

A review on polycystic ovarian syndrome

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I. INTRODUCTION:

Polycystic ovary syndrome (PCOS) is one of the most common endocrine and metabolic disorders in premenopausal women. Polycystic ovary syndrome (PCOS), also known as polycystic ovarian syndrome, is a common health problem caused by an imbalance of reproductive hormones. The hormonal imbalance creates problems in the ovaries. The ovaries make the egg that is released each month as part of a healthy menstrual cycle. With PCOS, the egg may not develop as it should or it may not be released during ovulation as it should be. PCOS can cause missed or irregular menstrual periods. Irregular periods can lead to infertility (inability to get pregnant). In fact, PCOS is one of the most common causes of infertility in women and Development of cysts (small fluid-filled sacs) in the ovaries.

Etiology:

The exact cause of pcos is unknown. Factors that might play a role include:

Obesity:

Obesity is a common finding in women with PCOS and between 40–80% of women with this condition are reported to be overweight or obese. Obesity is thought to exacerbate the symptoms of hyperandrogenism and hyperinsulinemia. Reproductive disturbances are more common in obese women regardless of the diagnosis of PCOS. Obese women are more likely to have menstrual irregularity and anovulatory infertility than normal-weight women. In reproductive-age women, the relative risk of anovulatory infertility increases at a BMI of 24 kg/m² and continues to rise with increasing BMI. Being above a healthy weight worsens insulin resistance, which is also thought to be a key part of the development of PCOS, and the symptoms of PCOS. Excess weight increases both the hormones responsible for PCOS symptoms.

Diabetes:

Diabetes has been produced to describe the disease which is due to a dysfunction of the ovary, whereby the ovary does not process the FSH and LH from the brain appropriately so that ovulation does not occur resulting in the diversion to the testosterone pathway, leading to excess testosterone with various emphases on clinical or biochemical hyperandrogenism, polycystic ovaries, and oligo anovulation.

Insulin resistance:

Insulin resistance is a common finding in PCOS that is independent of obesity. Insulin-mediated glucose disposal, reflecting mainly insulin action on skeletal muscle is decreased by 35–40% in women with PCOS compared to weight comparable reproductively normal women. Fasting insulin levels are increased in PCOS. Because the insulin is not working effectively, the body reacts by producing more insulin. Higher levels of insulin increases the production of androgens, such as testosterone, in the ovaries. Insulin resistance is caused in part by lifestyle factors – including being overweight, because of diet or physical inactivity. But insulin resistance can also be caused by genetic factors and can occur in women of all weight ranges. Evidence shows that in women with PCOS, about 95% of those with unhealthy weight and about 75% of those who are lean, have insulin resistance.

Family history:

Women with PCOS are 50% more likely to have an immediate female relative – mother, aunt, sister or daughter – with PCOS. Type 2 diabetes is also common in families of those with PCOS.

Hormone levels:

An imbalance in the body of the hormones insulin and androgens (male-type hormones, such as testosterone) causes the symptoms and signs of PCOS. One of the roles of insulin in the body is to keep levels of glucose (sugar or energy) in the blood from rising too high after eating. It does this by ‘unlocking’ the body’s

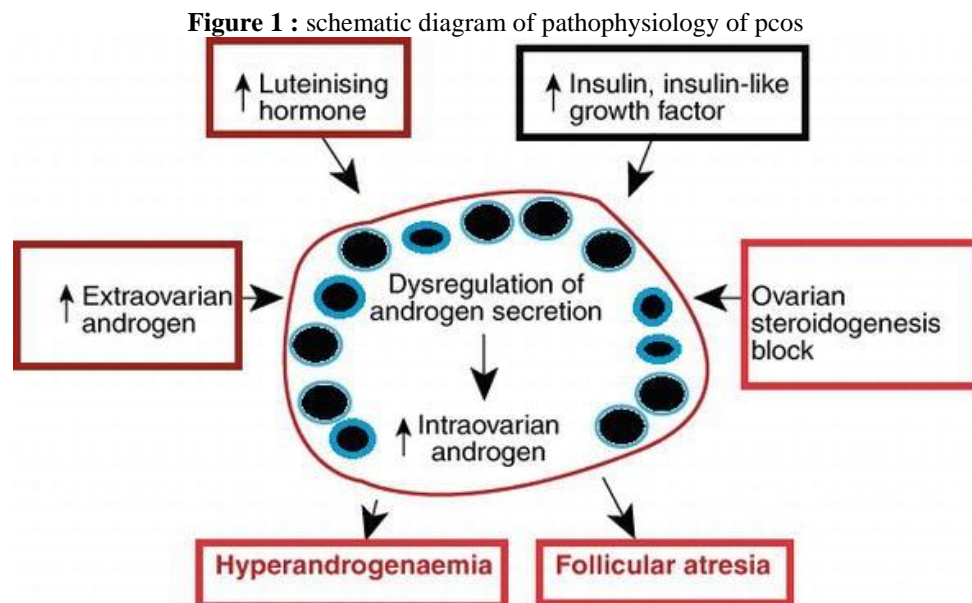
cells and allowing glucose to pass from the blood into the cells. This brings down the levels of glucose in the blood.

Androgens:

Increased levels of androgens in women with PCOS cause symptoms such as excessive body hair growth, scalp hair loss and acne. They also contribute to symptoms such as irregular periods and irregular ovulation.

Pathophysiology:

The ovarian tissue in women with PCOS remains sensitive to the action of insulin, although there is a systemic resistance to insulin. Ovarian stimulation seems to involve a signal transduction system other than glucose transport, in particular a different second messenger, probably inositol phosphoglycan. Insulin and insulin-like growth factor 1 (IGF-1) are important regulators of ovarian function and directly and indirectly affect ovarian steroidogenesis and androgenic status. Insulin acts directly on the ovarian cells of the theca by activating cytochrome P450 c17alpha hydroxylase and 17,20-lyase activity (key enzyme in the synthesis of androgens) and also synergistically promotes the synthesis of androgen induced by the LH. Insulin acts indirectly by suppressing the circulating levels of sex hormone-binding globulin (SHBG), resulting in increased free testosterone, and the fraction of the bioavailable hormone for tissues. Finally, insulin may suppress liver synthesis of IGF-1-binding protein (IGFBP-1), thereby increasing the bioavailability of IGF-1, another important regulator of androgenic ovarian synthesis. It also appears that insulin may act at the hypothalamus level by modifying the pulsed secretion of LH, thus also affecting ovarian steroidogenesis. (Figure 1)



Clinical presentation:

Symptoms of PCOS may begin shortly after puberty, but can also develop during the later teen years and early adulthood. Because symptoms may be attributed to other causes or go unnoticed, PCOS may go undiagnosed for some time. People with PCOS typically have irregular or missed periods as a result of not ovulating. Although some people may develop cysts on their ovaries, many people do not.

Periods:

Although some women with PCOS have regular periods, high levels of androgens and insulin can disrupt the monthly cycle of ovulation (when eggs are released) and menstruation. As menstrual cycles lengthen, ovulation can stop entirely (called ‘anovulation’) or occur only occasionally. Some women with PCOS also experience heavier or lighter bleeding during their cycle.

Infertility:

In women with PCOS, high levels of androgens and insulin can affect the menstrual cycle and prevent ovulation (the release of a mature egg from the ovary). Ovulation can stop completely (anovulation), or it can occur irregularly. This can make it more difficult for women with PCOS to become pregnant naturally, however, this does not mean that all women with PCOS are infertile. Women with PCOS can also have a greater risk of pregnancy complications once they are pregnant.

Excess hair :

Hirsutism' is excess hair growth on the face and body due to high levels of androgens stimulating the hair follicles. This excess hair is thicker and darker than normal. The hair typically grows in areas where it is more usual for men to grow hair, such as the sideburn region, chin, upper lip, around the nipples, lower abdomen, chest and thighs.

Hair loss:

For some women with PCOS, the high level of androgens causes hair loss or thinning of the scalp hair in a 'male-like' pattern.

Skin conditions:

Women with PCOS can also develop skin tags, which are thickened lumps of skin that typically occur in the armpits, on the neck or along the bra line. Rough, dark, velvety patches of skin can also develop in women with PCOS. These occur in the armpits or neck area, and are called acanthosis nigricans.

Psychological effects:

Coping with hirsutism, severe acne, weight changes and fertility problems can affect your body image, self-esteem, sexuality and femininity. This can add to depression and anxiety levels. Problems with fertility can have an impact on your mood, particularly if fertility has been a concern for a long time.

Weight:

Many women with pcos have difficulty in managing their weight. Increased weight can lead to higher levels of androgen and insulin resulting in worsen conditions.

Types of pcos:

INSULIN-RESISTANT TYPE OF PCOS:

With insulin resistant PCOS you have a decreased ability to properly manage your blood sugar. Too much insulin can impair ovulation and tells the ovaries to produce more testosterone instead of estrogen. It also stimulates your pituitary gland to make more luteinizing hormone. Balancing blood sugar is very important here with an insulin-resistant type of PCOS.

INFLAMMATORY TYPE OF PCOS:

With an inflammatory type of PCOS you can see just that – inflammation in the body. Signs in your body of inflammation include digestive issues like IBS, unexplained fatigue, headaches, joint pain, skin conditions like eczema or psoriasis, or even food sensitivities. You can test a marker called high sensitivity C-reactive protein (hsCRP) to check for the level of inflammation in your body if you suspect you may have an inflammatory type of PCOS.

POST-PILL TYPE OF PCOS:

If your periods were normal before taking hormonal birth control and now you meet the diagnostic criteria for PCOS you may have the post-pill type of PCOS. If you had experienced PCOS symptoms before going on the pill, but never received a formal diagnosis it's possible you had PCOS before going on the pill.

ADRENAL TYPE OF PCOS:

If DHEA-S is your only high androgen this can indicate an adrenal type of PCOS as DHEA-S is your adrenal androgen (testosterone is produced in the ovaries). With this one you want to check your prolactin levels and to rule out another condition that presents similarly to PCOS called nonclassic congenital adrenal hyperplasia (NCAH). The adrenal type of PCOS is driven by an abnormal stress response versus an impaired insulin or blood sugar response as seen in the insulin-resistant type of PCOS.

HIDDEN CAUSE TYPE OF PCOS:

Other drivers that can result in a hidden cause type of PCOS include thyroid disease because hypothyroidism affects ovulation and can worsen insulin resistance, deficiencies in vitamin D, zinc, or iodone, because your ovaries need these nutrients, or elevated prolactin because it can increase DHEA. With these hidden drivers once you fix the root cause your symptoms should improve pretty quickly.

LEAN TYPE OF PCOS:

While weight struggles can be a symptom of PCOS (especially with insulin-resistant type of PCOS), it's entirely possible to have a lean type of PCOS in a lean body as well.

Diagnosis:

Diagnosis can generally be accomplished with a careful history, physical examination, and basic laboratory testing, without the need for ultrasonography or other imaging. Hyperandrogenism can be diagnosed clinically by the presence of excessive acne, androgenic alopecia, or hirsutism (terminal hair in a male-pattern distribution); or chemically, by elevated serum levels of total, bioavailable, or free testosterone or dehydroepiandrosterone sulfate.²³ Measurement of androgen levels is helpful in the rare occasion that an androgen-secreting tumor is suspected (e.g., when a patient has marked virilization or rapid onset of symptoms associated with PCOS).Ovulatory dysfunction refers to oligomenorrhea (cycles more than 35 days apart but less than six months apart) or amenorrhea (absence of menstruation for six to 12 months after a cyclic pattern has been established)A polycystic ovary is defined as an ovary containing 12 or more follicles (or 25 or more

follicles using new ultrasound technology) measuring 2 to 9 mm in diameter or an ovary that has a volume of greater than 10 mL on ultrasonography.

TREATMENT:

PCOS treatment focuses on managing factors such as infertility, hirsutism, acne or obesity. Specific treatment might involve lifestyle changes or medication.

MEDICATIONS:

Hirsutism and acne

Contraceptive pills are frequently effective in reducing hirsutism. A common choice of contraceptive pill is one that contains cyproterone acetate which is a progestogen with anti-androgen effects that blocks the action of male hormones that are believed to contribute to acne and the growth of unwanted facial and body hair. On the other hand, progestogens such as norgestrel and levonorgestrel should be avoided due to their androgenic effects. Other drugs with anti-androgen effects include flutamide and spironolactone which can give some improvement in hirsutism. Metformin can reduce hirsutism and reduce insulin resistance, Eflornithine is a drug which is applied to the skin in cream form and acts directly on the hair follicles to inhibit hair growth.

Infertility:

Not all women with PCOS have difficulty becoming pregnant. For those who do, anovulation or infrequent ovulation is a common cause. Other factors include changed levels of gonadotropins, hyperandrogenemia and hyperinsulinemia. For overweight anovulatory women with PCOS, weight loss and diet adjustments, especially to reduce the intake of simple carbohydrates, are associated with resumption of the normal ovulation. Anti-diabetes medication metformin was the recommended treatment for anovulation, but it appears less effective than clomiphene. Assisted reproductive technology procedures such as controlled ovarian hyper-stimulation with FSH injections followed by in vitro fertilization are used for patients who do not respond to clomiphene, diet and lifestyle modification

Menstrual irregularity and endometrial hyperplasia:

menstruation can usually be regulated with contraceptive pills. There is no medical requirement for regular periods, so long as they occur sufficiently often. If menstruation occurs less often or not at all, some form of progestogen replacement is recommended. Some women prefer a uterine progestogen device such as the intrauterine system or the progestin implant, which provides simultaneous contraception and endometrial protection for years. An alternative is oral progestogen taken at intervals (e.g., every three months) to induce a predictable menstrual bleeding [

Alternative medicine:

Acupuncture is one of the alternative medicine modalities that had been emerging as one of the commonly used methods for treatment of PCOS. Acupuncture may help PCOS patients to regulate and manage their periods, it may help in decreasing body weight, reducing headache and improving patients' mood. Also, placing acupuncture needles in the areas related to the reproductive system may improve blood supply to the reproductive area, normalize hormone levels and help the proper functioning of the reproductive system.

Surgery:

Laparoscopic ovarian drilling (Ovarian diathermy):

Laparoscopic ovarian drilling is a surgical treatment that can trigger ovulation in women who have polycystic ovary syndrome (PCOS). Electrocautery or a laser is used to destroy parts of the ovaries. This surgery is not commonly used. But it can be an option for women who are still not ovulating after losing weight and trying fertility medicines. Ovarian drilling is usually done through a small incision (laparoscopy), with general anesthesia. The surgeon makes a small cut (incision) in the abdomen at the belly button. The surgeon then places a tube to inflate the abdomen with a small amount of carbon dioxide gas so that he or she can insert the viewing instrument (laparoscope) without damage to the internal organs. The surgeon looks through the laparoscope at the internal organs. Surgical instruments may be inserted through the same incision or other small incisions in the pelvic area. Because the incisions are so small, laparoscopy is often called "Band-Aid surgery."

Lifestyle changes :

Maintain a healthy weight:. Weight loss can reduce insulin and androgen levels and may restore ovulation.

Limit carbohydrates. Low-fat, high-carbohydrate diets might increase insulin levels. Choose complex carbohydrates, which raise your blood sugar levels more slowly.

Exercise : it helps lower blood sugar levels. increasing your daily activity and participating in a regular exercise program may treat or even prevent insulin resistance and help you keep your weight under control and avoid developing diabetes.

II. CONCLUSION:

Polycystic ovarian syndrome is one of the most prevalent disorders with endocrine and metabolic problems. Pcos in adolescent girls have greater chance of infertility. Early diagnosis is important in pcos management. Weight loss and lifestyle changes are important therapeutic priority, especially during adolescence. Management of signs and symptoms is prior as exact etiology is unknown. Early diagnosis and treatment along with weight loss may reduce the risk of long term complications such as type 2 diabetes and heart disease. Metformin has been proposed as an insulin reducing agent and for hirsutism. The new guidelines for PCOS recommend screening for glycemic status every 1–3 years and in high risk women with PCOS, including women with a BMI >25 kg/m², an oral glucose tolerance test is recommended. Even when lifestyle factors are similar to normal women, pcos women with obesity have risk of developing type 2 diabetes mellitus than women with hyperandrogenism. It is the most common endocrine condition affecting between 8 and 13% of women of reproductive age and 6–18% of adolescent girls.

REFERENCES:

- [1]. Umland EM, Weinstein LC, Buchanan EM. Menstruation-related disorders. In: DiPiro JT, Talbert RL, Yee GC, et al., editors. *Pharmacotherapy: A Pathophysiologic Approach*. 8th ed. New York: McGraw-Hill; 2011. P. 1393.
- [2]. Lin LH, Barakat MC, Gustavo AR, et al. Androgen receptor gene polymorphism and polycystic ovary syndrome. *Int J Gynaecol Obstet*. 2013;120:115–118.
- [3]. Pache TD, Fauser BC. Polycystic ovaries in female-to-male transsexuals. *Clin Endocrinol (Oxf)*. 1993;39(6):702–703
- [4]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC286198>
- [5]. Wang R, Mol BW: The Rotterdam criteria for polycystic ovary syndrome: evidence-based criteria? *Hum Reprod*. 2017;32(2):261
- [6]. Marx TL, Mehta AE. Polycystic ovary syndrome: Pathogenesis and treatment over the short and long term. *Cleve Clin J Med*. 2003;70(1):31–33. 36–41, 45.
- [7]. Strauss JF. Some new thoughts on the pathophysiology and genetics of polycystic ovary syndrome. *Ann NY Acad Sci*. 2003;997:42–48.
- [8]. Teede H, Deeks A, Moran L. Polycystic ovary syndrome: a complex condition with psychological, reproductive and metabolic manifestations that impacts on health across the lifespan. *BMC Med*. 8, 41 (2010).
- [9]. Bhattacharya SM, Jha A. Comparative study of the therapeutic effects of oral contraceptive pills containing desogestrel, cyproterone acetate, and drospirenone in patients with polycystic ovary syndrome. *Fertil Steril*. 98 (4), 1053–1059 (2012).
- [10]. Lumachi F, Basso SM. Medical treatment of hirsutism in women. *Curr Med Chem*. 17(23), 2530–2538 (2010).
- [11]. <https://academic.oup.com/jes/article/3/8/1545/5518341>
- [12]. Fauser BC, Tarlatzis BC, Rebar RW, Legro RS, Balen AH, Lobo R et al. Consensus on women's health aspects of polycystic ovary syndrome (PCOS): the Amsterdam ESHRE/ASRM-Sponsored 3rd PCOS Consensus Workshop Group. *Fertil Steril*. 2012 Jan;97(1):28–38.
- [13]. <https://www.sciencedirect.com/science/article/pii/S2590161319300948>
- [14]. <https://pubmed.ncbi.nlm.nih.gov/29569621/>
- [15]. Bassim Alsadi (May 30th 2018). Polycystic Ovary Syndrome, Pathophysiology, and Reproductive Health Implications, Pathophysiology – Altered Physiological States, David C. Gaze, IntechOpen, DOI: 10.5772/intechopen.70848
- [16]. <https://www.womenshealth.gov/a-z-topics/polycystic-ovary-syndrome>
- [17]. Nestler JE, Jakubovicz DJ. Lean women with polycystic ovary syndrome respond to insulin reduction with decrease in ovarian p450c17 alpha activity and serum androgens. *Clinics in Endocrinology and Metabolism*. 1997;82:4075–4079
- [18]. <https://www.jeanhailes.org.au/health-a-z/pcos/symptoms-causes>
- [19]. Fritz MA, Speroff L (2011). Induction of ovulation. In *Clinical Gynecologic Endocrinology and Infertility*, 8th ed., pp. 1293–1330. Philadelphia: Lippincott Williams and Wilkins.
- [20]. Dunaif A. Insulin resistance and polycystic ovary syndrome: Mechanisms and implications for pathogenesis. *Endocrine Reviews*. 1997;18:774–800
- [21]. Teede HJ, Misso ML, Costello MF, Dokras A, Laven J, Moran L, Piltonen T, Norman RJ, Andersen M, Azziz R et al. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. *Fertil Steril* 2018;110:364–379.
- [22]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6964225/>
- [23]. Bozdag G, Mumusoglu S, Zengin D, Karabulut E, Yildiz BO. The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. *Hum Reprod*. 2016;31(12):2841–55.
- [24]. Alexia S. Pena, Selma F. Witchel, Helena Teede. Adolescent polycystic ovary syndrome according to the international evidence-based guideline. 2020 march