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Research Article

Association between Polycystic Ovary Syndrome and Preterm Labor: A Case-Control Study at CMH Rawalakot, Azad Jammu and Kashmir

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ABSTRACT

Objective: To determine whether maternal polycystic ovary syndrome (PCOS) is associated with increased risk of preterm labor.

Methods: A case–control study was conducted at CMH Rawalakot, Azad Jammu and Kashmir, between December 2024 and May 2025. A total of 222 women were enrolled: 111 cases (preterm labor,<37 weeks) and 111 controls (term labor, 37–42 weeks). PCOS was diagnosed using the Rotterdam 2003 criteria. Data were analyzed using chi-square tests and odds ratios (OR) with 95% confidence intervals (CI).

Results: The mean age was 29.45 ± 5.89 years, gestational age 36.22 ± 3.59 weeks, parity 2.18 ± 1.09, and BMI 32.04 ± 2.32 kg/m^2. PCOS prevalence was 20.3%. Preterm women had significantly higher rates of PCOS (26.1%) compared to term women (14.4%). This association was statistically significant (x^2 = 4.73, p = 0.030), with an OR of 2.10 (95% CI: 1.07–4.14). BMI did not significantly influence PCOS prevalence (p = 0.134_).

Conclusions: Women with PCOS were approximately twice as likely to deliver preterm. Findings support international evidence that PCOS is an independent risk factor for preterm labor, highlighting the need for enhanced surveillance of pregnant women with PCOS.

Keywords: Polycystic Ovary Syndrome, Preterm Labor, Pregnancy Outcomes, Case–Control Study, Pakistan.

INTRODUCTION

Preterm labor, defined as the onset of uterine contractions before 37 completed weeks of gestation, remains a leading cause of neonatal morbidity and mortality worldwide. Globally, about 11–13 million preterm births occur annually, contributing substantially to neonatal deaths and long-term neurodevelopmental impairments (Blencowe et al., 2013; Chawanpaiboon et al., 2019). Rates vary geographically, ranging from 4.4% in Ireland to 12.7% in the United States, with higher risk in teenagers, women over 30, and primigravidae (World Health Organization, 2018).

Polycystic ovary syndrome (PCOS) is one of the most prevalent endocrine disorders, affecting 4–14% of women of reproductive age (Pan et al., 2022). Marked by hyperandrogenism, oligo-anovulation, and polycystic ovarian morphology, PCOS is linked to obesity, insulin resistance, and reproductive dysfunction (Norman et al., 2007). In addition to reproductive complications, PCOS is linked with increased risks of gestational diabetes, preeclampsia, and poor perinatal outcomes (Mirza et al., 2022).

Recent systematic reviews and meta-analyses affirm a robust association between PCOS and preterm delivery, with odds ratios ranging from 1.3 to 2.2 (Ban et al, 2024; Yu et al.,

2016; Khomami et al., 2024). Few data exist, however, from South Asia, such as Pakistan. The current research bridges this gap by examining the relationship between PCOS and preterm labor in a Rawalakot, Azad Jammu and Kashmir, tertiary care hospital A number of studies over the last 15 years have established a connection between PCOS and poor obstetric outcomes.

Pan et al. (2022) had previously indicated that PCOS women had a 2.4-fold higher risk of preterm labor in a population-based cohort study. Yu et al. (2016), in a meta-analysis, demonstrated pooled relative risk for preterm birth at 1.52 in women with PCOS. Ban et al. (2024) validated the same with a multinational analysis with consistently higher risks in various populations.

Biologically, PCOS is characterized by chronic low-grade inflammation, hyperinsulinemia, and androgen excess, all of which may impair placental function and trigger early labor. Hsu et al. (2018) found elevated anti-Müllerian hormone (AMH) levels associated with spontaneous preterm birth in PCOS women. Moreover, Khomami et al. (2024) demonstrated higher NICU admissions and lower neonatal birth weights in infants of mothers with PCOS, underscoring the perinatal burden.

Taken together, evidence suggests that PCOS not only increases metabolic and reproductive risks but also poses a significant independent risk for preterm birth. This underscores the clinical importance of screening and monitoring PCOS pregnancies.

MATERIAL AND METHODS

Study Design and Setting

This case–control study was conducted in the Department of Obstetrics and Gynecology, CMH Rawalakot, Azad Jammu and Kashmir, between December 2024 and May 2025.

Participants

A total of 222 women were enrolled through non-probability consecutive sampling: 111 cases (preterm labor, <37 weeks) and 111 controls (term labor, 37–42 weeks). Inclusion criteria included booked singleton pregnancies, age 20–45 years, cephalic presentation, and regular uterine contractions. Exclusion criteria comprised infections, PPROM, multiple pregnancies, previous miscarriages, placenta previa, polyhydramnios/oligohydramnios, preeclampsia, chronic hypertension, and chorioamnionitis.

Operational Definitions

Preterm labor: Uterine contractions ≥1 every 10 minutes before 37 completed weeks.

PCOS: Diagnosed using Rotterdam 2003 criteria (any 2 of polycystic ovaries, oligo/amenorrhea, hyperandrogenism).

Sample Size

Using WHO sample size calculator, with α = 0.05, anticipated PCOS prevalence of 25.4% in cases and 14.2% in controls, required sample size was 111 per group.

Data Collection

History, physical examination, BMI, transvaginal ultrasound, testosterone levels, and glucose tolerance results were recorded on a structured proforma.

Data Analysis

Data were analyzed in SPSS v19. Descriptive statistics summarized baseline characteristics. Chi-square tested association between PCOS and preterm labor; OR with 95% CI quantified strength. Stratification by BMI and family diabetes history addressed confounding.

Ethics

Ethical approval was obtained, and informed consent was secured from all participants.

RESULTS

Demographics

- **Mean age:** 29.45 ± 5.89 years (21–40)
- **Mean gestational age:** 36.22 ± 3.59 weeks (31–42)
- **Mean parity:** 2.18 ± 1.09 (1–4)
- **Mean BMI:** 32.04 ± 2.32 kg/m² (25–42)

Table 1. Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Age	21	40	29.45	5.89
Gestational Age	31	42	36.22	3.59
Parity	1	4	2.18	1.09
BMI	25	39	32.04	2.32

Prevalence of PCOS

- Overall: 20.3% (45/222)
- Cases: 26.1% (29/111)
- Controls: 14.4% (16/111)

Table 2. Frequency and Percentage of PCOS

	Frequency	**Percentage**
Yes	45	20.3
No	177	79.7
Total	222	100.0

Association with Preterm Labor

- Chi-square p = 0.030 (significant)
- OR = 2.10 (95% CI: 1.07–4.14)
- BMI showed no significant association with PCOS (p = 0.134).

Table3. Cross Tabulation between Study Group and Presence of PCOS

Study Group	**PCOS**		**Total**
	Yes	No	
Cases	29	82	111
Controls	16	95	111
Total	45	177	222

χ^2 = 4.71
D.F. = 1
P-value = 0.030
OR = 2.10 (CI. = 1.067- 4.137)

Table 4. Cross Tabulation between BMI and Presence of PCOS

BMI	**PCOS**		**Total**
	Yes	No	
BMI<31	5	37	42
BMI $\leq$ 31	40	140	180
Total	45	177	222

χ^2 = 2.243
D.F. = 1
P-value = 0.134

Interpretation of Results

The prevalence of PCOS was higher among preterm women (26.1%) compared to term women (14.4%), reflecting a statistically significant association. Women with PCOS had twice the odds of delivering preterm, consistent with international studies (Ban et al., 2024; Pan et al., 2022).

Importantly, BMI did not significantly confound this association, suggesting PCOS independently influences preterm risk. From two hundred and twenty two patients, it was found that the minimum age of the patients was 21 years and maximum age of the patients was 40 years with mean $\pm$ standard deviation as 29.45 $\pm$ 5.89 years. The minimum gestational age was calculated as 31 weeks and maximum gestational age was found as 42 weeks having mean $\pm$ standard deviation as 36.22 $\pm$ 3.59 weeks. The minimum parity was observed as 1 and maximum parity was found as 4 having mean $\pm$ standard deviation as 2.18 $\pm$ 1.09. The minimum body mass index was calculated as 25 kg m^{-2} and maximum gestational age was found as 42 kg m^{-2} having mean $\pm$ standard deviation as 32.04 $\pm$ 2.32 kg m^{-2}.

There were 111 (50%) patients who were labelled as cases (females presenting before 37 completed weeks of gestation) and 111 (50%) patients who were labelled as controls (females presenting between 37 to 42 completed weeks of gestation). It was observed that polycystic ovarian syndrome was found in 45 (20.3%) patients and

polycystic ovarian syndrome was not found 177 (79.7%).

In the present research it was seen that 26.13% women who had a preterm delivery were suffering from PCOS compared to 14.41% women who were having PCOS had term deliveries. By using chi-square test, BMI had no significant association with presence of polycystic ovarian syndrome having p-value = 2.243. There was significant association was observed between the cases, controls and presence of polycystic ovarian syndrome having p-value = 0.030 it has also OR as 2.10 with confidence interval of 1.067- 4.137.

Figure 1 illustrates PCOS prevalence (%) in preterm vs term deliveries, while Figure 2 displays raw counts of PCOS cases and non-cases.

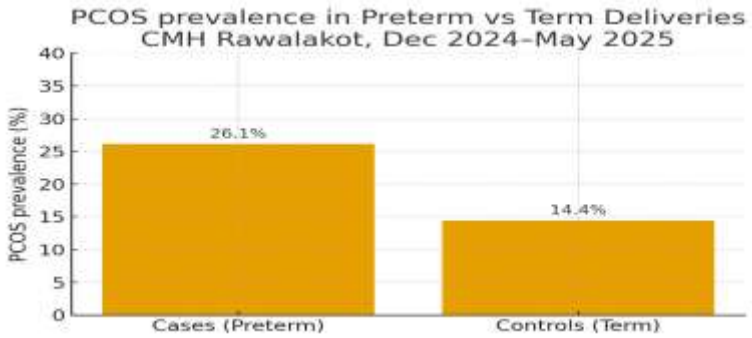

Figure 1. PCOS Prevalence in Preterm Vs Term Deliveries at CMH Rawalakot, Dec 2024–May 2025

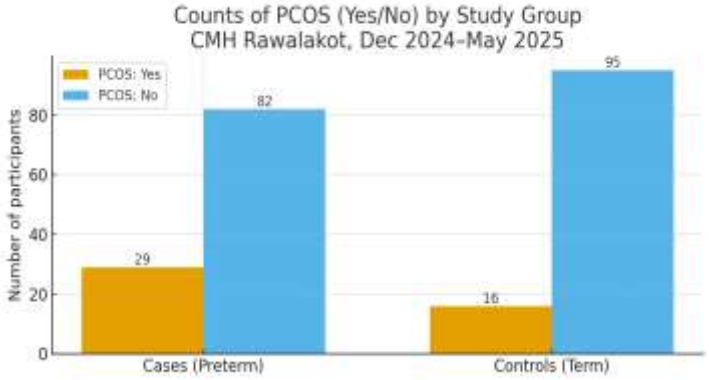

Figure 2. Counts Of PCOS (Yes/No) By Study Group at CMH Rawalakot, Dec 2024–May 2025

DISCUSSION

This study demonstrates a significant association between PCOS and preterm labor, consistent with global evidence. Pan et al. (2022) reported a 2.4-fold increased risk, and our OR of 2.10 closely aligns with these findings. Yu et al. (2016) and Ban et al. (2024) similarly documented elevated risks.

Biological plausibility lies in PCOS-related hyperandrogenism, insulin resistance, and inflammation, which may impair placentation and increase susceptibility to early labor. Hsu et al. (2018) suggested AMH as a mechanistic biomarker for preterm birth risk in PCOS women.

Strengths: Clear diagnostic criteria, balanced case–control groups, and stratification of confounders.

Limitations: Single-center design, moderate sample size, reliance on prior ultrasound/biochemistry, and absence of ART-related data.

Clinical implications: PCOS should be recognized as a high-risk marker for preterm delivery. Obstetricians should intensify surveillance in PCOS pregnancies, including cervical length monitoring and progesterone prophylaxis where appropriate.

Future research: Multicenter, prospective cohorts in South Asia are essential to strengthen evidence. Mechanistic studies exploring metabolic and endocrine pathways in PCOS may reveal targeted interventions.

CONCLUSION

Women with PCOS have significantly higher odds of preterm labor, independent of BMI. This underscores the need for targeted antenatal surveillance and preventive

interventions for women with PCOS. Policymakers and clinicians in Pakistan, particularly in AJK settings such as Rawalakot, should incorporate PCOS into maternal risk assessment protocols.

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