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Research Article

**PREGNANCY COMPLICATION AND ROLE OF LIFESTYLE  
MODIFICATION IN WOMEN WITH POLYCYSTIC OVARY  
SYNDROME**<sup>1</sup>Punam Kumari, <sup>2</sup>Sapna Pandey, <sup>3</sup>Ganesh Kuamr , <sup>4</sup>Priyanka Gupta, <sup>5</sup>Kshitiz Kumar<sup>1</sup>College of Pharmacy Shivalik campus, Dehradun,uttarakhand ,India.[sapnajoshi1919@gmail.com](mailto:sapnajoshi1919@gmail.com)**Article Received:** January 2023**Accepted:** February 2023**Published:** March 2023**Abstract:**

*PCOS (Polycystic ovary syndrome) is a common endocrine condition with reproductive and metabolic consequences, including anovulation, infertility. Women with PCOS usually experience pregnancy complications like gestational diabetes (GDM), gestational hypertension, preeclampsia, preterm and caesarean delivery. PCOS is a syndrome of ovarian dysfunction and its basic features include hyperandrogenism and polycystic morphology. lifestyle modifications are regarded as the cornerstone of all interventions against PCOS. Lifestyle modifications (including diet, exercise, sleep, and so on) are regarded to play roles in the development of PCOS by regulating insulin sensitivity and keeping the weight balanced as well as governing normal androgen production. In this review, we provide an overview of Pregnancy Complication with PCOS highlight some of the major consequences, and discuss preventive measures.*

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**INTRODUCTION:**

PCO (Polycystic ovary) is a condition and PCOS (Polycystic ovary syndrome) is a symptom [1, 2]. A pattern of symptoms belonging to a particular disease is defined as a syndrome [3]. Ovary of normal women who is in the age of her reproductive years has a volume of around 4-6 ml of each ovary and have a folded structure like a walnut, but if a woman is diagnosed with PCOS, her ovaries get enlarged and bulky with having more than 10ml of volume, thus it starts producing a high quantity of androgens [4-11]. Normal ovulating ovaries contain fluid-filled sacs called follicles, with variations in size from 1 to 30 millimeters, which depends on the phase of the menstrual cycle. The individual sac or follicle contains a tiny egg, which never matures enough to trigger ovulation. While in the polycystic ovary, there are more than 12 small follicles, measuring 2 to 9 millimeters in diameter, and are usually arranged in a 'pearl-necklace' manner around the periphery [12]. So, as the name suggests, poly means many, in polycystic ovary syndrome there are many small cysts like sacs that are filled with fluids and grown inside the ovaries and they do not need to be removed surgically.

**Features:**

The vital features of PCOS are excessive production of male hormones and having many cysts in the ovaries. However, a few common problems that women diagnosed with PCOS may include the following:

- Hirsutism: the presence of excess hair on the body
- irregular or missing periods
- heavy periods
- acne, oily skin, and other skin related problems
- hair loss and hair thinning from the scalp
- insulin resistance
- fertility problems
- body weight-related issues [3].

But these features do not rely on if a patient may have polycystic ovaries or may have PCOS. In 2003, a meeting was held by experts and they revised their concern about the PCOS, which later on they get their work published in 2004, which concluded: 'PCOS is a syndrome of ovarian dysfunction and its basic features include hyperandrogenism and polycystic morphology' [6]

The complication of gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), preeclampsia, premature delivery, lower neonatal birth weight is considered as adverse pregnancy outcomes [6].

**Pregnancy complication in women with PCOS:**

Women with PCOS usually experience pregnancy complications like gestational diabetes (GDM), gestational hypertension, preeclampsia, preterm and caesarean delivery.

Many psychological problems are also related to PCOS other than physical disturbances. [13,14] Hypertensive disease in pregnancy (HDP) occurs in 8% of PCOS pregnancies and there is an inconsistent association between them. GDM (gestational diabetes mellitus) complicates 40- 50% of PCOS pregnancies which is due to the inability of the pancreatic cells to beat the insulin resistance. Early pregnancy loss (EPL) happens in 30 to 50% of PCOS women as compared with 10 to 15% of normal women. The reason for EPL in PCOS women is elevated testosterone which down regulates the expression of HOXA10 gene, thereby reduces the uterine receptivity and implantation. Preterm birth complicates 6 to 15% of pregnancies of PCOS women. Preeclampsia itself could be a risk factor for preterm deliveries. [15]

Pregnancy complications	Non PCOS		PCOS		Chi square test	
	NO.	%	NO.	%	Chi Square Value	p-value
	Spontaneous Abortions	16	4.30	58	45.31	127.03
Gestational Diabetes	7	1.88	60	46.88	166.13	<0.001*
Gestational Hypertension	16	4.30	72	56.25	177.21	<0.001*
Preterm Labour	1	0.27	19	14.84	52.68	<0.001*

In this study, out of 128 women with PCOS 58 ended in spontaneous abortions (SAB) (45.31%), 60 had gestational diabetes (GDM) (46.88%), 72 had Gestational Hypertension (GHTN) (56.25%), 19 ended in preterm labour (PL) (14.84%). Among women without PCOS 16 had both GHTN and SAB (4.30%), 7 had GDM and 1 ended in preterm labour (0.27%), PCOS.

#### **Lifestyle modification:**

In recent years lifestyle modifications are regarded as the cornerstone of all interventions against PCOS. Lifestyle modifications are regarded as the first-line management for patients disturbed by overweight or obesity (16). The most effective interventions include applicable diet modifications, increased physical activity and exercise modifications, and strategies to maintain adherence (17). Lifestyle modifications also appear to draw the ovulation function (18) as well as the menstrual cycle (19) into a regular level, which subsequently increases the successful pregnancy rates in PCOS patients. The studies reported that almost half of the PCOS patients would gain improvement both in regular menstrual cycle and ovulation function depending on the lifestyle modifications. In addition, lifestyle modifications could provide improvements such as alleviation of anxiety and improved quality of life, particularly in obese female patients with PCOS. From the results, a healthy eating diet and involvement in educational programs would lead to more weight loss—for example, Oberg E found that in terms of behavioral intervention, minimal intervention would help people attain weight loss. The outcomes after diet modification, exercise modification, and the combination of diet with exercise are significantly different. A high-protein diet also leads to weight loss when compared with the standard protein diet (20). However, there was no significant difference between a vegan diet and a caloric diet. No significant difference was found between a low GI diet and a hypocaloric healthy eating diet.

#### **Mechanism of Lifestyle Modifications in PCOS:**

Lifestyle modifications (including diet, exercise, sleep, and so on) are regarded to play roles in the development of PCOS by regulating insulin sensitivity and keeping the weight balanced as well as governing normal androgen production. It was reported that lifestyle changes also appear to influence the restoration of ovulation and regular menstrual cycles and increased the pregnancy rates in overweight or obese anovulatory patients with PCOS. It is widely acknowledged that obesity is a *vita mediator* in the development of PCOS. The

level of sex-hormone-binding globulin is decreased in obese females (19), resulting in elevated androgen in the circulation and then in the target tissue, which disrupts normal ovulatory function (21). Additionally, obesity is associated with an elevated risk of metabolic syndrome, diabetes mellitus (type 2 diabetes), and insulin resistance in female bodies. Some studies compared the effects of lifestyle modifications with the effects of the combination of metformin and lifestyle modifications against PCOS and found that lifestyle modifications could reduce insulin resistance and increase the serum levels of sex-hormone-binding globulins when compared with metformin (22). Many studies also analyzed the effects of improved manifestations of PCOS by comparing the management of lifestyle modifications to the management of a combination of lifestyle modifications and other interventions (23). Negar reported their analysis based on 12 RCTs including 608 participants in which they witnessed a significant decrease in subcutaneous fat in subjects with “lifestyle (including daily physical activity, limited food intake, and so on) combined with metformin” compared with “lifestyle combined with placebo”. It was reported that both lifestyle modifications alone or a combination of lifestyle modifications and hormonal contraceptives have the potential to improve sexual function (24).

#### **Exercise Modifications:**

As increasing studies focus on the roles of physical activities in human health, the evidence showed that in the management of PCOS, exercise activities would help female patients gain benefits, and this view is becoming accepted among doctors and patients (25, 26). When considering the appropriate exercise activities to alleviate the symptom of PCOS, it is always puzzling how to set the appropriate exercise intensity and frequency. Recently, a meta analysis reported that improvements in health outcomes are more likely to be linked to the exercise intensity rather than the exercise itself. An RCT study indicated exercise modifications with vigorous intensity (eight consecutive weeks and three sessions of supervised exercise training each week for the final four consecutive weeks). Each session lasts approximately 60 min and will involve 40 min of an individualized exercise protocol performed either on a cycle ergometer or a motorized treadmill preceded by a 10-min warm-up and followed by a 10-min cooldown) might have a better impact on the outcomes of PCOS (insulin resistance decreased significantly) (27). On the contrary, PCOS patients are found to be more likely to stay sedentary rather than perform vigorous exercises. Moderate

aerobic exercise could also improve the insulin sensitivity of PCOS in the short term. Some other studies reported that women with PCOS could gain improvement, in terms of insulin sensitivity and abnormal androgen level, via vigorous aerobic exercise and resistance training (28). The minimum aerobic activity is recommended as more than 150 min per week, including intensive exercise for more than 90min (29).

#### **Diet Modifications:**

While it is recommended to reduce the calorie intake and induce weight loss among PCOS women with obesity, most of the current proposed recommendations regarding dietary modifications in PCOS are based on studies in obese women without PCOS. It was reported that there is limited evidence that any specific diet type is better than others (30). Some studies reported that once the intake of carbohydrates is less than 45% of the total daily calories, the low-carbohydrate diet might be helpful to decrease the body mass index as well as the serum levels of total cholesterol in PCOS subjects (31). Furthermore, studies indicate that maintaining the low-carbohydrate diet for more than 1 month could significantly increase the levels of follicle-stimulating hormone and sex-hormone-binding globulin (25). Even though some evidence indicates the effect of the low carbohydrate diet on PCOS, the definitive mechanisms to explain the relationship are still unclear. It is well acknowledged that metformin has similar effects in decreasing body weight. Some studies compared the effects of diet modifications with the effects of the combination of metformin and lifestyle modifications against PCOS. It was reported that diet modifications could reduce insulin resistance and increase the serum levels of sex-hormone-binding globulins when compared with metformin (26). What is more, weight loss could improve the features of PCOS patients regardless of dietary composition (32). Unfortunately, lifestyle modifications, including diet modifications, are seldom effective in the long run, which are in line with the results from the management of anti-obesity drugs. The unsatisfactory long-term results might be associated with the fact that the female subjects regain weight and fail to keep a normal body mass index (BMI).

#### **Weight Modifications**

While the complex clinical heterogeneity of PCOS brings up the lack of a clear understanding of obesity in PCOS, it is widely accepted that obesity would increase insulin resistance and hyperandrogenism. It was reported that just a minor weight loss of 5–10%

could play a role in significantly alleviating reproductive disorders (33), metabolic dysfunction, and even the psychological symptoms of PCOS patients (34). Thus, weight modification is recommended as a first step in the management of PCOS patients who are overweight or obese (35). If the PCOS patient is disturbed by infertility, it is recommended that women with PCOS and obesity should delay therapy against infertility and achieve the weight modifications first because obesity is linked to a higher risk of increased rates of miscarriage and preeclampsia in perinatal PCOS women. It is believed that PCOS patients who are overweight/obese are more likely to face mood disorders, including anxiety, depression, and so on (36). However, the degree of the increased risk of excess weight and the impact on the prevalence and severity of the features of PCOS remains unclear. Anti-obesity drugs, including orlistat, could also be considered in PCOS patients who cannot achieve weight modification with diet modification and exercise modification (35,37). Women with PCOS and normal weight and BMI also have an increased risk for metabolic disorders and chronic fatigue. A similar exercise program combined with diet modification is also recommended because these modifications could enhance insulin sensitivity (38,39). Moreover, more studies are needed on the effects of weight modifications on normal-weight patients with PCOS. Thus, it is recommended that females with PCOS pursue weight modifications and prevent excessive weight gain by weight monitoring and maintaining appropriate BMI and waist circumference.

#### **Sleep Modifications:**

It is important that psychological issues are considered as both a potential risk and a maintaining factor of illness, particularly in adolescent and young female subjects (40). As per the in-depth investigation and data analysis, a large proportion of psychological disorders with PCOS are sleep disorders. Since sleep disorders impact the development of PCOS, management relative to sleep modifications is considered an integral part of lifestyle modifications on females with PCOS. There is ample evidence that sleep deprivation is associated with an increased risk of insulin resistance and obesity as well as type 2 diabetes (41). The mechanisms of the associations have been proven to be linked to relative autonomic pathways, endocrine disorders, and inflammatory status, which are responsible for the development of PCOS (42). Therefore, it is plausible that sleep modifications are of great significance among PCOS patients. Some studies reported that women are more likely to be

disturbed by type 2 diabetes if the length of sleep is not more than 5 h per night when compared with women whose length of sleep ranges from 7 to 8 h per night. A study compared the quality of sleep by recording the percentage of rapid eye movement sleep via polysomnography and found that the percent sleep efficiency of obese females with PCOS is lower than that of not only normal-weight females but also obese adolescent females without PCOS (43). Ensuring adequate sleep with high quality would lead to a decreased risk of disturbance not only in obesity and insulin resistance but also in cardiovascular risk, suggesting that sleep modification could modify PCOS as an original modification.

#### **Mood Modifications:**

An increasing volume of evidence shows that both adolescent and adult females with PCOS are disturbed by mood disturbances, including depression and anxiety (44). It was reported that females with PCOS underwent a higher risk of depression, anxiety, and perceived stress when compared with women without PCOS (45). Since PCOS is linked to an increased risk of depression, anxiety, and some other mood disorders, screening and effective mood modifications for these disorders might be warranted. There are several shared links and connections between depression- and PCOS-associated abnormalities, such as excessive androgen secretion, insulin resistance as well as obesity. These shared connections between depression and PCOS might help in finding potential therapies for depression in PCOS (46). A kind of appropriate and applicable mood modification for the two treatments is regarded as the potential modification which could help females with PCOS to lead a better life.

#### **Yoga modification:**

Women with PCOS also suffer from emotional ill health, anxiety and depression. Medical yogatherapy is emerging as an effective modality in the management of much non-communicable disease. Yoga therapy also addresses psychological morbidity. Yoga has calming effect on the mind and body through balancing sympathetic and parasympathetic nervous system. Lifestyle modification including diet, exercise and weight loss is very important component of management of PCOS. 'Thus yoga results in multiple beneficial effects on neuroendocrine axis and facilitates adoption of healthier lifestyle addressing underlying hyperandrogenemia and insulin resistance in PCOS' (47). Due to disturbance in hypothalamo-pituitary-ovarian axis various symptoms like anxiety,

depression, insomnia, loss of concentration, acne, infertility etc. appears in syndrome. It is a psychosomatic disorder too, so it is important to provide psychic and somatic treatment also. Yoga is the complete prescription for the healthy body and mind which deals with the root cause of this disorder i.e., obesity and stress. 'Daily yoga with for thirty minutes with four asans, four pranayam, meditation, and shavasana helps in weight reduction and stress management, thus normalizing hypothalamo-pituitary-ovarian axis and curing polycystic ovary syndrome. Asans like suryanamaskar, paschimottan asan, bhujangasan, shalabhasan etc. helps in weight reduction and toxin excretion from the body. Pranayam and relaxing yoga posture like Shavasana, makarasana etc. helps curing stress' (48). Yoga and naturopathy therapy for twelve weeks improves ovarian morphology and anthropometric measurements (49). Regular mindful yoga practice can be used as complementary therapeutic option for women with PCOS. This lowers serum androgen (dehydroepiandrosterone) and free testosterone levels. Improvement occurs even in absence of weight loss and persists even if there is a lapse in practice (50).

#### **CONCLUSION:**

PCOS (Polycystic ovary syndrome) is a common endocrine condition with reproductive and metabolic consequences, including anovulation, infertility. Women with PCOS usually experience pregnancy complications like gestational diabetes (GDM), gestational hypertension, preeclampsia, preterm and caesarean delivery. PCOS is a syndrome of ovarian dysfunction and its basic features include hyperandrogenism and polycystic morphology. Lifestyle modifications are regarded as the cornerstone of all interventions against PCOS. Lifestyle modifications (including diet, exercise, sleep, and so on) are regarded to play roles in the development of PCOS by regulating insulin sensitivity and keeping the weight balanced as well as governing normal androgen production.

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