j. port. sci. res.
ISSN: 2616-7441 (Online)
ISSN: 2616-6232 (Print)
ISSN: 2616-7220 (USB)
INTERNATIONAL IDENTIFIER FOR SERIALS

Journal port Science Research
Available online www.jport.co
Volume 7, special issue 2024

Effect of high level of androgen on Polycystic ovary syndrome (PCOS)

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Abstract A multifactorial endocrine condition, polycystic ovarian syndrome (PCOS) is typified by anovulation, hyperandrogenism, and polycystic ovarian shape. In the current study, a number of women with PCOS underwent testing to determine the impact of the androgen hormone on PCOS. Upon follow-up, it was discovered that the majority of the samples, ranging in age from (49), (28), (26), (40), (24), (15), (20), (17), and (25) all had androgen levels that were the same—less than 1.00 ng/ml. This suggests that the sample's and all ages' androgen levels are below the normal level, which is believed to be between 2 and 8 ng/ml. At age 24, the percentage of androgen was calculated to be 1.06 ng/ml, which is low in comparison to the normal level of androgen . The sample, which comprises people in the ages of (20) and (27), had estimated androgen percentages of 1.02 ng/ml and 1.49 ng/ml, respectively. We note some minor variations in the analytical comparison between the samples, but despite this The proportion in this sample is nevertheless less than its true level, which is probably to be between (2-8), Since every member of the sample has polycystic ovarian disease, there is a specific malfunction in the way this sample's body operates, necessitating the development of solutions and early identification. about the illness using a variety of analyses to prevent contracting other fatal illnesses.

Crossref 10.36371/port.2024.special.4

Keywords: *Polycystic ovarian syndrome (PCOS), Hyperandrogenism, Endocrine condition, Anovulation Androgen levels*.

1. INTRODUCTION

A multifactorial illness known as polycystic ovarian syndrome (PCOS) affects around 6–20% of women who are of reproductive age. Hyperandrogenism, impaired ovulation, and larger ovaries with many follicles are the hallmarks of this condition. Additionally, at an advanced stage of the illness, women with PCOS are at a greater risk of developing insulin resistance, type 2 diabetes mellitus (T2DM), infertility, psychiatric problems, cardiovascular diseases, and numerous gynecological malignancies, including ovarian and endometrial cancer (Ashraf et al. 2019).

The three most prevalent androgen-related symptoms linked to PCOS are hirsutism, alopecia, and acne. Each patient undergo from different symptoms; some report having only one or two, while some report having all three (Sirmans and Pate, 2013). The pathophysiology of PCOS has been linked to several metabolic pathways. Numerous genes have been examined, including the androgen receptor (Ar) gene, which is involved in the metabolism and production of steroidal hormones. Elleithy and colleagues (2022). At the intersection of endocrinology and gynecology, the study of androgen's impact on female fertility is a developing area of reproductive research (Lebbe **et al** .,2013).

The defining characteristic of PCOS is hyperandrogenism, which presents clinically as hirsutism, acne, and alopecia. Hyperandrogenism is a result of both the adrenal glands and the ovaries producing too much androgen. PCOS women have abnormalities in the neuroendocrine system, such as elevated gonadotropin-releasing hormone pulsefrequency and pituitary stimulation leading to an excess of luteinizing hormone synthesis compared to follicle-stimulating hormone. When there is a relative deficiency in FSH, follicular growth is hampered, whereas excess LH increases ovarian androgen production. The LH imbalance: FSH promotes the growth of ovarian theca cells, which in turn increases steroidogenesis and eventually results in hyperandrogenism in women with PCOS (Ashraf **et al** .,2019)

1.1 Polycystic ovary syndrome (PCOS)

A prevalent heterogeneous endocrinological condition that affects women in the reproductive age range is called polycystic ovarian syndrome, or PCOS. It is the most common cause of infertility and the most common endocrinopathy.(Yousouf and others, 2012), In addition to being overweight or obese, PCOS patients frequently exhibit varying degrees of insulin resistance and compensatory insulin excess—conditions that are crucial in the pathophysiology of androgen excess (Didier et al., 2014). Previously thought to be

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a reproductive condition, PCOS is now recognized as a chronic metabolic illness due to evidence of elevated rates of obesity, insulin resistance, and metabolic syndrome (Kumarendran **et al** .,2018)

Reducing at least 5% of your body weight is the most important step in controlling this condition. For this reason, every woman with PCOS should exercise regularly and consume no sugar or fat in her diet. Sadeghi et al. (2021) cited Stein and Leventhal (1935) as the first authors of women with amenorrhea, hirsutism, and enlarged ovaries with many cysts in contemporary medical literature. It was at this time when PCOS was first discovered.1. It is now known to be a common, varied, heritable sickness that can strike women at any age. The main characteristics of PCOS include polycystic ovaries, ovulatory dysfunction, and hyperandrogenism (Lentscher et al., 2021). The three most prevalent androgen-related symptoms linked to PCOS are hirsutism, alopecia, and acne. Every patient has different symptoms; some only have one or two, while some report having all three (Sirmans and Pate, 2013).

A diverse disorder, PCOS affects between 6% and 20% of women who are of reproductive age. In women in this age range, it is the most prevalent endocrine disorder (Paris and Bertoldo, 2019). Excess luteinizing hormone (LH), hyperandrogenism, ovulatory problems, aberrant follicular development, impaired fertility, and an increased risk of miscarriage are examples of disturbed hormonal and reproductive aspects. whereas follicular-stimulating hormone (FSH) levels are either negligible or remain constant (Paris and Bertoldo, 2019). Increased GnRH causes the ovarian theca cells to be stimulated, which in turn creates more androgens. Ndefo and associates (2013) Hyperandrogenism (HA) often raises the concentration of free androgen by lowering the amount of SHBG. It has been shown that women's plasma androgen concentrations are greater, and in adipose tissue, androgen can be converted to estrone. Elevating the ratio of LH to FSH levels results in ovulatory impairment, and increasing the conversion of estrone to estradiol impacts follicle development. AMH overexpression brought on by HA can suppress follicle growth and ovulation through an alternative pathway (Sadeghi et al ., 2021), Elevated androgen levels are closely linked to hirsutism, acne, and alopecia, and over 70% of PCOS patients had PCOS on pelvic ultrasonography (Ndefo et al., 2013).

Since obesity was linked to a higher incidence of clinical hyperandrogenism in PCOS-afflicted women, hyperandrogenemia—and the ensuing hormonal imbalance and reproductive disorder—was assumed to be the cause of obesity in PCOS-affected women. This conclusion aligned with a research by, which found that the primary etiology of PCOS is insulin resistance and that obesity is a prevalent condition linked with PCOS. It is clearly clear how obesity and PCOS are related. (Alsaadi and Mohamad, 2019).

Notably, PCOS raises the chance of developing additional disorders such metabolic syndrome, depression, anxiety, and type 2 diabetes mellitus. The most crucial step in managing this illness is to drop at least 5% of your body weight; as a result, any woman with PCOS should follow a regular exercise regimen and a diet low in fat and sugar (Sadeghi, et al., 2021). The most prevalent endocrine condition affecting women of reproductive age is polycystic ovarian syndrome (PCOS), which is characterized by increased androgen production. It is often defined by little or no ovulation along with clinical and/or biochemical evidence of androgen excess, however a wide variety of clinical symptoms can be present. A hallmark biochemical indicator of polycystic ovary syndrome (PCOS) is elevated androgen production. Franks and Hardy (2018).

1.2 Diagnosis

There is no particular test for detecting PCOS known as the differential diagnosis, with the exception of linked illnesses based on symptoms and limiting of options. PCOS is one of the ailments that cannot be detected with simple diagnostic procedures, such as blood tests, cultures, and biopsies. Based on related studies, prolactinemia, thyroid illness, Cushing's syndrome, and adrenal hyperplasia should be ruled out in order to establish the differential diagnosis of PCOS. While past medical history, weight fluctuations, and signs of insulin resistance may be beneficial, tests that are commonly advised include a transvaginal ultrasound, a pelvic exam, and hormone level measurement (Sadeghi, et al . , 2021).

Currently applied treatment

The methods utilized to treat PCOS vary depending on the intended therapeutic outcome, which may include treating obesity, controlling monthly irregularities, relieving hyperandrogenism-related symptoms, or treating infertility. Clomifene is the first line of treatment for women who wish to get pregnant. Gonadotropins, which are used to induce ovulation, or laparoscopic surgery are further therapeutic choices for women with PCOS infertility. (Bednarska and Siejka, 2017).

1.3 Androgens in women

Among the many different and significant subgroups of steroid hormone molecular species are androgens. They have a variety of physiological responsibilities, including the regulation of the destiny and partition of metabolic energy, the preservation of skeletal and bodily integrity and protein, and the maturation of the brain and behavioral setup (including those characteristics that define maleness). Furthermore, androgens predate estrogens and share a great deal of influence over the reproductive systems in both sexes. The primary mode of action of the androgen receptor (AR), a conventional nuclear receptor, is the selective activation of DNA strand translation, which leads to the final synthesis of certain proteins. Depending on the target cells and how its signal is modulated, the AR causes the production of several different genes. In any event, the results of this stimulation are somewhat delayed in time, as it is consistent with steroid hormones (Alemany, 2022).

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One of the main indicators of polycystic ovarian syndrome (PCOS), a hormonal condition that affects people who are designated female at birth, is elevated levels of androgens, the sex hormones. Other signs of polycystic ovary syndrome (PCOS) include irregular or nonexistent menstruation and cysts or tiny sacs in the ovaries, which are egg-producing glands (Gurevich, 2022).
The menopausal transition and menopause do not directly affect androgen levels since the postmenopausal ovary is an androgen-secreting organ (Burger ,2002) . However, there is now strong evidence from both human and animal research to support the theory that excess androgens, through the AR, are a major factor in the development of polycystic ovarian syndrome (PCOS). To give the knowledge needed for the future development of innovative, mechanism-based therapeutics for the treatment of PCOS, it is imperative to identify the target areas of these AR activities and the molecular processes underlying the development of PCOS. Walters, 0 (2019).

Male pattern baldness, abnormal hair growth, acne, and virilization—the process by which assigned females take on characteristics associated with assigned males—are among the indications and symptoms of hyperandrogenism (Gurevich, 2022). Women receiving androgen treatment for menopausal symptoms reported feeling more attracted to women and having more desire. Studies by Geist and Salmon as well as Greenblatt et al. have demonstrated that androgen therapy significantly raises orgasmic responses and sexual desire as well as sexual pleasure. It is unknown if the genital organs, the neural system, or both directly affect the nervous system to moderate the effects of androgens. Though several clinical trials have demonstrated the potential benefit of androgens in treating female sexual dysfunction, the precise mechanism by which androgens modify vaginal and clitoral physiology is still unknown (Abdulmaged,2002).

Androgens are essential for women's health because they maintain bone density, muscle mass, and female sexual function. Androgens include dehydroepiandrosterone (DHEA), DHEA-S, androstenedione, androgen , and dihydroandrogen . Androgen and dihydroandrogen are the most biologically active.1. Peripheral tissues where androgen production occurs include the liver, adipose tissues, adrenal glands, and skin.Table 1 displays the source and estimated normal concentrations of androgen in women, which may vary according on the laboratory (Kanbour, 2022). The difficulty in estimating androgen using current biochemical approaches stems from the lack of information on the function of androgens in women. For example, assays used to assess androgen are frequently designed to measure the much higher levels of androgen observed in males. It is believed that women's androgen levels are around a tenth of those of men, and they fall within a narrow range. In recent years, research has attempted to detect female levels more accurately using a range of techniques. Davison (2003) states that the most reliable method for determining free androgen is equilibrium dialysis..

The most potent androgen is released by the adrenal zona fasciculata (25%) and ovarian stroma (25%) each day, each yielding around 50 µg. Circulating hormone accounts for the remaining 50%. While circulating levels range from 0.2 to 0.7 ng/mL (0.6 to 2.5 nmol/L), production rates range from 0.1 to 0.4 mg per day. The early follicular phase of the cycle has the lowest concentrations of androgen , whereas the luteal phase of the cycle has higher concentrations of the hormone (Burger, 2002). After then, androgen rises to a mid-cycle high.

2. METHODS AND MATERIALS

Materials.

- A buffer tube, which is used to keep the pH of the sample balanced.
  Transfer pipette (for sample transfer)
- Regent A molecule or combination used to initiate a chemical reaction in a system or to determine if one has already happened is called a reagent. A detector that reacts with a particular chemical can determine whether or not it is there.
- Sample: To get the serum, we placed the blood in a gel tube and centrifuged it.
- Chromatography cassette: This method is employed to isolate and examine the chemical constituents of serum.

Methods

1. Location of employment: Physiology Laboratory, Uruk University

2. Sample: Forty blood samples were collected from individuals in various Baghdad neighborhoods, ranging in age from 17 to 49.

3. Method: We put these blood samples in a gel tube to extract the serum. In the Uruk University laboratory, the serum was separated from the blood after five minutes in a centrifuge. After that, the serum is stored until needed.

4. process for androgen hormone test: After separating and conserving the serum, we head to the laboratory (Al Madar Laboratory) to make analysis. A displacement reagent of 30 µL is added to a sample mixing tube. Next, fill a sample mixing tube with 75 µL of the sample (serum) using a transfer pipette. Mix the sample and Regent completely in the tube. Allow the tube to rest at room temperature for three minutes. After adding the buffer solution to the tube, mix the sample and regent together completely by shaking the tube 10 times. Transfer 75 µL of the mixture onto an analysis strip using a transfer pipette. We inserted the tape into the cube—a customized cassette incubator—and left it there for twelve minutes. Then, after putting the tape into the ichroma apparatus, we read the results.

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3. RESULT AND DISCUSSION

The objective of this investigation is to find variations in the rise and fall of androgen levels. To this end, an analytical search was carried out for a number of sample members, all of whom were adult females. In order to identify the numerous disparities among the sample members and ascertain the level of convergence and divergence, statistical work will be made possible. The androgen level of the first case (22-year-old) was found to be (<1.00 ng/ml), which is similar to the levels of the first, second, third, fourth, fifth, sixth, seventh, eighth, and ninth samples.

Table: (1) *The blood levels of androgen hormone in women suffering from polycystic ovary in different ages .*

Sample No.	Age (Years)	Androgen Level
1	22	<1.00 ng/ml
2	23	<1.00 ng/ml
3	49	<1.00 ng/ml
4	49	<1.00 ng/ml
5	28	<1.00 ng/ml
6	26	<1.00 ng/ml
7	41	<1.00 ng/ml
8	26	<1.00 ng/ml
9	40	<1.00 ng/ml
10	23	1.01 ng/ml
11	26	<1.00 ng/ml
12	24	<1.00 ng/ml
13	24	1.06 ng/ml
14	27	1.49 ng/ml
15	22	<1.00 ng/ml
16	15	<1.00 ng/ml
17	20	1.02 ng/ml
18	20	<1.00 ng/ml
19	17	<1.00 ng/ml
20	25	<1.00 ng/ml

This was found after further investigation into the androgen level of the first sample. The current study used an analytical search technique to find differences in the rise and fall of androgen levels in many female sample members across a variety of age groups. Statistical analysis will therefore be able to determine the degree of convergence and divergence as well as the many disparities among the sample members. The estimated B (1.06 Ng/ml) androgen ratio in age (24), which is low compared to the typical level of androgen . The androgen ratios of the sample, which includes the ages of (27), which was determined to be 1.49 ng/ml, and (20), which was predicted to be 1.02 ng/ml, differ somewhat. Even if the age range in this sample is (23), (24) and (20), the percentage is still below its actual level, which is probably between (2–8). Despite being older, their androgen levels were measured more than once time. The analytical comparison of the several samples makes this clear.

The analysis reveals that all of the sample members have polycystic ovarian disease and that the sample's androgen levels are below the normal range, which is thought to be between two and eight. These results imply that the sample's physiological processes could be out of balance, which calls for the creation of early detection techniques and remedies. To avoid getting additional deadly ailments, educate yourself about the condition by reading through a range of analyses.

4. Conclusions

The findings of this study indicate that women's contain androgen hormone less than the normal (2–8 ng/dl) may become contribute to the development of polycystic ovaries and an imbalance in bodily processes, or the women with polycystic ovary undergo dropping in androgen hormone in blood .

REFERENCES

[1] Ashraf, et al ,(2019). Hyperandrogenism in polycystic ovarian syndrome and role of CYP gene variants: a review. The Egyptian Journal of Medical Human Genetics, 20(25): 3-10.

[2] Elleithy, et al , (2022). Spirulina therapeutic potentiality in polycystic ovarian syndrome management using DHEA-induced rat model. European Review for Medical and Pharmacological Sciences, (26): 2740-2754.

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Available online www.jport.co
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[3] Yousouf, et al, (2012). Polycystic Ovarian Syndrome: Clinical Correlation with Biochemical Status. The Scientific Research, (3): 245-248.

[4] Didier, et al, (2014). European survey of diagnosis and management of the polycystic ovary syndrome: results of the ESE PCOS Special Interest Group's Questionnaire. European Journal of Endocrinology, 171(4): 489–498.

[5] Sirmans and Pate, (2013). Epidemiology, diagnosis, and management of polycystic ovary syndrome. Dove press journal: Clinical Epidemiology, (6): 1-13.

[6] Alemany, (2022). The Roles of Androgens in Humans: Biology, Metabolic Regulation and Health. International Journal of Molecular Sciences, (23): 11952.

[7] Kumarendran, et al, (2018). Polycystic ovary syndrome, androgen excess, and the risk of nonalcoholic fatty liver disease in women: A longitudinal study based on a United Kingdom primary care database. The Plose medicine, 15(3): 1-20.

[8] lentscher and Decherney, (2021). Clinical Presentation and Diagnosis of Polycystic Ovarian Syndrome. Clinical obstetrics and gunecology, 64(1): 3-11.

[9] Sadeghi, et al, (2021). Polycystic Ovary Syndrome: A Comprehensive Review ofPathogenesis, Management, and Drug Repurposing. International Journal of Molecular Sciences, (23): 583.

[10] Paris and Bertoldo, (2019). The Mechanism of Androgen Actions in PCOS Etiology. medical sciences, 89(7).

[11] Ndefo, et al, (2013). Polycystic Ovary Syndrome A Review of Treatment Options With a Focus on Pharmacological Approaches. The P&T, 38(6): 336.

[12] Alsaadi and Mohamad,(2019). Prevalence of hyperandrogenism in Iraqi women with polycystic ovary syndrome. Iraqi journal of science, 60(12): 2600-2608.

[13] Franks and Hardy, (2018). Androgen Action in the Ovary. Frontiers in endocrinology, 9(452).

[14] Bednarska and Agnieszka, (2017). The pathogenesis and treatment of polycystic ovary syndrome: What's new?.The Advances in Clinical and Experimental Medicine, 26(2):359–367.

[15] Lebbe and Woodruff, (2013). Involvement of androgens in ovarian health and disease. Molecular Human Reproduction, 19(12): 828–837.

[16] Davison and Davis, (2003). Androgens in women. Journal of Steroid Biochemistry & Molecular Biology, (85): 363-366.

[17] Gurevich, (2022). PCOS and other Possible Causes of Hyperandrogenism,Verywell Health, (18).

[18] Burger, (2002). Androgen production in women, sciencedirect, 77(4): 3-5.

[19] Walters, et al, (2019). Androgens and ovarian function: translation from basic discovery research to clinical impact, Journal of endocrinology, 242(2): 23-50.

[20] Kanbour and Dobs, (2022). Women with Polycystic Ovarian Syndrome: Pathophysiology and Controversies, Clinical Research and Therapeutics, 3(1).

Baqer J. Hasan, Sumaya L. M. Shams Al-Dean, Zainab Fadhil Abbas, 2024. Effect of high level of androgen on Polycystic ovary syndrome (PCOS). *Journal port Science Research*, 7(special), pp.25-29. https://doi.org/10.36371/port.2024.special.4