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The Effect of Polycystic Ovary Syndrome (PCOS) On Some Hormonal and Biochemical Variables in The City of Bani Waleed

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تأثير متلازمة المبيض المتعدد الأكياس (PCOS) على بعض المتغيرات الهرمونية و الكيميوحيوية في مدينة بني وليد

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Abstract
This study investigates the biochemical and hormonal alterations associated with polycystic ovary syndrome (PCOS) among women in Bani Walid. PCOS is a prevalent gynecological condition that can lead to complications such as diabetes, dyslipidemia, hypertension, and cardiovascular diseases. The research was conducted in private clinics and laboratories in Bani Walid from April 1, 2024, to June 30, 2024, involving 67 women diagnosed with PCOS, aged between 20 and 50 years. Hormonal concentrations, including prolactin and thyroid-stimulating hormone (TSH), were measured. The results indicated a significant elevation in prolactin and TSH levels among affected women compared to healthy controls. Additionally, lipid profiles revealed notable increases in cholesterol and triglyceride levels in women with PCOS. A rise in cumulative blood glucose levels was also observed, particularly in obese women with PCOS, along with evidence of insulin resistance. These findings underscore the need for comprehensive management strategies for women with PCOS to address these metabolic disturbances.

Keywords: Polycystic Ovary Syndrome, Insulin Resistance, Proteoclin Hormone, Thyroid-Stimulating Hormone (TSH), Diabetes, Cholesterol, Triglyceride.

الملخص
تناولت هذه الدراسة التغيرات الحاصلة في بعض الخصائص الكيموحيوية والهرمونية وعلاقتها لدى النساء المريضات بتكيس المبايض في مدينة بني وليد والذي يعد من الامراض النسائية ذات التأثير على المريضات وقد يسبب هذا المرض بعض المضاعفات الجانبية مثل داء السكري، اضطراب الدهون الجسم، ارتفاع ضغط الدم، امراض القلب والاوعية الدموية. اجريت هذه الدراسة في مدينة بني وليد (في بعض العيادات الخاصة والمختبرات الخاصة) من 1-4-2024الى 30-6-2024 وتمت متابعة 67 حالة مرضية للنساء اللواتي يعانين من تكيس المبايض والتي تم تشخيص اصابتهن بتكيس المبايض من قبل طبيبات النساء والتوليد وتراوحت اعمارهن مابين (20-50) حيث تم قياس تركيز الهرمونات للمصابات بتكيس المبايض وتشمل هرمون الحليب *Protoclein Hormon*، هرمون المحفز للغدة الدرقية. لقد وحظ ارتفاعاً معنوياً لهرمون الحليب لدى النساء المصابات والهرمون المحفز للغدة الدرقية لدى النساء المصابات، وكذلك قياس تركيز الكوليسترول والدهون الثلاثية التي ارتفعت ارتفاعاً معنوياً لدى النساء المصابات بتكيس المبايض إذا ما قرنت بالنساء

السليمات والغير مصابات بتكيس المبايض. كما لوحظ من خلال هذه الدراسة ارتفاع السكر التراكمي لدى النساء التي تعاني من البدانة والمصابة بتكيس المبايض، وكذألك بينت الدراسة مقاومة الانسولين لبغض النساء المصابات بتكيس المبايض.

الكلمات المفتاحية: متلازمة تكيس المبايض المتعدد، الهرمونات المحفزة للغدة الدرقية، هرمون البروتوكلين، الكلسترول، الدهون الثلاثية، داء السكري.

Introduction

Polycystic Ovary Syndrome (PCOS) is a major public health issue and one of the most common hormonal disorders affecting women of reproductive age, with symptoms often emerging during adolescence. The symptoms of PCOS can vary over time. The condition was first identified by (Stein and Leventhal in 1935), and it is estimated to affect approximately 8 to 13% of women of reproductive age worldwide, with many cases remaining undiagnosed. The prevalence of PCOS is higher among certain ethnic groups, which often face additional complications, particularly those related to metabolic disorders. The biological and psychological effects of PCOS, especially those related to obesity, body image, and infertility, can lead to psychosocial health issues (Ehrmann et al., 2006).

PCOS is characterized by a dysfunction in normal ovulation processes due to hormonal or genetic imbalances, and it may present with a range of symptoms, particularly during adolescence and menstruation (Koneru & Priyanka, 2019). One of the earliest theories explaining PCOS suggests a relationship between theca cells in the ovaries, stimulated by luteinizing hormone (LH), and hyperandrogenism (Koracs & Norman, 2007). Recent theories indicate that the condition may be linked to reduced dopamine secretion in higher brain centers, affecting the hypothalamus and pituitary gland (Alan et al., 2019). A study by Ishrat and Hussain (2021) explains the relationship between PCOS and insulin resistance; when insulin resistance occurs, hormone levels increase in the blood, leading to elevated androgen levels.

This situation causes damage to premature follicles and anovulation. Additionally, elevated insulin levels result in a decrease in sex hormone-binding globulin (SHBG), increasing the concentration of sex hormones, particularly testosterone, which is converted into a more active form known as dihydrotestosterone. This process can lead to abnormal glucose metabolism, cardiovascular diseases, and obesity (Bryant et al., 2002). Disorders in lipid levels are also observed, with abnormal ratios of triglycerides, total cholesterol, high-density lipoprotein (HDL), and low-density lipoprotein (LDL) cholesterol (Al-Dabagh, 2017).

Materials and Methods

In this study, 68 blood samples were collected from women diagnosed with polycystic ovary syndrome (PCOS), aged between 20 and 50 years. The diagnoses were made by specialized obstetricians and gynecologists in clinics in Bani Walid and private laboratories, relying on clinical examination, biochemical tests, and ultrasound diagnostics from April 1, 2024, to June 30, 2024. Additionally, 50 blood samples were collected from healthy women who did not have diabetes, hypertension, cardiovascular diseases, or thyroid disorders, matching the same age range, serving as a control group. Data collection was conducted using a specific questionnaire. Following venous blood collection after a specified fasting period, samples from both the patient and control groups were placed in properly sealed plastic tubes (Tube Jell) and left at room temperature for 27 minutes for blood clotting. The samples were then centrifuged for 15 minutes at 3000 RPM to obtain serum, which was extracted using a micropipette and transferred into sterile, dry Eppendorf tubes. The serum was stored at -20 °C in a freezer until biochemical tests were conducted (Raymond et al., 1972).

The concentrations of prolactin (PRL) and thyroid-stimulating hormone (TSH) were measured, along with reproductive hormones, following specific procedures and using the test kits according to the manufacturer's instructions for the Minividas system. Thyroid hormone concentrations were assessed using the same device utilized for prolactin measurement. Blood glucose concentration was determined using the calorimetric enzymatic method with a ready kit, which relies on the enzymatic oxidation of glucose. Additionally, cholesterol and triglyceride levels were assessed using the enzymatic method.

Statistical Analysis

The statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 22. Descriptive variables were presented in terms of frequency and percentage. For numerical variables obtained from gynecological clinics and medical laboratories through questionnaire responses, the mean and standard deviation were used for description (Levesque et al., 2007).

Result

The distribution of polycystic ovary syndrome (PCOS) among the studied age groups was examined. A total of 68 women diagnosed with PCOS participated in this study, with ages ranging from 20 to 50 years. These participants were patients from private clinics and medical laboratories in Bani Walid,

having been diagnosed by obstetricians and gynecologists. Additionally, a control group of 50 women without PCOS was included. The results indicated that the highest incidence of PCOS was found in the age group of 20-30 years, accounting for 42% of the total study group. This was followed by the age group of 31-40 years, with an incidence of 31%, and lastly, the age group of 41-50 years, which showed an incidence of 17%. These findings are illustrated in Table 1 and Figure 1.

Table 1: Distribution of Polycystic Ovary Syndrome (PCOS) Incidence Among the Studied Age Groups.

Age	Percentage %
30-20	42%
40-31	31%
50-41	17%
50<	10%
Total	100%

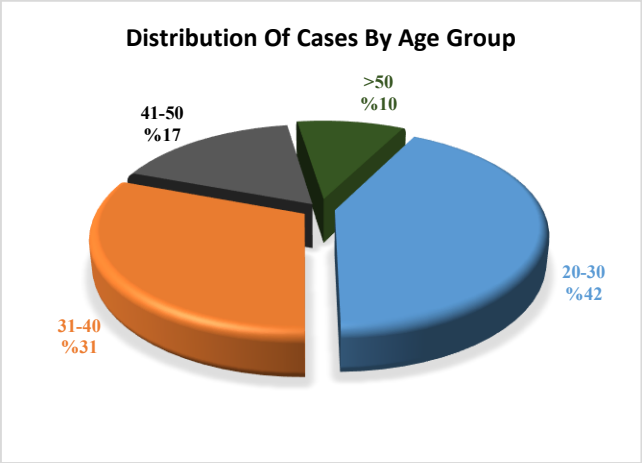

Figure 1: Distribution of Polycystic Ovary Syndrome (PCOS) Incidence Among the Studied Age Groups**.**

The results of the current study indicated that 70% of women diagnosed with polycystic ovary syndrome (PCOS) experienced irregular menstrual cycles and anovulation. Additionally, 56.60% of the studied group reported suffering from acne, while 73.30% of the women were found to be overweight or obese. Furthermore, 73.30% of the participants also reported issues with infertility, as shown in Table 2 and Figure 2.

Table 2: Percentage of Phenotypic Symptoms in Women with Polycystic Ovary Syndrome (PCOS).

Symptoms	children	overweight	acne	breast pain	menstrual cycles
Yes	26.60%	73.30%	56.60%	50%	30%
No	73.30%	26.60%	43.30%	50%	70%
Total	100%	100%	100%	100%	100%

Estimation of Blood Glucose Concentration The results of the current study revealed a significant increase ($p \leq 0.05$) in blood glucose concentration in women with polycystic ovary syndrome (PCOS) compared to the healthy control group, as shown in Table 3 and Figure 3.

Table 3: Comparison of Blood Glucose Levels Between Healthy Women and Women with Polycystic Ovary Syndrome (PCOS).

GROUPS	HbA1C(Mean±S.E)
Infected PCOS	7.68 ± 69.04
Non-infected(control)	6.77 ± 56.32

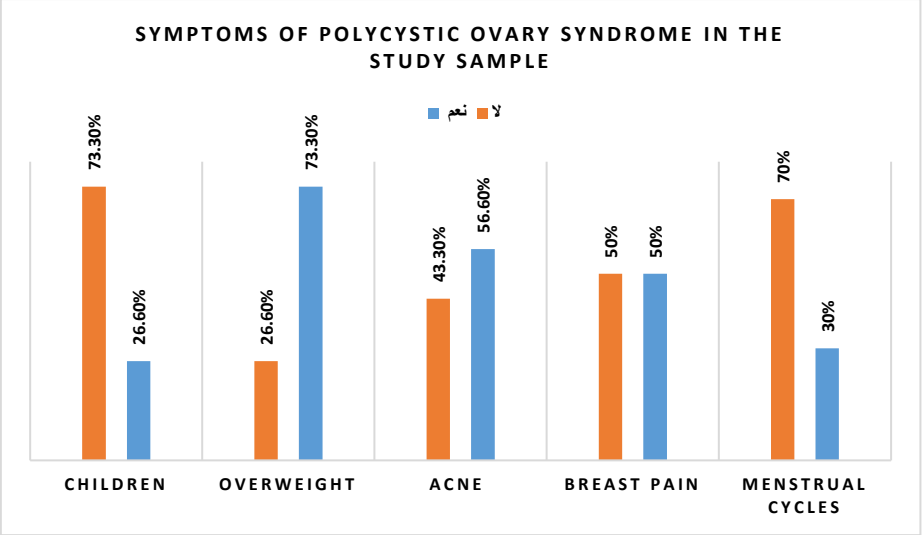

Figure 2: Percentage of Phenotypic Symptoms in Women with Polycystic Ovary Syndrome (PCOS).

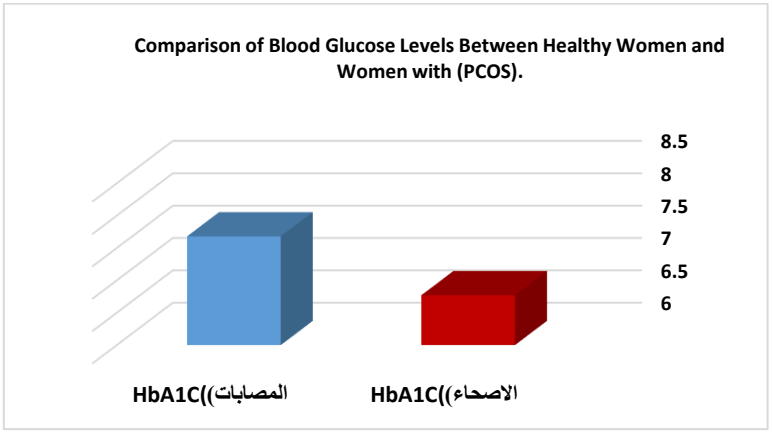

Figure 3: Comparison of Blood Glucose Levels Between Healthy Women and Women with Polycystic Ovary Syndrome (PCOS).

Concentration of Triglycerides and cholesterol the results of the study, as shown in Table 4 and Figure 4 demonstrated elevated levels of triglycerides and cholesterol in women with polycystic ovary syndrome (PCOS) compared to the healthy control group.

Table 4: Mean and Standard Deviation of Triglycerides and Cholesterol Levels.

Group	TG (Mean±S.E)mg/dl	HDL (Mean±S.E)mg/dl
Infected PCOS	166.89±2.4	56.35±1.3
Non-infected(control)	43.074±4.420	199.7462±1.394

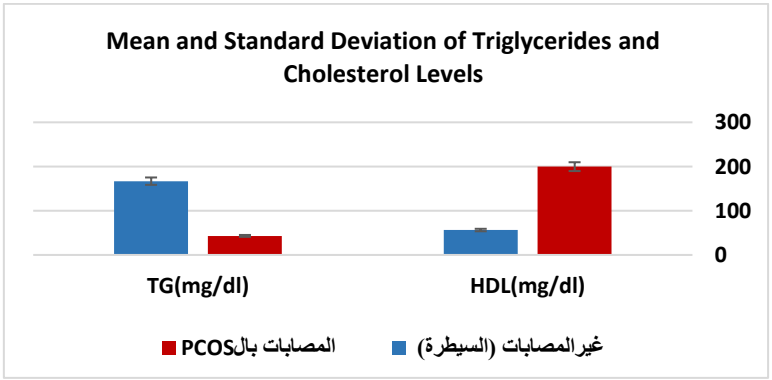

Figure 4: Mean and Standard Deviation of Triglycerides and Cholesterol Levels.

The concentration of prolactin (Prol) and thyroid-stimulating hormone (TSH) shows that Table 5 and Figure 5 present the levels of prolactin in women with polycystic ovary syndrome (PCOS) compared to healthy women (control group). The prolactin concentration in women with PCOS was measured at 23.8688, while in healthy women, it was 17.688, indicating a significant difference between the two groups with a p-value of less than 0.05. Additionally, Table 5 shows an elevated level of TSH in women with PCOS compared to the control group.

Table 5: Comparison of TSH and Prolactin Concentrations in Women with Polycystic Ovary Syndrome (PCOS) and Healthy Women.

parameters	TSH(Mean±S.E)ng/ml	PRL(Mean±S.E)ng/ml
Infected PCOS	3.2298±0.6981	17.688±2.009
Non-infected(control)	3.5759±0.75951	23.8688±3.32009

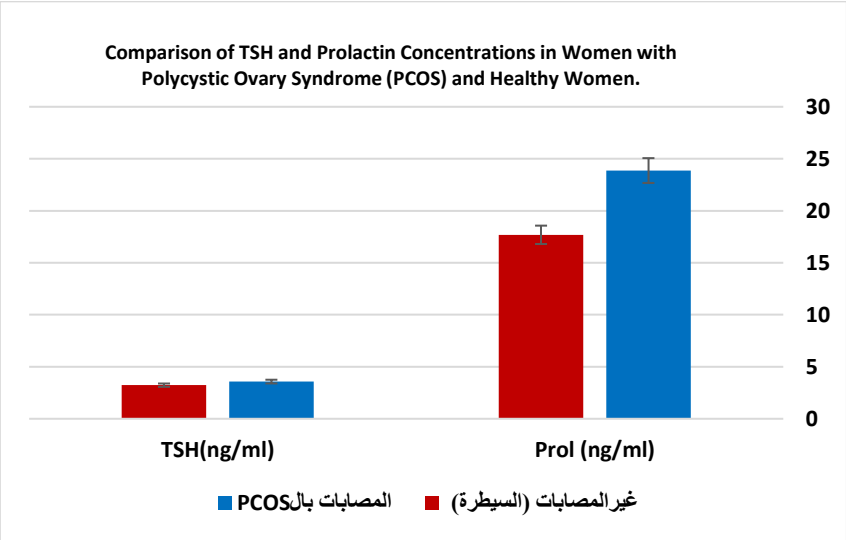

Figure 5: Comparison of TSH and Prolactin Concentrations in Women with Polycystic Ovary Syndrome (PCOS) and Healthy Women.

Discussion

Despite the differences in age groups, as noted in Table 1, polycystic ovary syndrome (PCOS) can occur in individuals of all ages and is not limited to a specific age group. However, it can be observed that the incidence is typically higher in the age groups of 20-30 years and 31-40 years. This increase may be attributed to the syndrome being diagnosed after marriage, during attempts to conceive, and through frequent visits to clinics for ultrasound examinations, which facilitate disease detection. In contrast, women younger than 20 or 18 years may not experience early detection of the syndrome unless they encounter menstrual irregularities, weight gain, or become diagnosed incidentally, often due to genetic factors.

Results of this study, as shown in Table 2, indicate a correlation between weight and PCOS, as most affected women are found to be overweight or obese. This finding aligns with a study conducted by (Najem et al. in Benghazi in 2008), which reported that 6% of women were overweight, 94% were obese, and 32% suffered from severe obesity. Despite differences in percentages, the overarching theme is that PCOS is frequently associated with obesity, and the prevalence of obesity among women with PCOS varies across countries and ethnic groups.

Additionally, Table 3 demonstrates a significant increase ($p \leq 0.01$) in both glucose and insulin levels in the serum of women with PCOS. These findings are consistent with those reported by Dabagh-Al (2017), which noted elevated levels of both glucose and insulin, as well as insulin resistance, particularly in obese individuals compared to those who are lean. Furthermore, the results in Table 4 indicate a significant increase ($p \leq 0.01$) in both triglycerides and total cholesterol levels in the serum of women with PCOS compared to the control group.

As we note in Table 5, the level of prolactin concentration in women with the syndrome increased compared to the control group, but this increase was not significant at a significance level of 0.05 P, but rather at a significance level of 0.01 > P. The increase in the level of prolactin in the blood may stimulate the adrenal gland to secrete DHEAS (one) Dehydropiandroster, which is one of the types of androgens whose level increases in the case of polycystic ovary syndrome. Prolactin is produced by the hypothalamic lobe of the pituitary gland and is the main cause of irregular menstruation. High levels of

this hormone will lead to a disturbance in the luteal phase, which in turn leads to anovulation and irregular menstruation. If it rises to very high levels, it will lead to amenorrhea Al-Jabri (2010). This is what was indicated by Frahan (2003), as there was an increase in the prolactin hormone in women affected during the luteal phase, as the prolactin hormone works to suppress follicular maturation.

Conclusion:

This study highlights significant hormonal and biochemical alterations associated with Polycystic Ovary Syndrome (PCOS) among women in Bani Walid, Libya. Key findings include elevated levels of prolactin, thyroid-stimulating hormone (TSH), triglycerides, cholesterol, and cumulative blood glucose (HbA1C) in women with PCOS compared to healthy controls. Additionally, obesity, irregular menstrual cycles, and infertility were prevalent among affected individuals, underscoring the strong association between PCOS and metabolic dysfunction. The results emphasize the critical need for early diagnosis and comprehensive management strategies, including weight control, regular monitoring of glucose and lipid profiles, and targeted interventions to mitigate complications such as diabetes and cardiovascular diseases. Furthermore, this study advocates for increased awareness programs to educate women and healthcare providers about PCOS and its long-term health implications. Future research should focus on longitudinal studies to explore genetic and environmental factors contributing to PCOS in the region, as well as the development of culturally tailored interventions to improve the quality of life for affected women. Addressing these gaps will enhance clinical practices and public health policies aimed at reducing the burden of PCOS-related complications.

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