



## NUTRITIONAL SUPPORT & DIETARY INTERVENTIONS FOR WOMEN WITH POLYCYSTIC OVARY SYNDROME: CASE REPRESENTATION

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**Abstract:** Polycystic ovary syndrome (PCOS) is a common thyroid disorder that causes reproductive, metabolic, and hormonal irregularities in women of reproductive age. The most common PCOS-related complications are hyperinsulinemia, insulin resistance, androgen excess, ovulatory dysfunction, polycystic ovaries, gonadotropin abnormalities, obesity, adipose tissue dysfunction, difficulty conceiving, and high-risk pregnancy. The purpose of this review was to explain and evaluate the effects of dietary interventions on PCOS-related outcomes and to include some evidence-based nutritional advice for clinical practice. For PCOS, there is no ideal diet or macronutrient composition. However, lifestyle changes, such as a small-to-moderate weight loss of 5–10% (combined diet with regular exercise) with any diet plan of choice, depending on the individuals' preferences, culture, habits, and metabolic needs, are recommended. (i.e., The Mediterranean diet, Dietary Methods to Prevent Hypertension [DASH] diet, or relatively low diets [30–45 percent of energy]), as well as alternative dietary interventions such as small, frequent meal consumption (five to six meals daily) at regular times, with the majority of carbohydrates consumed at lunchtime or evenly spread throughout the day, appears to offer the evidence-based first-line strategy for the management of PCOS symptoms and insulin resistance. At such a time, no conclusions can be drawn about high protein diets, polyunsaturated fatty acids, or micronutrient supplementation.

**Keywords:** Polycystic ovary syndrome, insulin resistance, hyperinsulinemia, gonadotropin.

### 1. INTRODUCTION:

Polycystic ovary syndrome (PCOS) is a complicated and common endocrine-metabolic disorder of unknown aetiology that affects 5–20% of women of reproductive age worldwide according to different diagnostic criteria. Women with PCOS often present with clinical or biochemical hyperandrogenism, oligoanovulation, and/or polycystic ovarian morphology, and these patients may present to clinicians with a variety of manifestations, including infertility, hirsutism, acne, insulin resistance (IR), and dyslipidaemia, among others. As a result of the life-long pathological state of PCOS, patients with PCOS are at increased risk of obesity, metabolic dysfunction, vascular dysfunction, malignancy, reproductive complications, and mood disorders.

Internationally, most studies indicate that women with and without PCOS have different baseline dietary intakes; the former with a higher intake of calories and saturated fat and inadequate fiber consumption. Clinical symptoms and the compounded risk of chronic disease in patients with PCOS may be exacerbated by these alterations in diet. In addition, the diet of women of childbearing age with PCOS demonstrated that metabolic disorders related to improper ovarian function are due to unhealthy diets in women with PCOS. PCOS is associated with dietetic abnormalities: a poor diet high in fat, sugar, and grease can damage the spleen and stomach, leading to spleen wet-sheng and phlegm within the knot, followed by blood stagnation and dampness (accumulation in the ovaries and uterus), which can be the result of oligo-ovulation. Epidemiological studies and numerous large clinical trials have identified long-term, moderate chronic inflammation in PCOS, as well as potential anti-inflammatory and pro-inflammatory dietary components associated with PCOS pathogenesis. A poor diet is one of the "deadly quartet" of the metabolic risks related with PCOS pathophysiology, along with obesity and diabetes. Low-grade inflammation, hyperinsulinemia, and hyperandrogenism. Eating disorders are becoming more common in PCOS and recommended that all women diagnosed with PCOS need to be regularly screened at the time of diagnosis. According to the newly published international evidence-based guidelines for the assessment and management of PCOS, All women with PCOS should adhere to general healthy eating principles throughout their lives, but for women with the PCOS who are overweight or obese, a variety of balanced dietary approaches can be recommended to reduce dietary energy intake and induce weight loss.



Researchers are committed to finding a diet that may aid in the prevention and treatment of PCOS. This review aimed to summarize the potential mechanisms, advantages, limitations, and currently available evidence for dietary interventions as a treatment for PCOS.

**2. CASE REPRESENTATION:** A regular patient comes to the pharmacy with her daughter, Rashmika, who is aged 20 years and is experiencing long and painful periods, as well as mild acne.

### Advice and recommendations

Rashmika should be advised to record the regularity and duration of her periods, as well as description of pain. She is feeling more tired than normal; this could possibly indicate anaemia.

I explained that mild acne is normal owing to hormonal changes, but it is important to follow a healthy lifestyle, as well as avoiding picking spots to help maintain good skincare.

Rashmika's mother was advised to give her 500mg of paracetamol for four times daily and 200–400mg of ibuprofen, as advised in the summary of product characteristics, to control her period pain. If she takes both analgesics and even then symptoms persist, she should see a doctor for further evaluation.

### 3. DIETARY PATTERNS & PCOS:

#### Mediterranean Diet

The Mediterranean diet is recognized as the healthiest dietary model and has been included in international guidelines among recommended healthy dietary patterns because of its unique characteristics, including regular consumption of unsaturated fat, fiber, low-glycemic index (low-GI) carbohydrates, antioxidants, and vitamins, as well as appropriate amounts of animal-derived protein. Various studies over several decades have said that the adoption of the MedDiet pattern can prevent against IR-related diseases, such as obesity, cardiovascular disease, type 2 diabetes (T2D), nonalcoholic fatty liver disease (NAFLD), cognitive impairment, breast cancer, and chronic kidney disease. The MedDiet's beneficial mechanisms include reduced inflammatory and oxidative stress markers, improved lipid profiles, insulin sensitivity, endothelial function, and antiatherosclerotic and antithrombotic properties. Furthermore, the MedDiet pattern is regarded as the primary preventive measure for metabolic syndrome (MetS). In consideration of the tight relationship between PCOS and obesity, low-grade chronic inflammation and IR, it appears likely that the MedDiet is one of the optimal nonpharmacological strategies for the treatment of PCOS.

#### Ketogenic Diet

The ketogenic diet (KD), or keto diet, is a high-fat and low-carbohydrate diet that encourages forgoing nearly all carbohydrates, consuming high levels of fat (generally exceeding 70% of calories consumed), and avoiding excess protein, resulting in high production of ketones (principally acetoacetate and  $\beta$ -hydroxybutyrate) and nutritional ketosis. The KD is known for its antiepileptic effects in the treatment of refractory epilepsy. KD has also been proposed as an effective treatment for other neurological disorders, including Alzheimer's disease, Parkinson's disease, and autism.

#### Dietary Approaches to Stop Hypertension

The Dietary Approach to Stop Hypertension (DASH) dietary pattern, a low-GI and low energy-dense diet, was basically designed for lowering blood pressure and emphasizes fruits, vegetables, whole grains, nuts, legumes, and fat-free/low-fat dairy products while recommending low consumption of saturated fats, cholesterol, red and processed meats, refined grains, and sweets. This diet increases consumption of dietary fibre, folic acid, phytoestrogens, potassium, magnesium, and other beneficial nutrients. The DASH diet, in particular, includes 4 to 5 servings of vegetables and fruits per day, 3 servings of low-fat dairy products per day, 6 to 8 servings of the whole type of grains per day, and less than the 6 servings of poultry, meat and fish per day. It also recommends 4 to 5 servings of nuts, seeds, and beans in a week, as well as foods that are high in potassium and fibre, low in saturated fat, and low in sodium. Although DASH was previously suggested as beneficial nutrition for people with hypertension, its beneficial effects have also been reported in IR., increased inflammation, obesity, T2D, gestational diabetes mellitus, MetS, NAFLD, and cardiovascular disease. International diabetes and heart association guidelines of recommending the DASH dietary pattern.



The DASH diet contains a higher number of antioxidants, magnesium, and fibre than other low-GI diets, which might further influence the abnormal metabolic profile and IR in women with PCOS.

### **Dietary carbohydrates and PCOS**

The "low-carbohydrate diet" is defined explicitly as having <20% carbohydrates (equivalent to 20–60 g carbohydrates/day).

Carbohydrate dispersion may be an important factor in glucose metabolism and IR. One study found that in people with type 2 diabetes, eating the majority of carbohydrates (50 percent) at lunch resulted in the lowest postprandial glucose spikes and improved glycemic control when compared to eating the majority of carbohydrates at breakfast, dinner, or spread equally throughout the day.<sup>93</sup> Moreover, another study showed that consuming the high-carbohydrate valued breakfast (>45% of energy from carbohydrates) would show detrimental effects in people with impaired glucose regulation and it should be avoided.

In conclusion, there is no optimal amount of carbohydrate intake for females, so any range of dietary carbohydrates can be used, depending on the individual's dietary assessment, metabolic goals, dietary habits, and priorities. However, it could be beneficial to consume the most of of carbohydrates at lunchtime, with the second-best option, i.e., their equal distribution in meals all through the day, and to avoid a high-carbohydrate breakfast.

### **Low-GI Diets and PCOS**

Low-GI diets are defined as those that obtain most carbohydrates from low-GI sources. Foods having carbohydrates that are digested, absorbed, and metabolized slowly are regarded as low-GI foods. Higher postprandial glycemia increases the risk of chronic lifestyle-related diseases, which is a universal mechanism for disease progression, and carbohydrates are the main dietary component affecting insulin secretion and postprandial glycemia. Therefore, glycaemic index (GI) is widely recognized to have clinical and public health significance because higher blood glucose concentrations and a greater demand for insulin have been produced by the same amount of carbohydrate; nevertheless, high glycaemic index (high-GI) diets may directly increase IR through their effect on glycemia, free fatty acids, and counterregulatory hormone secretion, which suggests that the GI of contributing carbohydrate foods is important irrespective of the level of carbohydrate intake. A study indicates that low-GI diets aid in glycaemic control, lipid profile control, and weight loss. They are also recommended in the primary prevention of MetS and can reduce the risk of chronic diseases, such as T2D and coronary heart disease.

### **Dietary protein and PCOS**

Pulses (e.g., lentils, chickpeas, split peas, and dry beans) are high in fiber and low in fat, contain high-quality protein and complex carbohydrates with a low GI, and are a significant source of vitamins and minerals, like iron, zinc, folate, calcium, magnesium, and potassium. Pulses, alone or as part of low-GI or high-fiber diets, improve markers of longer-term glycaemic control in humans. Dietary protein improves or maintains insulin sensitivity and prevents or reduces IR. Pulse consumption has been shown to improve cardiometabolic disease risk factors in women with PCOS. However, it is even more noteworthy that the phytochemicals, saponins, and tannins found in pulses have significant anticancer effects; in addition, adequate folate intake could reduce the risk of endometrial carcinoma. Thus, the possible positive effects of a pulse-based diet in women with PCOS are worth further study.

### **Dietary fat and PCOS**

Relatively low carbohydrate, high-fat diets are said to lower fasting insulin and AUC for insulin while increasing insulin sensitivity in PCOS women. In one study, A high-fat, moderately low-carbohydrate eucaloric diet greatly reduces the body fat, intra-abdominal adipose tissue, subcutaneous abdominal adipose tissue and intermuscular adipose tissue more effectively. A short-term, crossover study found that a moderate amount of carbohydrate (43%) and highly unsaturated fatty acid (monounsaturated fatty acids, MUFA: 18%; polyunsaturated fatty acids, PUFA: 17%) diet resulted in a greater decrease of insulin concentrations in fasting and the acute insulin to glucose response when compared to the control diet.

### **Meal frequency, meal timing and PCOS**

Meal occurrence and meal consumptions timing appear to be important components of changing lifestyles, despite the fact that data on women with PCOS is limited. Some argue that eating frequently is harmful to body composition and glycemic control indices because it can lead to weight gain, which is because of increased lipogenesis or fat deposition after meals or simply by increasing overall energy intake. Furthermore, its been suggested that the increased meal frequency may increase postprandial glucose, insulin, IR, and blood lipids while decreasing the fatty acid composition of serum phospholipids. In contradiction to the other perspective, many argue that increasing meal



frequency may have a beneficial effect on body weight and glycemic control indices due to nutrient load spreading, resulting in lower postprandial insulin concentration levels, lowered hunger, the inhibition effect of free fatty acids on glucose uptake suppression, and increased glucose clearance from circulation with significant savings in insulin secretion.

### Vitamin D and PCOS

Epidemiological studies on vitamin D status in women with and without PCOS have yielded inconclusive results. Some studies have indicated lower serum vitamin D concentrations in women with PCOS compared to women without PCOS, whereas a case study involving 85 women with PCOS and 115 healthy controls discovered higher serum vitamin D concentrations in females with PCOS compared to controls. Low serum vitamin D levels or insufficiency have been linked to PCOS symptoms like central obesity, IR, fertility problems, and hirsutism, whereas serum 25-hydroxy vitamin D levels are low (25OHD) appears to be an independent type of early indicator for measures of reproductive success after ovulation induction.

In conclusion, few studies have shown, but limited, the benefits of vitamin D supplementation in women with PCOS, and the topic remain contentious.

### PCOS and micronutrients

There have been few studies that have started to look at the effects of micronutrient supplementation on PCOS symptoms and biochemical indices. One study shows that taking 220 mg zinc sulfate twice a day for 8 weeks improved fasting glucose, insulin, IR, and TG levels in people with PCOS. It has been revealed that taking 200 mg of selenium supplements per day for 8 weeks has improved fasting insulin, IR, insulin sensitivity, TG, and VLDL levels without affecting fasting glucose or other lipid profiles in people with PCOS. Another study revealed that taking 200 mg of chromium supplements per day for 8 weeks improved fasting insulin, IR, and insulin sensitivity in people with PCOS. Furthermore, 5 mg/day folate supplements for 8 weeks had a positive effect on inflammatory factors and biomarkers of oxidative stress in PCOS patients. To summarise, there is currently insufficient evidence to conclude the micronutrient supplements for women with PCOS.

### 4. CONCLUSION:

PCOS is a most important endocrine disorder that affects females of reproductive age and may lead to serious complications. PCOS carries a considerable long-term health risk.

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