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ORIGINAL ARTICLE

PREVALENCE OF GESTATIONAL DIABETES MELLITUS USING "SINGLE STEP 75 GRAM OGTT" IN A TERTIARY CENTRE

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ABSTRACT: Prevalence of gestational diabetes varies from 3.8 to 21% in different parts of the country. The aim of this study was to determine the prevalence of GDM and to compare the occurrence of GDM in normal antenatal women and the women with risk factors for GDM and to assess the need for universal screening of antenatal women for GDM. **METHODS:** 200 pregnant women with their estimated gestational age between 24-28 weeks attending antenatal clinic in a tertiary care hospital in Guntur, South India were enrolled in the study. Women were given a standardized 75 gm Oral Glucose Tolerance test irrespective of their fasting or non-fasting state and plasma glucose was estimated at 2 hours (DIPSI criteria) and all women with a plasma glucose of ≥ 140 mg/dl were diagnosed to have GDM. A proforma containing general information on demographic characteristics like age and parity, risk factors like age more than 30 years, Obesity, family history of diabetes mellitus, past history of fetal loss, past history of congenital anomalies, prematurity, previous history of GDM, unexplained fetal loss, history of preeclampsia and polyhydramnios were noted and a comparison was made in between group 1- those with risk factors and group 2-those without risk factors to infer regarding the association of risk factors and GDM. **RESULTS:** A total of 200 women participated in the study, GDM was diagnosed in 5(2.5%). GDM was more common in the age group of 28 ±3.57 years, in antenatal women with higher parity, in women with a family history of diabetes. Of those testing positive, 20% of women had no risk factors for GDM and 80% had more than one risk factor for GDM. **CONCLUSION:** The prevalence of GDM was found to be 2.5% in a tertiary care hospital in Guntur, South India. Women with risk factors for diabetes had a higher prevalence of GDM and there is a role for universal screening as 20% of the GDM patients would be missed if selective screening is done. Large population based studies are needed in the antenatal women to know the prevalence of GDM in the community.

KEYWORDS: Prevalence, GDM, OGTT, Plasma Glucose.

INTRODUCTION: "Gestational diabetes mellitus"(GDM) is defined as carbohydrate intolerance with onset or recognition during pregnancy.(1) The prevalence of GDM in India varies 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 rather than rural areas.(2) Compared to selective screening, universal screening for GDM detects more cases and improves maternal and neonatal prognosis.(3) Universal screening for GDM is essential as it is generally accepted that women of asian origin and especially ethnic Indians are at higher risk of developing GDM and subsequent type 2 diabetes.(4)

A "single step procedure" was developed by Diabetes in pregnancy study group, India (DIPSI) due to practical difficulty of performing glucose tolerance test in the fasting state as seldom pregnant women visiting the antenatal clinic for the first time come in the fasting state. If they are asked to

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come on another day in the fasting state, many of them do not return.[5] The DIPSI diagnostic criteria of 2 hour plasma glucose of ≥140 mg/dl after a 75 gm oral glucose load irrespective of whether the patient is in fasting or non-fasting state is diagnostic for GDM and is similar to WHO criteria of 2 hour plasma glucose ≥ 140 mg/dl to diagnose GDM after a 75 gm OGTT. The single step procedure has been approved by Ministry of Health, Government of India[6] and also recommended by WHO.

AIMS AND OBJECTIVES: Gestational diabetes mellitus is one of the common medical disorders in pregnancy. The aim of the present study is to evaluate the prevalence of GDM in the antenatal women attending Government General Hospital, Guntur using "one step procedure of using 75 gms OGTT" and estimating plasma glucose at 2 hours and to evaluate and compare the occurrence of GDM in normal antenatal women and in women with risk factors for GDM and assess the need for universal screening of antenatal women for GDM.

MATERIALS AND METHODS: Two hundred pregnant women seeking antenatal care between 24 to 28 weeks gestation attending OPD or admitted as inpatients at Government General Hospital, Guntur from August 2012 to August 2013 were recruited for the study. Women with a history of pre-gestational Diabetes (Overt Diabetes), history of intake of drugs that effect glucose metabolism like corticosteroids, patients who refuse to undergo the test procedure and who do not give proper history were excluded from the study. A standard questionnaire was used and details pertaining to family history, medical history and obstetric history and anthropometrics were recorded.

After obtaining informed consent the pregnant women were screened for GDM by giving 75gms of glucose load irrespective of their last meal timings and venous plasma was drawn at 2 hours. The plasma glucose was estimated by glucose oxidase peroxidase method. (GOD-POD). Pregnant women with 2 hour plasma glucose of ≥ 140 mg/dl (DIPSI criteria) were diagnosed as GDM and the rest were classified as normal glucose tolerant women (NGT). Among the 200 patients there was no incidence of adverse effects of nausea and vomiting. All patients accepted the test readily. The clinical profiles of the study group were categorized into two groups. The study population of 200 women were divided into two groups.

GROUP 1: This group of patients had clinical or historical risk factors for GDM which included age ≥ 30 years, family history of type II diabetes mellitus (1st degree relative), obesity (BMI > 27 kg. /M 2), history of GDM in previous pregnancy, history of macrosomia in previous pregnancy, history of fetal loss after 20 weeks of gestation in previous pregnancy, history of congenital anomalies, prematurity and unexplained perinatal loss in previous pregnancy.

GROUP 2: Patients without any of the above risk factors, age < 25 years, normal weight before pregnancy, no history of diabetes in 1st degree relatives, no history of abnormal glucose tolerance, no history of poor obstetric out comes were included in group 2. The occurrence of GDM in the two groups were evaluated and compared.

STATISTICAL METHODS APPLIED: Statistical analysis was done with demographic profiles. The following statistical methods were applied in the present study- Descriptive statistics, Chi-Square test, 'p' value <0.05 was considered statistically significant.

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RESULTS: The results of the present study were tabulated and analyzed.

Age	Number of cases	Percentage
< 20 years	50	25.0
21 – 25	106	53.0
26 – 29	32	16.0
30 – 35	8	4.0
>35	4	2.0
Total	**200**	**100**

TABLE 1: AGE DISTRIBUTION OF STUDY POPULATION

Gravida	Number of cases	Percentage
Primi	81	40.5
2nd Gravida	75	37.5
3rd Gravida	29	14.5
4th Gravida	13	6.5
0115th Gravida	2	1.0
Total	**200**	**100.0**

TABLE 2: PARITY DISTRIBUTION IN STUDY GROUP

No. of women screened	Cases of GDM	Prevalence
200	5	2.5%

TABLE 3: PREVALENCE OF GDM

Test Value in mg/dl	No. of Patients	Percentage
< 140	195	97.5
140 – 149	0	0.0
150 – 159	2	1.0
160 – 169	1	0.5
170 – 179	1	0.5
180 – 190	1	0.5
	200	100

TABLE 4: RESULT OF 2 HR. 75 GM OGTT

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Age	Number of cases	Percentage
< 20	0	0.0
21 - 25 years	1	20.0
26 – 29 years	2	40.0
30 – 35 years	2	40.0
> 35 years	0	0.0
Total	**5**	**100.0**

TABLE 5: AGE DISTRIBUTION OF GDM WOMEN

	GDM	NGT
> 30 years	2	11
< 30 years	3	184

TABLE 6: AGE IN CORRELATION WITH GDM

Chi square = 9.4 with one degrees of freedom (with Yates correction). The two tailed 'p' value is =<0.01 (very statistically significant). There was a statistically significant difference in the age between GDM and NGT women.

Study Population	No. of cases of GDM	Percentage of GDM	NGT
Primi (81)	1	1.23%	80
Multi (119)	4	3.36%	115

TABLE 7: GRAVIDITY & ITS CORRELATION WITH GDM

BMI	Number of cases of GDM n=5	Percentage NGT- n=195
BMI > 27	2(40%)	13(6.5%)
BMI < 27	3(60%)	182(92.5%)

TABLE 8: BMI DISTRIBUTION OF GDM WOMEN

Chi – Square = 7.8 (by Yates correction) – with one degree freedom. 'p' value = <0.001(Very statistically significant.)

	Group I (Risk factor positive)	Group II (risk factor negative)	Total
GDM Positive	4 (2.0%)	1 (0.5%)	5
NGT	71 (35.5%)	124 (62.0%)	195
Total	**75**	**125**	**200**

TABLE 9: RISK FACTOR CORRELATION WITH GDM

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Rate of positivity of group I (risk factor +ve) as compared with group II (Risk factor –ve) is shown in above table. Chi – square = 3.9 (by Yates correction), with 1 degree of freedom. The two tailed 'p' value = 0.001 (statistically significant).

Factors	Normal (195)	percentage	GDM (5)	Percentage	'p' value
> 30 years	8	3.07	2	40	<0.01
Obesity	11	5.64	2	40	<0.01
Family H/O DM	12	6.15	3	60	<0.01
Past H/O Fetal Loss	21	10.7	3	60	<0.01
Prev. H/O Macrosomia	2	1.02	-	-	-
Past H/O Congenital Anomalies	4	2.04	-	-	>0.99
Prematurity	15	7.69	1	20	-
Previous GDM	-	-	1	20	-
Unexplained neonatal loss	5	2.56	1	20	-
H/O PIH/PE	10	5.12	1	20	>0.1
Polyhydramnios	3	1.53	-	-	-

TABLE 10: PREVALENCE OF RISK FACTORS IN NORMAL AND GDM POPULATION

The mean age of study population was 23.6+0.96 years. More than half of the study population, (53%) belonged to the age group 20 – 25 years. Only 6.0% of study population belonged to the high risk group of >30 years.(Table no. 1). 81(40.5%) were primi gravida and 119(59.5%) were multi gravidae (table no. 2). Overall prevalence of GDM in present study was 5(2.5%) cases out of 200 antenatal women screened (Table no. 3). Among the study population 195(97.5%) had normal glucose tolerance and 5(2.5%) had elevated plasma glucose of ≥ 140 mg/dl by single test two hour 75 gm OGTT. (Table no. 4).

20% of GDM women were in age group 21 – 25 years. 40% of GDM patients were in the age group of 26 – 29 years, 40% cases were in the high risk age group of ≥30 years. The average age of GDM patients was 28.0 + 3.57 years and that of women with normal glucose tolerance (NGT) was 23.54 + 1.14 years (Table nos. 5 and 6).

Among the GDM women, 1.23% were primigravida and 3.36% of multigravida had GDM. The prevalence of GDM increased with multigravidae and this shows that the severity of glucose intolerance increases with gravidity and glucose intolerance which may not manifest in index pregnancy may manifest later (Table no 7).

Two cases of GDM had BMI ≥ 27. Among NGT women 13 cases had BMI > 27. BMI > 27 was observed in 40% of GDM women and 6.5% of NGT women (Table no. 8).

Out of 200 pregnant women screened 75 (37.5%) were with risk factors, and 125 (62.5%) were without risk factor. Of 200 pregnant women screened in this study population, 5 antenatal populations (2.5%) had tested positive for GDM. Test result was positive in 4 of 75 cases with risk factors positive and 1 of 125 cases without risk factors. That is GDM positivity was 2.0% in group I and 0.5% in group II. GDM positivity was seen in 4 cases (80%) of women with risk factors for GDM and in one case (20%) with no risk factors for GDM (Table no. 9).

Family H/O Diabetes, Past H/O Fetal loss, Obesity, Age >30years, Prematurity were statistically more common in GDM population compared to normal population (Table no. 10).

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DISCUSSION: The prevalence of GDM in our present study is 2.5%. None of them was a known case of diabetes. In India, a study was done in 1982 and the prevalence of GDM was found to be be 2% and in a random survey performed in various cities in India in 2002-03, the prevalence of GDM was 16.2% in Chennai, 15% in Thiruvananthapuram, 21% in Always, 12% in Bangalore, 18.8% in Erode and 17.5% in Ludhiana.[7] In a study done in 2013 using the DIPSI criteria, 13.4% were diagnosed as GDM.[8] Use of different criteria for diagnosis of GDM is mainly responsible for different prevalence rates of GDM.

In this study, women were given 75 gms oral glucose load irrespective of their last meal timings and 2 hour PG ≥ 140mg/dl (7.8 millimoles/litre) were diagnosed as GDM. The rationale is that after a meal, a normal glucose tolerant woman would be able to maintain euglycemia despite glucose challenge due to brisk and adequate insulin response. Where as in a woman with GDM who has impaired insulin secretion, her glycemic level increases with a meal and with glucose challenge the glycemic excursion exaggarates further.[9,10,11] This cascading effect is advantageous as this would not result in false positive diagnosis of GDM.[9]

The mean age of women in the study was 23.7±0.96 years. The mean age of GDM women was 28±3.57 years and that of women with normal glucose tolerance was 23.54±1.14 years. Prevalence of GDM increases significantly with increase in age which has been seen with earlier studies.[12,13,14,15] Seshiah et al[13] reported a odds ratio of 2.1 for women ≥ 25 years of age.

Higher parity has been associated with higher prevalence of GDM in few studies.[16] In the present study, among GDM women. 20% were primi gravida and 80% were multigravida and this shows that the severity of glucose intolerance increases with gravidity. Jang et al[17] found greater ratio of women with GDM in the group with parity>2 in comparison to primiparous women but after controlling for age, prepregnancy BMI, family history of diabetes mellitus and weight gain during pregnancy the results were not statistically significant.

Family history of diabetes has been reported to be associated with higher prevalence of developing GDM.[12,13,14,18] Seshiah et al[13] observed a significant association between the family history of diabetes mellitus and the occurrence of GDM in pregnancy. In the present study, 60% of women with GDM had a family history of diabetes mellitus. Obesity is an important risk factor in the development of GDM.[13,19] BMI ≥ 27 was seen in 40% of cases of GDM and in only in 6.5% cases of NGT women. Higher prevalence of GDM in women with higher BMI has been seen in earlier studies as well.[19]

Family history of diabetes, past history of fetal loss, obesity, age>30 years were statistically more common in GDM population compared to normal population. In the present study, there is a low prevalence of past history of GDM, history of congenital anomalies and macrosomic babies. This is because of the fact that hospital records of previous deliveries were hardly available in our study population.

The prevalence of GDM and distribution of its classical risk factors in general population of women are key considerations for determining the optimum screening strategy. In the present study, 20% of GDM women would have been missed if universal screening is not used as they had no risk factors for GDM. In a study done by Seshiah et al,[13] it was found that diagnosis of GDM by OGTT based on initial GCT screening leaves 21.5% of women with GDM undiagnosed.

Among the South Asian countries, Indian women have the highest frequency of GDM. Indian women have eleven fold increased risk of glucose intolerance during pregnancy compared to

Caucasian women.[4] Hence universal screening during pregnancy has become important in our country as this might decrease the delay in the diagnosis and care of GDM patients.

The advantages of DIPSI procedure are that the pregnant women need not be fasting, would cause least disturbance in a pregnant woman's routine activities and serves as both screening and diagnostic procedure.

CONCLUSION: The prevalence of GDM is 2.5% in the present study and there is a greater prevalence of GDM in women with increasing age, higher parity, increasing BMI and a family history of diabetes mellitus. There is a need for universal screening to pick up gestational diabetes mellitus to prevent both maternal and fetal morbidity. Larger studies are needed to analyse the risk factors for GDM in Indian women and plan for preventive strategies and to improve maternal and neonatal outcomes.

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