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TO STUDY THE PREVALENCE OF GDM IN TERTIARY CARE CENTRE BY ROUTINE ANTENATAL SCREENING WITH DIABETES IN PREGNANCY STUDY GROUP OF INDIA (DIPSI) METHOD

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ABSTRACT

Background: Women with gestational diabetes mellitus (GDM) are at increased risk for adverse obstetric and perinatal outcome. The present study was undertaken to study the prevalence of GDM by routine Antenatal screening with DIPSI method among pregnant women attending the antenatal OPD or admitted in tertiary care center. **Method:** This prospective observational study was conducted on a total of 155 pregnant women. Later pregnant women were given 75 gm oral glucose load irrespective of their last meal timing and venous plasma was drawn at 2 hours. The plasma glucose was estimated in the central laboratory by the glucose oxidase peroxidase method. Pregnant women with 2-hour plasma glucose ≥140 mg/dl (DIPSI criterion) underwent 100 gm Glucose Tolerance test as per Carpenter and Coustan criteria to confirm GDM and rest was classified as normal glucose tolerant (NGT) women. **Results:** The incidence of GDM was found to be 6.5% by using 75 gm OGCT (DIPSI) and 3.87 % by using standard 100 gm OGTT. In comparison to OGTT test, OGCT has Sensitivity of 100% (95% CI - 60.97 to 100), Specificity of 97.32% (95% CI - 93.3 to 98.95), Positive Predictive Value 60% (95% CI - 31.27 to 83.18) and Negative Predictive Value 97.32% (95% CI - (97.42 to 100), so, it can be used as good predictor of early detection of GDM. **Conclusion:** In resource limited countries like India, 75 gm oral glucose challenge test recommended by DIPSI is a very simple, cost effective and feasible (irrespective of the last meal) one step procedure for universal screening and diagnosis of GDM.

KEYWORDS

GDM; DIPSI criterion; OGTT; Glucose oxidase peroxidase; Plasma glucose

INTRODUCTION

Gestational diabetes mellitus (GDM) provides a unique opportunity to study the early pathogenesis of diabetes and to develop interventions to prevent the disease. Abnormal metabolic environment due to hyperglycemia has a profound impact on maternal and foetal outcome. Indians belong to higher risk for developing diabetes due to their ethnicity [1].

However, GDM is associated with increased feto-maternal morbidity as well as long term complications in mother and babies. American college of obstetricians and gynaecologists (ACOG) on contrary advocates selective screening for patients with high risk factors such as history of previous GDM, strong family history of diabetes, member of an ethnic group with high prevalence of GDM, maternal age more than 25 years, obesity, persistent glycosuria, macrosomia (birth weight>4gm,) polycystic ovarian syndrome, spontaneous abortions and unexplained still births [2].

The maternal effects of gestational diabetes mellitus range from infections, spontaneous abortions, polyhydramnios, preterm labour, diabetic retinopathy, diabetic nephropathy, preeclampsia, etc. Various foetal effects of gestational diabetes mellitus that have been studied range from malformations, macrosomia, altered foetal growth to sudden foetal demise. The neonate of patients with gestational diabetes mellitus also can develop hypoglycemia, hypocalcemia, hyper bilirubinemia, respiratory distress syndrome, cardiomyopathy. The offspring of GDM patients may have impaired long-term cognition and inherit diabetes mellitus [3, 4].

Hence the present study was done at our tertiary care centre to study the prevalence of gestational diabetes mellitus by routine Antenatal screening with Diabetes in Pregnancy Study Group of India (DIPSI) method among pregnant women attending the antenatal OPD (outpatient department) or admitted in tertiary care centre.

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval, this hospital based prospective observational study was conducted in the Department of Obstetrics and Gynaecology, at tertiary care centre during a period of 18 months. A total of 155 antenatal women who attend OPD /admitted to ANC ward were included in the study. Patients diagnosed cases of Type I or type II Diabetes mellitus (HbA1c>6.5%) before pregnancy, patients with underlying chronic diseases like Diabetes, Hypertension, Ischemic heart disease and patients not willing to give consent were excluded from the study.

After obtaining the informed consent, pregnant women were given a pre structured questionnaire and details pertaining to their anthropometry, family history, medical, and obstetric history, and other relevant information was collected. Their BMI and blood pressure was recorded. Later pregnant women were given 75 gm oral glucose load irrespective of their last meal timing and venous plasma was drawn at 2 hours. The plasma glucose was estimated in the central laboratory by the glucose oxidase per oxidase (GOD-POD) method. Pregnant women with 2-hour plasma glucose ≥ 140 mg/dl (DIPSI criterion) underwent 100 gm Glucose Tolerance test as per Carpenter and Coustan criteria to confirm Gestational Diabetes Mellitus and rest was classified as normal glucose tolerant (NGT) women.

Statistical Analysis:

Data was entered into Microsoft excel data sheet and analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi square test, Fisher Exact tests was used as test of significance for qualitative data continuous data was represented as mean and standard deviation. Unpaired t test was used as test of significance to identify the mean difference between two quantitative variables for comparison.

OBSERVATIONS AND RESULTS

A total of 155 pregnant women were enrolled in the study. The incidence of GDM was found to be 6.5% by using 75 gm OGCT (DIPSI) and 3.87% by using standard 100 gm OGTT as depicted in figure 1.

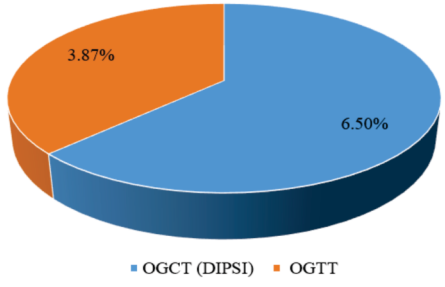

Figure 1: Percentage of women diagnosed as GDM in different trimesters of pregnancy.

Majority, 60% of the patients with positive OGCT result, belong to age group of 26 to 30 years whereas majority, 80% of the patients with positive OGCT result, had BMI more than 25 Kg/m2. Age and BMI of

positive patients was higher, and the difference was statistically significant ($p<0.05$).

However, 30% of the patients with positive OGCT result, had history of DM in Father and 10% had in mother unlike patients with negative test. The difference was statistically significant (p value 0.000), (Table 1).

Table 1: Demographic data of patients and OGCT result

Demographic data		OGCT Result		Total	p-value
		Positive	Negative		
Age group (years)	18 to 20	1(10%)	25(17.24%)	26(16.77%)	0.041
	21 to 25	2(20%)	78(53.79%)	80(51.61%)	
	26 to 30	6(60%)	31(21.38%)	37(23.87%)	
	31 to 35	1(10%)	11(7.58%)	12(7.74%)	
BMI Class	<18.5	0(0%)	4(2.76%)	4(2.58%)	0.000
	18.5 to 24.99	2(20%)	112(77.24%)	114(73.55%)	
	25 to 29.99	4(40%)	21(14.48%)	25(16.13%)	
	≥ 30	4(40%)	8(5.51%)	12(7.74%)	

60% of the patients with positive OGCT result, were gravida 2, majority, 42.76% of negative patients were primigravida but this difference lacks statistical significance (p value 0.267) as depicted in figure 2.

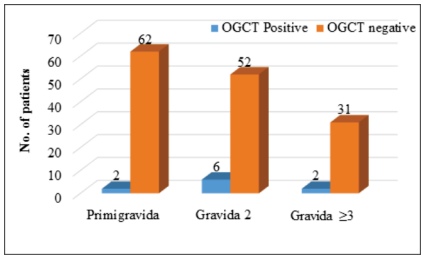

Figure 2: Gravida Status and OGCT result:

30% of positive patients found to have Pregnancy induced Hypertension (PIH) and only 3 (2%) patients with negative result had PIH. The difference was statistically significant (p value 0.000). None of the twin pregnancy had positive OGCT result. Out of 10 OGCT positive patients, 70% patients required Emergency LSCS, only 30% delivered vaginally. 46.21% of Negative patients delivered vaginally and 48.28% required Emergency LSCS. The difference was statistically significant (p value 0.000), (Table 2).

Table 2: Maternal characteristics

Demographic data		OGCT Result		Total	p-value
		Positive	Negative		
PIH	Yes	3(30%)	3(2.07%)	6(3.87%)	0.000
	No	7(70%)	142(97.93%)	149(96.13 %)	
Twin Pregnancy	Yes	0(0%)	3(2.07%)	3(1.94%)	0.646
	No	10 (100%)	142(97.93%)	152(98.06 %)	
Mode of delivery	FTE-LSCS	5(50%)	67 (46.21%)	72(46.45%)	0.000
	FTNVD	3(30%)	67 (46.21%)	70(45.16%)	
	PTE-LSCS	2(20%)	3(2.07%)	5(3.23%)	
	Ventouse Delivery	0(0%)	3(2.07%)	3(1.94%)	
	FTVBAC	0(0%)	3(2.07%)	3(1.94%)	
	Forceps Delivery (FD)	0(0%)	2(1.38%)	2(1.29%)	

Full-term Emergency LSCS = FTE- LSCS; Full-term Normal Delivery= FTNVD; Pre-term Emergency LSCS = PTE-LSCS; Full-term Vaginal birth after Caesarean = FTVBAC

In comparison to OGTT test, OGCT has Sensitivity of 100% (95% CI - 60.97 to 100), Specificity of 97.32% (95% CI - 93.3 to 98.95), Positive Predictive Value 60% (95% CI - 31.27 to 83.18) and Negative Predictive Value 97.32% (95% CI - (97.42 to 100), can be used as good predictor of early detection of gestational diabetes mellitus, (Table 3).

Table 3: Comparison of OGTT Results vs OGCT(DISPI) Result

OGCT Results (DIPSI)	OGCT Result		Total	p-value
	Positive	Negative		
Positive	06	04	10	0.000
Negative	00	145	145	
Total	06	149	155	

DISCUSSION

The prevalence of gestational diabetes is in proportion to type 2 diabetes in a given ethnical population. The prevalence of diabetes is increasing globally, and India is no exception. Compared to European women, the prevalence of gestational diabetes has increased 11-fold in women from the Indian subcontinent [5]. The prevalence of GDM in India varied from 3.8 to 21% in different parts of the country, depending on the geographical locations and diagnostic methods used. GDM has been found to be more prevalent in urban areas than in rural areas [6]. The present study population belonged to peri-urban and urban. The incidence of GDM in our study population was found to be 6.5% by using 75 gm OGCT (DIPSI) and 3.87 % by using standard 100 gm OGTT. This high pick-up rate by 75 gm OGCT test may help us in providing extra care to the patients at risk, though it may lead to increased cost and intervention tothe patient, especially people living in peri-urban and urban areas of our country.

Similarly, Balaji et al [7] and Kalra et al [8] observed 13.4% and 6.6% incidence using 75 gm OGCT test, respectively.

Established risk factors for GDM are advanced maternal age, obesity, and family history of diabetes. Majority, 60% of the patients with positive OGCT result, belong to age group 26 to 30 years unlike patients with negative result, majority, 53.79% from 21 to 25 years. Age of positive patients was higher, and the difference was statistically significant (p value 0.041). The prevalence proportion increased with age from 2.83% in the age group < 25 years to 14.28% in the age group ≥ 25 years. Similar studies by Bhattacharya et al [9] and Kalra et al [8] showed age ≥ 25 years as a risk factor for GDM. So as the age increases the incidence of GDM increases. This supports the American Diabetes Association recommendation [10] on the use of age 25 years as the cutoff for screening and the observation that maternal age 25 years is an important predictive factor for GDM. In clinical practice, maternal age of 25 years maybe adopted as a risk factor for the development of GDM.

Obesity as a significant risk factor for GDM is supported by several studies finding that overweight or obesity at the start of pregnancy predisposes to GDM. In current study, 80% women with Gestational diabetes mellitus had BMI ≥25 kg/m2 which confirms that increased BMI is a risk factor for GDM which is comparable with the study done by Seshiah et al [11] and Kalra et al [8] found that 21.4% and 67% of women with GDM, respectively, had BMI ≥ 25 kg/m2 . Of all the independent risk factors for GDM, BMI emerged as a modifiable risk factor. GDM women have high risk of developing diabetes in the future. They are the ideal group to be targeted for lifestyle modification or pharmacologic intervention in order to delay or postpone the onset of overt Type 2 diabetes mellitus in later life. Hence an important public health priority in the prevention of diabetes is to address maternal health both during the antenatal and post-natal period. Family history of diabetes mellitus was found in 50% of our GDM women. In studies by Kalra et al [8], Bhattacharya et al [9] and Das Vinita et al [12] 33.33% of GDM women had family history of diabetes mellitus.

The present study revealed that pregnancy induced hypertension (PIH) was common complications seen in GDM mothers were (30%). Gajjar et al [13] and Jindal et al [14] found that 60%and 48% of women with GDM, respectively, had PIH. Kalra et al [8] found that the most common complications seen in GDM mothers were gestational hypertension (36.4%) followed by vaginal candidiasis (24.2%), premature rupture of membranes (PROM; 18.1%), and abruption placentae (12.12%).

Caesarean delivery rate in the study by Kalra et al [8] was 78.8% amongst the GDM patients, with the most common indication being arrest of labor. While the rate of caesarean section in a study by Gorgal et al [15] was 19.5%. The results of this study were consistent with those of previous studies that the cesarean section rate increased

significantly among GDM women (66.67%). The high incidence of cesarean section in GDM study group can beattributed to the facts that associated maternal complications like PIH can lead to obstetric indications like abruptio placentae and cord prolapse respectively.

The present study was an attempt to evaluate validity of DIPSI guidelines as a universal screening as well as a diagnostic tool for Gestational Diabetes Mellitus. In comparison to OGTT test, OGCT has Sensitivity of 100% (95% CI - 60.97 to 100), Specificity of 97.32% (95% CI - 93.3 to 98.95), Positive Predictive Value 60% (95% CI - 31.27 to 83.18) and Negative Predictive Value 97.32% (95% CI - (97.42 to 100), can be used as good predictor of early detection of gestational diabetes mellitus. Using OGTT (100 gm 3-hour) test, we would have missed 40% subjects with GDM. Hence, for universal screening a single test with 75 gm of oral glucose and diagnosing women with > 140 mg/dl as GDM is recommended. This method also recommended by Seshiah et al [11] serves both as a one-step screening as well as diagnostic procedure and is easy to perform besides being economical.

For universal screening of GDM, the test should be simple and cost effective. The two-step procedure of screening with 50 gm Glucose challenge test and then diagnosing GDM based on Oral Glucose Tolerance Test is not feasible in a country like India, because the pregnant women may have to visit the antenatal clinic twice and at least 3–5 blood samples have to be drawn. DIPSI diagnostic criterion of 2-hour plasma glucose more than 140 mg/dl with 75 gm oral glucose load is a modified version of WHO guidelines. The WHO procedure requires women to be in the fasting state, on the contrary, DIPSI procedure is performed irrespective of the last meal timing, making the test more feasible and patients more compliant.

CONCLUSION

In resource limited countries like India, 75 gm oral glucose challenge test recommended by DIPSI is a very simple, cost effective and feasible (irrespective of the last meal) one step procedure for universal screening and diagnosis of GDM. Advanced maternal age, obesity and family history of diabetes are important risk factors for GDM. However, pregnancy induced hypertension and polyhydramnios are common associated complications in women with GDM. Increased rate of cesarean delivery in women with GDM contributes to increased maternal morbidity. Adequate glycemic control in antenatal period might reduce the incidence of macrosomic infants.

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