

# A Comparative Study of Antenatal Complications in Pregnant Women with and without History of Polycystic Ovary Syndrome

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**Abstract:** *Background:* Polycystic ovary syndrome (PCOS) in the present generation is a very common reproductive disorder and the prevalence is on the rise. *Aim:* In this study we compare the maternal outcome in normal and women with PCOS. *Methods:* This study was a case-control study conducted in Department of Obstetrics and Gynaecology, SMS Medical College and attached group of hospitals, Jaipur from May 2019 to Aug 2020. Pregnant women with history of PCOS were taken as cases and with no such history were controls. *Results:* 9.49% women developed gestational diabetes mellitus (GDM) in cases as compared to 1.61% women in control group. The difference in the incidence of GDM in the two groups was statistically significant. When hypertensive disorders of pregnancy (HDP) was considered, a statistically significant difference was observed as 11.2% cases and 2.42% controls showed HDP. *Conclusion:* With a detailed comparative analysis of this case-control study, it can be concluded that many antenatal complications are per se increased in women with a history of PCOS.

**Keywords:** Diabetes, HDP, PCOS

## 1. Introduction

Polycystic ovary syndrome (PCOS) is multisystem endocrinopathy in women of reproductive age with various metabolic disturbances and a wide spectrum of clinical features like infertility, obesity, menstrual abnormalities and hyperandrogenism. The condition is relatively common and affects about 20% of women in reproductive age group. The diverse manifestations of PCOS start at puberty.<sup>1</sup> PCOS is characterized by chronic anovulation, oligomenorrhea or amenorrhea, hyperandrogenism and polycystic ovary morphology on pelvic ultrasound.<sup>2</sup>

Globally, the prevalence of PCOS ranges from 2.2% to 26%. Women with PCOS are at higher risk for insulin resistance, type 2 diabetes mellitus, obesity, dyslipidemia, hypertension, atherosclerotic cardiovascular disease, endometrial hyperplasia and endometrial cancer, obstructive sleep apnea and mood disorders.<sup>3</sup> The pathophysiology of PCOS is multifactorial and it is believed that a genetic predisposition exists that is exacerbated by excess adiposity. The pathophysiology of PCOS involves the interaction between abnormal ovarian morphology, due to excess androgen production by the polycystic ovaries, hyperinsulinemia and elevated luteinizing hormone (LH) levels.<sup>4</sup> It has been shown that ovarian androgen production in women with PCOS is accelerated due to the increased ovarian theca cell androgenic enzymatic activity of 3 $\beta$ -hydroxysteroid dehydrogenase (HSD) 17 $\alpha$ -hydroxylase/C17, 20 lyase, a product of CYP17.<sup>5</sup> PCOS has profound implications on a woman's reproductive health and the long-term health outcomes of her offspring.<sup>6</sup>

## 2. Aim

This study was aimed at studying the antenatal period and any developing complications in women with history of polycystic ovary syndrome and comparing it with normal women.

## 3. Material & Methods

This was a case-control study designed prospectively with study population of pregnant women between 5-28 weeks of period of gestation with previous history of PCOS and pregnant women between 5-28 weeks without PCOS attending ANC and followed-up till delivering in our hospital. A total 125 women in each group were included.

### Inclusion Criteria

- 1) Pregnant women with h/o PCOS from 5-28 weeks of pregnancy
- 2) Those following the Rotterdam criteria (out of 3, 2 should be present):
  - a) Ovulatory dysfunction such as oligomenorrhea or amenorrhea.
  - b) Clinical or biochemical evidence of hyperandrogenism.
  - c) Polycystic ovarian morphology on USG scan defined as presence of 12 or more cyst in size in any one ovary or both ovaries with enlarged ovaries (volume >10 cc).
- 3) Proper written and informed consent was taken.

### Exclusion Criteria

Medical disorders which could affect maternal outcome such as decompensated heart disease, severe liver disease, chronic renal failure, acute fatty liver of pregnancy, fulminant hepatitis, severe anemia, chronic hypertension, thyrotoxicosis, diabetes mellitus type 1 & 2, acute attack of bronchial asthma were taken as exclusion criteria.

## 4. Methodology

All pregnant women attending the antenatal clinic were inquired in detail about their present and past history regarding any illness, menstrual history and obstetric history. Women giving history of oligo/anovulation were identified and their previous records were scrutinized. Those fulfilling the inclusion and Rotterdam criteria were taken as cases. Normal Pregnant women (without PCOS) between 5-28 weeks and fulfilling the exclusion criteria were treated as controls. Women in both the groups were subjected to a detailed general physical and systemic examination and few biochemical tests were done to exclude the conditions mentioned in the exclusion criteria. Women in both the groups were matched for age and BMI.

### Statistical Analysis

Continuous variables were summarized as mean and was analyzed by using unpaired t test. Nominal / categorical variables were summarized as proportions and was analyzed by using chi-square/ Fischer exact test. p-value <0.05 considered as significant.

## 5. Results

Out of 125 cases, 82 (65.60%) women were from 21-25 yrs of age group, 30 (24.00%) women were from 26-30 yrs age group, 10 (8.00%) women were more than 30 yrs of age and only 3 (2.40%) women were below 20 yrs of age. In Control group, out of 125 women, 66 (52.80%) women were between 21-25 yrs, 47 (37.60%) women from 26-30 yrs and 12 (9.60%) women from >30 yrs of age. Both groups were comparable. All the women in cases and control group were primigravida.

**Table 1:** Distribution of Women According to Abortion

Abortion	Cases		Controls	
	No.	%	No.	%
Present	9	7.20	1	0.80
Absent	116	92.80	124	99.20
Total	125	100.00	125	100.00

$p = 0.02$

Prevalence of abortion in PCOS group was 7.20% (9) and in control group was 0.80% (1). This difference was statistically significant. The abortion rate was significantly higher in PCOS group as compared to control group.

**Table 2:** Distribution of Women According to Gestational Diabetes Mellitus

Gestational Diabetes Mellitus	Cases		Controls	
	No.	%	No.	%
Present	11	9.49	2	1.61
Absent	105	90.51	122	98.39
Total	116	100.00	124	100.00

$p = 0.001$

Out of 116 women with PCOS, 11 (9.49%) women developed GDM as compared to 2 (1.61%) women in control group. This can also be attributed to the fact that few women in both groups had higher BMI. Women with PCOS have insulin resistance and development of GDM can be attributed to this.

**Table 3:** Distribution of Women According to Hypertensive Disorder of Pregnancy (HDP) and Pre-eclampsia

HDP & Pre-eclampsia	Cases		Controls	
	No.	%	No.	%
Present	13	11.20	3	2.42
Absent	103	88.80	121	97.58
Total	116	100.00	124	100.00

$p = 0.001$

13 (11.20%) women out of the 116 cases developed HDP as compared to 3 (2.42%) in control group.

**Table 4:** Distribution of Women According to Intrauterine Growth Retardation

Intrauterine Growth Retardation	Cases		Controls	
	No.	%	No.	%
Present	12	10.34	2	1.61
Absent	104	89.66	122	98.39
Total	116	100.00	124	100.00

$p = 0.001$

In PCOS group 12 (10.34%) women showed IUGR as compared to 2 (1.61%) in control group. This can be attributed to abnormalities of placentation.

## 6. Discussion

Women with PCOS have an increased chance of maternal as well as fetal adverse pregnancy outcome. The studies clearly suggest a relation between pregnant PCOS women and adverse maternal outcome.

Study conducted by Palomba S et al<sup>7</sup> reported that the abortion rate was significantly higher in PCOS group as compared to control group. Study conducted by Sha T et al<sup>8</sup> reported that women with PCOS had higher risk of early pregnancy loss (OR 1.41, 95% CI 1.04-1.91), as compared to control group. The miscarriage rate was calculated as the ratio of spontaneous abortion to clinical pregnancies and expressed per clinical pregnancy.

Urman B et al<sup>9</sup> reported that women with PCOS had a significantly higher BMI as compared to the control group and risk of abnormal glucose challenge test and GDM was significantly increased in pregnant women with PCOS ( $p < 0.5$ ). When lean PCOS subjects were compared with lean control subjects the difference in the incidence of the abnormal GCT and GDM complications were more and statistically significant ( $p < 0.5$ ). Mikola M et al et al<sup>10</sup> showed BMI >25 kg/m<sup>2</sup> to be the greatest predictor for GDM in women with PCOS. Haakova L et al<sup>11</sup> demonstrated that hyperinsulinaemia and insulin resistance were common findings in women with PCOS. Since there is an increase in insulin levels due to an induced state of peripheral insulin resistance in normal pregnancy, it would seem that pregnant

women with PCOS would be at increased risk of impairment of carbohydrate metabolism.

Toulis KA et al<sup>12</sup> reported that women with PCOS demonstrated a significantly higher risk for the development of GDM compared with women without PCOS. Veltman-Verhulst SM et al<sup>13</sup> demonstrated that women with PCOS have a 3 fold risk of developing GDM compared with women without PCOS. The increase risk for GDM in PCOS has been related to insulin resistance in PCOS women.

Li GH et al<sup>14</sup> demonstrated that PCOS women with BMI <24 kg/m<sup>2</sup> has significantly higher rates of GDM (27.9%) compared with the control group (15.6%) (p-value <0.05). It showed an increased risk of GDM in non-overweight / obese PCOS women, this risk seemed to be due to PCOS itself rather than obesity. Ashrafi M et al<sup>15</sup> reported a high incidence of GDM (44.4%) in PCOS group as compared to control group without PCOS (29.9%). Diamant YZ et al<sup>16</sup> demonstrated that the incidence of pre-eclampsia was much higher in women with PCOS as compared to women without PCOS. de Vries MJ et al<sup>17</sup> reported that the incidence of pre-eclampsia was significantly higher in pregnant women with PCOS than in control group (p=0.02). Radon PA et al<sup>18</sup> found that women with PCOS were more likely to develop HDP when compared with age and weight matched controls (OR-15.0; 95% CI-1.9 to 121.5).

Haakova L et al<sup>11</sup> and Mikola M et al<sup>10</sup> documented comparable prevalence of pre-eclampsia between PCOS and non-PCOS women. The results of this study differ from those found in our study.

Results similar to our study were found by Lovvik TS et al<sup>19</sup> and Mikola M et al<sup>10</sup> who reported that risk of IUGR was more common in PCOS women than non-PCOS women because of associated complications in PCOS women eg. HDP.

## 7. Conclusion

With a detailed comparative analysis of this case-control study, it can be concluded that many antenatal complications are per se increased in women with a history of PCOS. Thus women with history of PCOS should be identified either pre-conceptionally or during early gestation so that these women can be monitored closely and preventive measurements can be instituted timely to prevent complications.

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