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The impact of diet and physical activity on the symptoms of polycystic ovary syndrome (PCOS) in young women - A literature review

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ABSTRACT

Polycystic ovary syndrome (PCOS) affects approximately 20% of women of reproductive age, which makes it one of the most common endocrine disorders. This disorder often manifests itself during puberty - irregular cycles, symptoms of hyperandrogenism, and various metabolic abnormalities are typical manifestations. These manifestations not only reduce fertility but also increase the risk of health complications and lower quality of life. More and more evidence shows that lifestyle modification, such as diet adjustments and regular physical activity, should be considered as the first-line treatment for PCOS. This narrative review discusses current data regarding the importance of the role of diet and physical activity in reducing the symptoms of PCOS in young women.

Keywords: PCOS; polycystic ovary syndrome; lifestyle; physical activity; diet

1. INTRODUCTION

Most available studies on polycystic ovary syndrome indicate that weight loss in women achieved through a well-balanced diet and physical exercise, which is performed without interfering with daily activities, increases insulin sensitivity and alleviates the symptoms of PCOS (Butt et al., 2023; Barrea et al., 2023; Stańczak et al., 2024). Nowadays, there are many different diets, such as the Mediterranean, ketogenic, anti-inflammatory, and low-glycemic diets, that are effective in helping to lower androgen levels and restore ovulation and menstrual regularity. Evidence shows that regular physical activity improves insulin sensitivity and benefits metabolic health (Shele et al., 2020; Calcaterra et al., 2024; Dietz De Loos et al., 2022). However, there are factors such as fatigue, eating disorders, and low motivation, which make it significantly more challenging to adhere to lifestyle recommendations (Ee et al., 2021).

2. REVIEW METHODS

We conducted database searches up to 10 October 2025, and the review includes 29 peer-reviewed publications. We searched articles on PubMed and Google Scholar using combinations of terms related to PCOS and lifestyle management (e.g., "polycystic ovary syndrome", "diet", "glycemic index", "Mediterranean", "ketogenic", "physical activity", "aerobic", "resistance training", "adolescent", "young women"). Peer-reviewed systematic reviews and case reports conducted among women of reproductive age were included in the analysis. Studies without peer-reviewed reviews, those with an inadequate population or intervention, incomplete outcome reporting, and those assessed as low quality were excluded. Study selection followed the PRISMA 2020 guidelines (Figure 1). A qualitative narrative synthesis was performed; no meta-analysis was conducted.

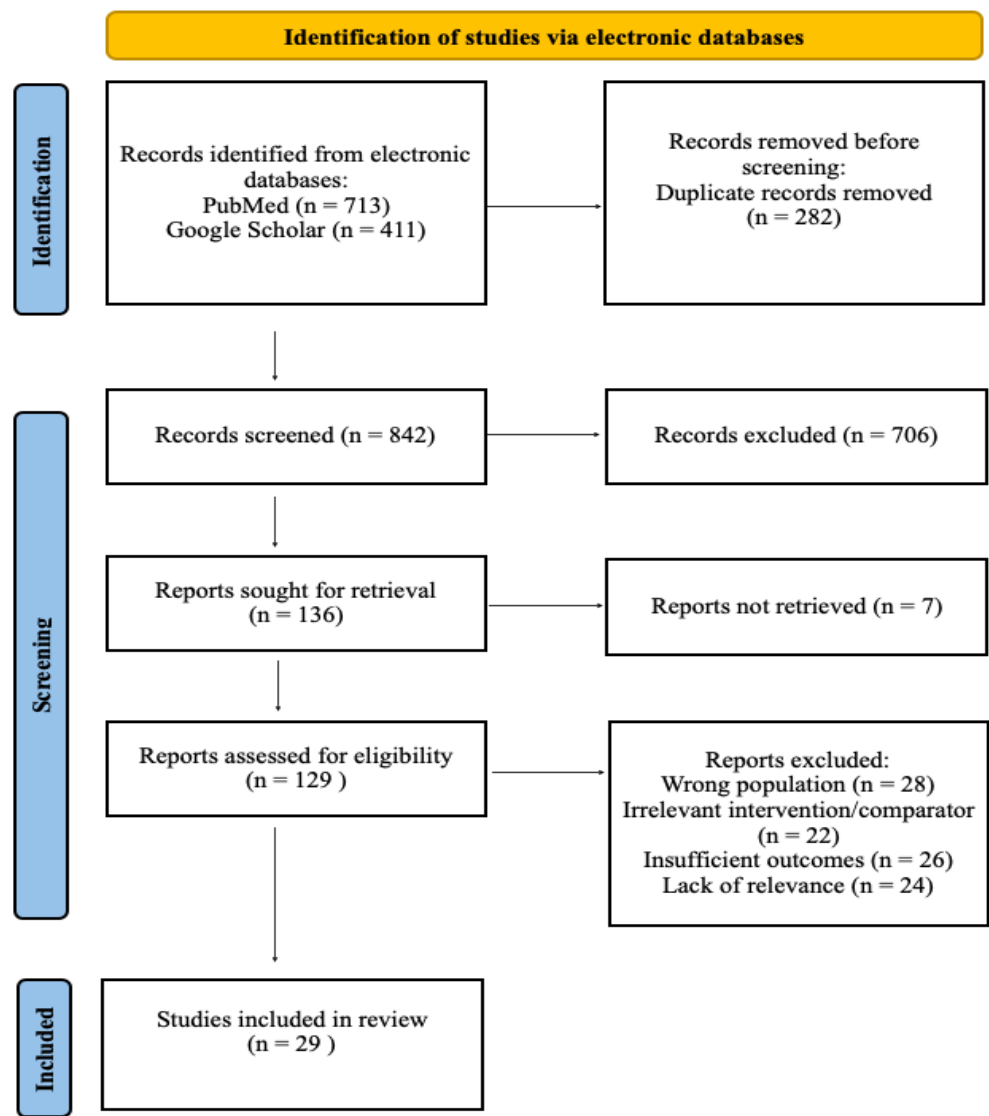


Figure 1. PRISMA flow diagram

3. RESULTS & DISCUSSION

All 29 articles met the inclusion criteria. These publications included systematic reviews, randomized controlled trials, observational studies, and expert recommendations. The research studies found included dietary changes, targeted supplementation, and physical activity. Most findings covered changes occurring during 8 to 24 weeks, but, unfortunately, in only a few studies did the follow-up period last longer than 12 months.

I. Dietary interventions

Low-glycemic index (GI) patterns

A low-glycemic index diet improves menstrual cycle regularity by reducing insulin levels in the body and improving receptor sensitivity to its effects (Kazemi et al., 2022; Jurczewska et al., 2023; Pawelec et al., 2025).

Mediterranean diet (MD)

The diet is rich in unsaturated fats, ber, and polyphenols. Using it is associated with improvements in insulin resistance, lipid proles, and inflammatory markers in PCOS (Szczuko et al., 2021). In one systematic review, there is also information on improving ovulation and reducing blood androgens (Gautam et al., 2025).

Targeted supplementation

Myo- and D-chiro-inositol may support the proper functioning of the ovaries, inuence ovulation, and increase insulin sensitivity (Arentz et al., 2017; Sabag et al., 2024). Vitamin D, as one of the factors, supports the development of ovarian follicles and regulates the level of androgens in the body, while omega- 3 fatty acids have anti-inflammatory properties and improve lipid regulation (Lin & Lujan, 2014; Dietz De Loos et al., 2022; Lim et al., 2019). In some articles, the authors reported positive results in patients who combined dietary changes with targeted supplementation (Shang et al., 2020).

Chrononutrition / time-restricted eating (TRE) and macronutrient personalization

Clinical studies have shown that lean women who increased their calorie intake in the morning at breakfast and simultaneously reduced their calorie intake in the evening experienced improved insulin response (Ee et al., 2021). An additional benefit was the increased protein intake, which influences hormonal regulation in women, including lower androgen levels.

Ketogenic/Very Low-Calorie Ketogenic Diet (VLCKD) approaches

When properly implemented, the Very Low-Calorie Ketogenic Diet (VLCKD) reduces BMI and waist circumference, improves insulin receptor sensitivity, and balances androgen levels (Patten et al., 2020). There are still reasonable doubts regarding the long-term adherence to this diet and its safety, particularly among adolescents and young adults (Peña et al., 2020). In a randomized trial comparing a VLCD with a moderate-energy-decit diet, the VLCD group achieved greater weight loss and more beneficial hormonal shifts (lower free androgen index, higher SHBG) (Shang et al., 2020) (Table 1).

Table 1. Summary of dietary strategies, clinical outcomes, and adherence issues

Dietary strategy	Key clinical effects (PCOS)
Low-GI diet	↑ insulin sensitivity ↑ regularity of the menstrual cycle ↓ insulin level
Mediterranean diet	↑ lipid levels ↑ chance of ovulation ↓ inflammatory factors ↓ androgen levels
Ketogenic diet	↑ insulin sensitivity ↓ BMI/waist ↓ androgen levels
Targeted supplementation (inositol, Vitamin D, omega-3)	↑ insulin sensitivity ↑ chance of ovulation ↓ inflammatory factors

	↓ androgen levels
Chrononutrition / time-restricted eating	↑ insulin sensitivity ↓ androgen levels
Higher-protein diet	↓ androgen levels ↓ BMI

II. Physical activity

Aerobic training

Many scientific studies indicate that aerobic exercise helps reduce insulin resistance and stabilize androgen levels. Especially adolescents and young adults who start doing exercises such as swimming, running, and cycling have fewer symptoms of polycystic ovary syndrome, improve test results, and feel better (Calcaterra et al., 2024; Gu et al., 2022; Gautam et al., 2025; Dietz De Loos et al., 2022; Arentz et al., 2017). In a systematic review, Shele et al. reported that even a small amount per week (≈90–120 min/week) influenced LH secretion and menstrual cyclicity (Shele et al., 2020).

Resistance training

Resistance training increases lean body mass, often without weight loss, improves glucose clearance, and favorably alters body composition (Lin et al., 2019). The best way to improve patients' health is to combine strength exercises with dietary changes, which help lower insulin levels and the HOMA-IR index (Butt et al., 2023).

Combing training

The most significant health benefits for women were achieved by combining aerobic and strength training. These include improved insulin receptor sensitivity and lipid profiles, as well as the return of spontaneous ovulation in a significant proportion of participants. These included enhanced insulin receptor sensitivity and lipid profile, and the return of spontaneous ovulation in a considerable proportion of participants. Studies have indicated that significant changes in body composition that affect a woman's hormonal system do not necessarily translate into significant weight loss (Shang et al., 2020; Cowan et al., 2023; Gautam et al., 2025), (Table 2).

Table 2. Physical Activity Strategies, Clinical Effects, and Implementation Notes

Physical activity strategy	Key clinical effects (PCOS)
Aerobic training (moderate intensity)	↑ insulin sensitivity ↑ regularity of the menstrual cycle ↓ insulin level ↓ androgen levels
Resistance training	↑ lean mass ↑ glucose disposal ↓ fasting insulin ↓ HOMA-IR
Combined aerobic + resistance	↑ chance of ovulation ↓ BMI
Group-based / supervised formats	↑ mood ↑ motivation
Behavioral supports (MI, self-monitoring)	↑ engagement ↑ long-term adherence

III. Psychological outcomes

PCOS patients often struggle with the psychological symptoms of this condition, which manifest as depression, anxiety, and low self-esteem. Participation in group sports activities by women is associated with fewer depressive symptoms and increased motivation (Pawelec et al., 2025; Lim et al., 2019; Kazemi et al., 2022).

Adherence and implementation of new solutions

Women with PCOS seem to have many barriers, such as tiredness, time limit, low motivation, irregular routines, emotional eating, and body-image concerns. Additionally, there is misinformation, limited individualized guidance, and unsupportive environments (Shele et al., 2020; Sabag et al., 2024; Lin et al., 2021; Barrea et al., 2023; Patten et al., 2020; Herbert et al., 2023). Women with PCOS seem to tend to be less physically active than their peers, which leads to greater metabolic and psychological burden.

Synthesis of main findings

Evidence shows that a change of diet (low glycemic index, Mediterranean diet, Very Low-Calorie Ketogenic Diet) with the use of appropriate supplementation, and medium intensity physical activity (aerobic, resistance, combined) leads to meaningful metabolic and endocrine benefits, with potential effects on reproductive function and psychological well-being, in young women with PCOS. What is essential is that there are some improvements independent of significant weight loss, underscoring the meaning of glycemic control, body-composition shifts, and cardiorespiratory/neuromuscular adaptations.

Mechanisms and clinical relevance

Lower postprandial glucose and insulin levels after a meal cause theca cells to produce fewer androgens, helping normalize GnRH/LH rhythms. Diets that affect anti-inflammatory pathways (such as the Mediterranean diet, rich in omega-3 fatty acids) may reduce cytokine activity, thereby decreasing insulin resistance. Additionally, resistance training increases GLUT4 translocation and skeletal muscle oxidative capacity. Clinical markers can improve when patients follow nutrition and activity plans around everyday life habits - their culture, cooking skills, daily routines, and symptoms such as fatigue or low mood.

It is crucial to select goals focused on increased energy, better mood, improved focus, and healthy skin, rather than weight loss, especially for adolescents. PCOS patients would benefit significantly from counselling that includes simple, standardised meals and relatively short exercise sessions that young people can participate in between classes, studies, and other commitments.

Implementation: barriers and enablers

To be sustainable and effective, daily habit change requires:

- 1) Flexibility in diet and training (simple, time-saving meal preparation, short training sessions that can be completed at any time);
- 2) Continuous development (giving the patient goals to achieve in a shorter timeframe, quick help with problem-solving, and gradual progress;
- 3) Social support (groups, friends, family, all of low-stigma spaces), Techniques that influence behavior (motivational podcasts, everyday intentions, new habits, self-monitoring by devices or apps);
- 4) Safety screening (to prevent the risk of eating disorders; to monitor vitamin D and iron levels).

Strengths and limitations of the evidence

Strengths include numerous randomized controlled trials and systematic reviews, which are increasingly common. Limitations include a lack of clear diagnostic criteria and treatment outcomes, limited long-term follow-up, and inconsistent application of recommendations. Care should prioritize making treatment decisions with the patient and individualized treatment.

Conclusions for practice

Interdisciplinary teams (dietitian, physiotherapist or trainer, psychologist, physician) should:

- 1) Identify difficulties such as time, stigma, and current mood;
- 2) Set small goals based on the adequate amount of training needed, like 90-120 minutes/week of aerobic as a starting target;
- 3) Use the progress monitoring feature - applications;
- 4) Prepare a backup training plan adapted to be done at home.

4. CONCLUSION

Polycystic ovary syndrome (PCOS) is a gynecological endocrinology disease that is very common in women of reproductive age, and its symptoms affect the entire body. Its vast influence, including reproductive and metabolic disorders and also psychological and social challenges, requires extensive, multidisciplinary treatment. Lifestyle modifications, including diet and training, are evidence-based strategies that can improve short- and long-term outcomes.

From this review, a low-glycemic index, Mediterranean, or ketogenic diet, when combined with appropriate supplementation, can help regulate insulin metabolism in a woman with PCOS, maintain hormonal balance, and support regular menstrual cycles. Regular physical activity, especially programs that combine aerobic and resistance training, leads to meaningful benefits for body composition, metabolic health, and emotional well-being.

However, following these strategies in everyday life is not easy. Adolescents with PCOS often have difficulties starting and maintaining new habits with diet and physical activity. Most common challenges include low motivation, limited time, and poor support from loved ones. All of these factors make it difficult to achieve lasting lifestyle changes. There is also no age-appropriate counseling, and the limited evidence base for adolescents further contributes to inconsistent care and unmet needs. Using all this information in everyday medical practice and treatment means using flexible, practical plans that evolve with continuous education and psychological support. Interdisciplinary teamwork and communication centered on a patient are essential to help women make informed decisions and sustain meaningful, long-lasting changes. Combining diet and exercise in the treatment of PCOS can significantly improve health and overall quality of life.

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Informed consent

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Ethical approval

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Conflict of interest

The authors declare that they have no conflicts of interest, competing financial interests or personal relationships that could have influenced the work reported in this paper.

Data and materials availability

All data associated with this study will be available based on reasonable request to the Corresponding Author.

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