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# A Systematic Review Article On Effect Of Nutritional Supplement And Lifestyle Management In Polycystic Ovary Syndrome (PCOS).

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#### ABSTRACT

Polycystic ovary syndrome (PCOS) is endocrine disorder in women of reproductive age, which lead to reproductive, hormonal, metabolic abnormalities such as type 2 diabetes and some other symptoms like menstrual irregularities, hypertension, obesity, obstructive sleep apnea, hirsutism and acne. The actual cause of this syndrome is unknown but environmental factors such as dietary habits, nutritional supplement and lifestyle management play an important role in prevention and treatment of PCOS. Illness affects up to 15% of women during their reproductive years, 116 million women worldwide are affected by this condition, women with PCOS experience infertility in 40% of cases. Patient with overweight have high risk of PCOS so weight management play an important role in the treatment, designing low-calorie diet food to maintaining a healthy weight, limit the intake of simple sugars and refined carbohydrates and intake foods. Reduction of saturated and Trans fatty acids and attention to possible deficiencies such as vitamin D, magnesium, copper and selenium. Melatonin and Inositol play an important role in nutritional supplements because they improved hormonal parameters in all subjects and improved menstrual regularity. Several herbal drug have also been researched for their impact on PCOS-affected women like Fenugreek seeds, Aloe Vera, Chamomile, Flaxseed and some herbal dosage forms play in important role to improve hormonal balance and prevent the disorder. Consume enough fiber-rich and omega-3 polyunsaturated fatty acids contain foods, monounsaturated fatty acids (MUFA), has been widely accepted as a gold standard for healthy diets in PCOS and also including whole grains, legumes, veggies, and fruits in diet. Women with PCOS are recommended to take special precautions to avoid receiving very high doses of caffeine. Management in lifestyle including stress, changing in eating habit, proper required nutritional supplement and medication will cure the PCOS.

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#### **INTRODUCTION**

Polycystic ovary syndrome (PCOS) is an endocrine disorder and the leading cause of female infertility worldwide [1]. It was first described by Irving. F. Stein and Michael. L. Leventhal in 1935 and is also termed a "Stein-Leventhal" syndrome. The classic symptoms of PCOS, including menstrual irregularities, infertility, hirsutism, androgenic alopecia, and acne, may have a strong impact on quality of life for sufferers, this syndrome is also linked to metabolic abnormalities such as type 2 diabetes, insulin resistance and obesity. Additionally, PCOS may result in dysregulation of the hypothalamic-pituitary-ovary and hypothalamic-pituitary-adrenal axes, and it has been linked to hypertension, obesity, sleep dyslipidemia obstructive apnea, and nonalcoholic fatty liver disease as well as Hyperandrogenism, recurrent anovulation, classic PCOS ultrasound pictures, and skin conditions such acne, hirsutism, and seborrhea are the most prevalent symptoms of PCOS[2][3][4][5]. It also causes a large rise in oxidative stress and is linked to low-grade systemic inflammation. Although the etiopathology of PCOS is unclear, the main contributing element appears to be a significant hereditary and insulin resistance is a major factor the clinical development of PCOS. in Environment, nutrition and change in lifestyle, should be first-line treatment in addressing a case of PCOS.[6] Weight management and a healthy, balanced diet for women will help to overcome from PCOS.[7] Development of good eating habit which include all type of nutrition in a proper diet in which protein, vitamins, Minerals and in right amount of carbohydrates, sodium and fat. Some polyunsaturated fatty acids (PUFA), which have been associated with positive health benefits in PCOS.[8] Regular exercise and activity will help to maintain the weight and improve the cholesterol level[9][10] Some nutritional supplements like Chromium picolinate, melatonin, inositol, vitamin

D, as well as N-acetylcysteine (NAC) will helpful in the recovery of PCOS.[11] Some herbs also play a major role from the recovery of PCOS, for example Aloe Vera, Chamomile, flax seed, coconut palm, fenugreek seed, curcuma longa all are the very beneficial herb in PCOS.[12] So, proper amount of all nutrition in regular diet, good eating habit, physical activity to manage the weight, change in life style and stress management will helpful to cure PCOS.

#### **Distribution of PCOS in world**

According to observational research, this illness affects up to 15% of women during their reproductive years. Additionally, it has recently been discovered that insulin resistance is a major factor in the clinical development of PCOS in nearly all women. It has highly variable global prevalence (2.2% - 26%), 116 million women worldwide are affected by this condition. disorder affecting 8% to 13% of women of reproductive age worldwide.[13][14][15] The highest prevalence is reported in US, Canada, Mexico, European countries. In India the prevalence rate is about 10 per cent.[16] Few community-based surveys have reported the prevalence rate up to 70 per cent (PCOS) affects women's hormonal levels in such a way that higher-than normal quantities of male hormones are produced.[17] The resultant imbalance implies that the women could skip menstrual periods and even face the difficulty of conceiving. Oligomenorrhea, amenorrhea, and protracted, irregular menstrual bleeding are among the menstrual abnormalities frequently seen with PCOS. [18] However, 30% of PCOS sufferers will experience regular menstruation.[19] PCOS affects between 85% 90% of and oligomenorrhagic women, while it affects between 30% and 40% of amenorrhagic women. [20] More than 80% of women who present with androgen excess symptoms have PCOS. [21] A typical clinical manifestation of hyperandrogenism that affects up to 70% of women with PCOS is



hirsutism. [22] Approximately 15%–30% of adult women with PCOS present with acne. In addition, 50% of women with a less severe distribution of have PCOS. [23] Women with PCOS experience infertility in 40% of cases. The most frequent reason for an ovulatory infertility is PCOS. The percentage of an ovulatory women who visit infertility clinics and have PCOS ranges from 90 to 95%. Primordial follicle counts are normal in women with PCOS, while main and secondary follicle counts are much higher. [24]

#### **Pathogenesis of PCOS**

The pathogenesis of PCOS involves both insulin resistance (IR) and hyperandrogenemia, with IR recognized as a key driver of this condition, regardless of body mass index (BMI) IR may lead to an increase in androgen synthesis by the ovaries and adrenal glands, and a suppression of hepatic synthesis of sex hormone binding globulin (SHBG). This, in turn, promotes increased levels. exacerbating androgen the hyperandrogenism seen in PCOS.[25] Elevations in serum luteinizing hormone (LH) and in the LHto-follicle-stimulating hormone (FSH) ratio are also frequently observed.[26] The prevalence of IR in the literature ranges from 40% to 75% in women from varying geographic regions worldwide with PCOS.[27]

#### Nutrition and Dietary management

Nutrition and change in lifestyle, should be firstline treatment in addressing a case of PCOS. Dietary change is effective in improving a variety of markers related to IR and body composition in subjects with PCOS.[28] There are currently no consensus statements or published dietary recommendations for the nutritional management of women with PCOS by an acknowledged organisation in the UK or anywhere else in the world. The fourth edition of the Manual of Dietetic Practice, which emphasises weight management and a healthy, balanced diet for women with PCOS, is the first version to discuss the nutritional management of PCOS[29] This includes improvements in the homeostasis model assessment of insulin resistance (HOMA-IR), fasting insulin, fasting blood sugar (FBS), BMI, waist circumference, and body weight itself [28]. In approaching dietary management, it is important to take into account the calorie requirements of the individual Calorie requirements are higher for women with higher body mass and, and increase in relation to activity [30]. Weight reduction should be the primary therapy in people with PCOS; weight loss of just 5% may be sufficient to promote more regular menstruation. It is often useful to focus initially on the eating pattern and the macronutrient content of the diet rather than to try to promote both healthy eating and weight loss too quickly. Energy deficit can be achieved either by limiting nutrient intake or by increasing calorie expenditure.[31] It is important to recognize that improved abdominal obesity and insulin sensitivity may occur without an overall change in body weight. In particular, body composition of patients who exercise regularly may change with increased lean body mass and decreased fat mass, but no overall change in weight. Increased lean body mass (muscle) increases resting energy expenditure and may help improve hormonal and metabolic parameters in women with PCOS.

## Dietary fat and protein

Fat is the most energy-rich macronutrient component of the diet containing 9 kcal/g, compared with only 4 kcal/g for carbohydrate and protein. Furthermore, the body has a virtually infinite capacity to store fat, particularly in hyperinsulinaemic individuals. Cross-sectional studies indicate that higher fat intake is associated with impaired insulin sensitivity, but this relationship is mainly due to obesity.[32] By contrast, intervention studies showed that a reasonable increase in total fat intake (from 20% to 40%) had no major impact on insulin



sensitivity.[33] A recent report also suggests that statins may have beneficial effects on the endocrine profile in PCOS, including decreasing circulating testosterone levels.[34] A recent investigation focused on a diet supplemented in polyunsaturated fatty acids (PUFA), which have been associated with positive health benefits in a number of studies. Administration of diet supplements with walnuts to increase levels of linoleic and a-linolenic acids, surprisingly increased glucose levels, both fasting and during an oral glucose tolerance test.[35] The longer PUFAs, eicosapentaenoic chain acid and docosahexaenoic acid which are found in fish oil have beneficial effects on metabolic parameters in patients with diabetes, but specific evidence relating to PCOS is not available at this stage. While the Mediterranean diet. rich in monounsaturated fatty acids (MUFA), has been widely accepted as a gold standard for healthy diets, its potential benefits in patients with PCOS have not been documented, although decreased features of obesity and insulin resistance have been noted in Italian compared with American patients with PCOS.[36]

#### **Eating pattern**

The importance of frequency and regularity of eating patterns is often neglected. There has been, in recent years, a move away from regular and social eating patterns to more irregular eating with increased consumption of convenience and snack foods.Those who energy-dense ate frequently during the day had higher intakes of carbohydrate, fibre, and a range of micronutrients. Those who ate less frequently had higher intakes of fat, cholesterol, protein and sodium. Lower micronutrient intake was associated with skipping breakfast.[37]

#### Exercise and PCOS

There is a surprisingly scant literature on the role of exercise in managing patients with PCOS. Accumulation of exercise in frequent short periods of physical activity appears to have similar influence in long-term weight loss programmes 30 min of moderate exercise daily will help to maintain body weight. More prolonged or vigorous exercise may be needed to produce weight loss which will helpful to manage PCOS.[38]

#### **Nutritional Supplements**

It has been investigated how various foods or dietary supplements affect PCOS-affected women. These include chromium, melatonin, inositol, and vitamin D, as well as N-acetylcysteine (NAC)[11]

#### 1. N-acetylcysteine

The cytoprotectant NAC, N-acetyl derivative of lcysteine, is well known. With its capacity to dissolve disulfide bonds and thiolated proteins and to boost the formation of sulfane sulphur in the mitochondria, NAC may act as a direct antioxidant. It has significantly greater effects on hirsutism score and FBS. NAC also serves as a precursor to glutathione (GSH) which in turn, works as a substrate for numerous antioxidant enzymes. NAC had significantly increased chances of ovulation and pregnancy. [39][40]

#### 2. Chromium

Through a variety of methods, the mineral chromium seems to have positive benefits on IR. According to preclinical investigations, chromium may increase the activity of the skeletal muscle glucose transporters (GLUT4). It improves glucose levels and insulin sensitivity.[41] Chromium picolinate, on the other hand, helps to reduce hirsutism and relieve PCOS symptoms. Chromium supplementation has been linked to a considerable loss of body mass in the limited research that exist on PCOS patients.

#### 3. Melatonin

The pineal gland hormone known for helping to regulate sleep cycles, melatonin, also functions as an antioxidant and free radical scavenger. Melatonin supplementation has been shown to be beneficial for IR, hyperglycemia, and



dyslipidemia in preclinical models and a number of clinical investigations. Additionally, it has been demonstrated that people with PCOS have reduced melatonin levels in their follicles, which is crucial for follicle development, ovulation, and oocyte quality. Melatonin supplementation led to significantly increased total antioxidant capacity and GSH levels. For six months, people with PCOS who took 2 mg of melatonin every night had their levels of testosterone and anti-Mullerian hormone dramatically fall, while their levels of FSH significantly rise. melatonin may also be a beneficial alternative For PCOS-afflicted women in reproductive technology.[42]

### 4. Inositol

Inositols are organic substances (sugar alcohols) that can be found in a wide range of foods, plants, and eukaryotic and prokaryotic cells' tissues. Although the majority of the body's inositol requirements are satisfied by diet, inositols are regarded as non-essential nutrients because they are generated in the human body. Supplementation at doses ranging from 500 to 1500 mg daily improved hormonal parameters in all subjects. Improved menstrual regularity and acne was improved. [43][44]

## 5. Vitamin D

According to studies, vitamin D is involved in a number of metabolic processes, including the metabolism of insulin, and that a vitamin D deficiency can contribute to the aetiology of insulin resistance and PCOS. Although the exact mechanism causing this effect is yet unknown, it has been suggested that ovarian dysfunction may play a part in the systems that control apoptosis. [45] In addition, a deficiency of vitamin D may trigger inflammatory reactions that result in insulin resistance because of its immunomodulatory activity. Studies show that PCOS patients have low vitamin D levels. Consequently, adding vitamin D to supplements may help these patient's hormones and metabolism. Up to 85% of women with PCOS had serum 25-hydroxy vitamin D (25-OHD) levels below 20 ng/mL, and multiple studies have indicated that the average 25-OHD level in women with PCOS is between 11 and 31 ng/mL. Vitamin D deficiency is a typical finding in women with PCOS. [46] It is believed that IR, as well as the metabolic and endocrine abnormalities seen in PCOS, may be caused by a vitamin D deficit. vitamin D supplement had significantly increased 250HD levels, significantly decreased FBS and increase in adiponectin. No appreciable effects of vitamin D supplementation were observed in relation to BMI, blood pressure, fasting insulin levels, LDL, or TGs in women with PCOS. [47] Other minerals like magnesium, copper and selenium, also have the important role in Nutritional Supplements. Women with high levels of testosterone or insulin resistance, such as type 2 diabetes and metabolic syndrome, have been found to have lower magnesium levels. Therefore, raising magnesium levels appears to be helpful in modifying and improving insulin resistance.

#### Management of PCOS [48]

- A patient with an average build who is not very active, needs between 2,000 and 2,400 kcal per day in energy. Don't restrict this too much at first.
- 2. Activity frequently: Maintaining body weight can be achieved with 30 minutes of moderate exercise each day. For weight loss to occur, activity that is longer or more intense may be required.
- Limit your daily calorie intake to 30% fat and 510 percent total calories for saturated fat. Use dairy products and spreads with minimal fat.
- 4. Between 45 and 55 percent of the diet should initially consist of carbohydrates. Reduce your consumption of processed carbohydrates. Pay special attention to wholegrain, high-fiber, and low glycemic index (GI) foods.



- 5. A diet with more protein may increase satiety and insulin sensitivity. Start with 20 percent of your daily calories coming from protein, but if you have trouble controlling your appetite or staying at a healthy weight, you can up that amount by replacing it with carbohydrates.
- Refrain from consuming an excessive amount of red meat. Consume oily fish at least once a week to get the long-chain omega-3 polyunsaturated fatty acids you need.
- 7. Consume a minimum of five portions of fruit or vegetables each day. This maintains the diet's micronutrient content while promoting satiety and supplying fibre.
- 8. Consume three (at most four) meals per day and eat regularly. The breakfast meal is significant. Women with PCOS are recommended to take special precautions to avoid receiving very high doses of caffeine.
- Steer clear of high-calorie snacks because they increase insulin resistance and hunger. Make sure to count the drinks every day.

#### CONCLUSION

The conclusions of this systematic analysis show that healthy food with nutrition, dietary fiber and managing the lifestyle play an important role in women with PCOS. Weight loss should be the primary goal in all overweight women with PCOS, regardless of diet composition, by reducing dietary energy intake in the context of optimal nutritional intake and focus on physical activity. The effect of the various food elements on enhancing insulin sensitivity should receive specific consideration. Low levels of saturated fatty acids should be combined with average levels of saturated fatty acids with one double bond and omega-3 in a diet for PCOS-afflicted women. Consume enough fiber-rich foods including whole grains, legumes, veggies, and fruits. Furthermore some herbal medicines and nutritional supplements will used to manage the symptoms and to cure the PCOS

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