



ORIGINAL ARTICLE

Investigating the association between PCOS (Polycystic Ovary Syndrome) and pregnancy complications: A cohort study.

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ABSTRACT... **Objectives:** The basic aim of the study is to identify the correlation between PCOS and pregnancy complications. **Study Design:** Retrospective Cohort study. **Setting:** Shahida Islam Medical Complex. **Period:** September 2024 and June 2025. **Methods:** The cohort used 405 women who were pregnant. This is considered a retrospective study that used medical records to analyze data in a tertiary care hospital across a given period of study. Important data were focused on demographic data, e.g., age, body mass index (BMI), and parity, pre-existing medical conditions, e.g., hypertension or diabetes. **Results:** Women in the PCOS group had a higher mean Body Mass Index (BMI) ($28.7 \pm 5.3 \text{ kg/m}^2$) compared to the control group ($25.6 \pm 4.9 \text{ kg/m}^2$, $p < 0.001$), with a significantly greater prevalence of obesity (45% vs. 25%, $p < 0.001$). Although the mean age ($30.4 \pm 4.8 \text{ years}$ vs. $29.9 \pm 4.5 \text{ years}$), gravidity (2.3 ± 1.1 vs. 2.1 ± 1.0), parity (1.2 ± 0.9 vs. 1.1 ± 0.8), and smoking status (12% vs. 10%) were slightly higher in the PCOS group, these differences were not statistically significant ($p > 0.05$). Preterm delivery occurred in 22% of PCOS pregnancies compared to 10% in the control group ($p < 0.01$), and cesarean deliveries were also more frequent among women with PCOS (42% vs. 28%, $p < 0.01$). **Conclusion:** It is concluded that Polycystic Ovary Syndrome (PCOS) is significantly associated with adverse pregnancy outcomes, including gestational diabetes, hypertensive disorders, preterm delivery, and neonatal complications such as low birth weight and NICU admissions.

Key words: Oxidative Stress, PCOs, Pregnancy Complications.

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder affecting 6–20% of women of reproductive age worldwide, depending on diagnostic criteria. The name is derived from hyperandrogenism, chronic anovulation, and polycystic ovary morphology together with endocrinopathies, metabolic dysfunctions, and obesity, in particular insulin resistance and dyslipidemia.¹ Although anovulatory infertility due to PCOS is well documented, the disorder affects conception only and impacts pregnancy and maternal health substantially. The higher incidence of PCOS together with delayed childbearing in many population groups has made researchers pay more attention to understanding the possible complications that may be faced by pregnant women with this condition.² There is an

increased Obstetric complication, and they are also at a higher risk of pregnancy complications like miscarriages, recurrent miscarriages, and a low probability of having a neonate with optimal birth weight, oversized neonates, and neonates that require admission to the NICU.³

The relationship between inflammation oxidative stress and pregnancy complications in women with PCOS is still complex and thus has not been explained in detail. These components include hyperinsulinemia, chronic low-grade inflammation, endothelial dysfunction, and hyperandrogenemia, the disruption in the maternal-fetal environment can result.⁴ For example, the major source of hormonal imbalance in PCOS is insulin resistance and this precedes Gestational diabetes mellitus, a condition that

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has complications on both the mother and the fetus. Likewise, endothelial dysfunction and chronic inflammation may be predisposing factors to hypertensive disorders leading to adverse pregnancy outcomes. They also found that apart from metabolic and hormonal changes, other factors that help to worsen complications comprise lifestyle factors.⁵ PCOS is associated with a higher BMI which in themselves have been shown to increase risks linked with pregnancy. This co-existence of PCOS-related metabolic factors and obesity makes the categorization of risks even more challenging and warrants the need to come up with more enhanced strategies of management. In addition, different phenotypes of PCOS may impact pregnancy results.⁶ Now, according to the Rotterdam criteria, PCOS has been categorized into four subtypes depending on hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology. New research papers have estimated that first-sound hyperandrogenic described phenotypes may be at a higher risk of pregnancy complications as compared to second-sound non-hyperandrogenic phenotypes, but more research is required to make solid conclusions.⁷ Studying these relations is not just important in clinical practice but essential in epidemiology because of rising PCOS prevalence worldwide.⁸ Eventually, research on causative factors, markers, or potential predictors of complications tied to PCOS and pregnancy will be of value to clinical practice, as clinical benchmarks for prevention and management can be established.⁹ For example, some specified guidelines received during pre-conceptional consultations such as weight and diet regulation, glucose levels and any change thereof, and other matters influencing the general health of women could reduce some of the PCOS pregnancy risks.¹⁰

OBJECTIVE

The basic aim of the study is to find the association between PCOS and pregnancy complications.

METHODS

This retrospective cohort study was conducted at Shahida Islam Medical Complex from September 2024 to June 2025. Ethical approval (N0.SIMC/

ET.C./0040/24) was obtained, data was collected after taking informed consent from the cohort of 406 pregnant women.

Inclusion Criteria for Cases (n=203)

1. Women diagnosed with Polycystic Ovary Syndrome (PCOS) based on the Rotterdam criteria
2. Pregnant women aged > 18 years with singleton pregnancies confirmed by ultrasound.
3. Availability of complete medical records, including hormonal profiles and pregnancy outcomes.

Inclusion Criteria for Controls (n=203)

Pregnant women with singleton pregnancy as confirmed by ultrasound and not having polycystic ovaries as confirmed by Rotterdam criteria. This was also made sure that controls have full medical and hormonal records too.

Exclusion Criteria for Cases and Controls

1. Women with a diagnosis of other endocrine disorders such as thyroid dysfunction, cushing's syndrome and congenital adrenal hyperplasia.
2. History of uterine or ovarian surgeries, such as myomectomy or ovarian cystectomy, that may alter reproductive anatomy.

Data Collection

Data were collected retrospectively from medical records at a tertiary care hospital over a specific study period. Key data points included demographic details, such as age, body mass index (BMI), and parity, along with pre-existing medical conditions like hypertension or diabetes. PCOS diagnosis details were extracted, including hormonal profiles such as serum testosterone levels and the luteinizing hormone/follicle-stimulating hormone ratio. Pregnancy outcomes were meticulously documented, including maternal complications such as gestational diabetes mellitus (GDM), hypertensive disorders, preterm labor, and mode of delivery. Neonatal outcomes, including birth weight, Apgar scores, and neonatal intensive care unit (NICU) admissions, were also recorded.

Statistical Analysis

Data were analyzed using SPSS v26. Descriptive statistics summarized the baseline characteristics and pregnancy outcomes of the participants. Continuous variables, such as BMI and birth weight, were expressed as mean \pm standard deviation, while categorical variables, like the occurrence of GDM, were presented as frequencies and percentages.

RESULTS

Data were collected from 405 pregnant women. Women in the PCOS group had a higher mean Body Mass Index (BMI) ($28.7 \pm 5.3 \text{ kg/m}^2$) compared to the control group ($25.6 \pm 4.9 \text{ kg/m}^2$, $p < 0.001$), with a significantly greater prevalence of obesity (45% vs. 25%, $p < 0.001$). Although the mean age (30.4 ± 4.8 years vs. 29.9 ± 4.5 years), gravidity (2.3 ± 1.1 vs. 2.1 ± 1.0), parity (1.2 ± 0.9 vs. 1.1 ± 0.8), and smoking status (12% vs. 10%) were slightly higher in the PCOS group, these differences were not statistically significant ($p > 0.05$). Table-I

Characteristic	PCOS Group (Mean \pm SD or %)	Control Group (Mean \pm SD or %)	P-Value
Age (years)	30.4 ± 4.8	29.9 ± 4.5	0.12
Body Mass Index (BMI) (kg/m^2)	28.7 ± 5.3	25.6 ± 4.9	<0.001
Obesity (BMI ≥ 30)	45%	25%	<0.001
Gravidity (number of pregnancies)	2.3 ± 1.1	2.1 ± 1.0	0.18
Parity (number of deliveries)	1.2 ± 0.9	1.1 ± 0.8	0.20
Smoking Status (current smokers)	12%	10%	0.45

Table-I. Demographic and clinical characteristics (n=203 in each group)

Gestational diabetes mellitus (GDM) was more prevalent in the PCOS group (29% vs. 12%, $p < 0.001$), along with hypertensive disorders (18% vs. 8%, $p < 0.01$). Preterm delivery occurred in 22% of PCOS pregnancies compared to 10% in the control group ($p < 0.01$), and cesarean deliveries were also more frequent among women with PCOS (42% vs. 28%, $p < 0.01$). Table-II. Low birth weight ($<2,500$ g) was more common

in the PCOS group (15% vs. 7%, $p < 0.01$), along with macrosomia ($>4,000$ g) (12% vs. 5%, $p < 0.01$). Additionally, neonates in the PCOS group required NICU admission more frequently (20% vs. 10%, $p < 0.001$). Table-II

Outcome	PCOS Group	Control Group	P-Value
Gestational Diabetes Mellitus (GDM)	29%	12%	<0.001
Hypertensive Disorders	18%	8%	<0.01
Preterm Delivery (<37 weeks)	22%	10%	<0.01
Cesarean Delivery	42%	28%	<0.01
Low Birth Weight ($<2,500$ g)	15%	7%	<0.01
Macrosomia ($>4,000$ g)	12%	5%	<0.01
NICU Admission	20%	10%	<0.001

Table-II. Maternal outcomes

The risk of gestational diabetes mellitus (GDM) was notably elevated ($p < 0.001$), as was the risk of hypertensive disorders (adjusted OR: 2.2, 95% CI: 1.4–3.5, $p < 0.01$). Preterm delivery was more likely in the PCOS group (adjusted OR: 2.5, 95% CI: 1.6–4.0, $p < 0.001$), and NICU admission for neonates was also significantly higher (adjusted OR: 2.3, 95% CI: 1.5–3.6, $p < 0.001$). The p-values for all variables were significant at a level of <0.001 , and the OR was greater than the reference point, indicating a positive association between risk factors and PCOs. Figure-1

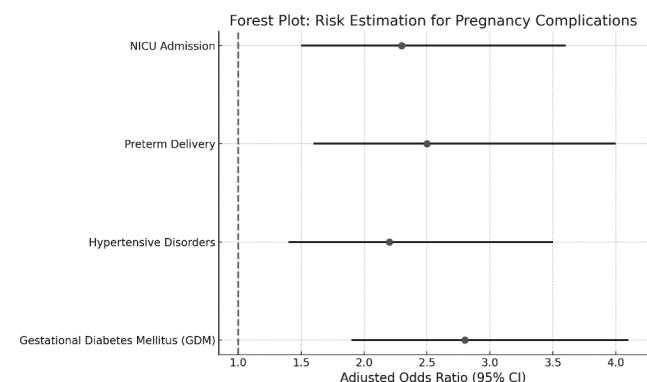


Figure-1. Forest plot indicating odds of developing various fetomaternal complications in females with PCOS. The blue dot indicates the odds ratio of each variable, and the horizontal lines show the 95% Confidence interval (CI) for each variable. The vertical line at number 1.0 indicates the reference line. Suppose a confidence interval crosses this line (indicating OR = 1), which suggests that there is no statistically significant association between the risk factor and the outcome (because an OR of 1 means no effect).

At 1 minute, the mean Apgar score for the PCOS group was 7.5 ± 1.2 compared to 7.7 ± 1.1 for the control group ($p = 0.08$). Similarly, at 5 minutes, the mean Apgar score was 8.9 ± 0.8 for the PCOS group versus 9.1 ± 0.7 for the control group ($p = 0.05$). Table-III

Time	Mean Apgar Score (PCOS Group)	Mean Apgar Score (Control Group)	P-Value
1 minute	7.5 ± 1.2	7.7 ± 1.1	0.08
5 minutes	8.9 ± 0.8	9.1 ± 0.7	0.05

Table-III. Apgar scores comparison

DISCUSSION

The findings of this study highlight the significant association between Polycystic Ovary Syndrome (PCOS) and adverse pregnancy outcomes, confirming and extending prior research in this area. Studies conducted also showed that women with PCOS have higher chances of developing gestational diabetes mellitus (GDM), hypertensive disorders, premature births and cesarean delivery as compared to non-PCOS women.¹¹ Newborn complications, such as low birthweight, macrosomia, and higher NICU admission rate were also reported often in women with PCOS. Prospective interventions in this high-risk group are highlighted by these outcomes. This could be attributed to insulin resistance; PCOS being the reason behind the high Ser posting of GDM in women of reproductive age.¹² Hyperinsulinaemia that accompanies insulin resistance not only causes hyperglycaemia during pregnancy but may worsen other complications such as hypertensive disorders. Higher preeclampsia and gestational hypertension identified in this study are consistent with endothelial dysfunctions and chronic inflammation seen in PCOS.¹³

In addition, the PCOS group has more likely to have higher cesarean delivery due to complications like macrosomia and failed labor induction. The neonatal complications in pregnancy affected by PCOS are the results of the poor-quality intrauterine environment due to maternal hyperglycemia, obesity and other metabolic derangements.¹⁴ While low birth weight of baby can be due to placental dysfunction, macrosomia

can be due to maternal hyperglycemia. Thus, the rising rates of NICU admission point at the clinical relevance of these complications and underscore the importance of continued observation of the neonates. There are various mechanisms and factors through which PCOS leads to these outcomes. Hyperandrogenism and insulin resistance are two key components, if not the root of the matter, in PCOS and are believed to cause complications through maternal metabolism, placental function and fetal development.¹⁵ Kurt Kovacs also discusses other risk factors making pregnancy risks to be a cocktail of multiple risks.

The findings of this investigation reinforce calls for targeting pre-conception and antenatal management interventions for women with PCOS.¹⁶ Weight loss, dietary management, and if needed, pharmacological interventions such as metformin should be provided in preconception counselling. It is mandatory to screen for GDM and hypertensive disorders in early gestations to start early assessments. By inspecting fetal size and health at least once a week, neonatal complications can be avoided.¹⁷

LIMITATIONS

This study is not without limitations. As a retrospective analysis, it is susceptible to biases related to data collection and record completeness. Additionally, the results may not be generalizable to all populations, as the study was conducted in a single center. Future research should aim to validate these findings in diverse populations and explore the impact of specific PCOS phenotypes on pregnancy outcomes.

CONCLUSION

It is concluded that poly cystic ovary syndrome (PCOS) has a strong correlation with abnormal pregnancy outcomes and that this disease is strongly correlated with gestational diabetes, hypertension, preterm birth, neonatal disorders including low birth offspring and NICU hospitalization. Early intervention and personalized antenatal care and specific ways of handling them are crucial in making the outcomes better in the case of mothers and their babies.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

1	Umm E Habiba: Study design, data analysis, writing, final approval.
2	Saadia Kanwal: Initial draft writing.
3	Ahmed Faheem: Interpretation.
4	Syeda Zainab Batool: Study design, analysis.
5	Sara Aslam: Data collection.
6	Zahra Haq: Proof reading.