Association of Risk Factors of GDM with Outcome of GCT in Obstetrical Population

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Objective: To determine the association of risk factors of Gestational Diabetes Mellitus (GDM) to outcome of Glucose Challenge Test (GCT). **Place and Duration of Study:** From February 2000 to October 2000 at the antenatal clinic of Unit-II at Services Hospital. **Subject and Methods:** One thousand pregnant women attending antenatal clinic at 24 - 28 weeks of gestation at Services Hospital were included. Glucose challenge test was performed after a history with special reference to diabetic risk factors. **Results:** Risk factors were identified in 198 (19.8%), while there were no risk factors in 802 (80.2%) women. An oral glucose tolerance test (OGTT) was carried out in all glucose challenge test positive patients. Out of 198 women with risk factors, 50 women were glucose challenge test positive while 148 were screen negative. Out of 802 women without risk factors 54 were GCT positive while 748 were screen negative. The positive predictive value was 48% and the negative predictive value was 83% Out of ten gestational diabetic women, six (3%) belonged to the risk factor group while four (0.5%) were in the no risk factor group. **Conclusion:** pregnant women with positive risk factors for diabetes mellitus were found to have a six times greater chance of developing gestational diabetes as compared to those with no risk factors.

Key Words: Gestational diabetes mellitus, Glucose challenge test, Oral glucose tolerance test.

Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance with onset or first recognition during the present pregnancy[1, 2]. The traditional method of screening for GDM is to assess risk factors, which include; previous large sized baby, history of perinatal loss, obesity and history of diabetes in a first-degree relative[4].

Due to lack of agreed criteria for diagnosing GDM and questionable obstetric benefits of treating women with mild glucose intolerance only a few U.K centres undertake screening[3]. On the other hand it still is widely though not universally performed as part of antenatal care despite persuasive arguments against routine screening[4].

Subjects and methods

The study was carried out from February 2000 to October 2000 on 1,000 women attending antenatal clinic of Department of Obstetrics & Gynaecology,, Unit-II at Services Hospital, Lahore. Besides routine antenatal work-up specific history regarding the potential diabetic risk factors was taken.

These risk factors included family history of diabetes, history of unexplained stillbirth, prior history of macrosomia, maternal weight >90kg, polyhydramnios, presence of glycosuria on two occasions and history of congenital anomalies.

Inclusion Criteria:

All women at 24 - 28 weeks gestation presenting to the antenatal clinic.

Exclusion Criteria:

Pregnancy beyond 28 weeks
Pregnancy earlier than 24 weeks
Hypertension and or cardiac disease

The pregnant women were divided into two groups depending on whether or not they had risk factors for diabetes mellitus. Glucose challenge test was given to both groups in the form of an oral load of 50 gm glucose without any dietary preparation, at 24 - 28 weeks of gestation. Plasma level of glucose was measured after one hour by Randox kit method. The test was considered negative if the value was <140 mg/dl and positive if ≥140 mg/dl. At values ≥140 mg/dl and ≤190 mg/dl oral glucose tolerance test was carried out. The glucose challenge test was repeated at 32 weeks in all women who had a blood sugar of 140mg/dl or more on earlier GCT but a normal OGTT at 24 - 28 weeks. Oral glucose tolerance test was also performed at 32 weeks in women with risk factors for gestational diabetes mellitus; who earlier had a glucose challenge test result of less than 140 mg/dl at 24 - 28 weeks. None of the patients dropped out from the study.

Results

Risk factors were identified in 198 (19.8%), while there were no risk factors in 802 (80.2%) women (Table 1)

Table 1: Prevalence of risk factors (n=1000)

	n=	%age
Positive risk factors	198	19.8
Negative risk factors	802	80.2

Out of 198 women with risk factors, the commonest feature was positive family history in 124 followed by unexplained stillbirth in 36. History of macrosomia and congenital anomalies in the previous pregnancies were present in six women each. Six patients weighed >90kg, and glycosuria and polyhydramnios were present in 4 patients each. In 12 patients multiple risk factors were present (Table 2).

Table 2: Type of risk factors

Risk factors	n=	%age
Family history	124	62.7
H/O still birth	36	18.3
Baby weight 4kg	6	3
Maternal weight >90kg	6	3
Congenital anomalies	6	3
Polyhydramnios	4	2
Glycosuria	4	2
Mixed	12	6
Total	198	100

Out of 198 women with risk factors, 50 women were GCT screen positive while 148 were screen negative. Out of 802 women without risk factors 54 women were GCT positive while 748 were screen negative. The positive predictive value was 48% and the negative predictive value was 83% (Table 3)

Table 3: Outcome of GCT in positive & negative risk factor patients (n= 198)

	Risk factors +ve	Risk factors -Ve
Positive GCT	50	54
Negative GCT	148	748

Positive Predictive Value: 48%
Negative Predictive Value: 83%

GCT positive patients (104) were subjected to OGTT, 8 were found to have frank gestational diabetes, 14 had impaired glucose tolerance and 82 had a normal OGTT (Table 4).

Table 5: Outcome of repeat GCT at 32 weeks (n= 244)

Positive GCT	Negative GCT
10	233

GCT was repeated in 244 women (148 women having risk factors but negative GCT (Table 3) and 96 women with positive GCT but impaired or normal OGTT (Table 4) at 32 weeks. Ten women were again found to be screen positive (Table 5) and were subject to OGTT. Out of these two had gestational diabetes (Table 6).

Table 4: Outcome of OGTT in women with positive GCT (n= 104)

	Impaired OGIT	Normal OGTT
8	14	82

Table 6: Outcome of OGTT in women with positive GCT (n= 10)

Frank Gestational diabetes	Impaired OGTT	Normal OGTT
2	2	6

Table 7: Risk factors and Gestational Diabetes Mellitus

		GDM	%age
Women with risk factors	198	6	3
Women without risk factors	802	4	0.5

Out of a total of ten gestational diabetic women, six belonged to the risk factor group (198) giving a rate of 3% while four were in the no risk factor group (802) giving a rate of 0.5%.

Discussion

Gestational diabetes mellitus (GDM) is diagnosed when the fasting blood sugar equals to or is greater than 8 mmol/l and the post prandial blood sugar equals 11 mmol/l or greater. GDM adversely affects pregnancy outcome and is a risk factor for subsequent pregnancies. Its significance lies in the fact that it is associated with increased fetal morbidity and mortality due to premature labour, macrosomia, intrauterine and neonatal death.

Maternal weight, parity and family history of diabetes all predispose to impaired glucose tolerance. Proper screening, diagnosis and management of GDM can reduce both maternal and neonatal morbidity. In unrecognized and hence untreated pregnancies, perinatal morbidity and mortality is increased twenty fold[5,6]. Screening and definitive testing for GDM should be undertaken to identify pregnancies at risk for macrosomia, birth trauma and neonatal hypoglycemia with the view that treatment will reduce this risk[4, 9].

Large scale screening for GDM can be carried out either by timed random blood glucose estimations or glucose challenge test. Time random glucose estimations are relatively cheap and fairly specific but lack sensitivity and cannot be repeated throughout pregnancy. In comparison GCT with the same cost needs to be done only twice during pregnancy and that too in the high-risk population. It has a sensitivity of 80% and specificity of 90%[7,10]

In our group of 1,000 women, 3% (6/198) of those who had risk factors developed diabetes during pregnancy as compared to only 0.5% (4/802) of women in the group, which did not have risk factors. This shows that screening in high risk population should be considered mandatory at least twice during pregnancy in order to pick up patients with GDM at the earliest. The ideal would be to screen the whole pregnant population at least once between 24- 28 weeks of pregnancy

Screening with GCT at an earlier gestation (24-28 weeks) due to its high negative predictive value (83%) will screen out most of the patients (80.2%). Amongst the screen positive at this gestation, 80% of the frank gestational diabetics will be diagnosed at this stage (8 women in this study). Secondly, the screen positive women without risk factors comprise only 6.7% of all women without risk factors. Finally the repeat screening to diagnose the remaining 20% (2/10) was required at 32 weeks gestation due to its relatively low positive predictive value (48%) at 28 weeks.

In our setup where women may not present for antenatal check up or may not afford blood sugar testing, it should be considered mandatory to have screening test in

the form of GCT for at least those who have positive risk factors[8].

A study carried out for prevalence of GDM, pregnant women registered in Agha Khan Maternity Home, Karimabad-unit, Karachi were studied from 1999 to 2002, showed a prevalence of 3.45%. Comparatively it was 3% in high-risk population of the current study. In our study family history of diabetes mellitus was found in almost 62% pregnant women and in the Agha Khan study it was almost 50%[11].

As GDM is associated with increased risk of fetal macrosomia, birth trauma, neonatal hypoglycemia and perinatal mortality[12]. No properly controlled trial has examined the benefit of universal or selective screening compared to routine care without screening. In two retrospective analyses, no significant difference in macrosomia or birth trauma was found in women screened for GDM compared to unscreened population[13]. Because women screened for GDM are more likely to be high risk, such studies cannot reliably exclude benefit of screening[13]. The clearest benefit of screening is the potential for treatment to reduce the incidence of fetal macrosomia in women with GDM. The American College of Physicians[14], American Diabetes Association[15] and the Third International Workshop on Gestational Diabetes recommend universal screening. The American College of Obstetricians and Gynaecologists does not recommend universal screening but selective screening in high prevalence populations and with special risk factors[16 17].

Conclusion

In this study pregnant women with positive risk factors for diabetes mellitus were found to have a six times greater chance of developing gestational diabetes as compared to those with no risk factors. Screening, therefore, is recommended for all women with positive risk factors.

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