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Nutritional approach to deal with complex multigenic disorder: polycystic ovary syndrome

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Abstract

Polycystic ovary syndrome (PCOS), under the name of Stein-Leventhal syndrome is a metabolic, endocrine hormonal disorder common among women affecting approximately 5-10% of the female population in developed countries of reproductive age. 26.7 percent of women in this age group have PCOS. Many women have PCOS but don't know it. Women with PCOS may have infrequent or prolonged menstrual periods or excess male hormone (androgen) levels, grow a number of small cysts, or fluid-filled sacs, on their ovaries. Its hyperandrogenic manifestations include acne, hirsutism, dyslipidemia, insulin resistance, diabetes, obesity, cancer, infertility and coronary heart diseases. The objective of this review was to describe and to provide some evidence-based dietary advice for use in clinical practice. However, lifestyle modification, including a small-to-moderate weight loss of 5–10% with any dietary pattern of choice, depending on the individuals' preferences, culture, habits and metabolic needs. Three diets that may help people with PCOS manage their symptoms are: a low glycemic index diet, an anti-inflammatory diet, the DASH diet that is Dietary Approaches to Stop Hypertension [DASH] diet or moderately low-carbohydrate diets [30–45% of energy]), as well as alternative dietary interventions, including small, frequent meal (five to six meals daily) consumption at regular times, with the majority of carbohydrates consumed at lunch time or equally distributed throughout the day, In general, people on a PCOS diet should avoid foods such as Refined carbohydrates, Fried foods, Sugary beverages, Processed meats, sausages, and luncheon meats, Excess red meat. The main focus of the review paper is to come under the reorganization to reviewer and aware about the cause and treatment also review the possible dietary management to prevent the health issues.

Keywords: Stein-Leventhal syndrome, reproductive age, hyperandrogenic, insulin resistance, dietary management, anti-inflammatory

Introduction

Polycystic ovary syndrome (PCOS), also known as Stein-Leventhal syndrome is a metabolic, endocrine hormonal disorder common among women affecting approximately 5-10% of the female population in developed countries of reproductive age. Women with PCOS may have infrequent or prolonged menstrual periods or excess male hormone (androgen) levels excess hair growth, acne, and obesity. The ovaries may develop numerous small collections of fluid (follicles) and fail to regularly release eggs. Most women with PCOS grow a number of small cysts, or fluid-filled sacs, on their ovaries. Its hyperandrogenic manifestations include acne, hirsutism, dyslipidemia, insulin resistance, diabetes, obesity, cancer, infertility and coronary heart diseases^[1]. Women who can conceive with PCOS have a higher incidence of miscarriage, gestational diabetes, pregnancy-induced high blood pressure, preeclampsia, and premature delivery. This heterogeneous disease presents as a constellation of symptoms including menstrual disturbances (amenorrhea, oligomenorrhea, and irregular menstrual cycles), clinical features of hyperandrogenism (acne/hirsutism), biochemical hyperandrogenism, polycystic ovarian morphology on ultrasound, and features of metabolic syndrome^[2].

Fast fact

- PCOS is a problem with hormones that affects women during their childbearing years (ages 15 to 44). 26.7 percent of women in this age group have PCOS. Many women have PCOS but don't know it. In one study, up to 70 percent of women with PCOS hadn't been diagnosed.
- More than half of women with PCOS develop type 2 diabetes before the age of 40 years.
- Around 70 percent of ovulatory fertility issues are related to PCOS. Mounting evidence

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suggests that PCOS might be a complex multigenic disorder with strong epigenetic and environmental influences, including diet and other lifestyle issues.

How PCOS is diagnosed

Doctors don't know exactly what causes PCOS. They believe that high levels of male hormones prevent the ovaries from producing hormones and making eggs normally. Genes, insulin resistance, and inflammation have all been linked to excess androgen production. Extra insulin triggers the ovaries to produce more male hormones. Obesity is a major cause of insulin resistance. Both obesity and insulin resistance can increase your risk for type 2 diabetes. Research has shown that women with PCOS have a type of low-grade inflammation that stimulates polycystic ovaries to produce androgens, which can lead to heart and blood vessel problems. Doctors typically diagnose PCOS in women who have at least two of these three symptoms:

- high androgen levels
- irregular menstrual cycles
- cysts in the ovaries

A pelvic exam can look for any problems with your ovaries or other parts of your reproductive tract. During this test, your doctor inserts gloved fingers into your vagina and checks for any growths in your ovaries or uterus. Blood tests check for higher-than-normal levels of male hormones. You might also have blood tests to check your cholesterol, insulin, and triglyceride levels to evaluate your risk for related conditions like heart disease and diabetes. An ultrasound uses sound waves to look for abnormal follicles and other problems with your ovaries and uterus.

Signs and symptoms of PCOS vary. A diagnosis of PCOS is made when you experience at least two of these signs:

- **Irregular periods:** Infrequent, irregular or prolonged menstrual cycles are the most common sign of PCOS. For example, you might have fewer than nine periods a year, more than 35 days between periods and abnormally heavy periods.
- **Excess androgen:** Elevated levels of male hormone may result in physical signs, such as excess facial and body hair (hirsutism), and occasionally severe acne and male-pattern baldness.
- **Polycystic ovaries:** Your ovaries might be enlarged and contain follicles that surround the eggs. As a result, the ovaries might fail to function regularly.
- **Heavy bleeding:** The uterine lining builds up for a longer period of time, so the periods you do get can be heavier than normal.
- **Hair growth:** More than 70 percent of women with this condition grow hair on their face and body — including on their back, belly, and chest. Excess hair growth is called hirsutism.
- **Acne:** Male hormones can make the skin oilier than usual and cause breakouts on areas like the face, chest, and upper back.
- **Weight gain:** Up to 80 percent of women with PCOS are overweight or obese.
- **Male-pattern baldness:** Hair on the scalp gets thinner and fall out.
- **Darkening of the skin:** Dark patches of skin can form in body creases like those on the neck, in the groin, and under the breasts.

- **Headaches:** Hormone changes can trigger headaches in some women.

Associated health risks: There are several health risks associated with PCOS. These are as follows- type 2 diabetes, infertility, high cholesterol, elevated lipids, sleep apnea, liver disease, abnormal uterine bleeding, high blood pressure, obesity possibly leading to issues with low self-esteem and depression, metabolic syndrome, nonalcoholic fatty liver (steatohepatitis), depression and anxiety also, there is an increased risk of endometrial cancer, gestational diabetes, pregnancy-induced high blood pressure, heart attacks, and miscarriage.

Treatment

There is no cure for PCOS, but treatment aims to manage the symptoms that affect an individual. This will depend on whether the individual wants to become pregnant and aims to reduce the risk of secondary medical conditions, such as heart disease and diabetes. There are several recommended treatment options, including:

- **Birth control pills:** These can help regulate hormones and menstruation.
- **Diabetes medications:** These help manage diabetes, if necessary.
- **Fertility medications:** If pregnancy is desired, these include the use of clomiphene (Clomid), a combination of clomiphene and metformin, or injectable gonadotropins, such as follicle-stimulating hormone (FSH) and luteinizing hormone (LH) medications. In certain situations, letrozole (Femara) may be recommended.
- **Fertility treatments:** These include in-vitro fertilization (IVF) or inseminations.

Excessive hair growth may be reduced with the drug spironolactone (Aldactone) or eflornithine (Vaniqa). Finasteride (Propecia) may also be recommended, but it should not be handled by women who may become pregnant. Anyone using spironolactone should use birth control, due to the risk of birth defects if taken while pregnant. Breast-feeding on this medication is not recommended. Other possible options to manage hair growth is laser hair removal, electrolysis, hormonal treatments, or vitamin and mineral use. Surgical options include: Ovarian drilling, Oophorectomy, Hysterectomy, Cyst aspiration, Diet and lifestyle tips to treat PCOS.

Lifestyle Changes and Dietary Management

There is no cure for PCOS, but some home and lifestyle interventions can make a difference and relieve some symptoms like eating a healthy, well-balanced diet including plenty of fruits and vegetables, participating in regular physical activity, maintaining a healthy weight, to reduce androgen levels and reduce the risk of diseases such as diabetes and heart disease, not smoking, as this increases levels of androgens and the risk of heart disease, Treatment for PCOS usually starts with lifestyle changes like weight loss, diet, and exercise, Losing just 5 to 10 percent of your body weight can help regulate your menstrual cycle and improve PCOS symptoms (11, 20). Weight loss can also improve cholesterol levels, lower insulin, and reduce heart disease and diabetes risks, Studies comparing diets for PCOS have found that low-carbohydrate diets are effective for both weight loss and lowering insulin levels. A low glycemic index (low-GI) diet that gets most carbohydrates from fruits,

vegetables, and whole grains helps regulate the menstrual cycle better than a regular weight loss diet. A few studies have found that 30 minutes of moderate-intensity exercise at least three days a week can help women with PCOS lose weight. Losing weight with exercise also improves ovulation and insulin levels. Exercise is even more beneficial when combined with a healthy diet.

A diet that includes high-fiber foods may benefit people with PCOS. Two of the primary ways that diet affects PCOS are weight management and insulin production and resistance. However, insulin plays a significant role in PCOS, so managing insulin levels with a PCOS diet is one of the best steps people can take to manage the condition. Many people with PCOS have insulin resistance. In fact, more than 50 percent of those with PCOS develop diabetes or pre-diabetes before the age of 40. Diabetes is directly related to how the body processes insulin. Following a diet that meets a person's nutritional needs, maintains a healthy weight, and promotes good insulin levels can help people with PCOS feel better.

Foods to eat

Research has found that what people eat has a significant effect on PCOS. That said, there is currently no standard diet for PCOS.

However, there is widespread agreement about which foods are beneficial and seem to help people manage their condition, and which foods to avoid.

Three diets that may help people with PCOS manage their symptoms are:

- **A low glycemic index (GI) diet:** The body digests foods with a low GI more slowly, meaning they do not cause insulin levels to rise as much or as quickly as other foods, such as some carbohydrates. Foods in a low GI diet include whole grains, legumes, nuts, seeds, fruits, starchy vegetables, and other unprocessed, low-carbohydrate foods.
- **An anti-inflammatory diet:** Anti-inflammatory foods, such as berries, fatty fish, leafy greens, and extra virgin olive oil, may reduce inflammation-related symptoms, such as fatigue.
- **The DASH diet:** Doctors often recommend the Dietary Approaches to Stop Hypertension (DASH) diet to reduce the risk or impact of heart disease. It may also help manage PCOS symptoms. A DASH diet is rich in fish, poultry, fruits, vegetables whole grain, and low-fat dairy produce. The diet discourages foods that are high in saturated fat and sugar.

A healthful PCOS diet can also include the following foods: natural, unprocessed foods, high-fiber foods, fatty fish, including salmon, tuna, sardines, and mackerel, kale, spinach, and other dark, leafy greens, dark red fruits, such as red grapes, blueberries, blackberries, and cherries, broccoli and cauliflower, dried beans, lentils, and other legumes, healthful fats, such as olive oil, as well as avocados and coconuts, nuts, including pine nuts, walnuts, almonds, and pistachios, dark chocolate in moderation, spices, such as turmeric and cinnamon. Researchers looking at a range of healthful diet plans found the following slight differences. For example:

- Individuals lost more weight with a diet emphasizing mono-unsaturated fats rather than saturated fats. An example of this kind of diet is the anti-inflammatory diet, which encourages people to eat plant-based fats, such as

olive and other vegetable oils.

- People who followed a low-carbohydrate or a low-GI diet saw improved insulin metabolism and lower cholesterol levels. People with PCOS who followed a low-GI diet also reported a better quality of life and more regular periods.

In general, studies have found that losing weight helps women with PCOS, regardless of which specific kind of diet they follow.

Foods to avoid

People on a PCOS diet should avoid sugary beverages. In general, people on a PCOS diet should avoid foods already widely seen as unhealthful such as Refined carbohydrates, such as mass-produced pastries and white bread, Fried foods, such as fast food, Sugary beverages, such as sodas and energy drinks, Processed meats, such as hot dogs, sausages, and luncheon meats, Solid fats, including margarine, shortening, and lard, Excess red meat, such as steaks, hamburgers, and pork^[3].

The estimation of high PCOS prevalence rates appears high in countries where diagnoses of obesity and type 2 diabetes are more common. Even though women with PCOS vary in degrees of thinness to fatness, but even then about 30-75% of PCOS cases contend with being overweight or obese. The aim of this review was to describe and evaluate the effects of dietary interventions on PCOS-associated outcomes and to provide some evidence-based dietary advice for use in clinical practice. There is no optimal diet or macronutrient composition for PCOS. However, lifestyle modification, including a small-to-moderate weight loss of 5–10% (combined diet with regular physical activity) with any dietary pattern of choice, depending on the individuals' preferences, culture, habits and metabolic needs (ie, Mediterranean diet, Dietary Approaches to Stop Hypertension [DASH] diet or moderately low-carbohydrate diets [30–45% of energy]), as well as alternative dietary interventions, including small, frequent meal (five to six meals daily) consumption at regular times, with the majority of carbohydrates consumed at lunch time or equally distributed throughout the day^[4]. The main focus of the review paper is to come under the reorganization to reviewer and aware about the cause and treatment also review the possible dietary management to prevent the health issues.

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