

PCOS: Causes and treatment

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Abstract: For women, it is the most prevalent hormonal condition. The term refers to the process by which the follicles responsible for ovulation develop into numerous tiny sacs because they are imprisoned just beneath the surface of the ovaries and are unable to release eggs.

The brain's pituitary gland secretes the hormones FSH and LH, which regulate when ovulation occurs, in a healthy state. The hormones progesterone and estrogen secreted by the ovary prime the uterus for the egg. The male hormone androgen is also secreted by the ovary.

In polycystic ovary syndrome, the ovary secretes high amounts of androgen, a male hormone, and the pituitary gland secretes high amounts of LH. This causes the menstrual cycle to be delayed or skipped, making it difficult to become pregnant and causing acne and increased facial and body hair.

The study concluded with a set of results, the most important of which was that the best way to treat polycystic ovary syndrome is to control it by following a healthy lifestyle and taking some medications recommended by your doctor. The study also found that there is an abnormality in the ovarian cells - most likely theca cells - that is the cause. The main cause of polycystic ovary syndrome

Keywords: PCOS, Hyperandrogenism, insulin resistance, metformin.

تشخيص وعلاج تكيس المبايض

الدكتورة / سعاد فرج محمد دعدوش

كلية الطب | جامعة المرقب | ليبيا

المستخلص: بالنسبة للنساء، في الحالة الهرمونية الأكثر انتشارًا. يشير مصطلح متلازمة تكيس المبايض إلى العملية التي تتطور من خلالها الجريبات المسؤولة عن الإباضة إلى العديد من الأكياس الصغيرة لأنها محصورة تحت سطح المبيضين مباشرة وغير قادرة على إطلاق البويضات.

تفرز الغدة النخامية في الدماغ هرموني FSH وLH، اللذين ينظمان عملية الإباضة في الحالة الصحية. هرمونات البروجسترون والإستروجين التي يفرزها المبيض هي التي تهيئ رحم البويضة. يفرز المبيض أيضًا هرمون الأندروجين الذكري.

في متلازمة المبيض المتعدد الكيسات، يفرز المبيض كميات عالية من الأندروجين، وهو هرمون ذكري، وتفرز الغدة النخامية كميات عالية من LH. يؤدي ذلك إلى تأخير الدورة الشهرية أو تخطئها، مما يجعل من الصعب الحمل ويسبب حب الشباب وزيادة شعر الوجه والجسم.

وخلصت الدراسة إلى مجموعة من النتائج أهمها أن أفضل طريقة لعلاج متلازمة المبيض المتعدد الكيسات هي السيطرة عليها من خلال اتباع نمط حياة صحي وتناول بعض الأدوية التي أوصى بها طبيبك. ووجدت الدراسة أيضًا أن هناك خللاً في خلايا المبيض - على الأرجح خلايا القراب - وهذا هو السبب. السبب الرئيسي لمتلازمة المبيض المتعدد الكيسات

الكلمات المفتاحية: متلازمة تكيس المبايض، فرط الأندروجينية، مقاومة الأنسولين، الميتفورمين.

Introduction:

One of the most prevalent disorders affecting women is polycystic ovarian syndrome (PCOS), it has many unknown causes this syndrome is recognized as a heterogeneous disorder that results Excessive production of androgens, primarily by the ovaries associated with insulin resistance.

The metabolic disorders in PCOS may be associated with an increased risk of cardiovascular disease, and most women experience menopause.

The causes of PCOS are unknown, and it can be controlled by lifestyle, physical activities, and some medications, and this is what we will discuss in this study.

Objectives of the study:

- Learn about PCOS, and how to diagnose this syndrome.
- Know the causes of PCOS, ways to manage it, and how to treat it.

Polycystic ovary syndrome (PCOS):

A collection of symptoms associated with a hormonal imbalance known as PCOS can have a significant impact on both men and women of reproductive age. It consists of a variety of androgen excess symptoms.⁽¹⁾

PCOS is characterized by insulin resistance and associated hyperinsulinemia and weight gain, these factors contribute greatly to the increase in androgens.⁽²⁾

What distinguishes PCOS is that the menstrual cycle in women is irregular, in addition to hyperandrogenism and the distinctive results on pelvic ultrasound. Women suffer from poor metabolism, obesity and infertility, which increases the risk of pregnancy complications and cardiovascular diseases in the long term.

This syndrome is complex, intertwined and multifactorial, so the diagnosis is based on the identification of the characteristics of the syndrome after excluding known disorders affecting ovulation or hyperandrogenism.⁽³⁾

PCOS increases the risk of cardiovascular disease and diabetes.

One of the most important steps is to manage these cases is to lose at least 5% of weight, so he recommends following a regular exercise plan and a fat- and sugar-free diet for every woman with PCOS.⁽⁴⁾

About 6–15% of women of childbearing age are significantly affected by PCOS, which causes infertility, irregular menstruation, hyperandrogenism, insulin resistance, abnormal glucose tolerance, and a risk of developing type 2 diabetes because insulin resistance causes hyperinsulinism, which disrupts the ovaries' normal function and ovulation rate.

Although the cause of PCOS is unknown, there are a few probable causes, such as hereditary genes that are inherited from parents or even ancestors. Women with PCOS experience facial acne, hair loss, and scalp thinning, which makes them more susceptible to baldness, though not to the same extent as men.⁽⁵⁾

Irregular or nonexistent menstrual cycles are just one of the symptoms that can result from PCOS, a hormonal disease, and other symptoms are included:

- Weight gain, especially around the waist.
- Infertility
- Acne
- Excessive body and facial hair

(1) Polycystic Ovary/Ovarian Syndrome (PCOS), National institutes of health, 2019, p.1

(2) The polycystic ovary syndrome: a position statement from the European Society of Endocrinology, Gerard Conway, and others, European Journal of Endocrinology, European Journal of Endocrinology (2014) 171, P.2

(3) Current Guidelines for Diagnosing PCOS, Jacob P. Christ, and Marcelle I. Cedars, Diagnostics 2023, 13, 1113, p.1

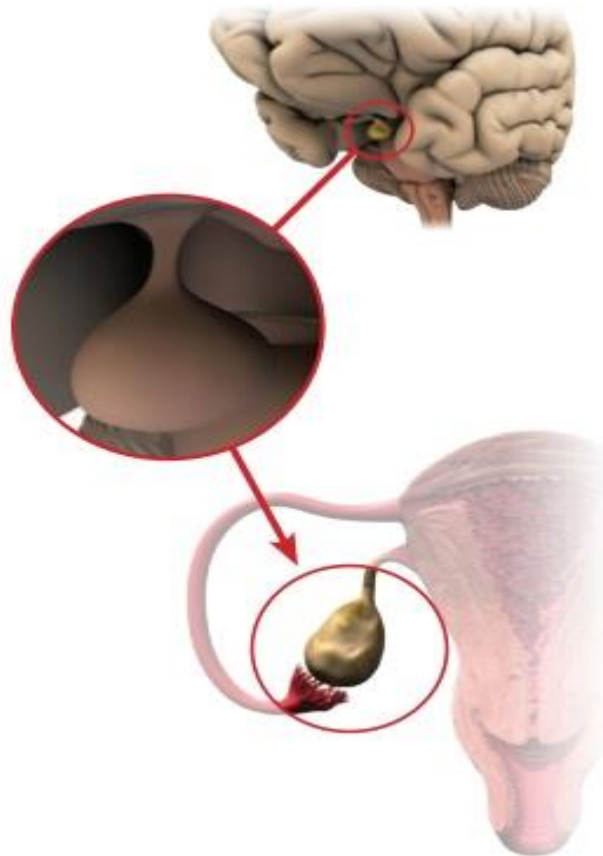
(4) Polycystic Ovary Syndrome: A Comprehensive Review of Pathogenesis, Management, and Drug Repurposing, Hosna Mohammad Sadeghi, and others, Int. J. Mol. Sci. 2022, 23, 583, p.2-3

(5) The Efficacy of Metformin and Exenatide in Polycystic Ovary Syndrome (PCOS) Patients, Sanggeeta Kesavan, and others, Ars Pharm. 2023;64(2): p.101

- Thinning scalp hair
- Skin tags
- Darkening of the skin
- Anxiety or depression
- Lack of sleep

Many women with PCOS tend to secrete too much insulin, and it is thought that with increased insulin, the production of male hormone or androgen by the ovaries increases. When a woman has insulin resistance, her body has trouble utilising insulin effectively, which forces her to release more insulin to deliver glucose..⁽⁶⁾

Menstrual cycle and pcos:



Understanding the ovulation process, the menstrual cycle, and the function of several hormones is necessary to comprehend the symptoms of PCOS.

The average menstrual cycle lasts between 24 and 35 days, and it involves the development of the egg, its release from the ovary, and the preparation of the uterus for the reception and sustenance of the embryo. The menstrual cycle regulates the body's hormone levels, which fluctuate on a monthly basis throughout reproductive life.

An egg is prepared for release by follicle stimulating hormone (FSH), which is released by the pituitary gland at the base of the brain when the cycle is healthy. FSH promotes the growth of a follicle with a diameter of 2 cm from the fluid-like sac that surrounds the egg.⁽⁷⁾

Around two weeks prior to the cycle in which the egg is at a ready stage, the pituitary gland releases a hormone (LH) that prompts the follicle to release one egg into the fallopian tube, a process known as ovulation.

(6) POLYCYSTIC OVARY SYNDROME, AN ENDOCRINE SOCIETY PATIENT RESOURCE, p.1

(7) Polycystic Ovary Syndrome (PCOS), Merck Serono ,Australia Pty Ltd 2011| ABN 72 006 900 830, p.6-7

The fertile phase of a woman's menstrual cycle is called ovulation.

The ovaries also emit modest amounts of androgens (male hormones), such as testosterone, which is turned into estrogen, as well as other hormones like progesterone and estrogen to thicken the lining of the uterus and prepare it for pregnancy at this time.⁽⁸⁾

PCOS investigations include a general physical exam, pelvic ultrasound, blood test and family history, and this disease is usually misdiagnosed or misunderstood with other disorders.

Diagnostic Criteria for PCOS:

Since then, a number of diagnostic criteria have been put out, each of which varies from menopause to hyperandrogenism to ovarian morphological alterations that may be seen by pelvic ultrasound. In addition to obesity, menopause, and enlarged bilateral ovaries that showed up as numerous cysts, a group of seven women were the first to be diagnosed with what is now known as PCOS by Stein and Leventhal in 1935.⁽⁹⁾

Table 1. Features of the diagnosis of PCOS.⁽¹⁰⁾

Feature	Diagnosis	Considerations
Biochemical Hyperandrogenism	High free testosterone calculated indices (FAI, BioT) or high total or free testosterone. - The considerations of DHEAS and ANSD	The examination of analytes should utilize high-quality assays.
Clinical Hyperandrogenism	4 to 8 on the modified Ferriman-Gallwey scale	Threshold level should be taken into account in relation to the patient's race.
Oligo-anovulation	Oligo-amenorrhea (cycles >35 days apart or	If PCOS is highly suspected but oligo-amenorrhea is not present, serum progesterone or luteinizing hormone testing may be an option.
Polycystic ovarian morphology	≥20 follicles per ovary in either ovary ≥ 10 cm3 ovarian volume	Using transvaginal ultrasound with a transducer frequency of less than 8 MHz

How is PCOS diagnosed?

PCOS is diagnosed with a medical history review, physical examination, blood testing, and ultrasounds. For a PCOS diagnosis, two of the following three conditions must be met.⁽¹¹⁾

Table 2. Diagnosis of PCOS

Periods less regular	More frequently than once every month No periods
Androgens	Acne and excessive hair growth, OR increased blood levels of androgens (male hormones) (hyperandrogenism)
Ultrasound	An ultrasound displaying 20 or more eggs on one ovary that are partly mature and resemble black circles Only in the absence of 1 and 2 is ultrasound necessary. Not advised for females under the age of 20.

(8) Polycystic Ovary Syndrome (PCOS), Merck Serono, p.7

(9) Current Guidelines for Diagnosing PCOS, Jacob P. Christ, p.2

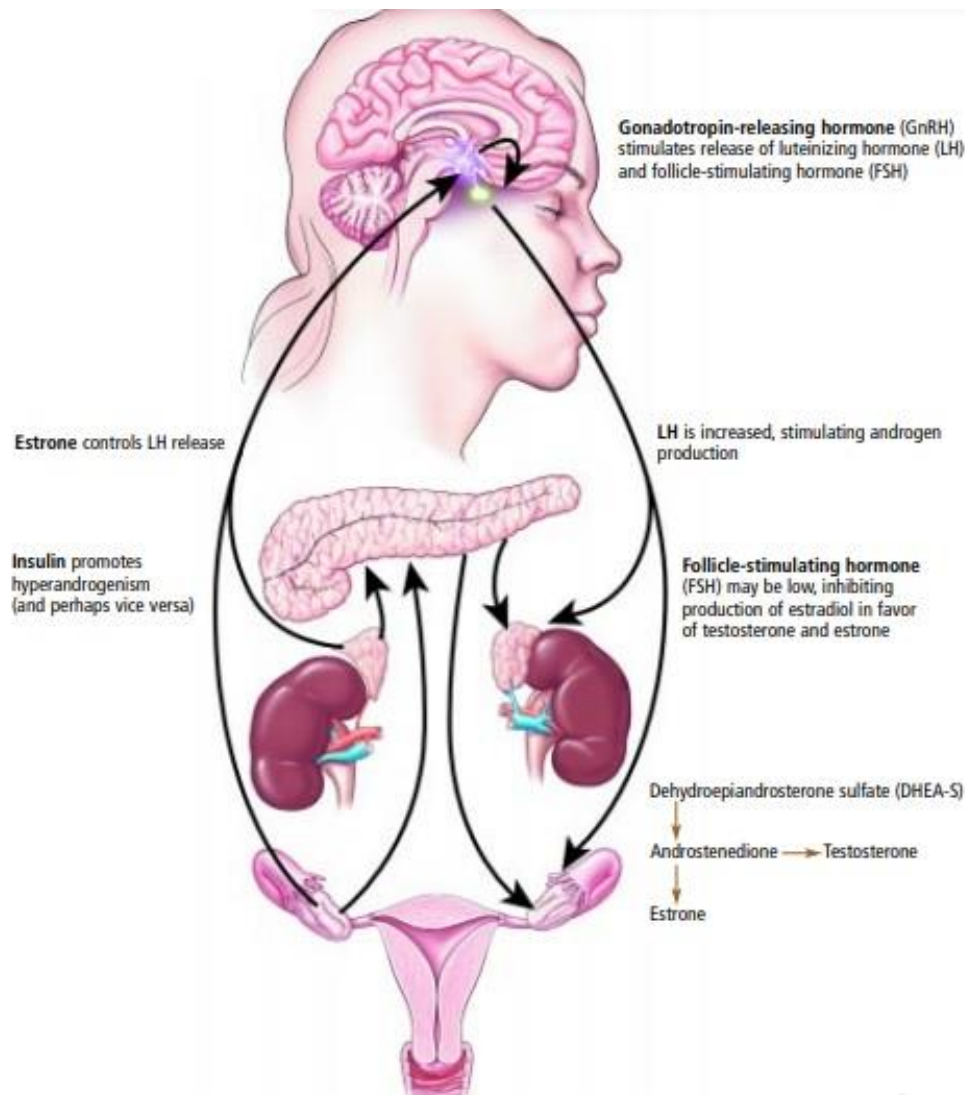
(10) Current Guidelines for Diagnosing PCOS, Jacob P. Christ, p.3

(11) Polycystic ovary syndrome (PCOS), jean hailes, p.1

Causes polycystic ovary syndrome:

Although the inciting event is unknown, polycystic ovary syndrome (PCOS) Hormonal abnormality reactions, some subjective ones, Results:

- Hyperandrogenism.
- Anovulation.

**Infertility**

5-10% of women of reproductive age have PCOS, yet its physiology and pathogenesis are still poorly understood, however, genetic factors and hypothalamus and ovarian weakness are the main causes of all symptoms in adolescents, as manifestations usually appear in childhood and then develop into adolescence and reproductive age⁽¹²⁾.

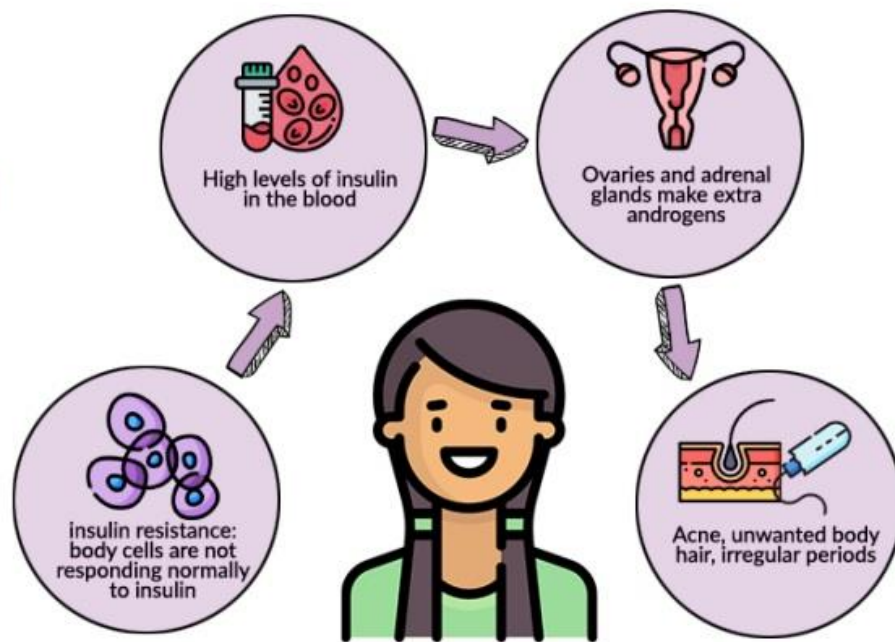
For most Women, there are likely to be some reasons why women have PCOS, including: Most PCOS sufferers are insulin resistant due to inherited genes, which means that their body's cells do not respond to insulin.

Insulin naturally. As a result, the ovaries and adrenal glands produce more insulin when blood levels of the hormone surge.

Androgens ("male hormones" such as testosterone).

Girls usually make small amounts of Androgens during puberty.

(12) Polycystic Ovarian Syndrome in Adolescents, Avanti adone, and Darshna G. Fulmali, . Cureus 15(1): e34183. DOI 10.7759/cureus.34183, 2023, p.3



Girls are exposed to androgens through their pubic hair and armpits, but excessive levels can result in severe acne, undesirable body hair, and irregular menstruation.⁽¹³⁾

The symptoms are related to abnormal hormone levels:

- Many of the symptoms of PCOS are linked to the higher-than-normal testosterone levels found in women with the illness.
- A woman with PCOS will have greater glucose levels because her body does not respond to insulin (insulinoma resistance). Your body produces more insulin when your blood glucose levels rise in an effort to reduce them. It may result from high insulin levels. Gaining weight, menstrual irregularities, infertility issues, and elevated testosterone levels.⁽¹⁴⁾

Etiopathogenesis:

An anomaly in the ovarian cells—likely the theca cells—is the primary cause of PCOS. This abnormality results in an excess production of androgen and the clinical and biochemical symptoms of the illness. PCOS is more common among Spanish-speaking, Native American, and Mexican women.

Genetic factors:

The influence of genetic factors is discussed. While studies have shown that PCOS-affected men are twice as likely to develop heart disease and four times more likely to have a stroke than PCOS-affected women, mothers of PCOS-affected women have a higher risk of developing high blood pressure and cardiovascular disease than mothers of women without the condition.⁽¹⁵⁾

Polycystic ovarian syndrome treatment:

Although PCOS cannot be cured, it may be effectively controlled. The initial stages to treating PCOS include eating correctly, staying healthy, engaging in physical activity, and avoiding weight gain. These are the greatest ways to reduce the symptoms of PCOS and manage long-term health.⁽¹⁶⁾

(13) POLYCYSTIC OVARIAN SYNDROME (PCOS), cheo, January 2020 | Form P6190E | www.cheo.on.ca, p.1

(14) Polycystic ovary syndrome: what it means for your long-term health, Royal college of obstetricians and gynaecologists, 2020, p.3

(15) The pathogenesis and treatment of polycystic ovary syndrome: What's new?, Sylwia Bednarska, and Agnieszka Siejka, *Adv Clin Exp Med*. 2017;26(2), p.360

(16) The prevalence and phenotypic features of polycystic ovary syndrome: A systematic review and meta-analysis, Bozdog, G.; Mumusoglu, S.; Zengin, D.; Karabulut, E.; Yildiz, B.O. ,*Hum. Reprod.* 2016, 31, p. 2844

Table 3. Managing & treating PCOS⁽¹⁷⁾

Symptom	Ways to manage the symptom
Irregular periods	hormonal birth control Women with PCOS who don't ovulate can be treated with metformin, an insulin-sensitizing drug.
Excess hair	Electrolysis. Waxing. Laser hair removal. Depilatory creams. The contraceptive pill can lower androgen levels, either by itself or in combination with anti-androgen drugs like spironolactone or cyproterone acetate.
Acne	Hormonal contraception Isotretinoin (sold as Roaccutane) Anti-androgens such as spironolactone
Fertility	management of weight by lifestyle. a 5- to 10% decrease in weight. medications including letrozole, metformin, and clomiphene citrate. Bariatric surgery with laparoscopic ovarian surgery

Reducing insulin resistance, reducing hyperandrogenism, managing diabetes, and addressing reproductive problems are the main goals of PCOS treatment.

Lifestyle:

A change in lifestyle is necessary to treat PCOS since it will increase and improve insulin sensitivity. Loss of weight, Conventional methods include oral insulin agonists like metformin. Low-androgenic-activity medications, a progestin to safeguard the endometrium, and antiandrogens to treat the hirsutism symptoms.⁽¹⁸⁾

Changing one's way of life may help one lose weight, improve anovulation, and subtly lower systolic blood pressure.

In addition to these lifestyle modifications, the following medicines can aid in managing PCOS:

- Drospirenone-based low-androgen oral contraceptives, sometimes referred to as minipills, or progestin-only pills.
- An inositol-containing supplement, such as myoinositol, D-chiro-inositol, or a combination of the two, which can help cure PCOS symptoms including hirsutism, acne, and infertility— Metformin.
- Medications to reduce lipids in women with abnormal lipid levels.⁽¹⁹⁾

Medications:

Several medicines can be administered to treat PCOS, depending on the patient's needs:

- Oral contraceptives (estrogen and progesterone are feminine hormones included in the birth control pill).
- Additional estrogen and progesterone delivery methods, such as a vaginal ring or patch.
- Treatments using just progesterone.
- Metformin, an insulin sensitizer.
- Anti-androgens such as Cyproterone acetate and Spironolactone.

It might be challenging to diagnose PCOS throughout the perimenopause and postmenopause periods because, by .less frequent, or stopping entirely .definition, menstrual cycles are becoming shorter

(17) Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome (PCOS). Hum. Reprod. 2004, 19, p.43

(18) POLYCYSTIC OVARIAN SYNDROME, VA Office of Patient Centered Care and Cultural Transformation, p.2

(19) Polycystic Ovary/Ovarian Syndrome (PCOS), National institutes of health, p.8

Some females may develop menstrual cyclicity at this time ovary volume will decrease throughout this time, and the quantity of follicles, and keep serum androgen levels, which sometimes conceal itself clinically. There the way PCOS manifests is little information about the normative perimenopause phase androgen vary, however there is a general trend toward greater levels in afflicted women-testosterone levels in PCOS⁽²⁰⁾

ntA study was conducted in the gynecology departme Gorki Trust Teaching Hospital, Lahore, 60 patients of polycystic ovarian syndrome, from 8th October 2012 to 7th April 2013.

From the outpatient department (OPD) of the Ghurki Trust Teaching Hospital in Lahore, 60 cases with polycystic ovarian syndrome were chosen. All of the study's participants provided their informed consent. At the time of presentation, the patient's history was recorded, including name, age, residence, marital status, symptoms (including monthly irregularities, subfertility, obesity, and excessive hair growth), severity, duration, and any prior treatments. Height, weight, body mass index, hirsutism, acne, acanthosis nigricans, and breast examination (galactorrhoea) were all investigated in these patients. Blood sugar (random), fasting insulin, pelvic ultrasound, LH, FSH, and serum prolactin levels were examined in these instances.⁽²¹⁾

RESULTS:

From the Ghurki Trust Teaching Hospital Lahore's outpatient department (OPD), sixty patients with polycystic ovarian syndrome were chosen.

The patients' average age was 24.93 + 5.67, and 68.3% of them were married. The patients' weights ranged from 40 to 90 kg, with a mean and standard deviation of 65.97 and 9.93 kg. The patients' height ranged from 145 to 165 cm, with a mean and standard deviation of 153.55 and 4.01 cm. The patients' body mass index (BMI) was 28.17 4.63 on average.

As for as investigations were concerned LH was raised in 46.7% while only 1.7% of patients had raised fasting insulin and prolactin level (Table-I). On USG the ovarian volume of all patients were more than 7.5 with the mean of right ovarian volume 12.08±3.04 and mean left ovarian volume was 11.86±4.83.⁽²²⁾

Conclusions:

The clinical diagnosis of PCOS still requires two factors: Here are several signs: ovarian morphology with polycystic ovaries, hyperandrogenism, and/or insufficient ovulation Along with anovulation and infertility, women with PCOS are more likely to develop metabolic syndrome, which increases their risk of hypertension and cardiovascular disease.

The best method to treat PCOS is to control it by a healthy lifestyle and certain medications advised by your doctor. Since the origin of the illness is unclear, PCOS treatment is confined to managing the signs and symptoms.

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Page 4	Reformulated to " A collection of symptoms associated with a hormonal imbalance known as PCOS can have a significant impact on both men and women of reproductive age. It consists of a variety of androgen excess symptoms
Page 5	Reformulated to " About 6–15% of women of childbearing age are significantly affected by PCOS, which causes infertility, irregular menstruation, hyperandrogenism, insulin resistance, abnormal glucose tolerance, and a risk of developing type 2 diabetes because insulin resistance causes hyperinsulinism, which disrupts the ovaries' normal function and ovulation rate.
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