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FETOMATERNAL OUTCOME IN PREGNANCIES COMPLICATED BY POLYCYSTIC OVARY SYNDROME: A PROSPECTIVE COHORT STUDY

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Abstract

Introduction: Polycystic Ovary Syndrome (PCOS) is among the most common endocrine disorders in reproductive-age women, and its association with high-risk pregnancy has been increasingly recognized. Evidence regarding its effects on fetomaternal outcomes is still mixed and applies to South Asian populations as well.

Aims and Objectives: This paper, therefore, seeks to assess and compare Maternal and Neonatal Outcomes among Pregnant women with PCOS as compared to those without PCOS.

Materials and methods: This prospective cohort study was conducted in the Department of Obstetrics and Gynecology between January 2022 and June 2024 at a Tertiary Care Hospital in North India. Overall, 160 pregnant women with a single fetus were recruited, including the PCOS group of 71 women diagnosed by Rotterdam criteria and non-PCOS controls (n =79) matched for baseline characteristics. Maternal (BMI, Miscarriage, Gestational Diabetes Mellitus, Gestational Hypertension, Preeclampsia, Mode of Delivery) and Neonatal Outcomes (Gestational age at birth, Weight at birth, Intrauterine Growth restriction rate, Amniotic fluid Abnormalities, and Admission to the NICU) were examined.

Results: The findings of this study confirm that pregnancies complicated by PCOS are associated with increased Maternal and Neonatal morbidity.

Conclusion: This study underscores the need for intensified antenatal surveillance and tailored management strategies in women with PCOS.

Keywords: Polycystic Ovary Syndrome, Pregnancy Outcomes, Gestational Diabetes, Preeclampsia, Fetal Growth

Introduction

Polycystic Ovary Syndrome (PCOS) is a heterogeneous endocrine disorder usually characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology. With a continuous surge in its occurrence, it currently affects approximately 6–20% of women of reproductive age,

depending on diagnostic criteria. Besides being increasingly linked with infertility, PCOS has been recognized as a condition with significant metabolic and cardiovascular sequelae (Azziz et al., 2004; March et al., 2010).

Insulin resistance, obesity, dyslipidemia, and chronic low-grade inflammation commonly accompany PCOS and may persist or worsen during pregnancy, predisposing affected women to adverse obstetric outcomes (Barber et al., 2006; Yildiz et al., 2008). Owing to these complications, pregnancy in women with PCOS is often considered high risk with an increased likelihood of miscarriage, hypertensive disorders of pregnancy, preterm birth, gestational diabetes mellitus (GDM), and operative delivery (Boomsma et al., 2006; Toulis et al., 2011).

Many cohort studies and meta-analyses have reported higher rates of GDM and hypertensive disorders in women suffering from PCOS, regardless of their body mass index (Legro et al., 2009; Kjerulff et al., 2011). Similarly, adverse neonatal outcomes such as intrauterine growth (IUGR), abnormal birth weight, and increased neonatal intensive care unit (NICU) admissions have also been associated with PCOS. Nevertheless, the findings remain inconsistent across populations (Han et al., 2011; Doherty et al., 2015).

Furthermore, Data from South Asian populations remains relatively sparse despite a high occurrence of metabolic diseases and PCOS. Hence, this prospective cohort study aims to evaluate fetomaternal outcomes in pregnant women with PCOS compared to non-PCOS controls at a tertiary care center, thereby contributing region-specific evidence to the existing literature.

Materials and Methods

Study design and setting

This prospective cohort study was conducted in the Department of Obstetrics and Gynecology at Sher-I-Kashmir Institute of Medical Sciences (SKIMS), Soura, Srinagar, over 18 months from January 2022 to June 2024. Ethical clearance was obtained from the Institutional Ethics Committee of SKIMS before commencement of the study, and written informed consent was obtained from all participants.

Study population and sample size

A total of 160 pregnant women with singleton gestations were enrolled consecutively during the study period. Of these, 71 women constituted the PCOS group and 79 women formed the non-PCOS control group. The sample size was determined based on feasibility within the study period and was comparable to prior prospective cohort studies evaluating pregnancy outcomes in PCOS.

Diagnostic criteria and group allocation

Women were classified as having PCOS based on the Rotterdam 2003 criteria, requiring the presence of at least two of the following: oligo- or anovulation, clinical or biochemical hyperandrogenism, and polycystic ovarian morphology on ultrasonography, after exclusion of other endocrinopathies. The control group consisted of pregnant women without a prior or current diagnosis of PCOS, matched broadly for age and gestational period at enrolment.

Inclusion and Exclusion Criteria

Inclusion Criteria: - Pregnant women with or without PCOS; Singleton Pregnancy; Willingness to provide informed consent and plan delivery at the study center.

Exclusion criteria: - Pregnant women with multiple gestations; known pre-existing Diabetes Mellitus, Chronic Hypertension, Renal disease, Thyroid disorders, or Autoimmune conditions; Pregnancies complicated by major fetal anomalies.

Data Collection and Outcome Measures

Baseline demographic and clinical variables, including maternal age, gravidity, body mass index (BMI), and obstetric history, were recorded at enrolment. BMI was calculated as weight in kilograms divided by height in meters squared and categorized according to WHO criteria.

Participants were monitored prospectively throughout their pregnancy until delivery. Several maternal outcomes were assessed, including gestational diabetes mellitus (GDM), miscarriage, gestational hypertension, preeclampsia, indication for caesarean section, mode of delivery, and gestational age at delivery. For diagnosing GDM, standard oral glucose tolerance testing was performed according to the institutional protocol. Also, the definitions of gestational hypertension and preeclampsia were formulated in accordance with the established clinical guidelines.
Neonatal outcomes included birth weight, categorized as <2.5 kg, 2.5–3.4 kg, and ≥3.5 kg; intrauterine growth restriction (IUGR); amniotic fluid abnormalities (oligohydramnios or polyhydramnios); Apgar scores; and admission to the neonatal intensive care unit (NICU).

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using standard statistical software. Continuous variables were expressed as mean ± standard deviation and compared between groups using Student's t-test. Categorical variables were expressed as frequencies and percentages and analyzed using the chi-square test or Fisher's exact test where appropriate. A p-value of <0.05 was considered statistically significant.

Results

Baseline Maternal Characteristics
The majority of women in both groups were aged between 30 and 34 years, with a mean maternal age of 29.9 ± 2.63 years in the PCOS group and 30.3 ± 3.19 years in the non-PCOS group. Primigravidae constituted a higher proportion of the PCOS group (58.8%) compared to the control group (41.2%).
Mean BMI was significantly higher among women with PCOS (26.1 ± 3.69 kg/m²) than among non-PCOS women (23.2 ± 3.42 kg/m²), with the majority of PCOS patients falling into the overweight category (BMI 25–29.9 kg/m²) (p = 0.001).

Maternal Outcomes
The rate of miscarriage was significantly higher in the PCOS group (11.3%) compared to the non-PCOS group (1.3%) (p = 0.018). Gestational diabetes mellitus occurred more frequently among women with PCOS, consistent with underlying insulin resistance. Gestational hypertension and preeclampsia were also observed at higher rates in the PCOS group compared to controls.
The mode of delivery differed significantly between the two groups. Caesarean section was performed in 76.1% of women with PCOS compared to 46.8% of women without PCOS (p < 0.001). Acute fetal distress was the most common indication for caesarean delivery in both groups, followed by cephalopelvic disproportion. Fetal macrosomia was observed exclusively among PCOS pregnancies.
Preterm delivery (<37 weeks) occurred in 22.5% of PCOS pregnancies and 15.2% of non-PCOS pregnancies, though the difference did not reach statistical significance.

Neonatal Outcomes
Neonatal birth weight <2.5 kg was observed in 11.2% of neonates born to PCOS mothers and 5% of neonates in the control group. Birth weight ≥3.5 kg was significantly more common in the PCOS group (35.2%) compared to the non-PCOS group (5.1%) (p < 0.002).
IUGR and abnormalities in amniotic fluid volume were more frequently noted in the PCOS group. NICU admission was required for 26.8% of neonates born to PCOS mothers and 16.5% of neonates born to non-PCOS mothers; however, this difference was not statistically significant (p = 0.124).

Discussion

This prospective cohort study highlights the association of pregnancies complicated by PCOS with heightened neonatal and maternal morbidity. Our sample of women with PCOS had significantly

higher BMI, higher miscarriage rates, and increased prevalence of gestational metabolic and hypertensive complications. Additionally, they also exhibited a higher rate of caesarean delivery compared to non-PCOS controls. Our findings are therefore consistent with earlier prospective and population-based studies pertinent to this domain (Boomsma et al., 2006; Kjerulff et al., 2011).

The higher incidence of miscarriage in women with PCOS resonates with the already existing literature attributing early pregnancy loss to hyperandrogenism, obesity, hyperinsulinemia, and prothrombotic states associated with PCOS (Wang et al., 2011; Wartena et al., 2023). Similarly, a higher incidence of GDM in women with PCOS that our study highlighted aligns with existing studies that demonstrate impaired glucose tolerance and insulin resistance as central pathophysiological mechanisms in PCOS pregnancies (Paradisi et al., 2009; Legro et al., 2009).

Women with PCOS exhibited a higher frequency of hypertensive disorders, thereby corroborating the results of cohort and Mendelian randomization studies suggesting a causal relationship between PCOS and gestational hypertension (Kjerulff et al., 2011; Ma et al., 2024). Similarly, the formidably higher caesarean section rate among the PCOS pregnancies in our study supplements the results of various such meta-analyses and population-based cohorts (Boomsma et al., 2006; Roos et al., 2011).

Neonatal outcomes, such as increased IUGR and abnormal birth weight distribution, of our PCOS pregnancies are consistent with existing research suggesting placental dysfunction and inflammatory pathways as contributing factors (Han et al., 2011; Toulis et al., 2011). Furthermore, the frequency of NICU admission for neonates born to mothers with PCOS was higher; the difference could not be attributed statistical significance—a finding resonant with Firoozabadi et al. (2020) and Kollmann et al. (2015)

The strengths of this study include a prospective design and a comprehensive assessment of both maternal and neonatal outcomes. However, it should also be stated here that the single-center setting of this study and a lack of stratification by PCOS phenotype can be among its limitations. Since these may influence outcome heterogeneity, they should be addressed in future multicentric studies.

Conclusion

This study highlights that PCOS significantly impacts various aspects of pregnancy, leading to increased risks of gestational complications, adverse birth outcomes, and neonatal health issues. The findings emphasize the need for tailored prenatal care and monitoring strategies for women with PCOS to optimize maternal and neonatal health outcomes. Future research should continue to explore interventions and management strategies to mitigate these risks and improve pregnancy outcomes for women with PCOS.

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Conflict of Interest

None declared.

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