Research Article

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Evaluation of Hursitism for Polycystic Ovary Syndrome Women At Al- Ramadi City

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ABSTRACT

The hyper-androgen and huritism in face and body in women is important diseases. It can be used as a possible marker in patients with ovary polycystic syndrome (PCOS). This study was carried out to evaluate DHEA and Testosterone levels associated with huritism and PCOS was studied in serum samples from pregnant, and non-pregnant patients and controls attending clinic Specialized. The study included 38 samples divided into three groups: 21 patients subjects, 6 pregnant women, 15 non-pregnant women with PCOS syndrome, and 17 normal subjects as control of the same age group. The target was selecting pregnant women due to changes in hormonal levels and physiological changes, as well as comparing them with non-pregnant women and control samples. The level of DHEAS was considerably higher in the median among pregnant women than in the control group and between non-pregnant and control groups without statistically significant differences between pregnant and non-pregnant values. Similarly, testosterone shows a statistically significant higher median among pregnant than control and also between non-pregnant and control groups without statistically significant difference between pregnant and non-pregnant values. In conclusion, this study detected a significant increase in testosterone and DHEA in non-pregnant women and then followed by pregnant women compared to the control, and age and the rise of these hormones are factors that cause the appearance of thick hair and thus cause polycystic ovary, which may lead to infertility.

1. Introduction

Although symptoms vary depending on lifestyle choices and stage of life, polycystic ovarian syndrome (PCOS) is the most common endocrinopathy among adults with ovaries who are of reproductive age and appears to afflict populations globally at similar rates (Huddleston & Dokras 2022). Three sets of criteria have been established for PCOS diagnosis instead of a specific test. Different combinations of ovulatory failure, polycystic ovarian morphology, and hyperandrogenism are present in each set (McCartney and Marshall 2016). The presence of terminal hair on the face and/or body in a masculine pattern is known as hirsutism. It is among the primary features of PCOS hyperandrogenism. In PCOS women, the prevalence of hirsutism varies from 60 to 80% (Abusailik *et al.* 2021). It is typically linked to sadness, emotional suffering, and cosmetic concerns (Ekbäck *et al.* 2013); it is usually a symptom of an underlying illness, most often one that originates from a hormone problem (Blume-Peytavi *et al.* 2012). However, some research has shown how testosterone and serum magnesium levels relate to female PCOS (Luo *et al.* 2021; Al-Hetty *et al.* 2022). Around 70–80% of instances of hirsutism in women have PCOS as the underlying reason, and up to 85% of cases are linked to excess androgen. About 10-15% of cases of hirsutism have other causes, such as idiopathic hirsutism, thyroid issues,

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hyperprolactinemia, congenital adrenal hyperplasia, Cushing illness, acromegaly, malignancies of the ovary and adrenal glands (Dennedy *et al.* 2010). PCOS is a hormonal disorder that affects women during their reproductive years. Its prevalence ranges from 6 to 15%, depending on the diagnostic standards applied. PCOS is characterized by hyperandrogenism, persistent ovulation, and polycystic ovarian morphology (PCOM) (Rosenfield & Ehrmann 2016). The adrenal cortex produces dehydroepiandrosterone sulfate (DHEAS), which is regarded as a pre-hormone that can be transformed into DHEA. DHEA is an active hormone that can be converted into testosterone (Te) and dihydrotestosterone (DHT), among other hormones. Although a literature search has revealed that DHEAS has multiple functions, including that of a neurosteroid, its function as an adrenal steroid is also well-established (Clark *et al.* 2018). According to recent research, up to 20–30% of females with PCOS-like traits secrete excessive amounts of adrenal androgens, including DHEAS. This suggests that adrenal androgens may play a part in the pathophysiology of PCOS (Prough *et al.* 2016). The hypothalamic-pituitary axis (HPA) and hypothalamic-pituitary ovarian (HPO) may be impacted in females with increased DHEAS (Goodarzi *et al.* 2015)-an additional relevance. According to a Turkish study, there is a strong correlation between adrenal androgen and PCOS topics in both the patients' siblings and themselves, suggesting that some subjects may be hereditary (Blagojevic *et al.* 2017). According to one explanation, underlying insulin resistance worsens hyperandrogenism by decreasing the synthesis of globulin, which binds sex hormones, and increasing the synthesis of androgens in the adrenal and ovarian glands, which raises androgen levels. Subsequently, these androgens cause irregular menstruation and outward signs of hyperandrogenism (DeUgarte *et al.* 2005). PCOS can appear in a variety of clinical ways. Patients may present with numerous gynecologic, dermatologic, or metabolic symptoms, or they may be asymptomatic. Most frequently, patients with PCOS exhibit hyperandrogenism together with oligomenorrhea and amenorrhea (Azziz *et al.* 2009). The purpose of this study was to evaluate the relationship between testosterone and DHEA-S and study factors in patients with PCOS and hirsutism in a sample of women in Al-Ramadi City.

2. Materials and Methods

2.1. Specimen Collection and Handling

The study included 38 samples divided into three groups: 21 patients subjects six pregnant women, 15 non- pregnant women with PCOS syndrome, and 17 normal subjects as control of the same age group from 18-38 years old. The research was a case-control study. The samples were collected from the clinic Specialized from October 2023 to January 2024. The case was considered as PCOS by appearance signs that appear on non-pregnant women's bodies. The study sample group had some criteria; pregnant women chose to be noted the change of study parameters during pregnancy. In addition, the group of women with PCOS showed the effect of high levels of testosterone, DHEA, and its relation with Hirsutism. Samples were collected after obtaining verbal consent from the patients. Sera were collected from each subject in heparinized or EDTA samples; citrated samples should not be used. The serum was prepared by centrifuging blood samples from different groups under septic conditions (i.e., 70% alcohol) for five minutes at 3,000 rpm. The serum was stored at -20°C until it was needed. Every patient, including the controls, permitted blood samples to be used in clinical studies.

2.2. Estimation of Testosterone and DHEA-S

The TOSOH Bioscience, automated immunoassay analyzer AIA-600ll, was utilized to measure the amounts of DHEA-S and testosterone in serum, as stated by the manufacturer. The test sample's testosterone and DHEA-S compete with enzyme-labeled testosterone and DHEA-S for a finite number of binding sites on hormone-specific antibodies immobilized on magnetic beads in a competitive immune enzyme metric assay. The magnetic beads were then washed to remove any remaining enzyme-labeled testosterone and DHEA-S and incubated with 4-methylumbelliferyl phosphate (4 MUP), a flurogenic substrate. Fluorometric measurements showed the reaction's fluorescence rate at 365 and 445 nm. The content of DHEA-S and testosterone in the sample is negatively correlated with the amount of these substances that bind to the beads.

2.3. Statistical Analysis

The computer was fed data, and IBM SPSS software package version 28.0 was used for analysis. Numbers

and percentages were used to describe the qualitative data. After determining the normalcy of the data using the Kolmogrov-Smirnov test, the quantitative data were reported using the median (minimum and maximum) for non-normally distributed data and the mean and standard deviation for normally distributed data. The acquired results were deemed significant at the (0.05) level. Chi-Square test to compare two or more categorical variable groups Mann-Whitney t-test and student In the case of regularly distributed and non-normally distributed data, two independent groups were compared using the U test.

3. Results

Table 1 and Figures 1-3 show that there is no statistically significant difference between the studied groups as regard their age, with mean age of the studied groups being (25.2, 26.33 and 29.29) years old respectively for Non-pregnant, pregnant and control groups. DHEAS illustrates a statistically significant higher median among pregnant women than control and between non-pregnant and control groups without statistically significant difference between pregnant and non-pregnant values. Similarly, testosterone shows a statistically significant higher median among pregnant than control and also between non-pregnant and control groups without statistically significant difference between pregnant and non-pregnant values. Parameters described as mean ± SD or median (range). In (Figure 1), depending on the average age in years, it was noted that the control group recorded the highest average age at a rate of 29.29, while the group of pregnant women recorded an average of 26.33, followed by non-pregnant women at an average of 25.2. In (Figure 2) concerning the existing comparisons of the male hormone (testosterone), it was noted that

the male hormone is very high in non-pregnant women, with a level of 84.27, and in pregnant women at a level of 68.15. In contrast, a level of 28.16 appeared in the control group. In (Figure 3), according to the comparison between the group of pregnant women and non-pregnant women and comparing it with the control group, it was noted that the group of non-pregnant women recorded the highest level of DHEA at a level of 350.79, followed by pregnant women at a level of 334.27, while the control group recorded the lowest level, which is 176.41.

4. Discussion

For PCOS diagnosis, an evaluation of biochemical hyperandrogenism utilizing computed free testosterone, free androgen index (FAI), or bioavailable testosterone has been proposed (Loh et al. 2020).

In the current study, women with hirsutism had considerably higher androgen mean values than women without hirsutism. This was due to the high levels of DHEA and testosterone in both the pregnant and non-pregnant groups compared to the control group. Roughly 10% of women of reproductive age have classic PCOS, which combines hyperandrogenism and ovulatory failure. The syndrome's defining feature is hyperandrogenism, whether it be clinical, biochemical, or both. Roughly 60–76% of women with PCOS are hirsute, and 75-90% of these individuals have hyperandrogenemia (Kanbourand Dobs 2022). However, because PCOS is a complex disorder, its origin is still unknown. Several scientific associations have developed diagnostic standards for PCOS and have identified three distinct phenotypes. The primary symptom of PCOS in all phenotypes is hyperandrogenism, or an

Table 1. comparison of age, DHEA & testosterone between studied groups

Parameters	Non pregnant (n = 15)	Pregnant (n = 6)	Control (n = 17)	Test of significance	Comparasion between groups
Age/years	25.20±6.82	26.33±5.50	29.29±9.21	F = 1.127 P = 0.335	P1 = 0.767 P2 = 0.150 P3 = 0.433
DHEA	350.79±73.8 378.6 (184.5-439.2)	334.27±52.89 316.7 (281.1-403.6)	176.41±72.48 164.2 (83.2-315.7)	KW = 27.04 P<0.001*	P1 = 0.632 P2<0.001* P3<0.001*
Testosterone	84.27±28.10 78.6 (59.6-173.4)	68.15±6.79 67.95 (59.7-78.9)	28.16±7.56 29 (16.4-42.3)	KW = 37.34 P<0.001*	P1 = 0.082 P2<0.001* P3<0.001*

DHEA: dehydroepiandrosterone sulphate, F: one way ANOVA test, KW: kruskal wallis test, p1: difference between non pregnant and pregnant groups, p2: difference between non pregnant and control groups, p3: difference between pregnant and control groups. Parameters described as mean ± SD or median (range)
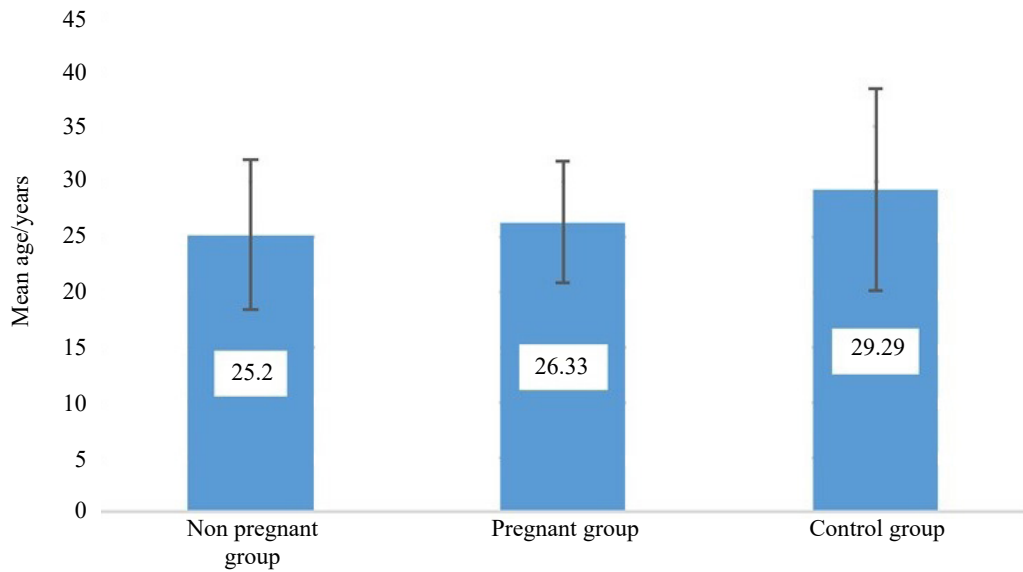
Figure 1. Percentage of mean age/years among studied groups
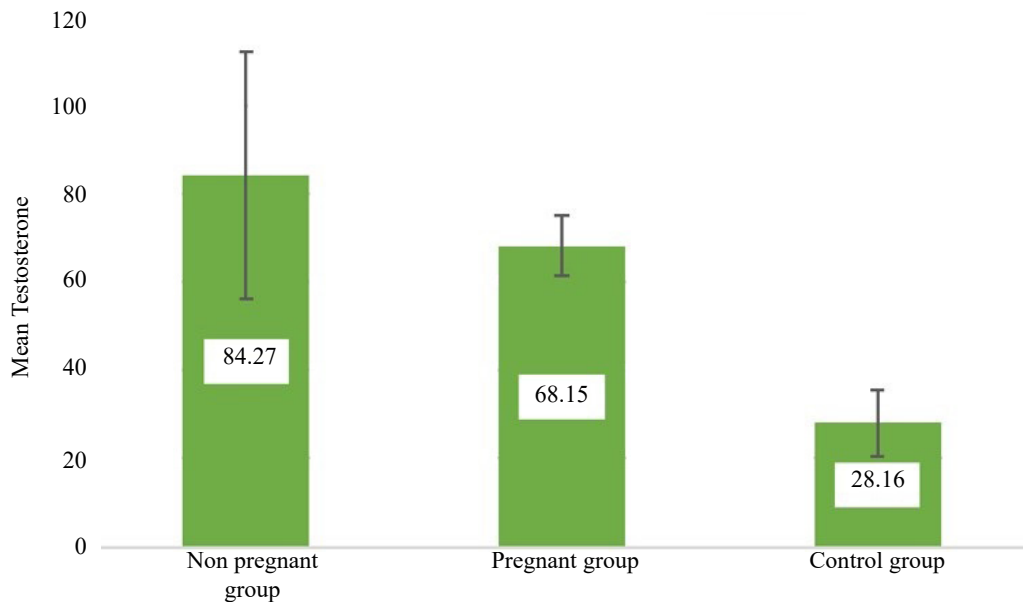

Figure 2. Testosterone level among studied groups

excess of androgen production (Abinaya *et al.* 2019). Hyperandrogenemia is one of the primary diagnostic criteria for PCOS. According to recent findings, total testosterone might not be a reliable indicator of androgen excess (Hahn *et al.* 2007; Saleem *et al.* 2022).

Increased ovarian and adrenal androgen production is assumed to be the cause of hyperandrogenism, a major clinical characteristic of PCOS (Turetta *et al.* 2024). Additionally, it causes females with PCOS to have masculine traits. In people with severe PCOS issues, facial hair is abundant on the chin, side of the face, upper lip, and chest area. The FG score defines

hirsutism (Mofid *et al.* 2008). even if Martin *et al.* (2008) note that it has some drawbacks, higher serum testosterone levels may be related to the distribution of peripheral muscle mass and upper body fat, according to (Douchi *et al.* 2001) research.

Furthermore, the distribution of fat in the upper body may also be influenced by the peripheral muscle mass (Douchi *et al.* 2001). A major cause of aberrant folliculogenesis and failed dominant follicle selection in PCOS patients with hyperandrogenism is steroid secretion abnormalities, which affect most of these patients. Obesity, hirsuction, acne, and androgenetic
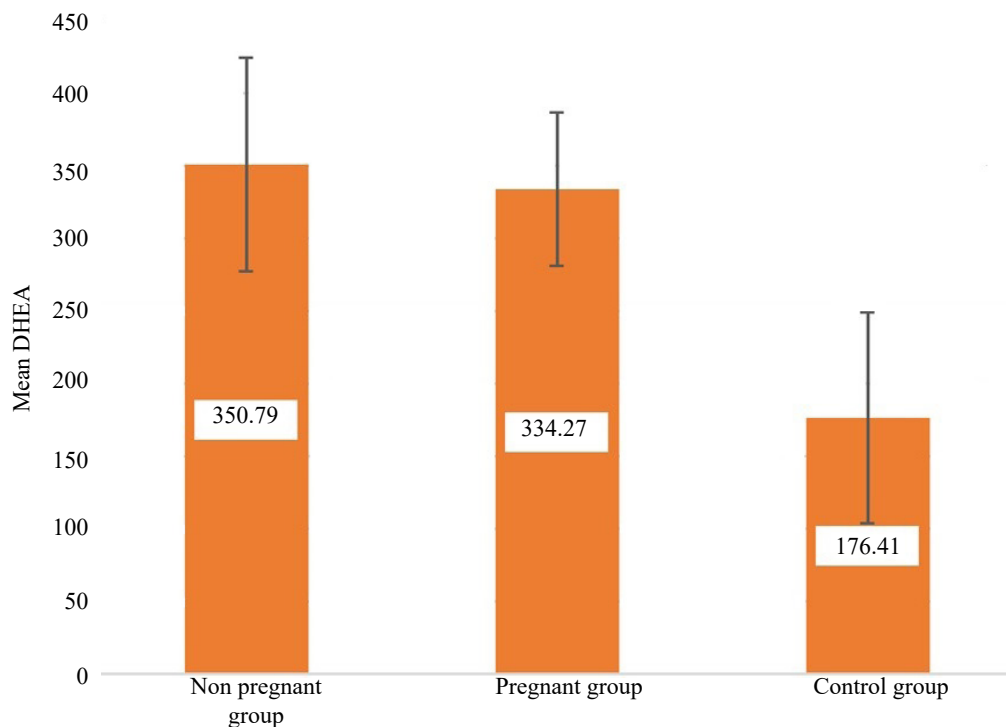
Figure 3. DHEA level among studied groups

alopecia are incited by hyperandrogenism. These symptoms can cause a woman to experience severe psychological distress (Zeng *et al.* 2020).

The DHEA and PCOS meta-analysis has contributed to the generation of evidence indicating the role of stress in the pathophysiology of PCOS (Benjamin *et al.* 2021). Compared to control rats, DHEA-induced PCOS animals showed lower levels of IFN-γ, partially restored in rats treated with an androgen receptor antagonist called flutamide (Li *et al.* 2019). In women with PCOS, the frequency of adrenal hyperandrogenism (AH), which is characterized by elevated levels of circulating dehydroepiandrosterone-sulfate (DHEAS), varies between 15 and 45% (Luque-Ramírez and Escobar-Morreale 2016). Lastly, terminal hair on the face and/or body in a masculine pattern is known as hirsutism. It is among the primary features of PCOS hyperandrogenism. The ranges for PCOS prevalence are 2–21% and 2–17%, respectively (Panidis *et al.* 2013; Azziz 2018). The hirsutism in PCOS women is attributed to increased circulatory levels of free testosterone and a more active form of testosterone, i.e., dihydrotestosterone, formed by the activity of 5α reductase on testosterone in the pilosebaceous gland. Hirsutism in PCOS is associated with both androgen excess and the individual response of the pilosebaceous unit to androgens (Spritzer *et al.* 2022).

In conclusion, it was noted in this study that the hormones testosterone and DHEA are high in women who suffer from polycystic ovary syndrome, and this is because the increase in these hormones is a major cause of the occurrence of polycystic ovary syndrome and the failure of female hormones, which causes infertility and the failure of pregnancy. Pregnant women do not notice an increase in these hormones due to the rise in female sex hormones, which are overwhelming in their work, causing a decrease in the hormones testosterone and DHEAS and the absence of hair in pregnant women compared to normal women who do not suffer from polycystic ovary syndrome or the appearance of controlled hair.

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