

A Review On Polycystic Ovarian Disease: A Dietary Intake For Pcod

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ABSTRACT:

Polycystic ovarian disease (PCOD) is a common hormonal disorder that primarily affects women of reproductive age, characterized by the enlargement of ovaries accompanied by multiple small cysts located along the outer edges. These cysts, which are tiny fluid-filled sacs often described as pearl-sized clusters, contain immature eggs that fail to mature and ovulate properly. Globally, PCOD impacts approximately 5 to 15 percent of women, often beginning around puberty and manifesting through hormonal imbalances, primarily involving decreased levels of oestrogen and progesterone alongside elevated androgens. This imbalance disrupts the normal menstrual cycle, leading to irregular or absent periods and related symptoms such as excessive hair growth, acne, weight gain, and fertility challenges. The condition's development and progression are closely linked with lifestyle and dietary factors, which play a significant role in influencing its severity and management outcomes. Effective PCOD management requires healthcare practitioners to engage in collaborative care with patients, focusing on customized lifestyle modifications, nutritional guidance, and appropriate supplementation to support hormonal balance and metabolic health. Recent evidence emphasizes that addressing PCOD through an integrated approach involving diet, exercise, stress management, and medical intervention can significantly improve symptoms and quality of life. Recognizing the complex interconnection between lifestyle, diet, and PCOD is essential for devising personalized treatment strategies that not only alleviate clinical manifestations but also reduce long-term health risks associated with this disorder.

KEYWORDS: Menstrual Irregularities, Hormonal Imbalance, Lifestyle Modification, Ovarian Cysts, lifestyle changes, diet, exercise.

INTRODUCTION:

Polycystic Ovary Disorder (PCOD) is Very challenging to diagnose due to vast spectrum of symptoms and the occurrence of other related gynecological issues. Patients with PCOD face significant challenges due to expensive nature and extended commitment of many clinical test.

PCOD is the milder condition with ovarian cysts and less severe hormonal imbalances, often manageable with lifestyle changes. In patients with PCOD the secretion rate and metabolism of androgens and estrogens are disrupts. Continuous investigations within the medical community aim to identify the root factors contributing to PCOD, with growing evidence indicating that lifestyle patterns and dietary behavior play a vital role in its progression and treatment. Lifestyle interventions target the underlying metabolic dysfunction of PCOD by lowering androgen levels, improving insulin sensitivity, and supporting weight management. Dietary modifications such as low glycemic index foods, caloric restriction, and anti-inflammatory nutrients can enhance

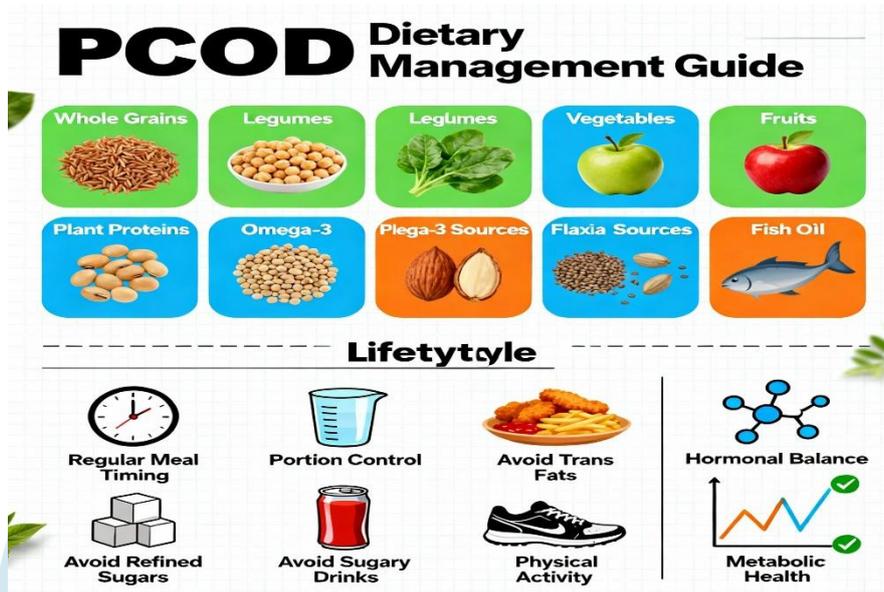
hormonal and metabolic balance. Aerobic and resistance exercises also benefit insulin and reproductive health. Clinical guidelines for numerous diseases highlight the importance of engaging in regular physical activity, maintaining a healthy body weight, adopting balanced dietary habits, and avoiding tobacco use to prevent and manage metabolic disorders. It is up to the individual to prioritize their own physical and mental health. PCOD is generally considered a milder form of hormonal dysfunction compared to Polycystic Ovary Syndrome (PCOS). It is primarily characterized by the presence of multiple immature follicles (often referred to as cysts) on the ovaries and moderate hormonal irregularities. These imbalances interfere with the normal production and metabolism of androgens and estrogens, disturbing the menstrual cycle and ovulation.

In addition to hormonal disruptions, lifestyle factors have emerged as significant contributors to both the onset and management of PCOD. Poor dietary habits, sedentary routines, irregular sleep patterns, and high stress levels can intensify the condition, whereas conscious lifestyle modifications can help restore balance and improve symptoms. Modern research emphasizes that dietary management, regular physical activity, and weight regulation are crucial in controlling PCOD, often forming the foundation of treatment plans.

While lifestyle changes are considered the first and most essential step in managing PCOD, they work best when combined with appropriate medical supervision. Clinical guidelines for metabolic and reproductive health consistently underline the importance of maintaining a healthy weight, consuming balanced meals, avoiding harmful substances, and engaging in routine exercise. Ultimately, long-term improvement relies on a woman's proactive involvement in safeguarding both her physical and emotional well-being.

➤ **Food Intake Management:**

Dietary management plays a pivotal role in controlling the symptoms and metabolic disturbances associated with Polycystic Ovarian Disease (PCOD). A well-balanced and individualized diet plan can help in maintaining hormonal balance, improving insulin sensitivity, and supporting weight regulation. Women with PCOD are often advised to consume a diet rich in complex carbohydrates, fiber, lean proteins, and healthy fats while minimizing the intake of refined sugars and processed foods. Incorporating whole grains, legumes, vegetables, and fruits with a low glycemic index helps in stabilizing blood glucose levels and reducing insulin resistance. Adequate protein intake, especially from plant-based sources such as lentils, soy, and nuts, contributes to better satiety and metabolic control. Additionally, omega-3 fatty acids from sources like flaxseeds, chia seeds, and fish oil have been shown to reduce inflammation and androgen levels. Regular meal timing and portion control further aid in improving metabolic parameters. Avoiding trans fats, sugary beverages, and excessive caffeine is also recommended to prevent hormonal fluctuations. Overall, a nutrient-dense, low-glycemic, and anti-inflammatory diet combined with lifestyle modifications such as physical activity can significantly enhance reproductive and metabolic outcomes in women with PCOD. Dietary management is a cornerstone in the treatment and control of Polycystic Ovarian Disease (PCOD). A structured, nutrient-dense eating plan can help improve hormonal regulation, reduce insulin resistance, and support weight maintenance. Emphasis is placed on consuming low-glycemic index foods such as whole grains, legumes, fruits, and vegetables, which stabilize blood glucose and minimize insulin spikes. Adequate intake of protein—particularly from plant-based sources like soy, lentils, and nuts—enhances satiety and metabolic function, while healthy fats, especially omega-3 fatty acids from flaxseeds, chia seeds, walnuts, and fatty fish, help reduce inflammation and balance hormone levels. Regular meal timing and portion control further aid in maintaining stable metabolic parameters. At the same time, limiting refined sugars, processed snacks, trans fats, sugary drinks, and excessive caffeine intake is essential to avoid hormonal fluctuations. When combined with physical activity and other lifestyle modifications, a balanced, low-GI, and anti-inflammatory diet can significantly improve reproductive and metabolic outcomes in women with PCOD.



➤ **ETIOLOGY/PATHOPHYSIOLOGY: -**

1. Hormonal Imbalance (LH/FSH Ratio, Androgen Excess)

PCOD is often characterized by an imbalance in reproductive hormones, most notably an elevated luteinizing hormone (LH) to follicle-stimulating hormone (FSH) ratio and increased androgen levels. This hormonal disruption interferes with ovulation and follicular development, resulting in multiple immature ovarian cysts. High androgen levels contribute to

symptoms such as acne, hirsutism, and central fat accumulation. Diet can influence hormonal balance: low glycemic index (GI) foods, high-fiber vegetables, and lean proteins help stabilize insulin levels, which indirectly reduces androgen excess. Foods rich in antioxidants (berries, leafy greens) and anti-inflammatory nutrients (omega-3 fatty acids from fish or flaxseeds) may also support hormonal equilibrium.

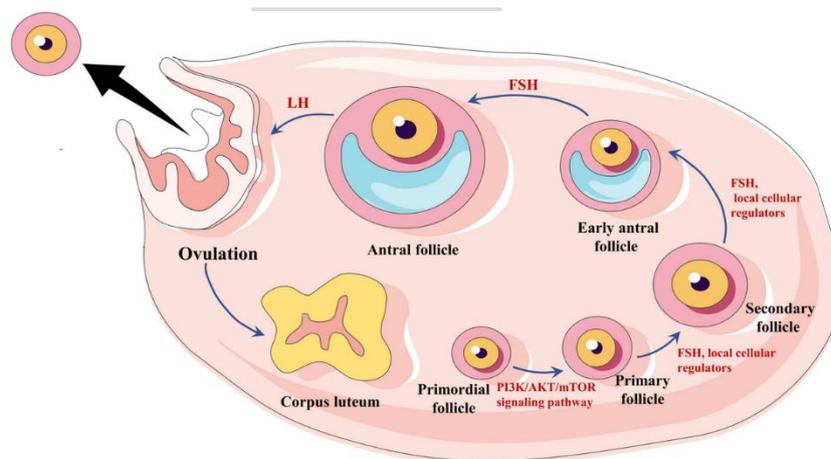


Fig.1 :- Ovarian Follicle Development.

2. Insulin Resistance and Obesity

Insulin resistance is a key driver of PCOD, even in women who are not overtly obese. Elevated insulin stimulates ovarian androgen production and reduces sex hormone-binding globulin (SHBG), increasing the level of free androgens. Obesity, especially visceral fat, exacerbates this cycle, leading to metabolic and reproductive complications. Nutritional strategies targeting

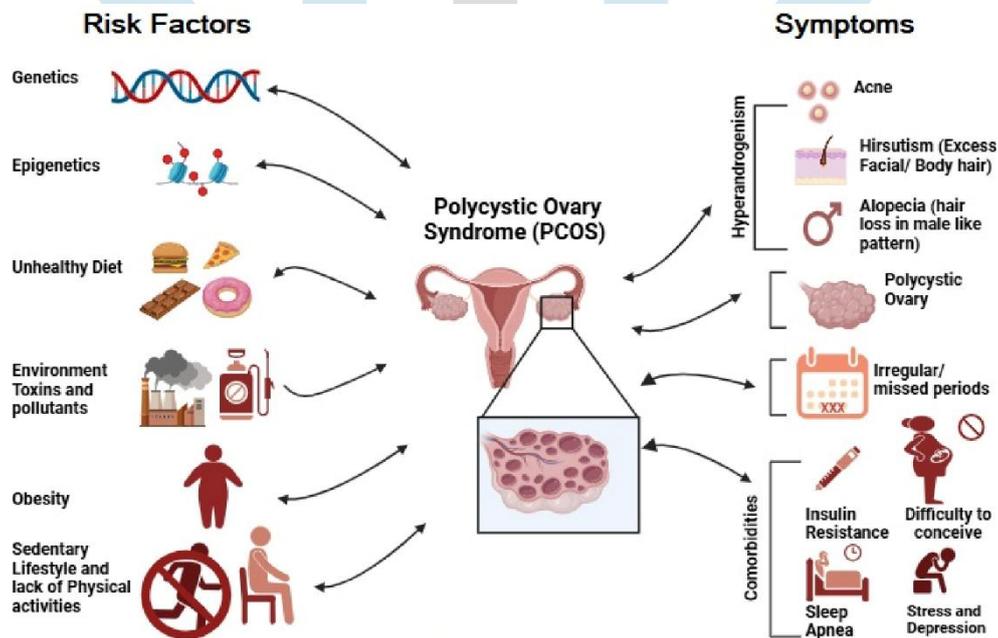
insulin sensitivity are critical: complex carbohydrates, high fiber, legumes, and moderate protein intake improve glycemic control and support weight management. Limiting refined sugars, processed foods, and trans fats can significantly reduce insulin spikes.

3. Genetic and Environmental Factors

Genetics influence PCOD susceptibility; family history of metabolic or reproductive disorders increases risk. Environmental exposures, including endocrine-disrupting chemicals, processed foods, and sedentary lifestyles, further modulate the disease. Diet plays a preventive and therapeutic role here: natural, whole foods rich in vitamins and minerals (e.g., magnesium, vitamin D, inositol-rich foods like beans and nuts) can help mitigate environmental risks and support metabolic function.

4. Role of Lifestyle and Stress

Lifestyle factors, including physical inactivity, poor sleep, and chronic stress, can exacerbate hormonal and metabolic disturbances in PCOD. Stress activates the hypothalamic-pituitary-adrenal (HPA) axis, elevating cortisol, which worsens insulin resistance and androgen excess. Incorporating regular exercise, yoga, stress management, and balanced nutrition is crucial. Diets emphasizing whole grains, fruits, vegetables, and healthy fats not only improve insulin sensitivity but also support overall stress resilience.



CLINICAL MANIFESTATION: -

1. Menstrual Irregularities

Women with PCOD often experience irregular or missed periods due to hormonal imbalance. The ovaries may not release eggs regularly, leading to problems like oligomenorrhea (infrequent periods) or amenorrhea (absence of menstruation). A balanced diet rich in vitamins, minerals, and fiber can help regulate hormonal levels and improve menstrual regularity.

2. Hirsutism

Hirsutism refers to excessive hair growth on the face, chest, or abdomen due to high androgen levels. Foods that support hormonal balance, such as those rich in omega-3 fatty acids (flaxseeds, walnuts, and fish), can help reduce androgen activity. Maintaining a healthy weight through diet and exercise also helps control this symptom.

3. Acne

Hormonal imbalance and excess sebum production often cause acne in PCOD. Consuming foods low in refined sugar and high in antioxidants (like fruits, vegetables, and green tea) can help reduce acne. Avoiding dairy products and high-glycemic foods may also improve skin health.

4. Alopecia

Alopecia or hair thinning occurs because of increased androgen levels that affect hair follicles. Adequate intake of protein, iron, zinc, and biotin supports healthy hair growth. Including eggs, lentils, spinach, and nuts in the diet can be beneficial.

5. Obesity and Metabolic Syndrome

Many women with PCOD struggle with obesity and insulin resistance. Weight gain increases the risk of metabolic disorders like diabetes and hypertension. A diet that includes complex carbohydrates (whole grains, legumes), lean proteins, and healthy fats can help manage body weight and insulin levels. Avoiding junk food, sugary drinks, and fried foods is essential.

6. Infertility and Reproductive Challenges

PCOD often leads to difficulty in conceiving because ovulation does not occur regularly. Balanced nutrition and weight control can improve ovulation and fertility outcomes. Foods rich in folic acid, vitamin D, and antioxidants help maintain reproductive health. Including fruits, vegetables, and whole grains supports hormonal balance.

7. Psychological Impacts

Women with PCOD may experience anxiety, depression, and low self-esteem due to physical changes and fertility issues. Consuming foods that support brain health—such as those containing omega-3 fatty acids, magnesium, and B-vitamins—can help reduce stress and improve mood. Regular physical activity and a balanced diet play a key role in improving mental well-being.

➤ DIAGNOSTIC CRITERIA

Polycystic Ovarian Disease (PCOD) is diagnosed mainly by using a few internationally accepted criteria such as the Rotterdam criteria, NIH (National Institutes of Health) criteria, and AE-PCOS (Androgen Excess and PCOS Society) criteria. According to the Rotterdam criteria, a woman is diagnosed with PCOD if she meets at least two of the following three features: irregular or absent menstrual cycles (oligo- or anovulation), signs of high androgen levels (like acne, excess hair growth, or alopecia), and the presence of multiple small cysts in the ovaries detected by ultrasound. The NIH criteria, on the other hand, emphasize two main features — chronic anovulation and clinical or biochemical evidence of hyperandrogenism, while ruling out other possible causes. The AE-PCOS criteria highlight the presence of hyperandrogenism as an essential feature, along with ovarian dysfunction.

On ultrasound examination, ovaries in PCOD patients often appear enlarged with multiple immature follicles arranged along the outer edge, commonly described as a “string of pearls” pattern. In terms of hormonal evaluation, women with PCOD often show increased levels of luteinizing hormone (LH) and testosterone, along with a normal or slightly low level of follicle-stimulating hormone (FSH), resulting in an elevated LH/FSH ratio. Insulin resistance and increased insulin levels are also frequently observed.

Before confirming the diagnosis of PCOD, it is important to exclude other medical conditions that can mimic its symptoms, such as thyroid disorders, hyperprolactinemia, congenital adrenal hyperplasia, or androgen-secreting tumors. Evaluating all these aspects helps in making an accurate diagnosis and planning suitable dietary and lifestyle interventions.

Complications and Associated Risks in PCOD

If PCOD is not managed properly through diet, exercise, and lifestyle changes, it can lead to several long-term health risks:

1. Type 2 Diabetes Mellitus

Many women with PCOD develop insulin resistance, which means their body cannot use insulin properly. Over time, this increases blood sugar levels, leading to type 2 diabetes. A healthy diet with limited sugar and refined carbs helps lower this risk.

2. Cardiovascular Risks

PCOD is linked to high cholesterol, high blood pressure, and obesity, which raise the chances of heart disease. Eating foods rich in fiber, omega-3 fatty acids, and antioxidants can help keep the heart healthy.

3. Endometrial Hyperplasia and Cancer

Because of irregular ovulation and hormonal imbalance, the uterine lining (endometrium) can become thicker over time. This condition is called endometrial hyperplasia, and if left untreated, it may increase the risk of endometrial cancer. A balanced diet that supports weight management and hormonal balance can help reduce this risk.

4. Long-term Metabolic and Psychological Consequences

Women with PCOD may face metabolic problems like obesity, insulin resistance, and abnormal lipid levels. They may also experience psychological issues such as stress, anxiety, depression, and low self-esteem due to physical changes like acne and hair growth. Eating nutritious foods, exercising regularly, and maintaining a healthy lifestyle can improve both physical and mental health.

➤ MANAGEMENT STRATEGIES:

A. LIFESTYLE MODIFICATION: Effective PCOD management combines sustainable lifestyle changes—such as adopting a diet rich in whole grains, vegetables lean, proteins, and low glycemic index foods—with regular physical activity and targeted weight loss to improve hormonal balance, insulin sensitivity, and menstrual patterns. Rather than relying on a one-size-fits-all approach, individual care may integrate insulin-sensitizing agents like metformin when needed, recognizing that even modest weight reduction can lead to meaningful improvements in symptoms. The most impactful interventions are holistic and focus on both metabolic and reproductive health, empowering patients to address their most distressing symptoms while mitigating long-term risks tied to excessive androgens and insulin resistance.

Strategy	Primary Role	Key Details & Highlights
Lifestyle Modification	First-line, holistic intervention for metabolic, reproductive, and mental health	Includes diet, activity, behavioural
Low GI Diet	Prevents insulin spikes, stabilizes sugar, reduces hyperinsulinemia	Whole grains, pulses, healthy fats
Physical Activity	Increases insulin sensitivity, helps weight loss, improves metabolic outcomes	Aerobic + resistance, HIIT effective
Weight Management	Reduces symptoms, restores cycles, lowers androgen excess	Calorie reduction, healthy weight
Insulin Sensitizers	Improves insulin response, supports weight and menstrual regulation	Metformin preferred, alternatives inositols, TZDs

B) PHARMACOLOGICAL INTERVENTIONS:

Pharmacological management of polycystic ovarian disease (PCOD) involves various medications tailored to individual symptoms and reproductive goals: combined oral contraceptives are commonly prescribed to control menstrual irregularities and reduce androgen-related symptoms; anti-androgens, such as spironolactone, may be added if excess hair growth or acne persists; metformin and other insulin-sensitizing agents help improve insulin resistance and metabolic function, with a beneficial impact on weight and ovulatory cycles; and for those pursuing pregnancy, ovulation induction agents like clomiphene citrate or letrozole are standard choices, occasionally supplemented by gonadotropins if first-line therapy fails. Together, these interventions are often integrated with dietary approaches favouring low glycemic index foods, balanced macronutrients, and appropriate caloric intake to reinforce metabolic benefits and enhance the efficacy of medical therapy in PCOD.

C) SURGICAL OPTIONS:

Ovarian drilling is a surgical option for women with polycystic ovarian disease who have shown resistance to ovulation induction medications such as clomiphene citrate; it involves creating small punctures in the ovaries to reduce androgen production and restore ovulatory cycles. While this minimally invasive procedure is primarily reserved for those who have failed medical therapy, its use is limited due to potential risks like decreased ovarian reserve and adhesions, making it suitable only for selected cases where fertility is a priority and other treatments have proven ineffective. Given these factors, dietary adaptations alone cannot replace the need for surgery in this scenario, but maintaining a balanced, nutrient-rich diet during recovery may support hormonal balance and overall reproductive health.

D) COMPLEMENTARY AND ALTERNATIVE THERAPIES:

Complementary and alternative therapies such as Ayurveda, yoga, herbal remedies, and acupuncture have gained recognition, with varying degrees of evidence-based support. Ayurveda, an ancient Indian system, integrates individualized treatments including herbs, diet, and yoga, showing promise in managing chronic diseases like diabetes and cardiovascular conditions through rigorous clinical evaluations. Yoga has been supported by moderate-certainty evidence for reducing blood pressure, stress, anxiety, and improving quality of life in multiple conditions, with practices combining physical postures, breathing, and meditation. Herbal remedies, while rooted in tradition, are increasingly subjected to scientific scrutiny revealing their bioactive compounds, safety profiles, and potential therapeutic effects, though comprehensive standardization and clinical validation remain ongoing challenges. Acupuncture is supported by clinical evidence demonstrating effectiveness in pain reduction, functional improvements, and symptom relief for various conditions such as osteoarthritis and back pain, with benefits extending beyond placebo effects and a strong safety record. Together, these therapies provide valuable complementary options with a foundation increasingly being built on scientific evidence to enhance integrative healthcare.

➤ RECENT ADVANCES AND RESEARCH TRENDS:

Recent research in 2025 has significantly expanded the understanding of dietary, genetic, and technological dimensions of polycystic ovary syndrome (PCOS), emphasizing a more personalized and integrative approach to management. Emerging findings show that nutrient intake, especially dietary components like omega-3 fatty acids, vitamin B12, folate, and fiber, plays a pivotal role in modulating metabolic and hormonal imbalances in PCOS, with bioelectrical impedance parameters such as the phase angle now being investigated as non-invasive biomarkers of nutritional and metabolic health. Genetic and epigenetic studies have identified key polymorphisms and gene-environment interactions linking PCOS susceptibility to dietary habits, insulin resistance, and exposure to endocrine disruptors, pushing the frontier toward nutrigenomics-guided interventions. On the therapeutic front, recent advancements explore novel pharmacological and natural compound strategies, including inositol's, resveratrol, berberine, and nanotechnology-based drug delivery systems for precision targeting of ovarian and metabolic pathways. Gene and microRNA therapies, alongside anti-inflammatory and adipokine-modulating treatments, are emerging as next-generation options for mitigating the reproductive and metabolic phenotypes of PCOS. Complementary lifestyle modifications—such as individualized nutritional protocols, high-intensity interval training, and vitamin D3 supplementation—remain foundational to enhancing clinical outcomes. Meanwhile, digital health innovations are transforming PCOS management through mobile health apps, artificial intelligence-powered diagnostics, and personalized eHealth platforms that track dietary intake, menstrual cycles, and metabolic data, thereby facilitating telemedicine-based remote care and self-management. These digital and telemedicine interventions, integrated with precision nutrition and genomically informed therapy, are bridging healthcare access gaps and optimizing adherence, marking a paradigm shift toward personalized, technology-driven management of PCOS.

Future perspective:

Looking ahead, the future of dietary management for PCOS lies in highly personalized treatment plans that recognize the unique genetic, metabolic, and lifestyle factors of each individual. Experts now realize that making the same diet suggestions for everyone with PCOD just doesn't work, since each person's needs are unique. Instead, the focus is shifting toward precision nutrition, which means creating a diet plan that fits each person's body, genetics, lifestyle, and health challenges, so they get the specific support that helps them most where interventions are tailored based on genetic biomarkers, insulin resistance status, and personal preferences. Equally important is the adoption of a multidisciplinary care model that integrates endocrinologists, dietitians, psychologists, gynecologists, and exercise specialists to comprehensively address the complex interplay of reproductive, metabolic, and mental health challenges of PCOS. Despite mounting evidence supporting these approaches, current research reveals significant gaps, including inconsistent documentation of multidisciplinary programs, poor patient adherence due to high attrition rates often linked to

psychological barriers and a lack of standardized guidelines for individualized lifestyle modification plans. Public health strategies have yet to fully embrace this complexity, particularly in low-resource settings where access to multidisciplinary teams remains limited. Moreover, most existing interventions focus primarily on weight loss without sufficiently addressing the psychological and behavioural components critical to sustainable health improvements. Closing these gaps will require rigorous longitudinal studies to optimize intervention delivery, improved training for healthcare providers on PCOS heterogeneity, and expanded access to integrated care pathways supported by digital health tools. Ultimately, future efforts must prioritize adaptable, patient-centered care frameworks that empower women with PCOS through collaboration, education, and accessible resources, ensuring their unique needs are met in both clinical and community settings.

CONCLUSION:

Polycystic Ovarian Disease (PCOD) clearly highlights the fundamental role of dietary intake in managing this complex hormonal disorder by regulating hormone levels, improving insulin sensitivity, and aiding in weight management. The importance of early diagnosis cannot be overstated, as prompt intervention with personalized nutrition and lifestyle changes can significantly prevent further complications and improve overall quality of life. Effective management of PCOD requires a holistic approach, emphasizing a balanced diet rich in low-glycemic, anti-inflammatory foods combined with regular physical activity and stress reduction techniques. Future research should prioritize the development of tailored dietary plans that consider individual genetic and metabolic profiles, supported by multidisciplinary teams including endocrinologists, dietitians, mental health professionals, and exercise experts to comprehensively address the multifaceted nature of PCOD. Moreover, there remains a critical need for advancing public health strategies to increase awareness, improve access to individualized care, and incorporate emerging digital health technologies for continuous patient monitoring and self-management. Addressing these gaps with further longitudinal studies and education initiatives will empower women with PCOD to achieve better health outcomes and foster more effective, patient-centered care in both clinical and community settings. Dietary intake plays a crucial role in managing PCOD by helping to regulate hormones, control insulin resistance, and support weight management. Early diagnosis is essential to enable timely nutritional interventions that can prevent complications and improve quality of life. Holistic management, incorporating balanced, low-glycemic, and anti-inflammatory foods along with physical activity and stress management, proves most effective for symptom control. Future research should focus on personalized nutrition plans based on genetic and metabolic profiles, supported by multidisciplinary care teams to address the complex needs of PCOD patients. There is also a pressing need for comprehensive public health strategies to enhance awareness, accessibility to individualized treatment, and integration of digital health tools for continuous monitoring. These steps will help improve long-term patient outcomes and empower women to manage PCOD more effectively.

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