Gestational Diabetes Mellitus Screening in a Developing Country

Pages with reference to book, From 249 To 252

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Abstract

All gravid women attending the antenatal clinic of the department of Gynaecology Unit-II, Civil Hospital Karachi and un booked cases presenting in labour from October, 1986 to December, 1993, were included in the study.-On the basis of risk factors for diabetes mellitus (DM), they were divided into 3 groups. Women in Group-I had family history of DM, bad obstetric history, congenitally malformed babies, polyhydramnios, obesity and macrosomia. Group-II included women with pregnancy induced hypertension (PIH) abruptio placentae, age >30 years and multiple pregnancy. Group-Ill comprised of the pregnant women with no risk factors for DM. Screening of 4497 subjects from the antenatal clinic was performed and DM was diagnosed in 211(12%) in Group-I, 11(3%) in Group-lI and 13(0.6%) in Group III. Chi-square analysis demonstrated that frequency of DM was significantly higher (P<0.001) in Group I and Group II as compared to Group III. Non- booked admissions numbered 7600, of these, DM was detected in 166(20%) belonging to Groups-I and II, whereas, 38 (0.6%) were from Group-Ill. Screening was done by the O'Sullivan criteria. It was concluded that all pregnant women should be screened for DM. However, if financial constraints prevail, then women with high risk factors only should be subjected to screening (JPMA 4&249, 1996).

Introduction

Gestation diabetes mellitus (GDM) is defined as carbohydrate intolerance with onset or recognition during pregnancy[1]. It is important to identify a pregnant woman with 0DM because (3DM is common and is associated with significant metabolic alterations, increased perinatal and maternal morbidity and exaggerated long term morbidity among the mothers and their offspring.

Perinantal mortality significantly increases in gestational diabetic pregnancies if the metabolic abnormality is not recognized or treated properly[2]. In addition to an increased risk of intrauterine for et al death, commonly reported perinatal morbidity associated with 0DM includes an increased incidence of macrosomia, birth trauma, neonatal hypoglycaemia, hyperbilirubinemia, hypocalcemia and polycythcmia[3]. Foetal congenital malformations will occur if there is maternal hyperglycaemia in early pregnancy. Short-term maternal morbidity includes an increased incidence of chronic hypertension, polyhydramnios and cesarean section[4].

The purpose of this study was to review the feasibility of screening all pregnant women for DM in hospitals where large number of patients with poor socioeconomic status, attend the antenatal clinics and to identify a screening protocol that will ensure better patient compliance and is cost-effective.

Patients and Methods

All gravid women attending the antenatal clinic of the Department of Gynaecology Unit-Il, Civil Hospital, Karachi were divided into 3 groups, according to the presence of risk factors for diabetes

meilitus.
GroupI: Family history of DM, bad obstetric history (stillbirths, neonatal deaths and abortions), baby with congenital malformation in past or present pregnancy, polyhydramnios, obesity and large baby (>3.5 Kg).
Group II: Pregnancy induced hypertension (past or present), history of abruptio placentae, age >30 years and multiple pregnancy.
Grouplil: No risk factors for DM.
From October 1986 to July 1991, women of Gmup I, from August, .199 1 to July, 1992, women of GroupI and II and from August, 1992 to December, 1993, all women attending the antenatal clinic were screened for DM. Antenatal screening protocol showed that women with risk factors of Group I and II had an oral-glucose-challenge-test (OGCT) without regardto time ofthc lastmeal ortime of the day. 50 gof glucose dissolved in 200 ml of water was consumed within a period of 5 minutes and blood sugar estimated after 1 hour by a reflcctometer (capillary blood). Blood glucose level of 140 mg'dl was taken as the cut-off level.
If the OGCT was negative, this test was repeated at 24, 28, 32 and 36 weeks of pregnancy. OGCT positive women were subjected to an Oral Glucose Tolerance Test (OGIT) according to the O'Sullivan's criteria for confirmation of DM5. After an over- night fast of 10-16 hours, venous plasma glucose concentrations were estimated in fasting, 1-hour, 2-hours and 3-hours samples after giving lOOg of glucose in
250 ml of water orally.
If two or more readings equalled or exceeded the following levels, DM was confirmed:
fasting 105 mg/dl;
1-hour 190 mg/dl;
2-hours 165 mg/dl;
3-hours 145 mg/dl.
Women with positive OGCT, but negative OGTT were subjected to repeat OGTT at 24,28,32 and 36 weeks of pregnancy. Women with no risk factors had urine tested for sugar and if positive, they entered into the screening protocol for risk factors. if urine test was negative for sugar, it was repeated at 24,28,3 2 and 36 weeks of pregnancy.
The unbooked emergency cases were also screened. If a woman delivered with high risk factors of group land II or had a random blood sugar level? 140 mgldlon admission, a 2 hour OGYF with 75 g glucose, was performed according to the WHO criteria6, 48-hours after delivery. After over-night fast of 10-16 hours, 2 hour blood sugar level (venous plasma) was taken after giving 75g of glucose load in 250 ml of water. If blood sugar level equalled or exceeded 200 mg/dl, DM was confirmed. Blood sugar levels between 140 mg/dl to 199 mg/dl were taken as impaired glucose tolerance (IGT).

Results

During the period of Oct. 1986 to Dec. 1993, 12877 women attended the antenatal clinic (Table I).

Table I. Number of high risk patients in antenatal screening.

Study period	No. of patients attending A/N Clinic	Patients with Group I risk factors	Patients with Group II risk factors	Patients with no risk factors Group III
Oct., 86 to July 91	8,123	1,347	-	-
Aug. 91 to July,92	2,023	230	189	-
Aug. 92 to Dec. 93	2,731	215	191	2,325
Total	12,877	1,792	380	2,325

Of these,1792 of group I, 380 of group II and 2325 of group III were screened for DM. In patients belonging to group 1, DM was detected in 12% as compared to 3% in group II and 0.6% in group Ill (Table II).

Table II. Results of antenatal screening October, 1986 to December 1993.

Group	No of patients	DM detected	%
Group I	1,792	211*	12
group II	380	11**	3
Group III	2,325	13	0.6
Total	4,497	235	5

Compared with Group III Chi-square analysis and Odds ratio demonstrated:
*P<0.001 H.S and Odds ratio=23.74
**P<0.001 H.S and Odds ratio=5.30

Of the 235 women with DM (booked cases), 84 had manifest DM in the 2nd half of pregnancy and reverted to normal blood sugar levels 48 hours after the delivery, indicating that these women had pregnancy induced diabetes rnellitus (Table IV).

Table III. Results of screening of emergency cases in labour room and after delivery.

Study period	Total No. of non-booked patients delivered	No. of patients with risk factors of Group I & II	DM detected	%
Oct.86, to Dec.93	7,600	831	166	20
		No. of patients with no risk factors		
		6,769	38	0.6

Table IV. Pregnancy induced DM-antenatal screening 84 out of 235 diabetics.

	Detection of DM at weeks of gestation.	
Weeks of gestation	Number	%
24	10	12
28	40	48
32	24	28
36	10	12
Total	84	

Repeat screening of these subjects at 24, 28, 32 and 36 weeks of gestation resulted in detection of DM in 10(12%), 40 (48%), 24(28%) and 10 (12%) women respectively. The significance of single or multiple risk factors are shown in Table V and VI respectively.

Table V. Significance of high risk factors in patients with DM.

High risk factors	No. of patients screened	Screen +ve (DM) patients	% of DM from high risk
Single factors			
Bad obstetrical history	1,758	219	12
Big baby wt. ≥3.5 Kg	588	101	17
Pregnancy induced hypertension	129	5	4
Family history of DM	210	16	8
Previous history of GDM	53	10	19
Twins	28	1	4
Congenital anomalies	48	11	22

Table VI. Significance of high risk factors in patients with DM.

High risk factors	No of patients screened	Screen +ve (DM) patients	% of DM from high risk
Multiple factors			
Polyhydramnios + Congenital anomalies	29	17	59
Bad obstetrical history +family history of DM	22	4	18
Bad obstetrical history +congenital anomalies	22	5	23
Bad obstetrical history +Pregnancy induced hypertension	19	1	5
Bad obstetrical history +Premature labour	24	2	8
Previous history of GDM +bad obstetrical history	19	1	5
Pregnancy induced hypertension+big baby	7	1	14
Previous big baby+bad obstetrical history+ family history of DM.	31	7	22

In single risk factors, bad obstetric history, large babies, previous history of DM and congenital anomalies were the main parameters for development of DM. In multiple risk factors, DM was discovered in 59% women with polyhydrarnnios and congenital anomalies and 23% with bad obstelric history and congenital anomalies.

Discussion

Screening and appropriate care of women with diabetes manifested during pregnancy is of prime importance. At present the practical difficulty of the lack of uniform diagnostic criteria and screening methods are the factors which hinder the genuine decrease in the maternal and fetal risks originating

from gestational diabetes[7]. The currently used screening methods and diagnostic criteria differ from one location to another. The approach recommended by the National Diabetes Data Group (NDDG) and three Workshops on Gestational Diabetes, is based on values derived from a population of pregnant women[8,9] using a 50 g pre- screening challenge test and a 100 g oral glucose load evaluated according to the O'Sullivan criteria. WHO recommends the same method (75g OGTF) and criteria recommended for use in non- pregnant adults[6,10-12]. A recent publication from the USA[13], has compared the WHO and the NDDG procedures. According to these authors, the NDDG criteria have a number of drawbacks; the need for two tests, blood samples at four time-points, a test duration of 3-hours, a high glucose load often un-palatable to pregnant women and no comparability with the 75g test in the follow-up. They found both the sensitivity and the specfficient of the WHO one-step test better in comparison with the currently used US-NT)DG procedure and criteria. In our study, screening methods and diagnostic criteria used were those recommended by the NDDG, i.e., 3 hour OGTT (O'Sullivan Criteria), performed only on OGCT positive subjects. A 2-hourOGIT (WHO criteria) required all subjects to return on following antenatal day with overnight fasting, this could lead to poor patient compliance. However, with patient education this may be possible.

In our study, the prevalence of DM was very high in Group-I (12%). We therefore recommend, that pregnant women belonging to this group must be screened, if it is not financially feasible to screen all pregnant women for DM. On the basis of presence of DM in subjects with various risk factors, a revised list of risk factors for DM is suggested; bad obstetrical history, big baby Wt. >3.5 Kg, previous history of GDM, congenital anomalies and presence of polyhvdramnios. In this study a large number of un booked subjects were also admitted in emergency and delivered. Those patients belonging to high risk groups, had high prevalence of DM. We recommend screening of these women for DM, 48 hours after delivery so as to counsel them for future pregnancies. According to the guideline on pregnancy outcome of the WHO/IDF working group on the Care and Management of Diabetic Pregnancy, every pregnant woman should be screened for gestational diabetes mellitus (GDM) between 24th and 28th gestational weeks[10]. A recent WHO recommendation claims that, depending on local health priorities, resources and facilities, serious consideration should be given to screening all pregnant women for glucose intolerance at the beginning of the third trimester of pregnancy[12]. Our screening protocol consists of first screening at the first antenatal visit, preferably first trimester and subsequent screening at 24, 28, 32 and 36 weeks of gestation. This done because we felt that by doing so more diabetics will be discovered specially those belonging to high risk groups. Though in 60% eases, DM oceurmd between 24-28 weeks gestation, in 28% at 32 weeks and in 12% at 36 weeks. If repeated screening was not done at 32 and 36 weeks, over 40% cases of DM would have been missed.

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