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PREVALENCE OF GESTATIONAL DIABETES MELLITUS IN WOMEN WITH POLYCYSTIC OVARY SYNDROME

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To find out association between polycystic ovary syndrome (PCOS) and subsequent Gestational Diabetes Mellitus (GDM), A case-control study was conducted at fertility center in Indore city. The study population included 75 women diagnosed with PCOS and 75 women without PCOS followed from early pregnancy. The average Body Mass Index (BMI) in PCOS patients was greater than that in controls (p = 0.0001), and PCOS patients were more often than controls (p = 0.0001). Women previously diagnosed with PCOS had a higher risk of GDM (p = 0.0025). This study suggested that PCOS is an independent risk factor for the development of gestational diabetes mellitus. When women at risk become pregnant, they require closer surveillance for maternal and fetal well-being and should follow a strict diet and adhere to weight gain control to avoid obstetric complications due to GDM.

Keywords: Body mass index, Gestational diabetes mellitus, Nulliparous, Polycystic ovary syndrome

INTRODUCTION

Polycystic ovary syndrome (PCOS), one of the most common endocrine disorders occurring during reproductive age, is characterized by ovulatory dysfunction, biochemical or clinical hyperandrogenism, and polycystic ovaries (Goodarzi *et al.*, 2011). The prevalence of PCOS is estimated to be approximately five percent to fifteen percent of reproductive aged women (March *et al.*, 2010; and Tehrani *et al.*, 2011), and affected patient often present with symptoms and signs of menstrual irregularity, obesity, infertility, and androgen excess (Wang *et al.*, 2013). Approximately 40-50% women with PCOS have co-existing metabolic syndrome, in those insulin resistance is common endocrine disorder (Veltman-Veshulst *et al.*, 2010). Gestational Diabetes Mellitus (GDM) is the most commonly reported pregnancy complication in women with PCOS. Pregnant women with PCOS have been reported to develop insulin resistance and impaired β-cell function (Legro *et al.*, 2006). This pathogenic mechanism may be associated with glucose intolerance, resulting in a greater incidence of gestational diabetes mellitus. There is conflicting evidence on the association between PCOS and GDM. Some studies have reported that PCOS is associated with insulin resistance and GDM (Sawada *et al.*, 2015), and remains an independent predictor that for GDM (Katulski *et al.*, 2015). We conducted a case control study of pregnant women, to assess the risk for GDM among women with PCOS. Determining the risk for GDM in women with PCOS is important for preventive intervention through screening in the early stage of pregnancy.

MATERIALS AND METHODS

A case-control study was conducted at fertility center in Indore city from June 2014 to September 2015. The inclusion criteria were <13 weeks of gestation at the first antenatal

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visit, women with age between 20 to 40 years. Exclusion criteria were multiple pregnancies, history of preexisting diabetes and missing delivery information. The study population included seventy five women diagnosed with PCOS and seventy five women without PCOS followed from early pregnancy (<13weeks of gestation). PCOS was diagnosed using the diagnostic criteria of the Rotterdam consensus 2003 (Fertil Steril, 2004), with presence of at least two of three criteria, including polycystic ovaries, oligomenorrhea and hyperandrogenism.

All respondents were interviewed personally to obtain the relevant information. A predesigned questionnaire was used for data collection. The following information was collected which included clinical history, age, weight, height, body mass index (BMI in kg/m²), weight gain during pregnancy, method of conception, length of gestation, pregnancy complications and mode of delivery. All biochemical data were retrieved from medical records. The diagnosis of Gestational Diabetes Mellitus (GDM) was defined as fasting blood glucose level $\geq$ 95 mg/dl and oral glucose tolerance test (75 gm glucose orally administered and plasma glucose measured after 2 hours) $\geq$ 155 mg/dl (American Congress of Obstetricians and Gynecologist, 2013/14). Preterm delivery was defined as delivery at less than 37 weeks of gestation. Statistics was done using Statistical Package for the Social Science (SPSS) 21.0. All the values were expressed as percentage and mean $\pm$ Standard Deviation (SD), continuous variables were compared using the Z-test and categorical data using the chi-square test.

RESULTS AND DISCUSSION

The Demographic and clinical characteristics of the study population are summarized in Table 1. Women with PCOS were more likely to be older, and had higher prepregnancy body mass index (respectively p = 0.0225, p = 0.0001). There was a strong association between PCOS and nulliparous (p = 0.0001). Twin pregnancy and preterm delivery were significantly higher in PCOS group than non PCOS group (respectively p = 0.0004, p = 0.0160). We observed in our study that women with PCOS have an increased prevalence with increasing age of pregnancy. This was statistically significant. Similarly in previously conducted study ,it is also found that women with PCOS were slightly older than women without PCOS (Roos *et al.*, 2011). Strong positive association was observed between pre pregnancy BMI and PCOS. This finding was consistent with study on pregnant

Table 1: Demographic and Clinical Characteristics of the Study Population

Variables	PCOS Group n = 75	Non PCOS Group n = 75	P Value
Age (yrs)	31.23±4.40	29.63±4.09	0.0225*
Age at menarche (yrs)	13.93±1.65	13.37±1.34	0.0239*
Pre pregnancy BMI (kg/m²)	26.08±4.91	23.36±3.26	0.0001**
Weight gain during pregnancy (kg)	11.20±4.53	12.10±4.22	0.21
Nulliparous	61(81.33%)	39(52.00%)	0.0001**
Previous Miscarriage ($\geq$1)	21(28.00%)	17(22.67%)	0.4527
Twin pregnancy	19(25.33%)	6(8.00%)	0.0004**
Preterm delivery	18(24.00%)	7(9.33%)	0.0160*
Caesarean section	52(69.33%)	44(58.67%)	0.1736

Note: Continuous measurements are summarized as mean $\pm$ SD and significant by z test. While nominal measurements are summarized as n(%) and significant by chi square test. *significant at <5% level, **significant at <1% level, BMI = Body Mass Index.

women with PCOS (Baldani *et al.*, 2012; and Frene *et al.*, 2014). We have observed a significant association of nulliparous with PCOS. Our finding regarding nulliparous was in agreement with previous study on pregnant women with PCOS. We have also seen that prevalence proportion of previous miscarriage was more in women with PCOS. In contrast, a previous study on women with IVF conceived pregnancies and PCOS, their findings was that PCOS subjects had fewer prior pregnancy than controls, however the study included women with PCOS had a higher rate per pregnancy 50% compared to that in controls 24% (p<0.01) (Bagegni *et al.*, 2010). In the present study, incidence of twin pregnancy was significantly higher in the women with PCOS than those without PCOS. Incidence of preterm delivery was significantly high in women with PCOS. A systematic review showed that PCOS increased the risk of preterm delivery by at least 2-fold (Galazis *et al.*, 2013).

Table 2 reveals the prevalence of gestational diabetes mellitus and their association with PCOS in the study population. The prevalence percentage of gestational diabetes mellitus was significantly more in PCOS group as

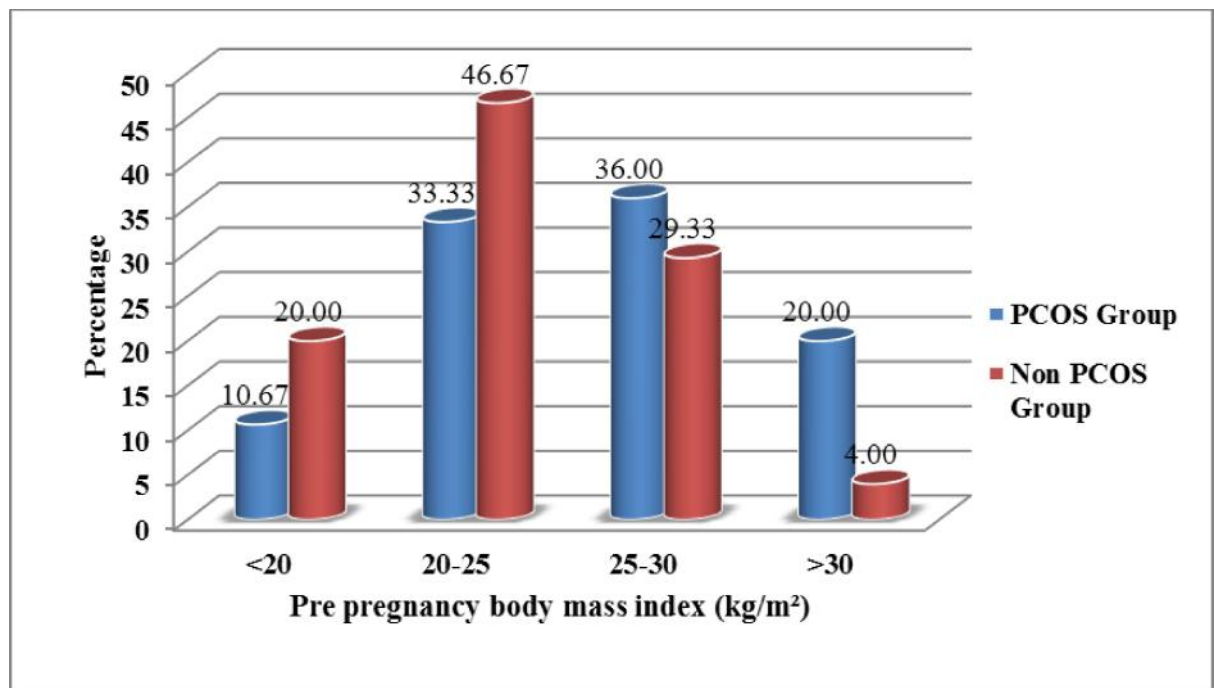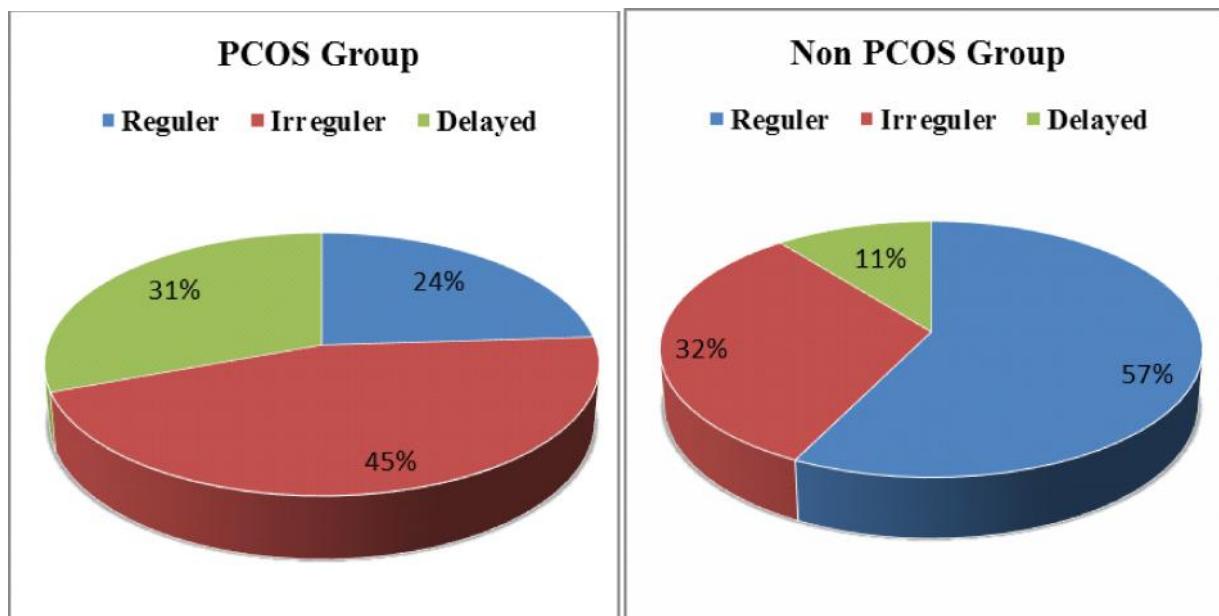**Figure 1: Prevalence Percentage of Women According to pre Pregnancy Body Mass Index (BMI) in Both Group**

Figure 2: Prevalence Percentage of Women in PCOS and Non PCOS Group According Menstrual Cycle

compare to non PCOS group (p = 0.0025). The incidence of GDM was higher among overweight women (BMI ≥ 25 kg/ m²) with PCOS and those who were older (age > 30 years). In both group the incidence of GDM was higher among

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Table 2: Prevalence of Gestational Diabetes Mellitus and their Association with PCOS in the Study Population

Gestational Diabetes Mellitus (GDM)	PCOS Group (n=75) Frequency (%)	Non PCOS Group (n=75) Frequency (%)	P Value
Yes	23 (30.67)	8 (10.67)	0.0025**
No	52 (69.33)	67 (89.33)	

Note: ** Highly significant at <1% level.

Table 3: Prevalence of Gestational Diabetes Mellitus in the Study Population with Variables

Variables	GDM in PCOS Group	GDM in Non PCOS Group
Age		
>30years	17/44 (38.64%)	6/36 (16.67%)
≤30years	5/31 (16.12%)	2/39 (5.12%)
Body Mass Index		
≥25kg/m²	15/42 (35.71%)	6/25 (24.00%)
<25kg/m²	7/33 (21.21%)	2/50 (4.00%)
Hypothyroid		
Singleton	19/56 (33.93%)	7/69 (10.15%)
Twins	4/19 (21.05%)	1/6 (1.67%)
Hypothyroid		
Yes	14/29 (48.28%)	2/13 (15.38%)
No	9/46 (19.57%)	6/62 (9.67%)

those who had hypothyroid (Table 3). In our study statistically significant association was found between gestational diabetes mellitus and polycystic ovary syndrome. Similar association between gestational diabetes mellitus and PCOS has been reported in various studies. A meta-analysis showed that PCOS may be a predisposing factor for GDM, independent of obesity. It is important to note that, among the obese population , the effect of PCOS on the presence of GDM were mitigated, while the incidence of GDM among the women with PCOS did not differ significantly from the controls (Qin *et al.*, 2013). The age of the study participant was a significantly predictor of the

Figure 3: Prevalence Percentage of Gestational Diabetes Mellitus in Women With and Without PCOS

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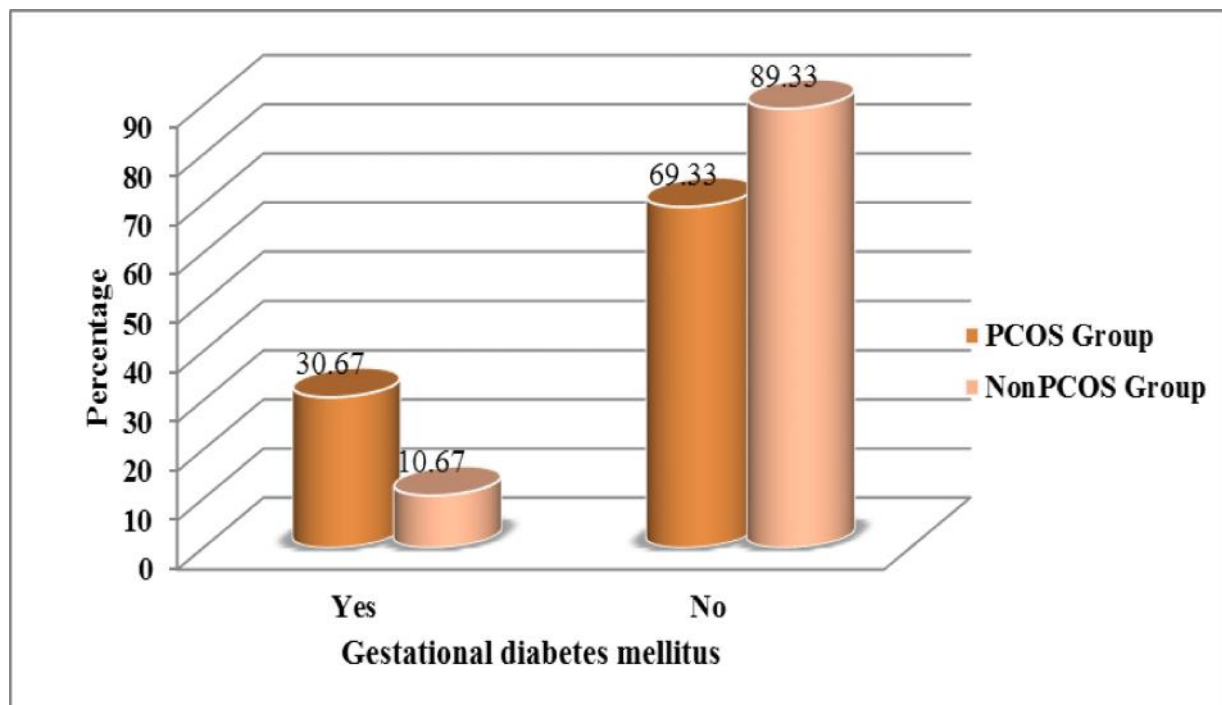
prevalence of gestational diabetes mellitus (p = 0.03), namely the older the participant, the more likely she was to develop GDM. In addition, PCOS is a major cause of infertility in women and these women might require assisted reproductive technology to become pregnant. Some studies have suggested that assisted reproductive technology is associated with an increased risk of GDM (Wang *et al.*, 2013; and Ashrafi *et al.*, 2014).

CONCLUSION

Our result suggests that women with PCOS were more likely to develop gestational diabetes mellitus. Future longitudinal studies are needed to better determine the underlying processes of PCOS during gestation and to develop efficient preventive strategies to preclude the adverse effects on both the mother and child.

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