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Lifestyle Management in Polycystic Ovary Syndrome: Diet, Exercise, Supplementation, Sleep, and Mental Health

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ABSTRACT

Polycystic ovary syndrome (PCOS) is a common hormonal condition in women of reproductive age. PCOS affects reproduction, metabolism, and hormone levels. The exact cause of PCOS is still unclear. It is a complex disorder that affects several body systems, such as the endocrine, metabolic, and reproductive systems. Lifestyle changes are often the first treatment for PCOS, but they do not replace medication when it is needed. These changes include diet, exercise, and supplements. Researchers suggest several dietary approaches for women with PCOS. These focus on controlling weight, controlling calorie intake, and lowering inflammation. The goal is to boost insulin sensitivity and reduce symptoms of the disorder. Physical activity has an essential role in the management of PCOS. It improves insulin resistance, cholesterol levels, and body composition. Regular exercise also helps people control their weight. It also reduces inflammation. All of these contributors can improve overall health. Supplements such as inositol, vitamin D, and omega-3 fatty acids may also offer additional benefits. This review looks at the latest evidence on how diet, exercise, and supplements affect PCOS. Combining and tailoring these lifestyle changes seems to work best.

Keywords: PCOS, polycystic ovary syndrome, diet, exercise, physical activity, supplementation, sleep, mental health.

1. INTRODUCTION

PCOS is a disease that affects many women. It is often diagnosed in the reproductive age. It affects endocrine system but also is a cause of metabolic problems (Joshi, 2024; El Hayek et al., 2016). We do not know the exact etiology of PCOS. PCOS has multiple causes. These include genetic factors, hormonal changes, metabolic changes, and environmental factors. All of these contribute to the development of PCOS (Siddiqui et al., 2022; Shaaban et al., 2019). PCOS has variety of conditions. PCOS shows high androgen levels. PCOS causes problems with ovulation. Ultrasound often shows polycystic ovaries. According to the Rotterdam

criteria, at least two of these three features must be present to make a diagnosis (Christ and Cedars, 2023; Armanini et al., 2022).

PCOS has different forms, or phenotypes. Patients can present many combinations of symptoms and metabolic issues. It makes diagnosis and treatment more difficult (Joshi, 2024; El Hayek et al., 2016). Clinicians usually group PCOS into four main phenotypes, A to D. Phenotype A includes high androgen levels. It also includes ovulation problems. It also includes polycystic ovaries. Phenotype B has high androgen levels and ovulation problems but no polycystic ovaries. Phenotype C includes high androgen levels and polycystic ovaries with normal ovulation. Phenotype D has ovulation problems and polycystic ovaries without high androgen levels. These types have different metabolic risks. It can affect how well lifestyle changes work. Knowing these phenotypes helps customize diet and exercise plans for each patient (Lizneva et al., 2016).

Insulin resistance is a major factor in the development of PCOS. It leads to higher androgen levels and makes symptoms worse. Ongoing low-level inflammation may help to the progression of the disease (Szczyko et al., 2021; Joshi, 2024). We do not know the cure for PCOS. Doctors advise lifestyle modification to their patients as a first step in treatment. Patient should try to improve their diet, increase physical activity and regulate weight. These steps are essential, because they can reduce symptoms and support metabolic and reproductive health (Gautam et al., 2025; Cowan et al., 2023). Weight loss and regular exercise are very important in PCOS. Even a small reduction in body weight can reduce symptoms. It can improve ovulation, which makes menstrual periods more regular. It can also increase the chance of pregnancy.

Regular physical activity helps the body use insulin better. It also improves body composition and can lower cholesterol levels. (Gautam et al., 2025; Szczyko et al., 2021). Recently, there has been more focus on diet plans and supplements. These methods may help improve metabolic health, lower inflammation, and reduce symptom severity (Günelan et al., 2018). This review intends to summarize current evidence on how diet, physical activity, and supplements help manage PCOS. It also offers guidance for building personalized lifestyle plans.

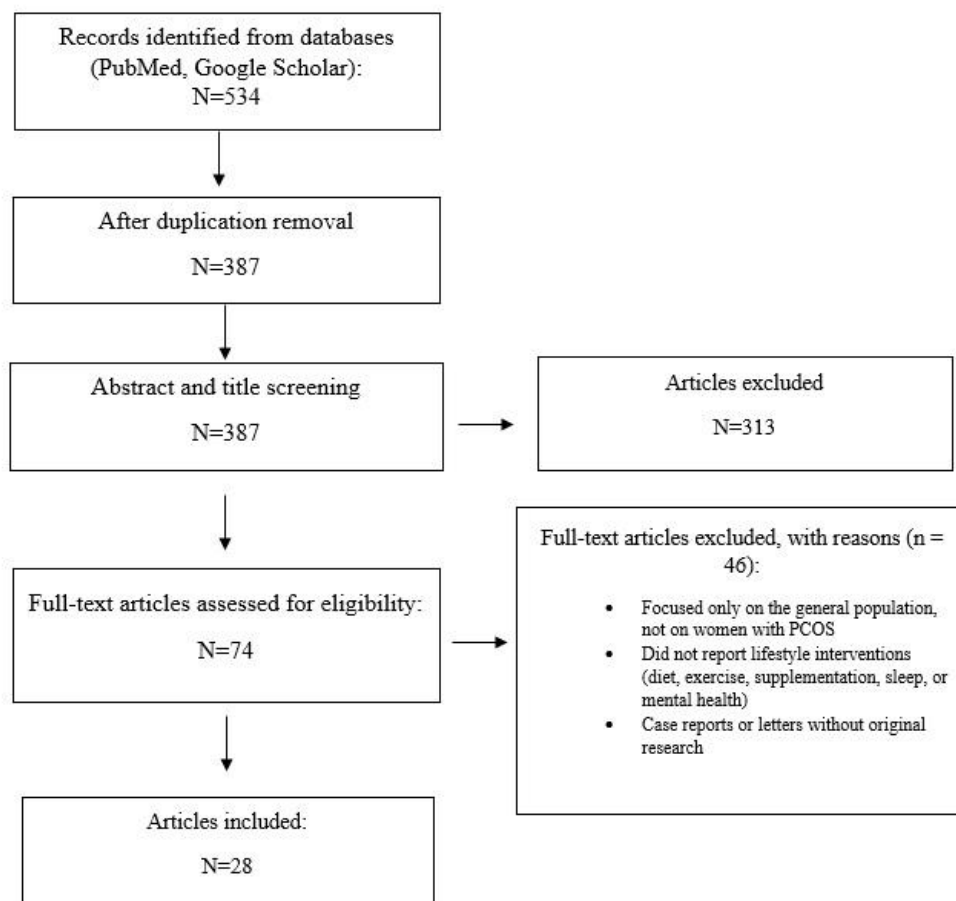


Figure 1. Prisma chart illustrating the selection process.

2. REVIEW METHODS

We searched PubMed for articles published between January 2015 and February 2026. We focused on polycystic ovary syndrome (PCOS). The study focused on lifestyle interventions. It also focused on diet, physical activity, supplementation, sleep and mental health. We used following keywords in different combinations: PCOS, polycystic ovary syndrome, diet, exercise, physical activity, supplementation, sleep, mental health.

We included a total of 28 records in the final analysis. We excluded studies that focused only on the general population or did not report clinical, metabolic, or hormonal outcomes. We screened titles and abstracts to identify relevant studies. We included clinical trials. We also included systematic reviews and narrative reviews. These studies focused on PCOS. They reported lifestyle outcomes or metabolic outcomes. The selection process is shown in Figure 1.

3. RESULTS AND DISCUSSION

Pathophysiology

PCOS has a complex cause that is not fully understood. Insulin resistance is important in many patients. High insulin levels increase male hormone production in the ovaries and make hormone imbalance worse. It causes symptoms like irregular periods, no ovulation, and high male hormone levels. Long-lasting mild inflammation and inherited factors may also help cause the disorder. These factors work together and affect both metabolism and reproductive health in PCOS.

The role of diet in PCOS

Diet modification is a part of lifestyle modifications essential in PCOS. There are many different diet modifications for patients with PCOS. It is important to find the best one to reduce symptoms and improve overall health. One diet used to manage PCOS is a low-glycemic-index diet. It helps control blood sugar levels after meals and lowers insulin response (Gu et al., 2022). It is especially important for patients with insulin resistance. This diet improves how the body uses insulin and lowers high insulin levels. As a result, it may reduce male hormone production and improve hormone balance.

Studies show that this diet can improve fasting insulin levels, insulin resistance, cholesterol levels, and waist circumference. It may also help people manage their weight because it reduces hunger and calorie intake. This diet can also improve reproductive health. It can make menstrual periods more regular and support ovulation. Better insulin control and lower male hormone levels may explain these benefits. Guidelines recommend foods with a low glycemic index, especially high-fiber foods for patients with high insulin levels.

We studied also other diets. Low-carbohydrate and ketogenic diets reduce carbohydrate intake and lower insulin levels. It may help improve body weight, insulin resistance, and male hormone levels. The ketogenic diet is a very low-carbohydrate and high-fat dietary approach. It promotes fat metabolism and significantly lowers insulin levels, which may benefit women with PCOS. Studies show that it may improve body weight, insulin resistance, and glucose metabolism. It may also reduce androgen levels and improve hormonal balance (Fleigle et al., 2025). These benefits can also improve menstrual cycle regularity and support ovulation, but more studies are needed to check the safety and long-term effectiveness (Barrea et al., 2023).

Some studies suggest that this diet may improve menstrual cycle regularity and support ovulation. However, most studies include only a small number of patients and have a short follow-up period. This diet may help some patients, especially those with obesity and insulin resistance. However, many people find it difficult to follow for a long time. More studies should examine its safety and long-term effectiveness (Barrea et al., 2023). The Mediterranean diet includes whole foods, healthy fats, and foods that are high in fiber. It can improve metabolic health and reduce inflammation. It may also support hormone balance and improve overall health in women with PCOS (Mei et al., 2022; Di Lorenzo et al., 2023).

In overweight patients, it is important to make a caloric restriction. It can make menstruation regular and reduce symptoms. Doctors should remember that every patient is different and can benefit from another diet. Doctors and dieticians should work together and make an individualized dietary plan (Zhang et al., 2025).

The role of physical activity in PCOS

Routine physical exercise is an important part of PCOS management. It has a positive effect on both metabolic and hormonal function. Exercise helps the body use insulin better and lowers insulin resistance. It lowers fasting insulin levels. It improves insulin resistance measures. These changes are important for managing PCOS. Physical movement also improves cholesterol levels. It can lower total

cholesterol. It can lower low-density lipoprotein (LDL). It can also lower triglycerides. It may also raise good cholesterol- high-density lipoprotein (HDL). These effects help reduce heart disease risk in women with PCOS.

Regular exercise has many benefits. It improves body composition and reduces body weight. Doctors often measure body mass index and waist circumference to assess metabolic risk. These parameters can be improved by regular physical activity. It is essential for a patient to find the type of exercise that she enjoys. Although different types of exercise have other benefits, all of them support metabolic health. It can improve hormonal balance and make ovulation and periods regular (Atmaca et al., 2026).

However, not all patients respond in the same way. The effects of exercise depend on baseline weight, insulin resistance, together with adherence. Maintaining consistent physical exercise over time is a challenge for many patients (Patten et al., 2020).

The role of supplementation in PCOS

Several supplements may help women with PCOS. They may improve metabolism. They may improve hormone balance. They may reduce inflammation. Inositol is one of the most studied supplements. Myo-inositol and D-chiro-inositol help insulin work better and increase insulin sensitivity. Inositol lowers fasting insulin levels and may help bring back regular periods and with ovulation. It can also improve cholesterol levels by lowering total cholesterol and triglycerides.

Vitamin D deficiency is common in women with PCOS. Taking vitamin D may improve how the body handles insulin and reduces inflammation. It may also lower total testosterone levels and help ovulation. anti inflammatory effects and may improve lipid profile in PCOS by reducing LDL cholesterol and increasing HDL cholesterol. Omega 3 may also help reduce insulin resistance and inflammation. Probiotics, prebiotics, and symbiotic can change gut bacteria and improve metabolism in women with PCOS. These supplements may lower fasting blood sugar and insulin levels, increase insulin sensitivity, and reduce signs of inflammation.

Patient with PCOS who have lower levels of minerals such as zinc and magnesium can benefit from their supplementation. They can help reduce insulin resistance and inflammation (Zhang et al., 2026). Carnitine is another supplement that may have a role in PCOS management. It may support weight control and improve metabolic parameters, including BMI and lipid metabolism (Zhang et al., 2025a). Selenium and B vitamins, may also be useful. Selenium protects cells from oxidative stress. Folic acid and vitamin B12 may support metabolic health and help reduce inflammation (Zhang et al., 2026).

There are many supplements that can support some aspects of PCOS. Doctors should check the levels of vitamins and other nutrients if it is possible and choose the right supplementation. The effects are not the same in all patients. We need more studies to define useful supplements and the right doses (Günalan et al., 2018; Stańczyk et al., 2024; Zhang et al., 2025b).

The role of sleep in PCOS

Regular and proper sleep is essential for women with PCOS. It improves glucose metabolism and lowers stress hormone levels (Siddiqui et al., 2022; Szczuko et al., 2021). Patients should know that short or low-quality sleep can increase inflammation and dysregulate hormonal balance (Gautam et al., 2025; Szczuko et al., 2021).

Mental health in PCOS

Women with PCOS often feel stressed and anxious. They can also get depressed. These feelings can make the metabolic problems that women with PCOS have even worse. Women with PCOS need help dealing with stress and bad feelings (Siddiqui et al., 2022). They might need to talk to a counselor to feel better. If women with PCOS take care of their health, they can make lifestyle changes that will help them feel better. Doctors should check on the health of women with PCOS regularly as part of their overall PCOS care. Women with PCOS need to take care of their mental health (Gautam et al., 2025; Szczuko et al., 2021). Table 1 shows a summary of main lifestyle interventions in PCOS.

Table 1. Summary of lifestyle interventions in PCOS

Intervention	Main effects	Key outcomes	References
Low glycemic index diet	Improves insulin sensitivity	↓ insulin, ↓ HOMA-IR, improved cycle	Kazemi et al., 2021; Capozzi et al., 2025; Saadati et al., 2021
Ketogenic/low-carb diet	Reduces insulin and body weight	↓ BMI, ↓ glucose, ↓ androgens	Fleigle et al., 2025; Barrea et al., 2023

Mediterranean diet	Anti-inflammatory effect	Improved lipid profile, ↓ inflammation	Mei et al., 2022
Physical activity	Improves metabolism and hormones	↓ insulin, ↓ testosterone, and better body composition	Patten et al., 2020; Atmaca et al., 2026
Inositol	Improves insulin signaling	↓ insulin, improved ovulation	Fitz et al., 2024
Vitamin D	Supports hormonal balance	↓ testosterone, improved insulin	Morgante et al., 2022
Omega-3	Anti-inflammatory	Improved lipid profile	Günalan et al., 2018
Probiotics	Gut microbiota modulation	↓ inflammation, ↓ insulin	Günalan et al., 2018
Sleep	Regulates metabolism	↓ insulin resistance, ↓ stress	Szczuko et al., 2021
Mental health support	Improves adherence	↓ stress, better outcomes	Gautam et al., 2025

4. CONCLUSION

PCOS is a complex disorder that affects hormones, metabolism, and reproductive health. Managing it usually depends on lifestyle changes. Changing diet, being more active, and using supplements can help increase insulin sensitivity, balance hormones, and promote metabolic health. Good sleep and psychological support can also reduce stress and increase overall health. People react differently to the same methods, so treatment should be individual. More research is needed to check long-term effects as well as how combining lifestyle changes may help.

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All authors contributed equally to the manuscript.

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 the reasonable request to corresponding author.

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