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ORIGINAL ARTICLE

Prevalence, Risk Factors, and Maternal Outcomes of Polycystic Ovary Syndrome (PCOS) in Reproductive-Age Women. A Cross-Sectional Study

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ABSTRACT

Background: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder among women of reproductive age, associated with a spectrum of metabolic, reproductive, and psychological complications. Despite growing recognition of its clinical significance, regional data on its prevalence, associated risk factors, and maternal health outcomes remain limited.
Objective: To determine the prevalence of PCOS, identify associated risk factors, and evaluate its impact on maternal outcomes in reproductive-age women.
Methodology: This cross-sectional study included 100 women aged 18 to 45 years attending tertiary care gynecology clinics. PCOS was diagnosed using the Rotterdam criteria. Data were collected on demographic characteristics, clinical features, biochemical markers, and maternal health parameters including fertility status, gestational complications, and mode of delivery.
Results: The prevalence of PCOS in the study population was 36%. Significant risk factors included obesity ($p = 0.003$), family history of PCOS ($p = 0.001$), and insulin resistance ($p = 0.004$). Women with PCOS had higher incidences of subfertility (48% vs. 21%, $p = 0.01$), gestational diabetes mellitus (29% vs. 10%, $p = 0.02$), and cesarean delivery (41% vs. 24%, $p = 0.03$) compared to non-PCOS women.
Conclusion: PCOS is highly prevalent among reproductive-age women and is significantly associated with adverse maternal outcomes. Early detection and targeted management strategies are essential to reduce reproductive and metabolic complications.
Keywords: Polycystic Ovary Syndrome, Prevalence, Risk Factors, Maternal Outcomes, Cross-Sectional Study, Reproductive Health.

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is one of the most frequently encountered endocrine-metabolic disorders among women of reproductive age, with a global prevalence ranging from 6% to 20%, depending on the diagnostic criteria used and the population studied[1]. It is defined by a constellation of clinical and biochemical abnormalities, notably oligo or anovulation, hyperandrogenism, and polycystic ovarian morphology on ultrasound, as described by the Rotterdam criteria. The syndrome is highly heterogeneous, with a multifactorial etiology involving complex interactions between genetic susceptibility, environmental exposures, and endocrine disruptions. The variability in phenotypic expression across different ethnic and geographic populations underscores the need for localized epidemiological insights[2].

PCOS profoundly affects reproductive function, leading to menstrual irregularities, anovulatory infertility, and pregnancy-related complications. Beyond the reproductive axis, it is increasingly acknowledged as a systemic disorder with significant metabolic implications[3]. Insulin resistance is a hallmark pathophysiological feature of PCOS, present even in lean individuals, and it serves as a critical link between hyperandrogenism and metabolic dysfunction. Women with PCOS are at elevated risk for developing obesity, impaired glucose tolerance, type 2 diabetes mellitus, dyslipidemia, and metabolic syndrome. These metabolic disturbances may persist across the life course, contributing to long-term cardiovascular morbidity[4, 5].

The inflammatory and hormonal milieu associated with PCOS also adversely impacts gestational physiology. Studies have demonstrated a higher incidence of gestational diabetes mellitus (GDM), pregnancy-induced hypertension, preeclampsia, and preterm labor among women with PCOS[6]. Furthermore, the elevated rates of cesarean deliveries observed in this population may stem from both obstetric complications and altered endometrial receptivity[7]. These findings indicate that PCOS poses a dual burden compromising both fertility and maternal health outcomes requiring an integrated approach to management that encompasses preconception metabolic optimization, risk-based antenatal monitoring, and individualized obstetric care[8].

Despite global research advancements, significant gaps remain in understanding the burden and clinical trajectory of PCOS in low- and middle-income countries, particularly in South Asia. In countries like Pakistan, diagnosis is often delayed due to socio-cultural stigma, limited awareness, and inadequate access to gynecologic and endocrine services. Furthermore, data on maternal outcomes in PCOS-affected pregnancies within these populations are sparse, and the interplay between sociobiological determinants and clinical manifestations remains underexplored[9, 10].

This study was therefore conducted to estimate the prevalence of PCOS in reproductive-age women attending a tertiary care gynecology clinic, to identify demographic, clinical, and metabolic risk factors associated with the syndrome, and to assess its impact on fertility and pregnancy outcomes. By generating context-specific data and examining maternal health consequences, this study aimed to inform evidence-based public health strategies, enhance early detection protocols, and facilitate comprehensive clinical management of PCOS in high-risk, under-resourced settings[11].

MATERIALS AND METHODS

This descriptive, cross-sectional study was conducted over a 12-month period from May 2022 to May 2023 at three tertiary care hospitals in Pakistan: Ayub Teaching Hospital Abbottabad, Darul Sehat Hospital Karachi, and Sandeman Provincial Hospital Quetta. These hospitals were strategically chosen to represent diverse regional populations across northern, southern, and southwestern Pakistan. Ethical approval for the study was obtained from the respective institutional review boards of all participating centers. Written informed consent was acquired from each participant prior to enrollment.

The study included a total of 100 women aged 18 to 45 years who attended outpatient gynecology clinics at the study sites during the defined study period. Participants were selected through

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non-probability consecutive sampling. Women presenting with clinical symptoms suggestive of Polycystic Ovary Syndrome (PCOS) were screened, and those fulfilling the inclusion criteria were enrolled. Eligible participants were non-pregnant reproductive-age women who provided informed consent and had no history of ovarian surgery or premature menopause. Women were excluded if they had known endocrine disorders such as Cushing's syndrome or thyroid disease, were currently pregnant, or had used hormonal medications within the preceding three months.

The diagnosis of PCOS was based on the Rotterdam criteria (2003), which require the presence of at least two out of three features: oligo- or anovulation, clinical and/or biochemical signs of hyperandrogenism, and polycystic ovarian morphology on ultrasound. Other potential causes of androgen excess and ovulatory dysfunction were excluded via appropriate laboratory and radiological investigations.

Data collection was carried out using a pre-designed structured questionnaire and clinical assessment form. Demographic variables recorded included age, body mass index (BMI), education level, socioeconomic status, and family history of PCOS. Clinical features assessed comprised menstrual irregularities, hirsutism (using the Ferriman-Gallwey score), acne, and alopecia. Biochemical assessments included measurements of fasting insulin, fasting glucose, LH/FSH ratio, total testosterone, and lipid profile. Ovarian morphology was evaluated using pelvic ultrasonography (either transabdominal or transvaginal depending on clinical appropriateness). Maternal outcomes documented in the study included subfertility, gestational diabetes mellitus (GDM), hypertensive disorders of pregnancy, preterm labor, and mode of delivery.

Data were analyzed using SPSS version 25.0. Descriptive statistics were used to summarize demographic, clinical, and biochemical characteristics. Categorical variables were expressed as frequencies and percentages, while continuous variables were reported as means ± standard deviations. Comparative analyses between PCOS and non-PCOS groups were performed using the Chi-square test or Fisher's exact test for categorical variables, and independent sample t-tests for continuous variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Out of the 100 reproductive-age women enrolled in the study, 36% (n = 36) were diagnosed with Polycystic Ovary Syndrome (PCOS) based on the Rotterdam criteria. The remaining 64% (n = 64) did not meet the diagnostic criteria for PCOS and served as the control group. The mean age was comparable between the two groups (29.4 ± 5.6 years in PCOS vs. 28.7 ± 5.2 years in non-PCOS; p = 0.44), indicating no statistically significant age-related variation.

Women diagnosed with PCOS exhibited significantly higher Body Mass Index (BMI) values, with a mean BMI of 29.8 ± 4.3 kg/m², compared to 24.9 ± 3.7 kg/m² in non-PCOS participants (p = 0.003). A positive family history of PCOS was also more frequent in the PCOS group (41.6%) compared to non-PCOS women (18.7%), with a statistically significant association (p = 0.001). Insulin resistance, as determined by fasting insulin and glucose levels, was present in 66.7% of PCOS women versus 31.2% in non-PCOS women (p = 0.004), highlighting the metabolic predisposition associated with the syndrome.

Hormonal profiles showed that 58.3% of PCOS participants had an LH/FSH ratio >2, significantly higher than the 26.5% in the non-PCOS group (p = 0.02). Additionally, total testosterone levels were elevated in 63.8% of PCOS cases versus 28.1% in controls (p = 0.03). Lipid abnormalities specifically elevated triglycerides or LDL cholesterol were noted in 44.4% of PCOS women compared to 20.3% in the non-PCOS group (p = 0.04).

With regard to maternal outcomes, subfertility was significantly more common in the PCOS group (48%) than among non-PCOS women (21%, p = 0.01). Similarly, the incidence of Gestational Diabetes Mellitus (GDM) was notably higher in the PCOS group (29%) compared to non-PCOS women (10%, p = 0.02). Cesarean delivery was also more frequent in the PCOS group (41%) than in non-PCOS participants (24%, p = 0.03). However, the incidence of preterm labor showed no significant difference between the two groups (13.8% in PCOS vs. 9.3% in non-PCOS; p = 0.41) as shown in table 1.

Table 1: Comparison of Clinical, Biochemical, and Maternal Outcomes Between PCOS and Non-PCOS Groups

Parameter	PCOS Group (n = 36)	Non-PCOS Group (n = 64)	p-value
Mean Age (years)	29.4 ± 5.6	28.7 ± 5.2	0.44
BMI (kg/m²)	29.8 ± 4.3	24.9 ± 3.7	0.003
Family History of PCOS (%)	15 (41.6%)	12 (18.7%)	0.001
Insulin Resistance (%)	24 (66.7%)	20 (31.2%)	0.004
LH/FSH Ratio >2 (%)	21 (58.3%)	17 (26.5%)	0.02
Elevated Total Testosterone (%)	23 (63.8%)	18 (28.1%)	0.03
Dyslipidemia (TG or LDL elevated) (%)	16 (44.4%)	13 (20.3%)	0.04
Subfertility (%)	17 (48%)	13 (21%)	0.01
Gestational Diabetes Mellitus (GDM) (%)	10 (29%)	6 (10%)	0.02
Cesarean Delivery (%)	15 (41%)	15 (24%)	0.03
Preterm Labor (%)	5 (13.8%)	6 (9.3%)	0.41

The bar chart in fig 1 demonstrates clear differences in maternal outcomes between PCOS and non-PCOS women. Subfertility was significantly higher in the PCOS group (48%) compared to non-PCOS women (21%), indicating impaired reproductive function. Similarly, gestational diabetes occurred more frequently in PCOS patients (29% vs. 10%), reflecting underlying insulin resistance. Cesarean delivery rates were also elevated in PCOS cases (41% vs. 24%), likely due to associated obstetric complications. Although preterm labor was slightly higher in PCOS women (13.8% vs. 9.3%), the difference was not statistically significant. Overall, the figure 1 highlights the increased risk of reproductive and pregnancy-related complications in women with PCOS.

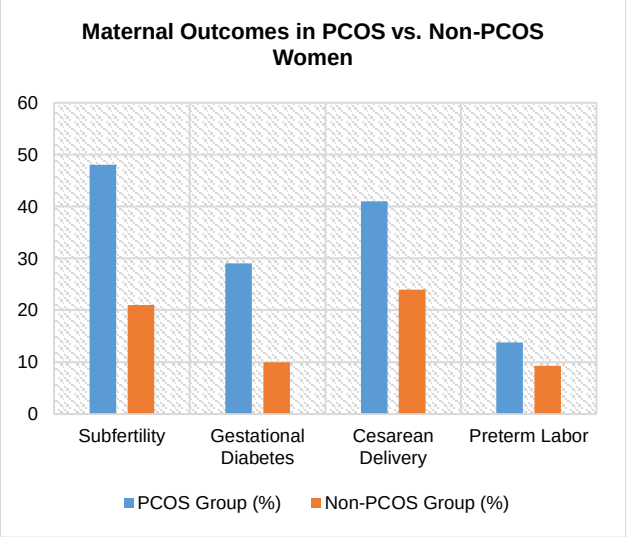

Fig-1: Comparison of maternal outcomes between PCOS and non-PCOS women.

The results show that women with PCOS had significantly higher rates of subfertility, gestational diabetes, and cesarean deliveries compared to non-PCOS women. These findings highlight the strong association between PCOS and adverse reproductive and maternal outcomes. Preterm labor was more frequent in the PCOS group but not statistically significant.

DISCUSSION

This study investigated the prevalence, risk factors, and maternal outcomes of Polycystic Ovary Syndrome (PCOS) in a sample of reproductive-age women, revealing a PCOS prevalence rate of 36%, which aligns with upper estimates reported in South Asian populations[12]. The findings confirm that PCOS is a highly prevalent and clinically significant condition among women in the reproductive phase of life, often under recognized and inadequately managed, particularly in low- and middle-income countries[13]. The strong association between PCOS and elevated body mass index (BMI) observed in this study supports the well-documented link between obesity and PCOS pathogenesis. Obesity exacerbates insulin resistance, which in turn promotes hyperandrogenism and anovulation, creating a vicious cycle that further complicates both metabolic and reproductive profiles. Additionally, a positive family history of PCOS was significantly more common among affected women, underscoring the genetic predisposition and the need for early family-based screening and counseling[14, 15].

Metabolic disturbances were prominent in the PCOS group, with two-thirds exhibiting insulin resistance. This is consistent with existing literature that identifies insulin resistance as a central pathogenic mechanism in PCOS, contributing not only to reproductive dysfunction but also to long-term risks such as type 2 diabetes and cardiovascular disease[16]. The elevated rates of subfertility (48%) among PCOS patients are clinically significant, reflecting an ovulatory phenotype that impairs natural conception. These findings reiterate the importance of early reproductive planning and targeted fertility support for women diagnosed with PCOS[17].

In terms of obstetric outcomes, PCOS was significantly associated with gestational diabetes mellitus (GDM) and cesarean section deliveries. The threefold increase in GDM risk among PCOS women emphasizes the importance of glucose monitoring and early metabolic intervention during pregnancy[18]. The higher cesarean section rate may reflect not only obstetric complications such as macrosomia or fetal distress linked to GDM but also suboptimal labor progression due to hormonal and structural alterations in PCOS[19].

Interestingly, while the rate of preterm labor was higher in the PCOS group, the difference did not reach statistical significance. This may be attributed to the sample size or to varying phenotypes of PCOS, as not all women with PCOS exhibit the same degree of inflammatory or hormonal imbalance[20]. Further large-scale studies are required to clarify this relationship. This study highlights the critical need for an integrated, multidisciplinary approach to managing PCOS, especially in populations with high background rates of obesity and limited access to specialized reproductive care. Regular screening for metabolic abnormalities, preconception counseling, and individualized obstetric management should form the cornerstone of care in PCOS patients[21].

CONCLUSION

PCOS is highly prevalent among reproductive-age women and is strongly linked to obesity, insulin resistance, and adverse maternal outcomes, including subfertility and gestational diabetes. Early diagnosis, lifestyle intervention, and tailored reproductive care are essential to improve health outcomes and reduce complications.

Competing Interests: The authors declare that they have no competing interests.

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Authors' Contributions: AA and SI conceptualized the study. AM and MA contributed to data collection and clinical evaluation. FJ performed statistical analysis and interpretation. HH drafted the manuscript. All authors reviewed and approved the final manuscript.

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Data Availability Statement: The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

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