International Journal of Leading Research Publication (IJLRP)

E-ISSN: 2582-8010 ● Website: www.ijlrp.com ● Email: editor@ijlrp.com

The Interplay of Diet and Psychological Stress in the Pathophysiology and Management of Polycystic Ovary Syndrome (PCOD): A Narrative Review

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Abstract

Polycystic ovary syndrome (PCOS), also called polycystic ovarian disease (PCOD), is a common hormonal and metabolic disorder in women of reproductive age. It causes high levels of male hormones (hyperandrogenism), irregular or absent ovulation, and multiple small cysts in the ovaries. Besides affecting fertility, PCOS is often linked to insulin resistance, obesity, abnormal cholesterol levels, and low-grade inflammation, which can increase the risk of long-term problems like type 2 diabetes, heart disease, and infertility. Women with PCOS also commonly experience psychological issues such as depression, anxiety, and stress, which can make both metabolic and reproductive symptoms worse.

Diet and lifestyle are very important in managing PCOS. Research shows that certain diets — such as low-glycaemic index (LGI) diets, Mediterranean-style diets, and anti-inflammatory diets — can improve insulin sensitivity, balance hormones, help with weight management, and improve fertility. Psychological stress can negatively affect the body by disrupting the hypothalamic–pituitary–adrenal (HPA) axis, increasing cortisol levels, and interfering with ovarian function, which can lead to irregular periods and infertility. Stress also encourages unhealthy habits such as poor eating, emotional eating, and less physical activity, making PCOS symptoms worse.

This review summarizes current evidence on how diet and psychological stress affect women with PCOS, explains the biological mechanisms involved, and identifies areas that need more research. Studies suggest that combining healthy diet changes, weight management, and stress-reduction strategies works better than addressing only diet or stress. Such holistic approaches can improve metabolic health, reproductive function, and mental well-being. However, more long-term and well-designed studies are needed to find the best diet plans and stress-management methods specifically for women with PCOS.

Keywords

Polycystic ovary syndrome, PCOS, PCOD, diet, Mediterranean diet, low-glycaemic diet, insulin resistance, psychological stress, mental health, reproductive health, lifestyle intervention, hormonal imbalance, fertility ,ovulation , menstrual cycle .

1.Introduction

Polycystic ovary syndrome (PCOS) is a common hormonal disorder that affects about 8–20% of women of reproductive age worldwide. It can cause a variety of problems, including irregular periods, excess male hormones, and difficulty with ovulation, making it a very diverse condition. PCOS is closely linked to insulin resistance, which can increase male hormone levels, worsen menstrual problems, and raise the risk of infertility. Women with PCOS may also have weight issues, high cholesterol, and higher blood sugar, which can increase the chance of developing type 2 diabetes and heart disease over time. Lifestyle changes, especially healthy eating and regular exercise, are the main treatments for PCOS, as they can improve both metabolic health and reproductive function. At the same time, many women with PCOS experience mental health challenges such as depression, anxiety, and stress. These problems can lower quality of life and make PCOS symptoms worse, creating a cycle that makes managing the condition more difficult.

2. Objectives

1. To summarize clinical evidence on the effects of dietary patterns (LGI, Mediterranean, low-carbohydrate, calorie-restricted) on metabolic and reproductive outcomes in women with PCOS.
2. To review evidence that psychological stress (and associated psychiatric morbidity) affects PCOS symptom severity and reproductive physiology.
3. To present mechanistic links and practical clinical recommendations.

3. Literature Review

3.1 Dietary Interventions in PCOS: A Systematic Review – This review highlights the effectiveness of low-glycaemic index and calorie-restricted diets in improving insulin resistance, menstrual regularity, and reproductive outcomes (Yang et al., 2024).

3.2 Comparative Analysis of Diets in PCOS: Evidence from RCTs – This article evaluates the impact of isocaloric vs. non-isocaloric dietary interventions, showing significant improvements in weight management and hormonal balance (Choi et al., 2025).

3.3 Mediterranean Diet and Lifestyle Interventions in PCOS – This review emphasizes the role of Mediterranean-style diets, combined with lifestyle modification, in reducing inflammation and improving ovulation and metabolic health (Gautam et al., 2025).

3.4 Mental Health Challenges in Women with PCOS: A Review – This article discusses the high prevalence of depression, anxiety, and psychological stress among women with PCOS and their impact on reproductive and metabolic outcomes (Almhmoud et al., 2024).

3.5 Stress, Emotional Eating, and BMI in PCOS – This study establishes a link between psychological distress, emotional eating behaviors, and increased body mass index in women with PCOS (Pesonen et al., 2025).

4. Methodology (Narrative Review Approach)

A comprehensive and targeted literature search was conducted using multiple electronic databases, including PubMed, PubMed Central (PMC), and MEDLINE, as well as recent high-quality narrative and systematic reviews, to identify relevant studies published up to late 2024/early 2025. The search focused on research evaluating the effects of dietary interventions or psychological stress on metabolic, hormonal, and reproductive outcomes in women diagnosed with PCOS. We mainly used randomized controlled trials (RCTs) and high-quality reviews, since they give the strongest and most reliable evidence for clinical decisions. We also included observational and recent laboratory studies to better understand how diet and stress are linked to PCOS. Studies were first checked by title and abstract, and then full articles were read to collect details about study design, participants, interventions, results, and main findings. This method gave a clear and complete summary of current research on how diet and stress affect PCOS, along with the biological reasons behind these effects and their possible use in treatment. Key studies and sources are cited throughout to support the conclusions.

5. Diet and PCOS — Summary of Evidence

5.1 Types of diets studied

- Low glycaemic index/load (LGI/LGL) diets: use carbs that don't raise blood sugar too quickly.
- Mediterranean diet: includes whole grains, fruits, vegetables, legumes, nuts, fish, and olive oil; reduces inflammation and improves heart health.
- Low-carb / moderate-protein diets: reduce carbs, sometimes mixed with Mediterranean diet features.
- Calorie-restricted diets: reduce calories to help with weight loss and insulin sensitivity.

5.2 Clinical results

- RCTs and reviews show LGI and calorie-restricted diets improve insulin resistance, cholesterol, weight, and sometimes menstrual cycles and ovulation.

- Mediterranean and hybrid diets (Med + low-carb) improve weight, hormones, and periods in overweight women.
- Reviews highlight that low GI carbs, more fiber, and healthy fats (MUFA/PUFA instead of saturated fats) improve PCOS-related metabolic health.

5.3 **How diet helps PCOS**

- Insulin pathway: Lower sugar spikes reduce insulin levels, which lowers androgen production in the ovaries.
- Inflammation: Anti-inflammatory diets (like Mediterranean) reduce inflammation and improve ovarian health.
- Weight: Even small weight loss (5–10%) improves ovulation and metabolism.

6. Stress and PCOS — Summary of Evidence

6.1 Prevalence and impact

- Women with PCOS have higher rates of depression, anxiety, and stress compared to others.
- Stress worsens lifestyle habits and creates a cycle of poor health behaviors.

6.2 How stress affects PCOS

- HPA axis: Stress increases cortisol, which disrupts hormones needed for ovulation.
- Behaviours: Stress leads to emotional eating, cravings, poor sleep, and less activity, all of which worsen insulin resistance and weight.
- Inflammation & nerves: Stress increases inflammation and sympathetic activity, making PCOS symptoms worse.

6.3 Stress reduction trials

- CBT, mindfulness, yoga, and combined lifestyle programs improve mental health and sometimes reproductive/metabolic outcomes.

  Larger, high-quality PCOS-specific RCTs are still limited.

7. Diet × Stress Interaction

- Stress leads to poor eating habits and weight gain.

- Healthy diets (Mediterranean, high fiber, low GI) can improve mood and reduce inflammation.
- Combining diet + stress management works better than either alone. Small studies show benefits in both mood and PCOS outcomes.

8. Clinical Recommendations

1. Screening: Check all women with PCOS for depression, anxiety, and stress (tools: PHQ-9, GAD-7, PSS/DASS-21).
2. Diet: Prefer Mediterranean or low GI diets — whole grains, legumes, vegetables, fruits, oily fish, nuts, olive oil. Reduce refined carbs and sugar. For overweight women, aim for 5–10% weight loss. Individualize diet for lean vs. overweight PCOS.
3. Stress management: Offer counselling, CBT, mindfulness, yoga, or refer to mental health services. Support helps patients stick to diet plans.
4. Monitoring: Track blood sugar, insulin resistance, cholesterol, menstrual cycles, ovulation, weight, and mental health.
5. Team-based care: Involve gynecologists, endocrinologists, dietitians, and mental health experts for best results.

9. Limitations and Gaps

- Many trials are small, short (12–24 weeks), and use different diet definitions.
- Need larger and longer RCTs comparing specific diets with stress-reduction approaches.
- Few studies test stress–hormone pathways in humans.
- Limited data on lean PCOS and adolescents.

10. Conclusion

Diet and stress strongly affect PCOS. Evidence supports Mediterranean and low GI diets along with stress management as part of routine care. Combined lifestyle approaches (diet + stress reduction + weight management) look promising but need more high-quality studies.

11. Suggested Study Protocol

- Design: 24-week RCT, 2×2 factorial (Diet: MedDiet vs Healthy Eating; Stress: CBT/mindfulness vs usual care).

- Participants: Women 18–40 with PCOS, BMI 25–40 (include lean as a separate group). Exclude pregnancy and current drug treatment.
- Main outcome: Insulin resistance (HOMA-IR) at 24 weeks.
- Other outcomes: Menstrual regularity, ovulation, testosterone, weight, body fat %, inflammation (CRP), mental health (PHQ-9, GAD-7), quality of life.
- Assessments: 24-hour diet recalls + food frequency questionnaire; Mediterranean diet adherence score. Stress scales: PSS/DASS-21.
- Sample size: About 60 per group to detect a 20% improvement in HOMA-IR.
- Analysis: Intention-to-treat; adjust for baseline; test if stress reduction mediates diet effects.

➢ References

1. Yang et al., 2024: Review of diet interventions in PCOS (calorie-restricted, low-carb) and effects on symptoms and pregnancy.
2. Choi et al., 2025: Review of RCTs testing different diets in PCOS (isocaloric vs non-isocaloric).
3. Gautam et al., 2025: Review of lifestyle interventions (diet, exercise, behavior) on PCOS outcomes.
4. Almhmoud et al., 2024: Review of PCOS and mental health challenges.
5. Pesonen et al., 2025: Study showing higher emotional eating in women with PCOS linked to BMI and distress.
