Hyperinsulinemia is one of the root causes behind PCOS. Treatment can include medications such as metformin, which improve insulin insensitivity. So doctors often prescribe the drugs which are used in the diabetic populationinking. The chances of pregnancy become low. Insulin resistance may occur, which causes acne, hirsutism and problem in ovulating. Insulin resistance means the body cells are resistant to insulin. The body, therefore, has to make extra insulin to compensate. Insulin resistance significantly aggravates all the features of PCOS. Education about how PCOS affects long-term health should be provided to women with this disorder to feel physical and psychological benefits so that they could engage themselves more with their health care providers.

**Keywords:** Polycystic ovarian syndrome, Hyperinsulinemia, Hormone disbalance, Hirsutism, Ovarian cyst, Obesity, Sleep disorders.

**INTRODUCTION**

Polycystic ovarian syndrome (PCOS), Stein–Leventhal syndrome, or hyperandrogen anovulation syndrome is a common hormonal condition which was first diagnosed by physicians in 1930. It is called a syndrome because it refers to a number of symptoms which are experienced at the same time. It is both emotionally and physically challenging. In the 20th century, polycystic ovarian disease condition was poorly understood. On 23 December, 2012, National Institutes of Health held a conference on this disorder and sponsored an evidence-based methodology workshop which clarifies its benefits, drawbacks, causes, predictors, long-term consequences and prevention strategies. Hormones are chemical messengers that trigger many processes including growth, development, and energy production; their job is to signal the release of other hormones. During each menstrual cycle, follicles develop and form eggs, one of which is released during ovulation. After this process, the follicles break down and disappear. With PCOS, these follicles stop growing and become cyst. Polycystic ovarian disease (PCOD) is a health issue in which female sex hormones get disturbed, 12 or more tiny cysts in ovaries make a tiny amount of androgen (male sex hormone) that causes irregular periods. PCOS causes unwanted changes in the appearance of women and overtime, can lead to serious health problems such as heart diseases, diabetes, high cholesterol, and high blood pressure. PCOS is affecting 1 out of 15 females in the teen year and 25–30% in young women. It affects approximately 5 million women in the United States and also affects 11-year-old girls during puberty. In young girls, it causes acne, weight gain, facial hairs, male pattern baldness (alopecia) and affects their self-esteem, while in women it manifests an inability to conceive (infertility) [1-5].

In PCOS, ovulation does not occur properly in the young women due to which egg does not come out each month, progesterone is not made and the chances of pregnancy become low. Insulin resistance may occur, so doctors often prescribe the drugs which are used in the diabetic patients such as metformin, which improve insulin insensitivity. Hyperinsulinemia is one of the root causes behind PCOS. Treatment can control the long-term problems and can cause the patient to ovulate. Other organs which are affected by PCOS are liver, heart, muscles, blood vasculature, and pancreas [6-10].

**SYMPTOMS**

The symptoms of PCOS usually become apparent in teens and early 20s. It varies from women to women. Symptoms can vary from mild to severe conditions. The common symptoms of PCOS include unpredictable or irregular periods, many small cysts in the ovaries, high level of androgen and prolactin hormones, acne (occur after adolescence and does not respond to usual treatment), rapid weight gain, difficulty in losing weight, hirsutism (excess hair growth on face, chest, abdomen, upper thighs, back or buttocks, affect 70% of women with PCOS), mental health problems, metabolic dysfunction, difficulty getting pregnant, thinning hair and hair loss from the head, oily skin, depression and mood changes, patches of thickened velvety, darkened skin on the neck, arms, breast or thighs which is known as Acanthosis nigricans, pelvic pain and sleep apnea (breathing stops for short period of time), obesity (80% of women with PCOS are obese), fatigue (very low energy level all the time) [11-15].

**CAUSES**

The exact cause of PCOS is not unknown but thought to be related with abnormal hormonal balance. In PCOS, women make more androgen than normal. High level of androgen affects the development and release of egg during ovulation. Hyperinsulinemia is also linked with PCOS. Insulin is a hormone, produced by the pancreas that regulates and controls the change of sugar, starches, and other food into energy. It moves the sugar from blood into cells; where sugar is broken down to liberate energy. Insulin resistance means the body cells are resistant to insulin. The body, therefore, has to make extra insulin to compensate. High insulin produces too much of testosterone hormone which further affects ovulation. Excess insulin produces androgen, which further causes acne, hirsutism and problem in ovulating. Insulin resistance makes PCOS symptoms worse by inducing weight gain in females, which lead to excess fat. Others hormones, such as luteinizing hormones (LH) (which stimulates ovulation), prolactin (hormone that stimulates...
breast glands to produce milk), and sex hormone binding globulin, are also raised in PCOS. Raised levels of LH have abnormal effects on ovaries. Low levels of Sex hormone binding globulin decrease the high level of testosterone. PCOS runs in progeny sometimes, if mother, sister or aunt, have PCOS then its risk is often increased. Genes which are linked in this disorder are not identified yet. Recently, Genome Wide Association Studies have identified some genes that merit further studies. Every individual experiences this syndrome in the context of her own reproductive health and quality of life concern [16-20] (Fig. 1).

**DIAGNOSIS**

Doctor takes medical history (menstrual periods, weight changes, etc.) and physical exam (blood pressure, body mass index [BMI], and waist size) [21-24]. He will also check areas of increased hair growth. He might check ovaries, if they are enlarged or swollen by the increased number of small cysts. Blood test is done to check cortisol, insulin, thyroid hormone, androgen, dehydroepiandrosterone sulfate, glucose, levels, LH and follicle stimulating hormone, examination of the endometrium (lining of the womb) This lining becomes thick, which is known as endometrial hyperplasia, if periods are not regular. This condition increases the risk of endometrial cancer. Serious health problems associated with PCOS are risk of heart attacks, high blood pressure (4-7 times more than normal female), metabolic syndrome, diabetes or pre-diabetes in 50% of women before 40 years of age. High level of low-density lipids cholesterol and low level of high-density lipids [25-30].

**TREATMENT**

Until now, PCOS is considered as incurable disorder, it is managed to prevent problems. Treatment is tailored according to symptoms, health problems or whether she wants to get pregnant or not. Some treatments are lifestyle modifications such as physical exercise (30 minutes, at least, 3 times a week) to reduce weight and obesity, even a weight loss of 10-15 pounds is useful in regulating proper menstrual cycle, eating healthy food, maintain BMI (between 19 and 25). Healthy tips include limited processed food and food with added sugars. The addition of whole grain products, lean meats, fruits in diet, helps to lower blood glucose level, improves insulin level and normalizes hormone level in the body. Healthy fats and protein over butter, mayonnaise, red meat, etc. can be given. Sugar-free drinks like water, diet soda and flavored water should be given instead of sugary drinks. A 10% loss in bodyweight helps in normal period and makes the menstrual cycle more regular. Birth control pills (which are the combination of estrogen and progestin) help to clear acne and control menstrual cycle more regular. Birth control pills (which are the combination of estrogen and progestin) help to clear acne and control menstrual cycle more regular. Birth control pills (which are the combination of estrogen and progestin) help to clear acne and control menstrual cycle more regular.

**DIABETES/CVS**

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**PCOS, AFFECTING PREGNANT WOMEN**

Pregnant women have higher rates of miscarriage, gestational diabetes, premature delivery, pregnancy-induced high blood pressure (preeclampsia) with PCOS. Babies have a higher risk of spending time in neonatal intensive care unit during or after birth. Metformin lowers androgen level in pregnant women and does not cause birth defects. Drugs like troglitazone showed improved results in this disorder, but now its use is taken off in the market because it causes liver problem. Glucocorticoids 5-7.5 mg, Prednisolone once or twice daily have shown to improve hirsutism in women and congenital adrenal hyperplasia [39-42]. Overdosing can lead to weight gain, decreased bone mineral density. Gonadotropin-releasing hormone agonist is effective and expensing method in severe insulin resistance. It suppresses pituitary hormones to reduce facial hair, laser hair removal or electrolysis. Laser hair removal damage hair follicles but is harmful too as it has a potential for depigmentation and scarring in darker skinned women [35-38]. Bariatric (weight loss) surgery is also very effective in PCOS. Drugs like metformin lowers androgen level in pregnant women and does not cause birth defects. No one is quite sure what causes this syndrome. It is a result of both genetic and environmental factors. PCOS refers to the enlarged ovaries that contain tiny cysts. Women dealing with the challenges of PCOS should banish negative self-talk, self-critical thoughts and should start treating themselves with a worthwhile person to improve their self-esteem. Stop taking too much of stress, which could be a main cause of PCOS. Overall further researches are necessary for this complex condition. Scientist is trying to better understand this disorder, which is defined an excess production of male hormones, irregular ovulation, and cyst.

![Fig. 1: Causes of polycystic ovarian syndrome](image_url)
Insulin sensitivity in women with polycystic ovary syndrome. Weight loss results in significant improvements in pregnancy outcome for all forms of fertility treatment. J Clin Endocrinol Metab 2005;90(2):634-5.


et al. Postmenopausal women with a history of irregular menses and elevated androgen measurement at high risk of worsening cardiovascular event -free survival: Results from the National Institutes of Health—National Heart, Lung, and Blood Institute sponsored Women’s Ischemia Syndrome Evaluation. J Clin Endocrinol Metab 2006;91(7):2676-84.


