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GESTATIONAL DIABETES;
SCREENING IN PREGNANT WOMEN

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ABSTRACT… Objectives: To find the frequency of gestational diabetes in pregnant women using 50 grams glucose challenge test. **Study design:** a descriptive study. **Place and duration:** Department of Obstetrics and Gynecology, Lady Atchison Hospital, Lahore from August 2012 to August 2013. **Methodology:** Through non-probability convenient sampling, 200 pregnant women between 24-28 weeks of gestation were studied. All known diabetic patients were excluded from the study. Pulse, BP, weight and height were recorded and Body Mass Index was calculated. Physical and antenatal examination were done. Patients were given 50 gm glucose dissolved in 200 ml of water without any dietary preparation. Glucose levels were measured in venous plasma after one hour according to American Diabetic Association protocol. Blood glucose level more than 140mg/dl was diagnosed as screened positive and less than 140mg/dl screened negative. The data analysis was analysed by SPSS 20. **Results:** Out of total 200 women studied, 28 (14%) had abnormal screening test while 172 (86%) had normal test. History of obstetric complications was noted in 10 (5%) women. PIH was noted in 19 (19.5%) and past history of GDM was present in 14 (8.13%). Mean age of patients screened positive was 25.03 ± 2.9 years. Gestational age of positive group ranged between 19 to 32 weeks. Mean gestational age was 26.17+3.37 weeks. Among screened positive women, 7 (25%) women were primigravida while 21 (75%) women were multigravida. **Conclusion:** Significant risk factor associated with GDM include family history of DM, maternal obesity, previous history of obstetric complications. Failure to recognize and treat the GDM results in maternal and fetal morbidity and mortality.

Key words: Gestational diabetes, Multigravida, Screening for GDM, Risk of GDM

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INTRODUCTION

Gestational Diabetes Mellitus (GDM) is a form of diabetes developed during pregnancy in a women who never had diabetes before. The earliest description of Gestational diabetes mellitus is available in the medical literature of nineteenth century.[1] Diabetes is encountered in 3-4% of all pregnancies. However, it may vary between 1% and 14% in different populations.[2]

About 80-90% of cases of diabetes during pregnancy are of GDM.[3] GDM may be defined as the glucose intolerance which is first time recognized during pregnancy.[4] In this definition the possibility remains that glucose intolerance may have been there unrecognized even before gestation.[5]

GDM usually occurs in mid or late pregnancy, therefore between 24th and 28th week of pregnancy, all pregnant women need screening for GDM. Studies suggest that hyperglycemia during pregnancy affects mother and fetus adversely, thus making a strong argument in favour of screening for GDM. Maternal hyperglycemia can be detrimental for neonate and can cause respiratory distress syndrome, hypoglycemia, cardiomyopathy, macrosomia, hypocalcemia, polycythemia and hypomagnesemia in the new born.[6]

GDM prevalence is found to be approximately six times higher in patients having risk factors like obesity, advanced maternal age, family history of diabetes, smoking, previous baby with weight more than 4.5 kg, presence of polyhydramnios,

history of still birth.[7] There are different oral glucose tests used for screening and diagnosis of GDM, like 1 hour 50 grams, 2 hour 75 grams and 3 hour 100 grams glucose tests. American Diabetes Association recommends two strategies in diagnosing GDM between 24-28 weeks of gestation. First strategy (one step approach) recommends direct use of 75 grams of glucose in a fasting patient, while other strategy (two steps approach) recommends 50 grams glucose test in non-fasting state followed by 100 grams glucose test if required. (for detail see Table-I & II).[8] WHO has adopted the two-hour 75-g OGT (oral glucose test) during pregnancy and recommended the same diagnostic cutoff points established for the diagnosis of impaired glucose tolerance in nonpregnant women.[9] Random glucose test is quite convenient for use, but its poor sensitivity precludes its use as screening test. Similarly, fasting glucose also appears to have unsatisfactory sensitivity/specificity in different populations so needs further testing after being used for screening. The oral glucose tolerance test, despite its limitations, is considered as the 'most acceptable' diagnostic test for GDM. Glucose Challenge Test (GCT) now a days is widely used as the screening test for GDM.[10] In this test, 50 grams of glucose is given orally in water at any time of the day. One hour later, the plasma glucose levels are measured.[11] This test has high NPV but variable PPV, as its sensitivity is 70% and specificity is 83%.[12] While sensitivity of random blood sugar is 90% with low specificity. Sensitivity of fasting blood sugar is 90% and specificity of 50% as for as diagnosis of gestational diabetes is concerned. Thus 50 gram glucose test still has got better sensitivity and specificity as compared to random and fasting glucose levels.

• Pregnant women with risk factors	• Test for undiagnosed type 2 at first prenatal visit using standard diagnostic criteria
• Pregnant women without known prior diabetes	• Test for GDM at 24-28 weeks
• Women with GDM	• Screen for persistent diabetes 6-12 wks postpartum using OGTT and standard diagnostic criteria
• Women with a history of GDM	• Lifelong screening for diabetes or prediabetes every ≥3 yrs
• Women with a history of GDM and prediabetes	• Lifestyle interventions or metformin for diabetes prevention
• Women with diabetes in the first trimester have type 2 diabetes • GDM is diagnosed in the second or third trimester and not clearly associated with type 1 or type 2 diabetes	

Table-I. Screening for Gestational Diabetes Mellitus
Adopted from American Diabetes Association. Standards of medical care in diabetes—2016. *Diabetes Care*. 2016;39 (suppl 1):S1-S106. January 2016

One-step diagnosis strategy	Two-step diagnosis strategy
• Perform 75-g OGTT with plasma glucose measurement • Test in the morning after the patient has fasted for ≥8 hours • Repeat test at 1 and 2 hours after initial measurement	Step 1: Perform a 50-g nonfasting GLT with venous plasma measurement at 1 hour • If PG measured 1 hour after the load is ≥140 mg/dL (7.8 mmol/L), proceed to 100-g OGTT
Diagnosis is confirmed when at least two venous plasma PG levels meet or exceed: • Fasting 92 mg/dL (5.1 mmol/L) • 1 hr: 180 mg/dL (10.0 mmol/L) • 2 hr: 153 mg/dL (8.5 mmol/L)	Step 2: Perform 100-g OGTT while patient is fasting Diagnosis is confirmed when two or more venous plasma PG levels meet or exceed: • Fasting: 95 mg/dL (5.3 mmol/L) • 1 hr: 180 mg/dL (10.0 mmol/L) • 2 hr: 155 mg/dL (8.6 mmol/L) • 3 hr: 140 mg/dL (7.8 mmol/L)

Table-II. Strategies for Diagnosis of Gestational Diabetes Mellitus
Adopted from American Diabetes Association. Standards of medical care in diabetes—2016. *Diabetes Care*. 2016; 39(suppl 1):S1-S106. January 2016

The aim of this study was to find the frequency of GDM in pregnant women and assess the sensitivity, specificity and accuracy of 50 grams glucose challenge test (GCT) in diagnosing gestational diabetes.

PATIENTS AND METHODS

This descriptive study was carried out in the department of Obstetrics and Gynecology, Lady Atchison Hospital, Lahore from August 2012 to August 2013. This study included 200 consecutive women coming for antenatal check-up. A non-probability convenient sampling technique was used. All pregnant women attending the antenatal clinic at 24-28 weeks of gestation were included in the study. All known diabetic patients were excluded from the study. In outpatients department, on arrival, a focused history regarding potential risk factors for GDM was taken. The patients were asked about risk factors like family history of diabetes, smoking, previous baby with weight more than 4.5 kg, presence of polyhydramnios, history of still birth, presence of glycosuria and history of congenital anomalies. Pulse, BP, weight and height were recorded and Body Mass Index was calculated by following formula: Weight in Kgs / (height in meters).[2] General Physical Examination and routine antenatal examination were done and base line lab tests were requested. Women were counseled regarding the objectives and the purpose of the study and an oral consent was obtained to include them in this study.

The patients were given 50 gm glucose dissolved in 200 ml of water without any dietary preparation. Glucose levels were measured in venous plasma after one hour according to American Diabetic Association (ADA) protocol. Blood glucose level more than 140mg/ dl was diagnosed as screened positive and less than 140mg/dl screened negative. Patients personal biodata and all the findings of screening test were entered into pre-designed proforma. The data analysis was computer based. Computer software SPSS 20 was used to enter and analyze the data. Means, standard deviation were calculated for numeric data and frequencies were calculated for categorical data by SPSS 20.

RESULTS

A total of 200 pregnant women were studied in this research project. The first woman was enrolled on 17th August 2012. Out of total 200 women, 28 (14%) had abnormal screening test while 172 (86%) had normal. History of obstetric complications amongst previous pregnancies were noted in 10 (5%) women. PIH was noted in 19 (19.5%) women. Previous history of GDM was present in 14 (8.13%) women.

The age of women screened positive for GDM, ranged from 21 to 30 years. Mean age of this group was 25.03 ± 2.9 years. Gestational age of this group of women ranged between 19 to 32 weeks. Mean gestational age was 26.17+3.37 weeks. Among screened positive women, 7 (25%) women were primigravida while 21 (75%) women were multigravida. Family history of DM (among first degree relatives) was positive in 8 (28.57%) women. Mean value of BMI of the women screened positive for GDM was 29.29±3.99 kg/ m2.

DISCUSSION

Diagnosing GDM is paramount to prevent prenatal and maternal complications.[1] Untreated GDM is associated with significantly higher perinatal mortality rate. With the modern management of GDM, lower morbidity rate can be expected in infants of diabetic mothers. Changing lifestyle and diet, and addition of insulin treatment have shown better perinatal outcomes.[2] One study results suggested that age, family history of diabetes, body weight before pregnancy, FBG, and HbA1c values are predictors for the necessity of insulin treatment.[3] Treatment of GDM results in less preeclampsia and macrosomia. Current evidence does not show that treatment of GDM has an effect on neonatal hypoglycemia or future poor metabolic outcomes. Research is needed on the long-term metabolic outcome for offspring as a result of GDM and its treatment.[4]

	Abnormal Glucose Tolerance (n = 28)	Normal glucose tolerance (n = 172)	P Value
Age (Years)	25.03±2.91	24.63±4.31	> 0.05 (N.S)
Gestational Age (weeks)	.26.17±3.37	25.96±3.27	> 0.05 (N.S)
BMI (Kg/m2)	29.59±3.99	25.24±4.02	< 0.05 (S)
Gravidity Primigravida	07 (25.0%)	79 (45.93%)	•
Multigravida	21 (75.0%)	. 92 (53.48%)	
Family H/0 DM	08 (28.57%)	09 (95.23%)	< 0.05 (S)
PIH	08 (28.57%)	11 (6.39%)	< 0.05 (S)
Previous abnormal obstetric history	05 (17.85%)	5 (2.90%)	< 0.05 (S)
H/O of previous GDM	06 (21.42%)	08(4.65%)	<0.05

Table-III. Comparison of Characteristics of GDM Positive Women with Women having Normal Glucose Tolerance
PIH= Pregnancy induced hypertension, DM=diabetes mellitus,
BMI=body mass index. GDM=gestational diabetes mellitus.

Gestational Age (weeks)	Number	Percentage
15-19	2	7.14%
20-24	10	35.71%
25-29	10	35.71%
30-34	6	21.44%

Table-IV. Gestational Age (weeks) n = 28

BMI (kg/m2)	Number	Percentage
20-23	4	14.29%
24-27	8	28.57%
28-31	10	35.71%
32-35	4	14.29%
36-39	2	7.14%

Table-V. Distribution of BMI of GDM positive women n - 28

This was a hospital based study in which we have observed proportionate rate of GDM amongst pregnant women visiting our antenatal clinic. One important point to consider is that our results might be different from true prevalence of GDM in the community as most of the pregnant women prefer to visit traditional birth attendants (TBA) or local antenatal clinics. They visit the antenatal clinic of a tertiary care hospital only if they feel that they have some complications associated with their pregnancies. Out of the 200 gravida whom we screened for our study 28(14%) were diagnosed as GDM according to new WHO criteria for the diagnosis of diabetes during pregnancy with the inclusion of both DM and IGT of non-pregnant state.

Comparing our results with that of al-Shawaf of Saudi Arabia which shows IGT 8.4% and GDM 1.9%.[1] If we add-up these 2 figures a total of 10.3%, is comparable to our results.

A study conducted at Boston, USA shows prevalence of GDM 1 1-15%.[2] If we compare our study result with Boston study it is evident that our results are higher than of Boston study.

Thus our study supports the WHO prediction of increasing prevalence of DM including GDM in the developing countries.[3] Also it is consistent with the earlier reports that prevalence rate of GDM is higher in women from Asian subcontinent.[4]

Although in our study, the policy of universal screening was adopted instead of risk factors based screening however we did make observations about the presence of risk factors. Mean age of women diagnosed as GDM was 25.03±2.91. This is consistent with earlier observation that GDM is likely to be discovered in older gravida.[5,6]

Gestational age at the time of diagnosis of screened positive was 26.17±3.3 weeks. This result shows that women should be subjected to

first screening for GDM before third trimester of pregnancy, as the late recognition of the condition may result in delay in the treatment when the hyperglycaemia already have had its effects on the fetus.

Among the GDM positive women, 25% were primigravida and 75% were multigravida. Thus our study led to similar conclusion that GDM risk increases with increased parity as insulin sensitivity is likely to deteriorate with each pregnancy.[7]

Positive family history of DM in first degree relatives was seen in 28% of screen positive women. Thus our study yielded data similar to a study which showed increased risk of GDM in women with positive family history of diabetes. One explanation for this apparent increase in number of diabetic first degree relatives might be that because of increased diagnostic facilities more people subjected to blood sugar testing because of increased awareness of general public about DM. An increase in life expectancy has also increased the incidence of DM.

In our study BMI was 29.29±3.99 Kg/m2 in gestational diabetic women. Thus our study yielded findings supportive of earlier data that GDM is common in obese women. As there is trend towards increase in obesity amongst general population, this automatically increase the risk of GDM. It is therefore very important to control pre-pregnancy weight and also excessive weight gain during pregnancy especially In women with other risk factors of diabetes, thus minimizing the chance to develop diabetes during pregnancy.

In the current study, pregnancy induced hypertension was observed in 28.6% of GDM positive women. Thus our study revealed similar magnitude of problem of PIH amongst gestational diabetic women as reported in earlier studies.[8]

Hypertension is an important risk factor which is liable to increase the obstetric complications. It is therefore very important to detect and treat these cases early. In 7.1% of GDM positive women gave history of obstetric complications in previous pregnancies. This observation is also consistent with earlier observation and might be due to undetected previous GDM.[18]

CONCLUS1ON

It is concluded that a significant risk factors associated with GDM includes family history of DM in first degree relatives, maternal obesity, previous history of obstetric complications. Failure to recognize and treat the GDM will result in maternal and fetal morbidity in many pregnancies. Women with GDM should be educated on life style changes which will delay the onset of type-2 DM.

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