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GESTATIONAL DIABETES IN A DEVELOPING COUNTRY, EXPERIENCE OF SCREENING AT THE AGA KHAN UNIVERSITY MEDICAL CENTRE, KARACHI

Pages with reference to book, From 31 To 33

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ABSTRACT

In order to determine the prevalence of glucose intolerance in pregnancy, 1267 consecutive women attending the antenatal clinic of the Aga khan University Medical Centre were subjected to a 75g glucose challenge followed 2hr later by plasma glucose determination irrespective of gestation on the first antenatal visit. The test was repeated at 28-32 weeks of gestation if the patients had an abnormal initial screen at < 28 weeks gestation and a normal glucose tolerance test on diagnostic follow-up and for those who had a risk factor for gestational diabetes and a normal initial screen at < 28 weeks gestation. The glucose challenge test was abnormal (2hr plasma glucose> 1 40mg%) in 8.6% of the screened population. Follow-up oral glucose tolerance test on these patients revealed a prevalence of 3.2% of gestationat diabetes and 1.9% of impaired glucose tolerance test based on the modified O'Sullivan criteria. Improvement in cost effectiveness of screening programmes was adjudged possible by avoiding glucose tolerance tests in patients with 2hr plasma glucose value of > 170mg% after a 75g oral glucose challenge for screening (JPMA 41:31, 1991).

INTRODUCTION

Gestational diabetes has been identified as a distinct entity deserving increased recognition, treatment and research. [1,2]Its prevalence varies from 0.15% in New Castle(UK) to 1.8% in Nairobi and 1.9% in Riyadh to 2.5 -7.5% in Boston[3,4]. The differences observed maybe due to variations in the weight of the glucose load used for the glucose tolerance test and in the criteria used for assessing abnormality. In Pakistan where the prevalence of gestational diabetes in largely undetermined, there is good reason to believe that it maybe high. As diabetes has a genetic basis at least asstrongas the environmental one, frequent intermarriages as well as poor dietary habits may contribute to this presumed high prevalence. While controversy prevails over screening strategies and diagnostic criteria, [3,5,6] we report our experience with an ongoing programme of screening for diabetes in all women attending the antenatal clinics during one year (1988-89).

SUBJECTS AND METHODS

The study population included the first 1267 pregnant women registering at the Aga Khan University Medical Centre Karachi, from July 1988 to June 1989. Women known not to be diabetic before the onset of pregnancy were screened for abnormal carbohydrate metabolism. On the first visit to the antenatal clinic a 75g glucose challenge test (GCT) was scheduled irrespective of gestational age. This was part of the patients routine prenatal care. Fasting was not required although most women came fasting on the day of the screen. A dose of 75g glucose was dissolved in about 300ml of fluid and administered orally Over a 5 minute period. A single venous blood sample was obtained 2hr later for plasma glucose determination. The results were available for review at the next antenatal visit. Any subject with a plasma value of > 140g% underwent a formal glucose tolerance test (GTT). The subjects

consumed an unrestricted carbohydrate diet for at least 3 days prior to the GTT and came fasting for 10-12hrs on the morning of the test. After an initial venous blood sample was drawn, a 75g oral glucose load was given as for the GCT. Further venous blood samples were obtained at 1,2 and 3hrs after the glucose load for determination of plasma glucose. The plasma glucose was determined in all the blood samples by the hexokinase method using as autoanalyser. The diagnosis of abnormality of glucose tolerance was based on the Modified O'Sullivan criteria.7 Plasma glucose values of > 105mg%, > 186mg%, > 140mg% and 122mg% for the fasting, 1hr, 2hr and 3hr samples respectively were considered abnormal. To make a diagnosis of gestational diabetes mellitus (GDM) at least 2 abnormal values were required, whereas a single abnormal value was sufficient to make the diagnosis of impaired glucose tolerance test (IGTT). GCT was repeated at 28-32 weeks on women who were screened before 28 weeks of gestation, the GCT if the initial GCT was abnormal followed by a normal GTT and for those who had an initial normal GCT but presented with features of potential diabetes i.e. close family history of diabetes, previously delivered macrosomic baby, past history of unexplained stillbirth/neonatal death. A repeat GTT was carried out if the plasma glucose level was > 14Omg% on the repeat GCT The two sample t test was used for comparison of differences between means.

RESULTS

Of 1267 consecutive women screened 109(8.6%) had an abnormal GCT (Table-1).

TABLE-1. Prevalence of abnormal screening values (140mg%).

	No	%
Total # of patients screened	1267	100
Total # of patients with abnormal GCT	109	8.6
At initial booking		
< 28 wks.	60	4.7
> 28 wks.	26	2.1
Rescreened at 28-32 wks.	23	1.8

Of these 109 subjects 60 were detected at the initial screen before 28 weeks and 26 after 28 weeks gestation, while 23 women had an abnormal GCT when the screen was repeated according to the criteria outlined in methods. The mean age of all women screened was 27.8 (SD6.1) yrs, and of women with abnormal GCT 28.8 (SD 4.3) yrs. There were 31 (28.4%) and 601 (51.9%) primiparous women among those with an abnormal and normal GCT respectively. The difference for ages was statistically insignificant ($P > 0.05$) and that for parity was significant ($P < 0.05$). Of the 109 women with an abnormal GCT, 102 underwent a GIT as 7 subjects were excluded (3 did not return, 2 had late abortions and 2 could not complete the test due to vomiting). GTF's were normal in 38 and abnormal in 64 women (Table II).

TABLE-H. Analysis of 102 patients with a glucose tolerance test (GTT).

	No(%)	Prevalence
No abnormality on GTT	38(37.2)	
Abnormal GTT	64(62.8)	5.1%
Impaired glucose tolerance (1 abnormal critical value)	23(22.5)	1.9%
Gestational diabetes mellitus (1 abnormal critical value)	41(40.3)	3.2%

Prevalence of abnormal GTT in Total population screened (267)

Based on the abnormal GT1 GDM was diagnosed in 41 and IGTT in 23 giving a prevalence of 3.2% and L9% respectively. The mean plasma glucose value of the GCT of 38 subjects with a normal GTT was significantly different (P <0.001) from the mean plasma glucose value in GCT of 41 women found to have GDM (Table-III).

TABLE-III Gct values according to glucose tolerance status in 102 women with abnormal gct.

Glucose Tolerance Status	2 Hr Plasma Glucose in GCT	
	Mean (mg%)	S.D.
1. Normal glucose tolerance	149.3	10.5
2. Impaired glucose tolerance (IGTT)	163.9	14.5
3. Gestational diabetes mellitus (GDM)	190.5	61.4

The differences analysed using the student's t test

1 vs 2 P > 0.05 2 vs 3 P < 0.05 1 vs 3 P < 0.001

DISCUSSION

The frequency of recognition of gestational diabetes is directly related to the intensity of screening programmes. Poor pick up rates from screening only selected patients based on risk evaluation[10,11] has generated recommendations of screening all pregnant women[1,2]. In our hospital such a screening programme was instituted in July1988 and acceptance of the pregnant women has been good. Except for 2 patients who had vomiting, no other patients complained about the taste or volume of glucose solution, nor did they mind the 2hr waiting time for the blood sample to be drawn. For administering the GCT, a 75g glucose challenge was chosen in preference to a 50g challenge (recommended by O'Sullivan) as the better efficiency of the former has been shown by Markatz[8] and it has also been

recommended by WHO[1]. In view of increasing awareness that minor degrees of carbohydrate intolerance considered to be within normal range as judged by currently available criteria, can adversely affect pregnancy outcome, [16] stricter criteria for diagnosing abnormal glucose tolerance in pregnancy should be used. We selected the O'Sullivan's criteria[9] rather than the WHO criteria[1] because the latter are the same for both the pregnant and the non-pregnant state and hence do not take into account the physiological alterations of carbohydrate metabolism in pregnancy. The prevalence of abnormal GCT in our study was 8.6%. This compares to the 6.1% and 19.3% reported by Beard[12] and Al- Shawaf. [4] The majority of these patients were picked up on the first antenatal visit prior to 28 weeks gestation (Table 1) which supports the suggestion to screen in early pregnancy as opposed to postponing the screening till the 27th week of gestation as suggested by Peterson. [13] Early screening and pickup have the advantage of providing an opportunity to institute therapy in early pregnancy. In our series, the prevalence rates of GDM and IGTT are 3.2% and 1.9% respectively which are higher than those reported from the West. [3,4,12,14], is of interest to note that the prevalence of GDM in our study (3.2%) is higher than the 1.9% prevalence reported from Riyadh[4] where the diagnosis was based on O'Sullivan's criteria like in our study as well as on WHO criteria. We found that IGTT (1.9%) was diagnosed in a significantly lower proportion of our women than 8.4% reported by Al-Shawat[1] who used WHO criteria. This could be that due to the use of WHO criteria which tends to diagnose more patients with IGTT than with GDM. This is due to the relatively high critical fasting value of 140mg% which does not take into account the fasting hypoglycemia of normal pregnancy. The risk of having GDM in patients with an abnormal screening GCT (positive predictive value' of GCT) in our study was 41.8% which is much higher than the 9.8% obtained from screening at Riyadh. [4] The reason for this difference is not clear, but it could be due to geographical, ethnic and racial variations in the pattern of carbohydrate intolerance. [3] The mean glucose value in the GC'F of women with normal GTT and in those with GDM are significantly different (Table Ill). Based on this observation we would propose that women who are found to have a 2hr plasma glucose level on GCT of <170mg% (which is the mean + 2SD. of the plasma glucose level of the subjects with normal GTF) could be used as a cut-off point above which a diagnosis of abnormal glucose tolerance could be made without the need for a GIT In our series there were 18 patients with GDM/IGTT who had a GCT of > 170mg%. However there was one patient who had a GC'F of > 170mg% but was found to have a normal GTT Such an approach will increase the cost-effectiveness of screening programmes which is very important for developing countries where resources are limited.

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