

Gestational diabetes mellitus and its correlation with pre-eclampsia

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ABSTRACT

Background: Well-defined Gestational diabetes mellitus (GDM) is a carbohydrate intolerance of varying degree of severity with beginning or first recognition during pregnancy. GDM is associated with contrary fetomaternal outcome. Its early recognition and controlling is necessary for better perinatal outcome.

Objective: To assess the relation between gestational diabetes and hypertension during pregnancy and further assess BMI association with gestational diabetes mellitus.

Method: This prospective study was conducted at J. N. Medical College, AMU, Aligarh Uttar Pradesh, India including 250 pregnant women between 24-28 weeks gestational age who attended the antenatal OPD from September 2017 to February 2018. All women were given 75 g oral glucose irrespective of their meals. Women with blood sugar values >140mg/dl were considered as GDM and rest as non GDM group. All the GDM patients were followed up either with diet or insulin therapy till delivery.

Results: Out of 250 Women 58 women (23.2%) were diagnosed as having GDM and among risk factors higher BMI showed significant association ($p < 0.05$). A highly significant association between preeclampsia and GDM group. ($P < 0.001$) was observed.

Conclusion: The relatively high prevalence of GDM revealed in the present study need education and awareness campaign among all the women to be pregnant and it was concluded screening is very necessary for all pregnant women even in low-risk group. More research is also needed to observe the probability that GDM and preeclampsia share a common etiologic pathway.

Key Words : Fetomaternal outcome, Gestational diabetes mellitus, Oral glucose tolerance test, Preeclampsia

INTRODUCTION

About 16% of pregnancies affected by Gestational glucose intolerance and is associated with increased risk of gestational and perinatal adverse outcomes such as macrosomia, respiratory distress syndrome, fetal hyperinsulinemia and, in some settings, perinatal death (King, 1998).

Hypertensive disorders of pregnancy complicate 5–10 per cent of all pregnancies and the major causes of maternal and fetal complications, including seizures, stroke, hepatic failure, renal failure, intrauterine growth retardation, foetal distress, premature delivery, and death (Walker, 2000).

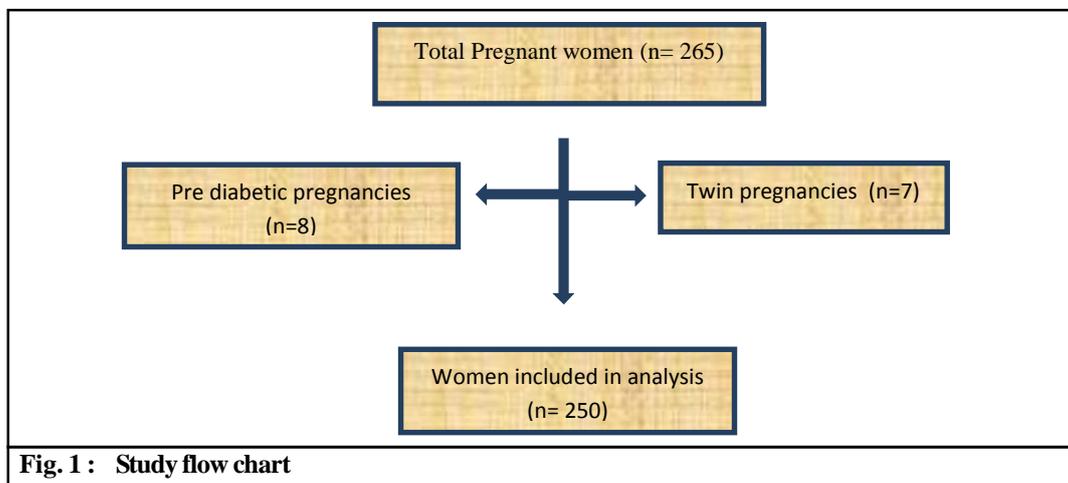
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The relationship between these two conditions is not well understood but pre-eclampsia has been often reported as a complication of gestational diabetes (Vambergue *et al.*, 2002). Several studies suggest essential common pathophysiology (including insulin resistance, chronic inflammation and endothelial dysfunction) and Common risk factors (higher body mass index and advanced age have been distinguished for each of the two conditions (Hollander *et al.*, 2007). Preeclampsia and gestational diabetes mellitus is also relatively common and affects 3–5 per cent of pregnancies, causing a variety of complications that primarily affect the foetus, including macrosomia, stillbirth, jaundice, and respiratory distress syndrome (Kjos and Buchanan, 1999). The relation of preeclampsia and gestational diabetes is not well understood (Suhonen and Teramo, 1993 and Nordlander *et al.*, 1989). Several studies observed an association between these diseases and concluded that Preeclampsia risk increased according to pre-pregnancy body mass index (BMI) (Conde-Agudelo and Belizan, 2000 and Joffe *et al.*, 1998).

A better understanding of the association between these conditions may lead to more effective strategies for prenatal care and may ultimately allow for a better understanding of their pathophysiology. Therefore, this study was conducted with the aim to better describe the relation between gestational diabetes and the hypertension (preeclampsia) and to evaluate the association between gestational diabetes and BMI during pregnancy.

METHODOLOGY

This prospective study was conducted in department of obstetrics and gynaecology of J.N. Medical College, AMU, Aligarh, U.P, India from September 2017 to February 2018 over a period of six month. Total numbers of 265 antenatal women with gestational age of 24-28 weeks of pregnancy were enrolled. According to the exclusion criteria pre-diabetic (total number of 8 pregnancies) and twin pregnancy (total number of 7 pregnancies) were excluded and a total of 250 healthy pregnant women were included in this study (Fig. 1). A standardized questionnaire was used and details pertaining on maternal socio demographic characteristics, family history, medical and Obstetric history, Dietary intake and lifestyle habits. Pre-pregnancy weight, and height was noted by the interviewer as to evaluate the pre pregnancy body mass index (BMI) and other relevant information were collected. BMI was categories according to given ranges by WHO (2004). Kuppuswamy's socio-economic status scale (Sheikh, 2018) criteria was used to ascertain



socio-economic status of the pregnant women. A complete antenatal examination was done. After attaining the informed consent. All women with GDM were diagnosed by a standardized OGTT (Oral glucose tolerance test- 75 gm of oral glucose load with water irrespective of her last meal and venous blood was drawn after 2 hour for estimation of plasma glucose) If 2 hour plasma glucose value was >140 mg/dl (>7.8 mmol/L) it was considered diagnostic of GDM by National policy and diabetes in pregnancy study group in India (DIPSI and WHO) (Polur *et al.*, 2016) recommendations. All screened positive (GDM) women were advised dietary therapy (diet chart and dietary counselling) and those who did not respond to diet therapy were put on insulin therapy to control their blood sugar level. Data on blood pressure and diagnosis of pre-eclampsia were abstracted from medical records.

The institutional ethical committee of study centre has approved the study protocol, and patients consented to participate after being informed about the nature of the study.

RESULTS AND DISCUSSION

A total of 250 healthy pregnant women attending the antenatal OPD were followed up till delivery. The mean age of women was 27.46 years. Out of 250 pregnant women, 58 women (23.2%) were diagnosed as GDM using DIPSI recommended 75 gm OGTT. Gestational diabetes mellitus was found to occur more in women above 25 years of age (Table 1). Majority of GDM women have a positive family history of diabetes in comparison of Non-GDM women. Majority of GDM women belonged to urban area and semi urban areas of Aligarh, majority of women diagnosed to have GDM belonged to lower middle class.

Table 1 : Socio-demographic profile of the patients					
Parameter		GDM (n=58)	23.2%	Non-GDM (n= 192)	78.6%
Age	<25 years	12	20.7	76	39.6
	25-30 years	28	48.3	81	42.2
	30-35 years	16	27.6	31	16.1
	>35 years	2	3.4	4	2.1
Family history of diabetes mellitus	Present	19	32.8	19	9.9
	Absent	39	67.2	173	90.1
Socioeconomic status	Upper	2	3.4	2	1.0
	Upper middle	15	25.9	18	9.4
	Lower middle	22	37.9	62	32.3
	Upper lower	17	29.3	102	53.1
	lower	2	3.4	8	4.2

Table 2 shows that majority of GDM women (48.3%) had BMI >25 kg/m², those pregnant women were overweight before conceiving, showing a positive significant correlation between increased pre-pregnancy BMI with GDM during pregnancy among women ($p<0.05$).

Hypertension among women with and without GDM studied in terms of high blood pressure or preeclampsia during gestational period (Table 3), showed a highly significant relationship between preeclampsia and GDM among women. ($p<0.001$).

Table 2 : Distribution of patients according to BMI

Variable	BMI (Body mass index)					Total
	>18.5	18.5- 24.9	25.0- 29.9	30- 40	<40	
Non- GDM group	3	83	79	26	1	192
	1.6%	43.2%	41.1%	13.5%	0.5%	100.0%
GDM-group	1	14	28	14	1	58
	1.7%	24.1%	48.3%	24.1%	1.7%	100.0%
Total count	4	97	107	40	2	250
	1.6%	38.8%	42.8%	16.0%	0.8%	100.0%

Correlation, (p<0.05).

Table 3 : Distribution of patients according to preeclampsia

Variables	Pre- eclampsia		Total
	Present	Absent	
Non GDM group	8	184	192
	4.2%	95.8%	100.0%
GDM group	14	44	58
	24.1%	75.9%	100.0%
Total count	22	228	250
	8.8%	91.2%	100.0%

Chi-square, (p<0.001).

Discussion :

The worldwide GDM prevalence has been reported variably from 1.4 to 14%. The existence of GDM differed among racial and ethnic groups (Wahi *et al.*, 2011) compared to European women. The prevalence of gestational diabetes has increased 11 fold in women from the Indian subcontinent (Seshiah *et al.*, 2006). The prevalence of gestational diabetes mellitus reported from other studies, Wahi *et al.* (2011) as 6.94%, Rajput *et al.* (2013) as 7.1%, Nilofer *et al.* (2012) as 6% and Kalyani, (2014) as 8.33% are lower in comparison to the present study which revealed 23.2% of pregnant women with GDM. The GDM prevalence was more common in upper middle class than lower middle and upper lower socioeconomic stratus which could be related to multiple factor such as high maternal age, increased pre-pregnancy weight and BMI along with sedentary life style. About 74.1% of women with GDM had BMI more than 26 kg/m², the same observation were made in the study conducted by Kalyani (2014). Out of 58 GDM women, 39 were treated by dietary modifications while other 19 GDM women were managed by both diet and insulin therapy. About 24.1% GDM women had preeclampsia as compared to 4.6% in non GDM group which was highly significant. GDM and preeclampsia share many risk factors, including advanced maternal age, multifetal pregnancies and pre-pregnancy obesity. GDM is frequently recorded as a risk factor for the development of preeclampsia. Excess gestational weight gain may increase preeclampsia risk among women with GDM, pre-existing obesity advises a greater risk (Phaloprakarn and Tangjitgamol, 2009).

Conclusion :

High prevalence of GDM in this study group population irrespective of the risk factors present is an indication that every pregnant female should be screened. More research is also needed to observe the probability that GDM and preeclampsia share a common etiologic pathway. Many

maladaptations to pregnancy are common to both condition, suggesting that their pathophysiology may overlap. Still, studies to date have not had the control to compare biomarkers and risk factors among women with preeclampsia alone, GDM alone and preeclampsia with GDM. A better understanding of the shared and separate pathophysiologicals of these two conditions may help researchers and clinicians to optimize screening techniques and improve treatments for GDM and preeclampsia

Ethical approval:

The study was approved by the Institutional Ethics Committee.

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