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Comparative Analysis of antenatal and fetal complications in pregnant women with and without history of polycystic ovary syndrome

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Abstract

Background and Aim: Many studies have shown that Polycystic ovary syndrome (PCOS) is independently associated with an increased risk for short for gestational age (SGA) infants and observed in nonobese infertile women with PCOS who had undergone assisted reproductive technique (ART). Neonates born to women with PCOS also showed an increased risk for admission to the NICU.

Material and Methods: This was a cross-sectional 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 department of obstetrics and gynaecology, Tertiary care hospital, Bhuj, Kutch, Gujarat. 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.

Results: Prevalence of abortion in PCOS group was 7% (14) and in control group was 1% (2). This difference was statistically significant. Out of 200 women with PCOS, 18 (9%) women developed GDM as compared to 3 (1.5%) women in control group. Total 22 (11%) women out of the 200 cases developed HDP as compared to 5 (2.5%) in control group (Table 3). Mean birth weight of new born in women with history of PCOS was 2.45±0.37 kg and in control group was 2.69±0.24 kg. The difference was statistically significant.

Conclusion: PCOS is a common and heterogeneous condition, with affected women at substantively higher risk of infertility and cardiometabolic risks factors, both exacerbated by a

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greater prevalence of overweight and obesity. Many antenatal and fetal complications are per se increased in women with a history of PCOS.

Key Words: Cross-sectional study, Gestational Age, Polycystic ovary syndrome, Type 2 Diabetes Mellitus

Introduction

Polycystic ovary syndrome (PCOS) is a common endocrine disorder affecting up to 8%–13% of reproductive-aged women.[1] According to the Rotterdam criteria, PCOS in adults is diagnosed based on a minimum of two of the following: oligo/anovulation, clinical and/or biochemical hyperandrogenism, and PCO morphology on ultrasound, after ruling out differential diagnoses.[2] These criteria result in four phenotypes of PCOS including phenotype A with oligo/anovulation, hyperandrogenism, and PCO morphology; phenotype B with oligo/anovulation and hyperandrogenism; phenotype C with hyperandrogenism and PCO morphology; and phenotype D with oligo/anovulation and PCO morphology. PCOS is associated with metabolic, reproductive, and psychological features.[3]

The condition is relatively common and affects about 20% of women in reproductive age group. The diverse manifestations of PCOS start at puberty.[4] PCOS is characterized by chronic anovulation, oligomenorrhea or amenorrhea, hyperandrogenism and polycystic ovary morphology on pelvic ultrasound.[5]

PCOS and excess adiposity have a bidirectional relationship with excess weight exacerbating the underpinning hormonal imbalance and PCOS itself appearing to predispose to excess weight and weight gain.[6] The prevalence of PCOS in women with obesity is up to 37%.[7] Women with PCOS may also be more likely to gain weight longitudinally and at a greater pace.[8] This may be attributable to impairments in appetite-regulating hormones and hyperinsulinemia.[9] and a more sedentary lifestyle. and may be inter-related to the psychological features of PCOS such as anxiety, depression, and poor quality of life.[10,11] Obesity further exacerbates hyperandrogenism and hyperinsulinemia and plays a key independent role in increasing cardiometabolic risks in women with PCOS.[12,13]

An important issue in studying pregnancy complications in women with PCOS is the definition of the specific diagnostic features of PCOS, since the distinct variability in hormonal and metabolic abnormalities among various PCOS phenotypes could significantly influence the obstetric and neonatal outcomes observed.

Many studies have shown that PCOS is independently associated with an increased risk for short for gestational age (SGA) infants and observed in nonobese infertile women with PCOS who had undergone assisted reproductive technique (ART). Neonates born to women with PCOS also showed an increased risk for admission to the NICU. An APGAR score lower than seven at 5 min was more frequent in neonates born to women with PCOS. [14]

Current investigation 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.

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Material and Methods

This was a cross-sectional 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 department of obstetrics and gynaecology, Tertiary care hospital, Bhuj, Kutch, Gujarat. A total 200 women in each group were included. This study was conducted over a period of 1 year.

Pregnant women from 5-28 weeks of pregnancy who were known cases of PCOS satisfying the rotterdams criteria (2/3 should be present): ovulatory dysfunction such as oligomenorrhea or amenorrhea, clinical or biochemical evidence of hyperandrogenism, 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 >10cc) were included in the study.

Patients with decompensated heart disease, severe liver disease, chronic renal failure, acute fatty liver of pregnancy, fulminant hepatitis, severe anemia, chronic hypertension, thyrotoxicosis, and diabetes mellitus were excluded from the study.

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

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

Out of 200 cases, 130 (65%) women were from 21-25 years of age group, 48 (24.00%) women were from 26-30 years age group, 16 (8.00%) women were more than 30 years of age and only 6 (3%) women were below 20 years of age. In control group, out of 200 women, 104 (52%) women were between 21-25 years, 76 (38%) women from 26-30 years and 20 (10%) women from >30 years of age. Both groups were comparable. All the women in cases and control group were primigravida. Prevalence of abortion in PCOS group was 7% (14) and in control group was 1% (2). This difference was statistically significant. The abortion rate was significantly higher in PCOS group as compared to control group (Table 1).

Out of 200 women with PCOS, 18 (9%) women developed GDM as compared to 3 (1.5%) women in control group (Table 2).

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. Total 22

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(11%) women out of the 200 cases developed HDP as compared to 5 (2.5%) in control group (Table 3). Mean birth weight of new born in women with history of PCOS was 2.45±0.37 kg and in control group was 2.69±0.24 kg. The difference was statistically significant. The mean APGAR score of new born in case group at 1 minute was 6.16±1.32 and in control group was 7.16±0.03. APGAR score at 5 minutes in PCOS group was 7.74±1.22 and in control group was 8.21±0.30. The difference was statistically significant.

In present study it was observed that 20 neonates from the cases group were admitted in NICU. Among these 13 had meconium aspiration syndrome and birth asphyxia, 4 were preterm births and 3 had IUGR. Among the control group, out of 4, 2 had birth asphyxia and IUGR and 2 had MAS (Table 4).

Table 1: Distribution of women according to abortion

Abortion	Cases		Control	
	Number	Percentage (%)	Number	Percentage (%)
Present	14	7	2	1
Absent	186	93	198	99
Total	200	100	200	100

Table 2: Distribution of women according to gestational diabetes mellitus

Gestational diabetes mellitus	Cases		Control	
	Number	Percentage (%)	Number	Percentage (%)
Present	18	9	3	1.5
Absent	182	91	197	98.5
Total	200	100	200	100

Table 3: Distribution of women according to hypertensive disorder of pregnancy (HDP) and preeclampsia

HDP and preeclampsia	Cases		Control	
	Number	Percentage (%)	Number	Percentage (%)
Present	22	11	5	2.5
Absent	178	89	195	97.5
Total	200	100	200	100

Table 4: Distribution according to admission in NICU

Admission in NICU	Cases		Control	
	Number	Percentage (%)	Number	Percentage (%)
Present	20	10	4	2
Absent	180	90	196	98
Total	200	100	200	100

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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 et al reported that the abortion rate was significantly higher in PCOS group as compared to control group.[14] Urman et al 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 ($p<0.05$)[15] Toulis et al reported that women with PCOS demonstrated a significantly higher risk for the development of GDM compared with women without PCOS.[16]

The risk of hypertensive disorders of pregnancy including gestational hypertension and pre-eclampsia is also higher in women with PCOS.[17-20] Dysregulation in glucose profile and GDM are amongst the risk factors for hypertensive disorders of pregnancy and the aetiology of hypertensive disorders and GDM might be similar.[21,22] This was confirmed in a systematic review where (similar to GDM) PCOS was not an independent risk factor for gestational hypertension or pre-eclampsia in nonhyperandrogenic phenotypes of PCOS, for women with a BMI > 30 kg/m, some ethnic backgrounds or pregnancy post-ART, but PCOS was a risk factor in BMI-matched studies in women without obesity and who spontaneously conceived.[23] Diamat et al demonstrated that the incidence of pre-eclampsia was much higher in women with PCOS as compared to women without PCOS.[24] de Vries et al reported that the incidence of pre-eclampsia was significantly higher in pregnant women with PCOS than in control group ($p=0.02$).[25] Radon et al 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).[26]

Study conducted by McDonnel et al found that perinatal outcomes of infants born to women with PCOS is significantly worse than those born to women without PCOS when meconium aspiration syndrome, low APGAR score at 1 and 5 minute and admission in NICU is taken into consideration.[27] However, one study has one result opposite to our study, Roos et al in their study found that infants born to mothers with previous diagnosis of PCOS were more often large for gestational age and also an increased risk of low APGAR score at 5 minute (OR -1.41, CI -1.09 to 1.83).[28] Similar observation was found by study Løvvik et al and Mikola et al that the maternal and fetal both complications are more common in women with history of PCOS as compared to women without PCOS.

Infants born to women with PCOS are more likely to be born premature.[17-20] However, most studies do not report whether the onset of preterm birth is spontaneous.[21] The odds of preterm birth in PCOS differ by PCOS phenotypes and ethnic background of the population.[29] However, the likelihood was similar in BMI-matched and post-ART pregnancies in women with and without PCOS.[10] This suggests that the higher odds are to some extent related to more severe phenotypes of PCOS with a higher prevalence of obesity and fertility treatments.[30] The odds also remained higher in singleton pregnancies. Two systematic reviews reported that infants born to women with PCOS have higher rates of admission to Neonatal Intensive Care Unit (NICU)[18,20] and higher rates of perinatal mortality.[19.31] It should be noted that the results were limited to

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small numbers with only five studies providing data for each of these two outcomes. Given that infants born to women with PCOS have a similar rate of respiratory distress syndrome to infants born to women without PCOS, the higher rate of admission to NICU in infants born to women PCOS is likely due to routine admission of infants born to GDM affected pregnancies.[32,33]

Our study showed that PCOS women had 2.5 times the higher risk of developing pre-eclampsia and these findings were similar as reported by many studies across the globe.[34-37] However some studies had reported that there is no association between these two factors.[38] The possible mechanism could be impaired vascular adaptation to pregnancy or hyper-androgenemia. The underlying relationship between PCOS and pre-eclampsia remains relatively elusive but is thought to be related to the similar pathophysiological processes that predispose PCOS women to higher rates of metabolic syndrome, such as central obesity and increased IR. Not surprisingly, Obesity/morbid obesity were associated with increased risk of pre-eclampsia. It is noteworthy to describe that age and Primigravida were also having higher risk of pre-eclampsia.

The PCOS guidelines recommend for women with excess weight to achieve modest weight loss, an energy deficit of 30% or 500–750 kcal/day (1200–1500 kcal/day) tailored to individual energy requirements, body weight, food preferences, physical activity levels, and preferred approach could be considered. This could be achieved with a lower energy intake through diet, with higher energy expenditure through increased physical activity level, or a combination of these two lifestyle components.

Conclusion

PCOS is a common and heterogeneous condition, with affected women at substantively higher risk of infertility and cardiometabolic risks factors, both exacerbated by a greater prevalence of overweight and obesity. Many antenatal and fetal 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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