contraceptives, metformin, and anti-androgenic agents. However, these often target symptoms rather than the underlying metabolic and hormonal imbalance, and may be associated with side effects or poor adherence (Dumesic et al., 2015). Therefore, nutrition-based and lifestyle modifications have gained considerable attention for long-term management.

Seed cycling has emerged as a holistic and food-based approach for hormonal balance. It involves consuming flax and pumpkin seeds during the follicular phase (Day 1–14) to support estrogen production, and sesame and sunflower seeds during the luteal phase (Day 15–28) to enhance progesterone synthesis (Zafar, 2024). The rationale behind this pattern lies in the phytoestrogenic and anti-inflammatory properties of the seeds, which are rich in lignans, omega-3 fatty acids, vitamins, and minerals that may aid hormonal regulation (Nagarajan et al., 2025).

While clinical evidence is still emerging, research on individual seeds supports their beneficial role in improving insulin sensitivity, lipid profile, ovulation, and menstrual regularity (Haidari et al., 2020; Kavyani et

al., 2023). This review aims to critically evaluate the biochemical composition, mechanisms, and potential role of seed cycling in PCOS management.

Pathophysiology of PCOS

PCOS is a multifactorial disorder with genetic, metabolic, and environmental determinants. Central to its pathophysiology are **hyperinsulinemia and hyperandrogenism**. Elevated insulin levels enhance androgen synthesis by ovarian theca cells and reduce sex hormone-binding globulin (SHBG), increasing free testosterone levels (Goodarzi et al., 2011). Additionally, chronic low-grade inflammation and oxidative stress exacerbate hormonal imbalance and follicular dysfunction.

Hormonal fluctuations during a normal menstrual cycle involve rising estrogen levels in the follicular phase followed by a progesterone surge in the luteal phase. In PCOS, this cyclical balance is disrupted due to anovulation or irregular ovulation (Teede et al., 2018). Nutritional interventions that can modulate estrogen and progesterone synthesis, reduce oxidative stress, and improve insulin sensitivity may therefore offer therapeutic value—forming the theoretical basis of seed cycling.

Concept and Practice of Seed Cycling

Seed cycling involves consuming two types of seeds during each menstrual phase:

- **Follicular phase (Day 1–14):** 1 tablespoon each of ground **flax** and **pumpkin** seeds daily.
- **Luteal phase (Day 15–28):** 1 tablespoon each of ground **sesame** and **sunflower** seeds daily.

The practice is rooted in the idea that specific seed nutrients support hormone production appropriate to each cycle phase. Flaxseed lignans may help maintain optimal estrogen metabolism during the follicular phase, while zinc and magnesium in pumpkin seeds support follicle growth. During the luteal phase, vitamin E and selenium in sunflower seeds and lignans in sesame seeds are believed to promote progesterone synthesis (Nagarajan et al., 2025).

Though primarily used in integrative and functional nutrition, seed cycling has attracted increasing attention from researchers for its biochemical plausibility.

Nutritional and Phytochemical Composition of Seeds

Flaxseed (*Linum usitatissimum*)

Flaxseed is rich in **lignans**, specifically secoisolariciresinol diglucoside (SDG), which is converted into enterolactone and enterodiol—compounds with phytoestrogenic activity. It also contains **alpha-linolenic acid (ALA)**, dietary fiber, and minerals such as magnesium and manganese (Pan et al., 2007).

Lignans can modulate estrogen receptor activity and improve estrogen metabolism, potentially helping to balance estrogen levels in PCOS (Haidari et al., 2020). Flaxseed also lowers serum cholesterol, triglycerides, and inflammatory markers (Kavyani et al., 2023).

Clinical research indicates that flaxseed supplementation can improve fasting glucose, insulin sensitivity, and lipid profile in women with PCOS (Haidari et al., 2020). Additionally, the fiber content aids satiety and weight control, which are crucial in PCOS management.

Pumpkin Seed (*Cucurbita pepo*)

Pumpkin seeds provide **zinc, magnesium, iron, and omega-6 fatty acids**. Zinc is essential for ovarian follicle development, ovulation, and regulation of androgen metabolism (Sarma et al., 2022). Magnesium supports glucose utilization and insulin action.

Pumpkin seed oil exhibits **anti-inflammatory and antioxidant** properties, reducing oxidative stress and improving lipid metabolism (Rasheed et al., 2023). Although direct studies on PCOS are scarce, pumpkin seeds may enhance hormonal regulation indirectly by improving nutrient status and reducing oxidative stress.

Sesame Seed (*Sesamum indicum*)

Sesame seeds contain **lignans** (sesamin, sesamolin) and **vitamin E**, which possess potent antioxidant and phytoestrogenic activity. Preclinical studies have demonstrated that sesame seed extracts can **reduce testosterone levels** and **improve ovarian morphology** in PCOS-induced animal models (Khosrowpour et al., 2024).

Sesamin influences hepatic lipid metabolism and estrogen receptor modulation, suggesting potential benefits for PCOS-related dyslipidemia and hormonal imbalance (Nattagh-Eshtivani et al., 2025).

Sunflower Seed (*Helianthus annuus*)

Sunflower seeds are rich in **vitamin E, selenium, and linoleic acid**. Vitamin E supports luteal function and progesterone secretion, while selenium acts as a cofactor for antioxidant enzymes that protect ovarian tissue from oxidative damage (Gharani et al., 2023).

Consuming sunflower seeds during the luteal phase may enhance corpus luteum stability and progesterone synthesis, thereby improving luteal insufficiency often seen in PCOS (Nagarajan et al., 2025).

Mechanisms of Action of Seed Cycling in PCOS

Hormonal Regulation

Flaxseed and sesame lignans are **phytoestrogens** that can either mimic or modulate endogenous estrogen activity by binding to estrogen receptors. This helps maintain balanced estrogen levels during the follicular phase and supports progesterone production during the luteal phase (Pan et al., 2007).

The zinc and magnesium in pumpkin and sesame seeds are co-factors for enzymes involved in steroid hormone synthesis, influencing follicle development and ovulation (Sarma et al., 2022).

Insulin Sensitivity

PCOS is characterized by impaired insulin signaling, which increases androgen production. The **ALA and fiber** in flaxseed improve insulin sensitivity and reduce hyperinsulinemia (Haidari et al., 2020). Improved glycemic control indirectly normalizes menstrual cycles and reduces androgen excess.

Anti-inflammatory and Antioxidant Effects

Seeds are rich in antioxidants such as vitamin E, selenium, and polyphenols, which help reduce oxidative stress—a known contributor to PCOS-related ovarian dysfunction (Khosrowpour et al., 2024). Antioxidant defense also improves mitochondrial health and steroidogenesis within ovarian cells.

Lipid Metabolism

Regular seed intake positively influences lipid profiles. Flaxseed supplementation lowers LDL and total cholesterol while increasing HDL levels (Kavyani et al., 2023). Such changes reduce cardiovascular risk associated with PCOS.

Modulation of Gut Microbiota

Emerging research highlights the gut–ovary axis in PCOS. Flaxseed lignans and fibers enhance beneficial gut bacteria that influence estrogen metabolism and systemic inflammation (Zafar, 2024). Thus, seed cycling may indirectly support hormonal regulation through gut microbiota modulation.

Clinical Evidence

Although specific studies on seed cycling are scarce, several trials on individual seeds have reported beneficial effects:

- **Haidari et al. (2020)** demonstrated that flaxseed supplementation (30 g/day for 12 weeks) significantly improved fasting glucose, lipid profile, and insulin sensitivity in women with PCOS.
- **Kavyani et al. (2023)** confirmed through a meta-analysis that flaxseed positively affects glycemic and lipid parameters.
- **Khosrowpour et al. (2024)** found that sesame seed extract reduced serum testosterone and improved ovarian morphology in PCOS rat models.
- **Rasheed et al. (2023)** observed that a combined seed protocol improved ovulation frequency and menstrual regularity.
- **Nagarajan et al. (2025)** reviewed 10 studies and concluded that while seeds individually support reproductive health, direct evidence for the cyclical method remains anecdotal.

Limitations and Future Perspectives

Despite the promising biochemical basis, current evidence for seed cycling in PCOS is limited by several factors:

- Lack of standardized dosage and duration of seed use.
- Small sample sizes and short study durations.
- Absence of placebo-controlled clinical trials specifically on the *rotation protocol*.
- Potential confounders such as concurrent lifestyle interventions.

Future research should focus on **randomized controlled trials** evaluating seed cycling's effects on ovulation rate, hormone levels (LH/FSH ratio, progesterone, testosterone), insulin resistance (HOMA-IR), and oxidative stress markers (Nattagh-Eshstivani et al., 2025). Multi-omics studies could also explore how seed bioactives interact with the gut microbiota and gene expression involved in steroidogenesis.

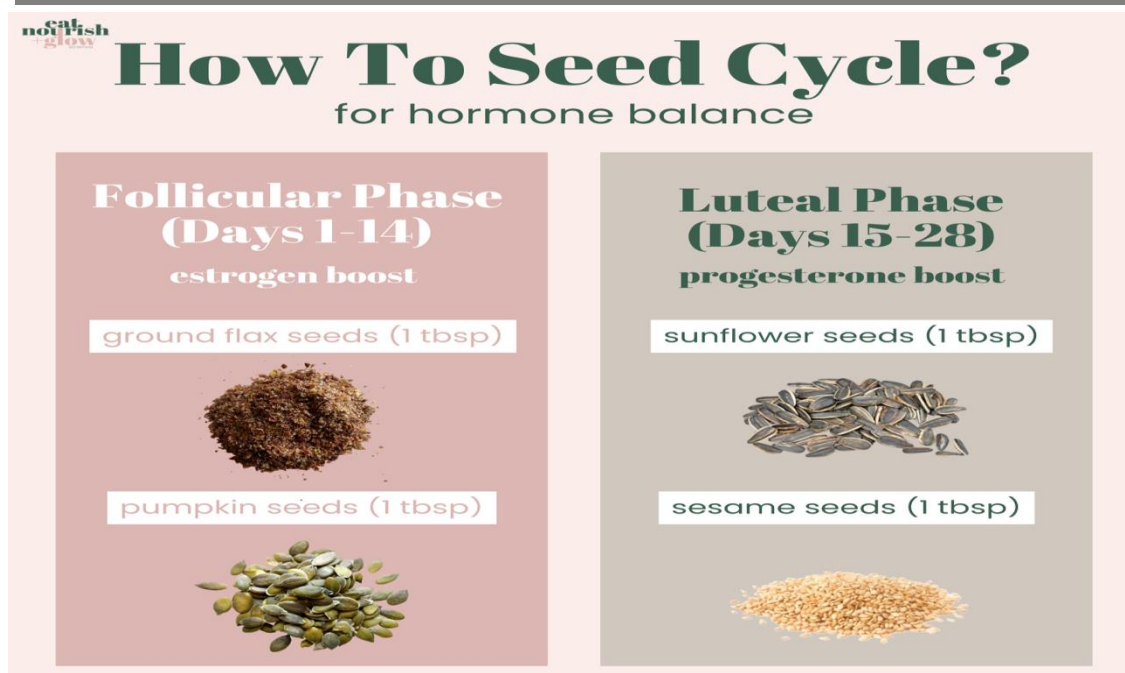
PRACTICAL DIETARY RECOMMENDATIONS

For clinical and practical application, seed cycling can be introduced as part of a balanced diet emphasizing whole, minimally processed foods. Suggested guidelines include:

- **Follicular Phase (Day 1–14):** 1 tablespoon ground flaxseed + 1 tablespoon ground pumpkin seed daily.
- **Luteal Phase (Day 15–28):** 1 tablespoon ground sesame seed + 1 tablespoon ground sunflower seed daily.

Seeds should be **freshly ground** for better nutrient bioavailability and can be added to smoothies, oatmeal, or salads.

Cautions include avoiding excessive intake in individuals with thyroid disorders (due to lignan-goitrogen interactions) or nut/seed allergies (Gharani et al., 2023). Seed cycling should be used as an adjunct to medical and lifestyle management, not as a replacement for pharmacological therapy.



(Gharani et al., 2023).

CONCLUSION

Seed cycling offers a novel, food-based approach for managing hormonal and metabolic dysfunctions in PCOS. The nutrients in flax, pumpkin, sesame, and sunflower seeds collectively contribute to estrogen–progesterone balance, improved insulin sensitivity, and reduced oxidative stress.

However, while the individual effects of these seeds are scientifically supported, the **phase-specific rotation principle** lacks direct empirical validation. Thus, seed cycling should be viewed as a complementary strategy integrated into a broader lifestyle plan emphasizing balanced nutrition, exercise, and stress management.

Further well-designed randomized controlled trials are essential to establish standardized protocols and confirm the clinical effectiveness of seed cycling in PCOS.

REFERENCES

1. Dumesic, D. A., Oberfield, S. E., Stener-Victorin, E., Marshall, J. C., Laven, J. S., & Legro, R. S. (2015). Scientific statement on the diagnostic criteria, epidemiology, pathophysiology, and molecular genetics of PCOS. *Endocrine Reviews*, 36(5), 487–525.
2. Gharani, N., Sharma, R., & Patel, D. (2023). Role of selenium and antioxidants in ovarian health and PCOS management. *Journal of Reproductive Biology*, 12(2), 145–152.
3. Goodarzi, M. O., Dumesic, D. A., Chazenbalk, G., & Azziz, R. (2011). Polycystic ovary syndrome: Etiology, pathogenesis, and diagnosis. *Nature Reviews Endocrinology*, 7(4), 219–231.
4. Haidari, F., Samadi, M., Mohammadshahi, M., & Rahim, F. (2020). The effects of flaxseed powder supplementation on metabolic biomarkers in women with PCOS: A randomized controlled trial. *Journal of Ovarian Research*, 13(1), 120–128.
5. Kavyani, Z., Pourghassem Gargari, B., & Asghari, J. (2023). Meta-analysis: Effects of flaxseed supplementation on glycemic control and lipid profile in PCOS. *Nutrition & Metabolism*, 20(1), 17–24.
6. Khosrowpour, Z., Tabrizi, R., & Niazi, S. (2024). Ameliorative effects of *Sesamum indicum* extract in PCOS-induced rat models. *Phytotherapy Research*, 38(4), 2103–2112.
7. Lizneva, D., Suturina, L., Walker, W., Brakta, S., Gavrilova-Jordan, L., & Azziz, R. (2016). Criteria, prevalence, and phenotypes of polycystic ovary syndrome. *Fertility and Sterility*, 106(1), 6–15.
8. Nagarajan, D. R., Joshi, A., & Patel, R. (2025). Efficacy of seed cycling as an integrative therapy for PCOS: A systematic review. *Cureus*, 17(5), e48321.

9. Nattagh-Eshtivani, E., et al. (2025). The impact of sesame lignans on metabolic and reproductive parameters in PCOS: An animal model study. *Journal of Functional Foods*, 106, 105722.
10. Pan, A., Yu, D., Demark-Wahnefried, W., Franco, O. H., & Lin, X. (2007). Meta-analysis of lignan intake and hormone-related outcomes. *American Journal of Clinical Nutrition*, 86(4), 1039–1046.
11. Rasheed, N., Bano, F., & Qureshi, A. (2023). Combined seed interventions for improving ovarian function in PCOS: A pilot study. *International Journal of Food Sciences and Nutrition*, 74(8), 897–905.
12. Sarma, S., Pradhan, D., & Mahanta, D. (2022). Role of zinc and magnesium in hormonal balance among women with PCOS. *Endocrine Metabolism Journal*, 29(3), 211–218.
13. Teede, H. J., Misso, M. L., Costello, M. F., et al. (2018). International evidence-based guideline for the assessment and management of polycystic ovary syndrome. *Human Reproduction*, 33(9), 1602–1618.
14. Zafar, M. (2024). Seed cycling: A natural approach for hormonal regulation in PCOS. *Journal of Complementary and Integrative Medicine*, 21(2), 143–150.*