



ORIGINAL RESEARCH PAPER

Obstetrics & Gynaecology

THE STUDY OF GESTATIONAL DIABETES MELLITUS AMONG PREGNANT WOMEN WITH AND WITHOUT POLYCYSTIC OVARY SYNDROME – COHORT STUDY

KEY WORDS: Gestational diabetes mellitus, Oral glucose tolerance test, Prevalence, PCOS

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ABSTRACT

BACKGROUND: Gestational diabetes mellitus (GDM) is an important public health problem in India and its prevalence is steadily increasing. It is one of the common complications during pregnancy affecting both maternal and fetal outcome. The increased prevalence is due to the aging population structure, urbanization, obesity epidemic and physical inactivity. Among the South Asian ethnic groups, Indian women mainly south Indians are developing GDM in highest frequency which emphasizes the significance of universal screening in South Asians. The main objective are to evaluate the risk of GDM in pregnant women with and without PCOS and to evaluate other risks associated with PCOS pregnant women. **METHODS:** This hospital based cohort study utilize of 99 women with PCOS and 99 women without PCOS who are pregnant and aged 20-35 years with less than 20 weeks of gestation were followed up to till 38 weeks of gestation. They were given 75 g oral glucose and plasma glucose was estimated after 2hour. GDM and PCOS were diagnosed according to DIPSI and Rotterdam criteria respectively. Inclusion criteria was pregnant women aged 20-35 years attending outpatient department before 20 weeks of gestation. Exclusion criteria were known diabetic women, women suffering from chronic illnesses, twin pregnancy and women conceived after ART techniques. **RESULTS:** Increased association of GDM was in PCOS pregnant women found to be 19%. In present study age shows no effect on the association of GDM. However, women with BMI > 25 show increased rates of GDM while comparing with women whose BMI < 25. We found an increased incidence of Hypothyroidism and PIH in PCOS pregnant women compared to normal pregnant women. An increased incidence of Hypothyroidism in GDM women was found. PCOS women are at high risk for developing endometrial cancer and cardiovascular problems. PCOS women's are considered to be a high risk population for metabolic syndrome. **CONCLUSIONS:** Prevalence of GDM is progressively increasing and it was significantly associated with multiple risk factors. Universal screening should be done for all pregnant women for better maternal and fetal outcome.

INTRODUCTION:

Gestational diabetes mellitus is defined as carbohydrate intolerance of variable severity with its onset or first recognition during pregnancy. It is one of the common complications during pregnancy which affects both mother and the fetus. As Indians are more prone for developing diabetes mellitus especially south Indian, universal screening is recommended. Joslin described a case of diabetes in 1916, which presented in pregnancy and resolves after delivery^[1]. The incidence of Diabetes complicating pregnancy increased approximately from 40 percent between 1989 and 2004 (Getahun, 2008). Worldwide its prevalence differs according to age, ethnicity, race, body composition, screening and diagnostic criteria. As pregnancy advances insulin resistance increases due to hormones secreted by placenta which necessitate compensatory increase in insulin secretion. Women with GDM ultimately develop overt diabetes in the ensuing 20 years. Baby of GDM mothers are more prone to develop obesity and diabetes in their future. Thus it is a vicious cycle of transmitting glucose intolerance from one generation to another. The polycystic ovary syndrome (PCOS) is a common endocrine disorder in women of reproductive age. It is characterized by a combination of hyperandrogenism (either clinical or biochemical), chronic anovulation, and polycystic ovaries, and it is frequently associated with insulin resistance and obesity. The syndrome has received much attention as a result of its high prevalence and possible metabolic, reproductive, and cardiovascular consequences. Insulin resistance is a condition in which the body cells do not respond to insulin. As a result the level of glucose in the blood increases. This may cause more insulin to be produced by the body which in turn leads to diabetes. In pregnant women with PCOS, the increasing tissue resistance to insulin, mainly caused by placental hormones, adds on the preexisting state of insulin resistance, which may accompany the syndrome. This pathogenic mechanism could lead to hyperglycemia, reflected in a higher incidence of GDM. Hyperinsulinemia has shown to increase androgen production by the ovaries which in turn may play a central role in the pathogenesis of PCOS^[2]. PCOS women have multiple pregnancy

complications like pre-eclampsia, preterm, spontaneous abortion in addition to gestational diabetes mellitus^[3]. It has a strong hereditary basis, if the mother is suffering from PCOS 20% of chance the children will get and if the sister is suffering 40 % of chance that she will get PCOS. This condition requires a multidisciplinary modality to treat. The main objective of this study was to assess the risk of GDM in pregnant women with and without PCOS and to evaluate other risks associated with PCOS pregnant women.

METHODS:

A hospital based Cohort study was conducted from 198 pregnant patients attending Antenatal OPD and admitted in labour ward with PCOS who satisfy the eligibility criteria were included till the sample size was reached and compared to equal number of healthy pregnant women without PCOS before 20 weeks of gestation for the period of eight months from January 2017 to August 2017 and followed up till 38 weeks of gestation. Informed consent was obtained from all the participants at the start of the study. Ethical clearance was taken from the institutional ethical committee before starting the study.

Inclusion criteria: Pregnant women with PCOS aged 20-35 yrs registered /admitted before 20 weeks of gestation and Healthy Pregnant women aged 20-35 yrs registered /admitted before 20 weeks of gestation.

Exclusion criteria: 1. Known diabetic women. 2. Women suffering from chronic illnesses 3.Twin pregnancy 4. Women conceived after ART techniques.

Method of the study: All pregnant patients attending Antenatal OPD and admitted in labour ward with PCOS who satisfy the eligibility criteria were included till the sample size was reached and compared to equal number of healthy pregnant women without PCOS before 20 weeks of gestation and followed up till 38 weeks of gestation. After getting consent from the patient 75

grams of glucose mixed with 300 ml of water was given to the patient and two ml of venous blood would be withdrawn after a period of two hours for blood sugar irrespective of the last meal or fasting status. A detailed history regarding the symptoms of PCOS, when and how they got diagnosed was obtained. The previous history of GDM, DM, HTN and recurrent abortion was obtained and also Obstetrics examination was performed. The Diabetology opinion was obtained for the diagnosed cases and they were treated according to their advice.

RESULTS:

Statistical methods:

A Descriptive analysis was carried out by mean and standard deviation for quantitative variables. The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. Odds ratio along with 95% CI was presented. Chi square test was used to test statistical significance. P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

Table: 1 Association of Group with Demographic parameters of study population

Variable	Normal		PCOS		Chi-square	p-value
	NO GDM (N=90)	GDM (N=9)	NO GDM (N=80)	GDM (N=19)		
Maternal age					1.661	0.436
< 25 years	44 (48.9%)	4 (44%)	32 (40%)	7 (36%)		
>= 25 years	46 (51.1%)	5 (55%)	48 (60%)	12 (64%)		
Mean + S.D.	25.06 + 3.61		25.58 + 3.35			0.299
Maternal BMI						
<=25	44 (48.9%)	4 (44%)	31 (38.8%)	8 (42%)		
>25	46 (51.1%)	5 (55%)	49 (61.2%)	11 (58%)		
Mean + S.D.	25.36 + 4		26.75 + 4.55			0.024
GA weeks mean + S.D	13.12 + 4.44		12.11 + 2.86			0.059

The table 1 reveals that age group wise pregnant women with PCOS and without PCOS. Out of 198 study population only 11% of people belong to more than 30 years of age with mean age between 25 years of age in both normal pregnant women and

Table 3 Other risk factors in GDM with PCOS and Normal Pregnant women

Variable	NO PCOS		χ ²	p-value	PCOS		χ ²	p-value
	NO GDM (N=90)	GDM (N=9)			NO GDM (N=80)	GDM (N=19)		
TSH			6.087	0.014			6.808	0.009
Increased	3 (3.33%)	2 (22.22%)			5 (6.25%)	5 (26.32%)		
Normal	87 (96.67%)	7 (77.78%)			75 (93.75%)	14 (73.68%)		
PIH								
Yes	5 (5.56%)	1 (11.11%)	0.444	0.505	10 (12.5%)	4 (21.05%)	0.925	0.336
No	85 (94.44%)	8 (88.89%)			70 (87.5%)	15 (78.95%)		

The table 3 reveals that hypothyroidism and pregnancy induced hypertension are risk factors in addition to GDM in pregnant women with and without PCOS. We found that 26.3% of GDM with PCOS had increased TSH and it was 6.3% in No GDM with PCOS. Similarly, 22.2% of GDM without PCOS had increased TSH and it was 3.3% in No GDM without PCOS. This association was statistically significant at 95% C.I and 0.05 level of significance. We noticed that the PIH was 21.1% of GDM with PCOS than in Normal pregnant women. The PIH was two times more in PCOS than in No PCOS pregnant women. Overall, 10% of PCOS pregnant women develop hypothyroidism while 5% of normal pregnant women develop hypothyroidism. Similarly, 14% PCOS pregnant women and 6% normal pregnant women develop PIH.

Table 4 GDM in history of DM and GDM among pregnant women in study population

Variable	NO PCOS		χ ²	p-value	PCOS		χ ²	p-value
	NO GDM (N=90)	GDM (N=9)			NO GDM (N=80)	GDM (N=19)		
DM in family history			2.546	0.111			23.26	<0.001
Yes	12 (13.3%)	3 (33.3%)			20 (25%)	16 (84.2%)		
No	78 (86.7%)	6 (66.7%)			60 (75%)	3 (15.8%)		
h/o GDM in previous pregnancy								
Yes	2 (2.2%)	0 (0%)	0.204	0.651	1 (1.25%)	4 (21.1%)	12.56	<0.001
No	88 (97.8%)	9 (100%)			79 (99%)	15 (79%)		

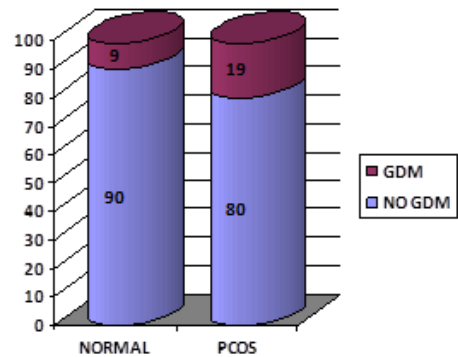
PCOS pregnant women. The PCOS pregnant women who developed GDM (64%) were in more than 25 years of age while 55% of normal pregnant women who developed GDM were more than 25 years of age. About 58% of PCOS pregnant women who developed GDM have BMI >25 while 55% of normal pregnant women who developed GDM have BMI > 25. Most of our study population belongs to a mean BMI of 25 kg/m²

The present study population belongs to a mean GA of 12 to 13 weeks of amenorhea. Thus GA does not play any significant role in the development of GDM. In present study, we found that the maternal age was independent of the pregnant women with and without PCOS.

Table 2 Association of Group with GDM of study population (N=198)

GDM (any OGCT positive)	Group		Chi square	P-value
	Normal	PCOS		
Positive	9 (9.09%)	19 (19.19%)	4.160	0.041
Negative	90 (90.91%)	80 (80.81%)		

Figure: 1 GDM among normal and PCOS pregnant women



The table 2 and figure 1 shows the relation between GDM positive women among the study population. It reveals that 9% of normal pregnant women develop GDM and 19% of PCOS pregnant women develop GDM and statistically significant at 95% C.I.

H/O HTN in family								
Yes	10 (11.1%)	2 (22.2%)	0.948	0.33	11 (13.8%)	8 (42.1%)	7.96	0.005
No	80 (88.9%)	7 (77.8%)			69 (86.2%)	11 (57.9%)		

The table 4 shows the GDM level with family h/o of DM and HTN among the pregnant women of the study population. We noticed that out of 15 normal pregnant women who had h/o diabetes mellitus only 3 persons (20%) developed GDM. Similarly, Out of 36 PCOS pregnant women who had h/o DM in family 16 persons (44%) developed GDM. We found that none of normal pregnant women who had h/o GDM did not developed GDM. Similarly, out of 5 PCOS pregnant women who had h/o GDM in previous pregnancy, 4 (80%) of them developed GDM and statistically significant at p-value <0.001. We had seen that 12 normal pregnant women had h/o HTN in family 2 of them (16.7%) developed GDM. In the same way, Out of 19 PCOS pregnant women had h/o HTN in family, 8 of them (42.1%) developed GDM and statistically significant at p-value is 0.005.

DISCUSSION:

Dr.Leila J et al found the prevalence of GDM was 11.8%⁴. In the present study found the prevalence of GDM was 14.1%. The present study shows increased incidence of GDM in PCOS pregnant women as compared to normal pregnant women. In present study 9% of the normal pregnant women developed GDM while 19 % of the PCOS pregnant women developed GDM. Joan C. Lo in his population based study found that women with diagnosed PCOS had a 2 to 4 fold increased odds of GDM, independent of age and multiple gestation⁵. In the present study age shows no effect on the association of GDM and it states that women with PCOS are at an increased risk of developing GDM independent of age. In the present study shows that there is an increased incidence of Hypothyroidism in PCOS pregnant women compared to normal pregnant women.10% of PCOS pregnant women developed hypothyroidism, Of these 5% have associated GDM. present study also shows that there is an increased incidence of PIH in PCOS pregnant women compared to normal pregnant women. 14 % of PCOS pregnant women developed PIH, of these 4% have associated GDM. Amita Gupta, Kapila Raina et al found an increased incidence of PIH in PCOS pregnant women⁷. Both GDM and PCOS have a strong genetic influences and family history. 36 % of PCOS women have h/o diabetes mellitus in family members while 19 % of PCOS women have h/o HTN in the family. 84 % of PCOS women who had the family h/o diabetes developed GDM while 42 % of PCOS women who had the family h/o hypertension in family members developed GDM. Previous h/o GDM plays a significant role. 26 % of PCOS pregnant women have h/o GDM in the past pregnancy. Of these 21% developed recurrent GDM. A California study showed that patients having history of GDM is twofold higher risk for developing future GDM.

CONCLUSIONS:

Gestational Diabetes Mellitus is one of the emerging scenarios which should be cared a lot. It is a not a problem of one generation it is s a problem which passes on to next generation. Early diagnosis of PCOS is important as it has been linked to an increased risk for developing several medical conditions including insulin resistance, type 2 diabetes, high cholesterol, high blood pressure and heart disease. PCOS is common diagnosis in women presenting with infertility. PCOS is an emerging health problem during adolescence therefore promotion of healthy lifestyles and early interventions are required to prevent future morbidities.

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