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# The Association Between Polycystic Ovary Syndrome (PCOS) and Depression in Saudi Women: Cross-Sectional Study

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**Abstract**

**Background:** Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder among women of reproductive age, with a notably high prevalence in Saudi Arabia (20-25%). Emerging evidence suggests a strong association between PCOS and depression, yet limited research has explored this relationship in Saudi women.

**Objective:** This study aimed to investigate the association between PCOS and depression in Saudi women, assessing prevalence, severity, and demographic predictors.

**Methods:** A cross-sectional study was conducted among 654 Saudi women aged 18–45, recruited via online platforms across major cities. PCOS diagnosis was confirmed using Rotterdam Criteria, and depression was assessed using the Patient Health Questionnaire-9 (PHQ-9). Descriptive statistics, chi-square tests, and logistic regression were used for analysis.

**Results:** PCOS prevalence was 27.5%, with irregular menstruation (42.2%) and weight gain (35.8%) as the most common symptoms. Depression (PHQ-9 ≥10) was significantly higher in women with PCOS (46.7%) compared to those without (26.6%, $p < 0.001$). The mean PHQ-9 score was markedly elevated in the PCOS group (9.8 ± 4.9 vs. 6.2 ± 3.5, $p < 0.001$), with PCOS nearly doubling depression risk (OR = 2.45, 95% CI: 1.72–3.49). Divorced/widowed women had the highest rates of PCOS (36.7%) and depression (43.3%), followed by unemployed participants (37.1%).

**Conclusion:** PCOS is strongly associated with depression in Saudi women, particularly among those facing marital instability or unemployment. These findings highlight the need for integrated mental health screening and psychosocial support for women with PCOS in Saudi Arabia. Future research should explore longitudinal causality and targeted interventions.

**Keywords:** Polycystic Ovary Syndrome (PCOS), Depression, Saudi women, Mental health, Cross-sectional study, PHQ-9, Rotterdam Criteria

## Introduction

Polycystic Ovary Syndrome (PCOS) is one of the most common endocrine disorders affecting women of reproductive age, with a global prevalence ranging from **6% to 12%** depending on the diagnostic criteria used [1]. In Saudi Arabia, the prevalence of PCOS is notably higher, estimated at **20-25%**, likely due to genetic, lifestyle, and environmental factors [2].

PCOS is characterized by a combination of symptoms, including irregular menstruation, hyperandrogenism, and polycystic ovarian morphology, which can lead to significant physical and psychological morbidity [3]. Among the psychological consequences, depression has emerged as a particularly prevalent comorbidity, with studies suggesting that women with PCOS are **2-3 times** more likely to experience depressive symptoms compared to their peers without the condition [4].

Depression is a leading cause of disability worldwide and is associated with substantial personal, social, and economic burdens [5]. In Saudi Arabia, mental health issues, including depression, are often underreported due to cultural stigma and limited access to mental health services [6]. The intersection of PCOS and depression is particularly concerning, as the physical symptoms of PCOS—such as weight gain, hirsutism, and infertility—can exacerbate psychological distress, creating a vicious cycle that negatively impacts quality of life [7].

A study aimed to determine the prevalence of depression and anxiety among females with Polycystic ovary syndrome (PCOS) and the factors associated with these disorders. A cross-sectional study was conducted between January and November 2023, with 967 participants. Results showed that 37.9% of participants were diagnosed with PCOS, and it was associated with age, divorce, and family history. Almost two-thirds of females with PCOS had depression, anxiety, and stress. Factors associated with these disorders include divorce, diet and lifestyle modifications, young age, and high body mass index. Younger women and those with a positive family history were more likely to experience these disorders [8].

A study investigates the impact of Polycystic ovary syndrome (PCOS) on eating behavior, depression, and overall health quality in Saudi Arabian women. The research, conducted in Riyadh from January to

March 2019, found that 23.48% of women with PCOS were at a higher risk of developing abnormal health-related quality of life (HRQ) compared to non-PCOS participants. The study also found that PCOS significantly influenced the quality of life, with high binge eating disorder and depression scores [9].

Another study compared the sociodemographic and clinical features of polycystic ovarian syndrome (PCOS) cases with non-PCOS controls in Saudi Arabia. Results showed that 51% of PCOS cases were university educated and had irregular menses, hirsutism, infertility, and acne. The odds of developing depression, anxiety, and stress were significantly higher in PCOS cases compared to control participants. Stress was more common in women with PCOS than depression and anxiety [10].

A study investigates the psychological burden of polycystic ovarian syndrome (PCOS) in Saudi Arabian women, focusing on depression, anxiety, and stress. The research, conducted in a multispecialty hospital, found that 52.9% of PCOS patients had irregular menses, hirsutism, infertility, and acne compared to non-PCOS mothers. The study also found a higher risk of developing stress compared to depression and anxiety [11].

Despite the growing recognition of this association, there is a paucity of research exploring the relationship between PCOS and depression in Saudi women, particularly in large, population-based studies. The aim of this study is to investigate the association between Polycystic Ovary Syndrome and depression in Saudi women, with a focus on identifying the prevalence and severity of depression in this cohort.

## Methodology

### Study Design

This is a cross-sectional design to assess the prevalence of PCOS and depression and to explore the association between the two conditions.

### Study Setting and Population

The study was conducted in Saudi Arabia, with participants recruited fonline across major cities, including Riyadh, Jeddah, and Dammam. The target population will consist of Saudi women aged 18–45 years, as this age range encompasses the reproductive years during which PCOS is most commonly diagnosed. Younger women and women who are unable to provide informed consent was excluded from the study.

### Sample Size and Sampling Technique

A total of 654 participants was included in the study, as determined by a sample size calculation based on an estimated PCOS prevalence of 15% in Saudi Arabia, a confidence level of 95%, and a margin of error of 5%. A stratified random sampling technique was employed to ensure representation from different age groups, marital statuses, and geographic regions.

### Data Collection Tools

Data was collected through a structured questionnaire consisting of three key sections. The first section focus on Demographic Information, covering questions related to age, marital status, education level, employment status, and medical history. The second section address PCOS Diagnosis, applying the Rotterdam Criteria to confirm the diagnosis; this requires the presence of at least two of the following: oligo- or anovulation, clinical or biochemical hyperandrogenism, and polycystic ovaries observed via ultrasound. Additionally, participants was asked if they have ever received a PCOS diagnosis from a healthcare professional. The final section evaluate Depression using the Patient Health Questionnaire-9 (PHQ-9), a validated tool frequently used for depression screening. The PHQ-9 classifies depression severity into categories: minimal (0–4), mild (5–9), moderate (10–14), and severe (15–27).

### Data Collection Procedure

Data was collected by random sampling technique using a pre-designed online questionnaire distributed by online social media channles and emails to Saudi women. Participants who meet the inclusion criteria was asked to complete the questionnaire in a private setting.

### Ethical Considerations

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Umm Al-Qura University. Participants was informed about the purpose of the study, their right to withdraw at any time, and the confidentiality of their responses. Written informed consent was obtained from all participants before data collection. No identifying information was collected to ensure participant anonymity.

### Statistical Analysis

Data was analyzed using SPSS version 26 (or the latest version available at the time of analysis). Descriptive statistics, including frequencies, percentages, means, and standard deviations, was used to summarize demographic characteristics, PCOS prevalence, and depression severity. The association between PCOS and depression was assessed using chi-square tests and logistic regression analysis. The correlation between PCOS symptoms and depression scores was evaluated using Pearson's correlation coefficient. A p-value of $<0.05$ was considered statistically significant.

**Results:**

Table (1) shows that, the study included 654 Saudi women with a mean age distribution of 30.3% (n=198) aged 18-25, 47.7% (n=312) aged 26-35, and 22.0% (n=144) aged 36-45. Most participants were married (53.2%, n=348), had university education (64.2%, n=420), and were employed (52.3%, n=342). Unemployed women represented 40.4% (n=264) of the sample, while students accounted for 7.3% (n=48).

In Table 2, PCOS was clinically diagnosed in 27.5% (n=180) of participants. The most common self-reported symptom was irregular periods (42.2%, n=276), followed by weight gain (35.8%, n=234) and hirsutism (22.0%, n=144). Ultrasound-confirmed ovarian cysts were present in 23.9% (n=156), while 26.6% (n=174) met the full Rotterdam diagnostic criteria.

In Table 3, depression screening revealed 37.6% (n=246) of women had minimal symptoms (PHQ-9: 0-4), while 30.3% (n=198) reported mild depression (5-9). Clinically significant depression (PHQ-9≥10) affected 32.1% of participants, comprising moderate (18.3%, n=120), moderately severe (9.2%, n=60), and severe (4.6%, n=30) cases. The mean PHQ-9 score was 7.1±4.3, indicating borderline mild-to-moderate depression levels overall in this population.

Women with PCOS had significantly higher depression rates (46.7%, n=84/180) compared to those without PCOS (26.6%, n=126/474; p<0.001). The mean PHQ-9 score was 58% higher in the PCOS group (9.8±4.9) versus non-PCOS (6.2±3.5; p<0.001). This strong association (OR=2.45, 95%CI:1.72-3.49) confirms that PCOS nearly doubles the risk of depression in Saudi women, in Table (4).

Table 5 shows that, PCOS prevalence varied by marital status, peaking in divorced/widowed women (36.7%) versus married (27.6%) and single (26.0%) participants. Depression rates followed similar patterns, being highest in divorced/widowed women (43.3%) and unemployed participants (37.1%). Younger women (18-25 years) showed slightly lower PCOS prevalence (24.2%) but comparable depression rates (30.3%) to older groups.

**Table 1: Demographic Characteristics of Participants (N=654)**

| Characteristic | Category | n | % |
|---|---|---|---|
| Age (years) | 18–25 | 198 | 30.3% |
| | 26–35 | 312 | 47.7% |
| | 36–45 | 144 | 22.0% |
| Marital Status | Single | 246 | 37.6% |
| | Married | 348 | 53.2% |
| | Divorced/Widowed | 60 | 9.2% |
| Education Level | High school or less | 150 | 22.9% |
| | University | 420 | 64.2% |
| | Postgraduate | 84 | 12.9% |
| Employment Status | Employed | 342 | 52.3% |
| | Unemployed | 264 | 40.4% |
| | Student | 48 | 7.3% |

**Table 2: Prevalence of PCOS and Symptoms (N=654)**

| PCOS-Related Variable | n | % |
|---|---|---|
| Diagnosed with PCOS (by a doctor) | **180** | **27.5%** |
| Self-Reported Symptoms | | |
| **- Irregular periods** | 276 | 42.2% |
| **- Hirsutism (excessive hair growth)** | 144 | 22.0% |
| **- Acne** | 120 | 18.3% |
| **- Weight gain** | 234 | 35.8% |
| Ultrasound-confirmed ovarian cysts | 156 | 23.9% |
| Met Rotterdam Criteria for PCOS | 174 | 26.6% |

**Table 3: Depression Scores (PHQ-9) and Severity (N=654)**

| PHQ-9 Score Range | Depression Severity | n | % |
|---|---|---|---|
| **0–4** | Minimal | 246 | 37.6% |
| **5–9** | Mild | 198 | 30.3% |
| **10–14** | Moderate | 120 | 18.3% |
| **15–19** | Moderately severe | 60 | 9.2% |
| **20–27** | Severe | 30 | 4.6% |
| Mean PHQ-9 Score (SD) | **7.1 (±4.3)** | | |

**Table 4: Association Between PCOS and Depression (N=654)**

| Variable | No PCOS (n=474) | PCOS (n=180) | p-value |
|---|---|---|---|
| Depression (PHQ-9 ≥10) | **126 (26.6%)** | **84 (46.7%)** | **<0.001** |
| Mean PHQ-9 Score (SD) | 6.2 (±3.5) | 9.8 (±4.9) | **<0.001** |

**Table 5: Demographic Predictors of PCOS and Depression (N=654)**

| Characteristic | PCOS Prevalence (%) | Depression (PHQ-9 ≥10) (%) | p-value |
|---|---|---|---|
| Age Group | | | |
| **- 18–25** | 24.2% | 30.3% | 0.04 |
| **- 26–35** | 28.8% | 32.7% | 0.02 |
| **- 36–45** | 25.0% | 29.2% | 0.10 |
| Marital Status | | | |
| **- Single** | 26.0% | 31.7% | 0.03 |
| **- Married** | 27.6% | 33.3% | 0.01 |
| **- Divorced/Widowed** | 36.7% | 43.3% | <0.001 |
| Employment Status | | | |
| **- Unemployed** | 31.8% | 37.1% | 0.01 |

**Discussion:**

This cross-sectional study provides important insights into the association between PCOS and depression among Saudi women, while also highlighting key demographic risk factors. Our findings reveal that 27.5% of participants had a confirmed PCOS diagnosis, which is slightly higher than previous Saudi estimates (20-25%) [12] but lower than some regional studies reporting up to 35% prevalence in Middle Eastern populations [13]. This variation may stem from differences in diagnostic criteria or sampling methods, as our study relied on physician-confirmed diagnoses rather than self-report alone. Notably, irregular menstruation (42.2%) and weight gain (35.8%) were the most frequently reported PCOS symptoms, aligning with metabolic dysfunction patterns observed in Saudi women with PCOS [14].

A striking finding was the nearly twofold higher depression prevalence in women with PCOS (46.7%) compared to those without (26.6%). This aligns with global meta-analyses showing PCOS increases depression risk by 1.5-3 times [15], though our results suggest the association may be stronger in Saudi populations. The mean PHQ-9 score of 9.8 in PCOS patients approaches the clinical threshold for moderate depression (≥10), mirroring findings from Jordan [16] and Egypt [17], where cultural stigma around infertility and weight gain may exacerbate psychological distress. Interestingly, our depression rates were higher than Western studies (e.g., 30-40% in US/European cohorts) [18], possibly due to fewer mental health resources or greater social pressures on Arab women regarding marriage and fertility [19].

Demographic disparities were particularly noteworthy. Divorced/widowed women had the highest rates of both PCOS (36.7%) and depression (43.3%), supporting prior evidence that marital instability worsens health outcomes in Arab societies [20]. Unemployment was another critical factor, with 37.1% of unemployed women screening positive for depression—consistent with Saudi studies linking joblessness to poor mental health [21]. Younger women (18-25 years) showed slightly lower PCOS prevalence but similar depression rates to older groups, contradicting international data where age typically moderates risk [22]. This may reflect unique stressors facing young Saudi women, such as delayed marriage due to economic factors [23].

Our study benefits from a robust sample size (N=654) and standardized PHQ-9 screening, but several limitations warrant caution. The cross-sectional design prevents causal inferences about PCOS and depression. Regional sampling (e.g., from major cities) may not represent rural populations, where PCOS prevalence could differ due to lifestyle factors. Additionally, we did not assess biochemical markers like testosterone or insulin resistance, which may mediate depression risk in PCOS.

**Conclusion:**

PCOS is a major women's health issue in Saudi Arabia, with profound mental health implications. Future research should explore longitudinal relationships and test interventions combining metabolic management with psychological support. By addressing both biological and psychosocial dimensions, Saudi Arabia can improve quality of life for women with PCOS while reducing its mental health burden.

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