Single-Step First Trimester Screening “Sooner the Better”

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About the Author

Abha Singh has completed M.S., FICS (Indian Section) and is working as a Director, Professor, and Head of the Department of Obstetrics and Gynecology, Pt.J.N.M. Medical College, Raipur. At present, she is also the President of Raipur Obstetrics and Gynecology Society with a keen interest in academics.

Abstract

Purpose To evaluate the role of single-step universal screening in first trimester and its effectiveness.

Materials and methods Three thousand women attending antenatal clinic of Pt JNM Medical College, Raipur, were

screened with 75 gm OGTT in their first trimester irrespective of their last meal, and those who were screened negative were again subjected to OGTT at 24–28 weeks. The women were followed throughout pregnancy till delivery. Any maternal or perinatal complications were noted.

Result Overall incidence of GDM was 5.2 %. About 61.54 % women screened positive in first trimester. At 24–28 weeks, 38.46 % women were diagnosed with GDM. Women diagnosed in first trimester showed significantly low incidence of cesarean section rate (20.83 %), PIH (2.08 %), and macrosomia (14.44 %), in comparison to women diagnosed later in pregnancy.

Conclusion The role of first trimester screening was found effective in reducing adverse maternal and perinatal outcomes in GDM.

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Fig. 1 Association of risk factor with time of screening

Introduction

Gestational diabetes mellitus (GDM) refers to any degree of glucose intolerance first diagnosed during pregnancy. GDM is the most common medical disorder complicating pregnancy. As a result of global trend of increased maternal obesity, it is estimated that 15 % of all pregnant women develop GDM [1]. If GDM is left undiagnosed and untreated, then it may lead to a considerable fourfold increase in perinatal as well as maternal morbidity and mortality [2].

India is a country with exponential diabetic burden and is considered “The Diabetic Capital of world” with the second largest diabetic population of 63 million, including GDM. Not surprisingly, the prevalence of GDM is also alarmingly high as Indian women are eleven times more likely to develop GDM compared to Caucasian women [3]. Thus, there is a need to direct special attention to pregnant women with GDM. Universal screening of GDM is an important step to recognize and treat GDM. Primary prevention in fetus is likely to reverse or halt the vicious cycle. Intrauterine exposure to hyperglycemia affects the fetal pancreas and predisposes for developing glucose intolerance later in life [4].

Aims and Objective

To determine the role of universal screening in first trimester and its effectiveness.

Methods

Our study was a prospective observational study. 3000 antenatal women irrespective of risk factors for GDM were screened with 75 gm oral glucose in first trimester (group A). They were given 75 gm oral glucose load without regard to the time of last meal, after 2 h venous blood sample was taken. A blood glucose level of 140 mg/dl was taken as cut-off value. If OGTT was negative in first trimester, then it was repeated at 24–28 weeks (group B). The women in both groups were followed till delivery.

Pre-diagnosed diabetic women and women lost to follow up were excluded from the study.

Chi-square test was used to test the difference between two groups. All statistical analysis was performed using SPSS version 20 software.

Results

The overall incidence of GDM in both groups was 5.2 %. It was found 4 times higher in urban than rural population.

The highest prevalence was in 25–29 years age group. Out of 156 OGTT positive women, 61.54 % were diagnosed in first trimester, whereas the rest of them were diagnosed later at 24–28 weeks.

Group A women (65.63 %) were found to have association with high risk factors (Fig. 1). Women with BMI > 25 (55.13 %) had association with GDM (Fig. 2). These women also had more maternal and fetal complications.

Over 60 % of women diagnosed at first trimester were started with early treatment and were able to achieve euglycemia with Medical Nutritional Therapy alone, as compared to only 7.58 % women who were treated with MNT when diagnosed at 24–28 weeks that is highly significant.

Group A women had less incidence of complications in comparison to group B (Table 1). Only 40 % of women in group A were on insulin.

Higher rate of Cesarean section of 68.33 % was seen in group B, whereas it was only 20.83 % in group A. Also adverse perinatal outcome was seen in 75 % of women in group B as compared to 23.96 % of women in group A (Table 2).

Discussion

Out of 3000 women who participated in the study, 156 were diagnosed to have GDM that is in accordance to the study conducted in Haryana [5]. Another Indian ICMR-INDIab study stated that the prevalence of GDM corresponds to the prevalence of impaired glucose tolerance (IGT) within a given population. It estimated the prevalence of IGT to be between 8.3–14.6 % varying according

Fig. 2 Association of BMI with GDM **Table 1** Associated antepartum and intrapartum complications

Associated complications	Screening at first trimester (group A) (n = 96)	%	Screening at 24–28 weeks (group B) (n = 60)	%	P value
Congenital anomaly	02	2.08	06	10	0.014629
Pregnancy induced hypertension	02	2.08	10	16.67	0.000442
Preterm delivery	18	18.75	18	30	0.052402
IUGR	04	4.16	08	13.33	0.018309
None	70	72.91	18	30	<0.00001

to the state [6]. In our study, the incidence of GDM was 5.2 %.

61.54 % women were screened positive in first trimester, with the mean gestation being 10 weeks. However, 38.46 % women were diagnosed at 24–28 weeks with the mean gestation of 26 weeks.

A study conducted in the UK showed that the first trimester screening was positive for 24.2 % of total GDM women and it would have diagnosed more than 58.6 % cases in first trimester with the positive GCT cut-off value of 130 mg/dl at 6–14 weeks [7].

We have subjected all recruited women to a system of universal screening in first trimester, whereas all the recent guidelines, i.e., Consensus Evidence-based guidelines for management of GDM In India [8], International Association of Diabetes and Pregnancy Study Groups Recommendations [9], WHO Guidelines [10], and NICE Guidelines [11], advocate universal screening at 24–28 weeks and early screening only in high-risk cases. In our analysis, we found that high-risk association was present in 65.63 % women, but 34.37 % women had absolutely no risk factors and they could have been missed out without universal screening. Huynh et al. also reported

that using International Association Diabetes Pregnancy Study Group criteria, 19 % women were diagnosed to have GDM and it would miss 17 % cases [11] if only high-risk women were screened.

High association of GDM in both groups was observed with BMI > 25(55.13), age > 25 years, history of GDM, or family history of type 2 diabetes. Many other studies [3, 7, 12–14] supported similar finding. In fact, one of the studies gave strong recommendation that algorithms derived from multiple regression analysis of maternal characteristics and obstetric history can potentially identify about 60 % pregnancy that will develop GDM [13].

Only 38.54 % in group A were on insulin, the rest required only MNT. In group B, a considerable high percentage (91.64 %) of women needed intensive insulin therapy to achieve targeted blood sugar level. In contrast, in a study done in the UK, insulin therapy was given to 44.4 % cases of GDM diagnosed at first trimester, whereas 14.9 % women diagnosed at second trimester received insulin therapy [7].

There was a significant relation between time of diagnosis of GDM and adverse maternal outcome. In group B, significantly more women had developed complications (70 %) as compared to women of group A who were

Table 2 Delivery outcome

Maternal	First trimester Group A (<i>n</i> = 96)	%	24–28 weeks Group B (<i>n</i> = 60)	%	<i>P</i> value
Cesarean delivery	20	20.83	41	68.33	<0.00001
Vaginal delivery	76	79.17	19	31.67	<0.00001
Assisted vaginal delivery	00	00	01	01.52	
Perinatal	23	23.96	45	75	
Birth wt > 3.5 kg	13	14.44	20	30.3	0.00162
Apgar < 7	02	02.22	04	06.06	0.073809
Hypoglycemia	01	01.11	05	07.57	0.010611
Hypoglycaemia	03	03.33	03	04.54	0.348675
Intrauterine death	03	03.33	08	12.12	0.007696
Early neonatal death	01	01.11	05	07.57	0.010611

diagnosed early and had early initiation of treatment (23.96 %). Landon et al. also reported graded increase in adverse maternal outcome with GDM associated with increasing levels of maternal glycemia [15].

Another study conducted by O'Sullivan et al. observed significant association between GDM and 50, 250, and 30 times increased incidence of preeclampsia, polyhydramnios, and cesarean section rates, respectively [16].

Incidences of PIH were 2.08 % in group A and 16.67 % in group B. It was confirmed by Landon et al. [15] in a study which stated that development of PIH was related to glycemic control. Similar conclusion was given in a Brazilian study which simulated and observed reduction in incidence of pre eclampsia by screening of GDM though of modest degree [17].

The most significant observation of our study was that in first trimester screening and intervention group, 72.91 % women have developed no complication compared to only 30 % women of second group who were diagnosed and treated at 24–28 weeks of gestational age.

The cesarean section rate was only 20.83 % in group A in contrast to 68.33 % in group B. The main indication for cesarean section in both groups was macrosomia. The incidence of macrosomia was 14.44 % in group A, whereas it was 30.3 % in group B. The reason for this was explained by a research study which used a carbohydrate model and observed that macrosomia develops in the presence of transient hyperglycemia, and in spite of good glycemic control in second trimester, it persists thus proving that good glycemic control in first trimester is mandatory to prevent macrosomia [4].

Overall incidence of perinatal complication was significantly high (75 %) when screening and treatment were done at 24–28 weeks, while it was only 23.96 % when interventions were started at first trimester. Landon et al. confirmed the fact that perinatal outcome was directly related to the glycemic control achieved during the antenatal period [15].

Conclusion

As per standard guidelines, universal screening for GDM is recommended in the beginning of third trimester by a single-step screening, thus leaving only a narrow window of time span for implementing therapeutical interventions to improve the outcome more so the effects of hyperglycemia already have taken place. Our results show that universal screening during first trimester could diagnose GDM in 3.2 % women. In group B, when the test was repeated at 24–28 weeks, 2 % of patients were diagnosed with GDM. The women in group A had a chance of early diagnosis, early initiation of treatment, and, thus, the complications like PIH and macrosomia were significantly reduced. Therefore, only a small number of women were on insulin therapy. HAPO has already shown the importance of early glycemic control by screening in first trimester.

A standardized screening system in diagnosing GDM is required especially in India with the purpose of reducing the adverse maternal and fetal outcome.

Compliance with Ethical Standards

Conflict of interest Abha Singh and Avinashi declare they have no conflict of interest.

Ethical Approval As this was prospective observational study, not an interventional or case–control study, informed consent with human subjects for being included in the study was not necessary; however, all procedures followed were in accordance with ethical standard of the responsible committee on human experiments (institutional and international) and with the Helsinki Declaration of 1975, as revised in 2008(5).

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