International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391

Study of Fasting Plasma Glucose (FPG) for Prediction of Feto-maternal outcome in Pregnant Women between 24 to 32 wks Gestation

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Abstract: ***Background: The longitudinal changes in carbohydrate metabolism during gestation are integral for successful pregnancy outcome for both mother and fetus. Fasting blood glucose between 24 to 36 weeks gestation have been found to be a good screening test for GDM in many studies and helpful in prediction of feto- maternal outcome. Methods: The present study deals with 500 consenting pregnant women with gestational age between 24 to 32 weeks enrolled in the Antenatal outpatient department (OPD) of Obstetrics and Gynaecology, New Civil Hospital, Surat from 1st Nov, 2011 to 30th Sept, 2013 studied prospectively. After a detailed history taking and examination, consent was obtained and Fasting samples were collected the next morning. Results: Fasting plasma glucose is a good screening test with sensitivity 77.94% for detection of GDM. There is a linear relationship between rising FPG and adverse feto-maternal outcome. Conclusions: Fasting plasma glucose test is feasible at health centre; we can screen pregnant women for abnormal values. If they are abnormal, we can refer them to tertiary health care centre for further investigation and management. So, fasting plasma glucose test as a simple screening test, many advantages by reducing maternal morbidity as well as perinatal morbidity and mortality due to GDM from a group of people who are far from tertiary health care.***

Keywords: fasting plasma glucose, pregnancy, GDM,GTT, outcome

1. Introduction

The longitudinal changes in carbohydrate metabolism during gestation are integral for successful pregnancy outcome for both mother and fetus[1].

Many screening methods have been tested for early diagnosis of GDM in an attempt to reduce fetal and maternal morbidity and mortality. Fasting blood glucose between 24 to 36 weeks gestation have been found to be a good screening test for GDM in many studies[2] and helpful in prediction of feto maternal outcome.

This study of Fasting Blood Glucose was done in an attempt to improve the maternal and neonatal outcome.

Fasting plasma glucose test

The simplified oral glucose tolerance test with 50 gm. is normally recommended for the screening of gestational diabetes mellitus. However because of the complexity of the test, less expensive and easier methods to perform the screening have been extensively studied. Recently a population based extensive study conducted on the general population of pregnant women in Brazil showed that fasting plasma sugar is good screening method for GDM[3].

Fasting plasma glucose, measured using the glucose oxidase method with cut off value of 90 mg/dl for both diabetes mellitus as well as impaired glucose tolerance, maximized sensitivity without undue loss of specificity[4].

Fasting plasma glucose could serve as both a screening and a diagnostic tool, a strategy that could potentially improve early diagnosis at a lower cost.

A fasting plasma glucose as a screening test offers many advantages. It is easy to administer, well tolerated, inexpensive, reliable and reproducible.

2. Methods

The present study deals with 500 consenting pregnant women enrolled in the Antenatal outpatient department (OPD) of Obstetrics and Gynaecology, New Civil Hospital, Surat from 1st Nov, 2011 to 30th Sept, 2013 studied prospectively.

The subjects with gestational age between 24 to 32 weeks were randomly selected when they came for their routine antenatal check up in the Antenatal OPD of Obstetrics and Gynaecology Department of New Civil Hospital, Surat.

After a detailed history taking (obstetric, menstrual, medication, personal and family) and examination (general with vitals, systemic and obstetric), consent was obtained and Fasting samples were collected the next morning after an overnight fast of 8 hours. All samples were tested using Glucose Oxidase-Peroxidase (**GOD-POD**) method in the laboratory of Biochemistry Department of New Civil Hospital, Surat.
Subjects with fasting plasma glucose level ≥ 105 mg% and were subjected to a 100 gm 3hr oral glucose tolerance test (OGTT) as per usual protocol. Subjects with GDM underwent a detailed obstetric evaluation were closely followed-up during the antenatal period and further obstetric management was done according to the institutional protocols.

We categorized our subjects into “Low risk” and “high risk group”. The enrolled subjects were considered “high risk” if one or more of the following were present:

- Age ≥ 30 years
- Diastolic Blood Pressure >90 mm Hg at booking
- Body Mass Index >30
- Diabetes in first degree relatives
- Past history of diabetes in previous pregnancy
- Previous stillbirth, repeated abortion, intrauterine fetal death
- Current glycosuria, recurrent urinary tract infection
- Past history of pre-eclampsia

3. Results

Table 1: Baseline Characteristics

Risk status at Enrollment (n=500)	
High risk	80 (16%)
Low risk	420 (84%)s

Table 2: Distribution of subjects according to fasting blood glucose level

Fasting Plasma Glucose(n=500)	
Normal :	
< 70 mg/dl	94 (18.8%)
71-75 mg/dl	134 (26.8%)
76-80 mg/dl	120 (24%)
81-85 mg/dl	70 (14%)
86-90 mg/dl	19 (3.8%)
91-95 mg/dl	13 (2.6%)
96-100 mg/dl	17 (3.4%)
101-105 mg/dl	11 (2.2%)
Abnormal (≥105 mg/dl)	22 (4.4%)

Majority of enrolled subjects (18.8+26.8+24=69.6%) had FPG < 80 mg/dl while (14+3.8=17.8%) had FPG between 80-90 mg/dl, (2.6+3.4+2.2=8.2%) had FPG between 91 to 105 mg/dl and only 4.4% had FPG values of higher than 105 mg/dl.

Table 3: Correlation between OGTT and FPG

FPG	OGTT		Total
	Normal	Abnormal	
Normal	53	7	60
Abnormal	15	7	22
Total	68	14	82

- FPG cut-off of 105mg/dL identified 50% subjects with GDM and IGT and missed 50% of GDM and IGT suggesting a need to lower the FPG cut-off values.
- Also 53 of the 60 subjects (88.3%) with "normal" FPG had normal OGTT results.

Table 4: Statistical analysis of FPG

	FPG
Sensitivity	77.94%
Specificity	50%
Positive predictive value	88.33%
Negative predictive value	31.82%

Table 5: Abnormal feto-maternal outcome with FPG results

Feto-maternal outcome (n=418)	FPG results (n=418)	
	Normal	Abnormal
Normal (n=354)	348	6
Abnormal (n=64)	53	11

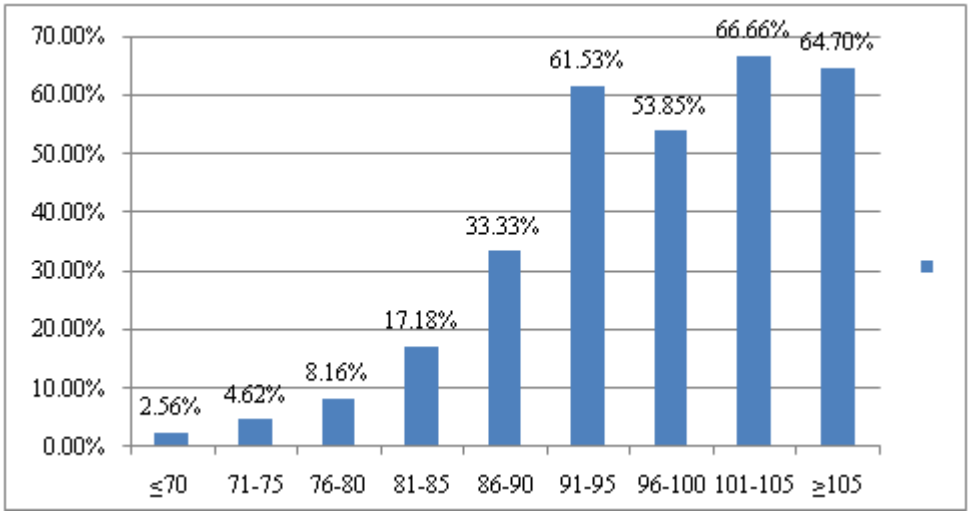
11 of the 64 subjects with abnormal feto-maternal outcomes (17.18%) had abnormal FPG results, while 53 of the 64 subjects with abnormal feto-maternal outcomes(82.8%) had normal FPG results.

Though we had taken a FPG of more than or equal to 105mg/dL as a cut off to screen for GDM or IGT – we analysed the various FPG results with adverse feto-maternal outcome as in Table 6.

Table 6: Correlation of FPG and adverse Feto-Maternal outcome

FPG(mg/dl)	No. of participants with adverse feto-maternal outcome	Adverse Feto-Maternal outcome						
	n(%)	Antenatal complications		Gest. Age at delivery	Congenital anomaly	NICU admission	Birth weight	
		Poly.	HTN	<37wks			<2 kg	>3.5 kg
≤70 (n=78)	2 (2.56%)	2						1
71-75(n=108)	5 (4.62%)	2	1			1		1
76-80(n=98)	8 (8.16%)	7	1					
81-85(n=64)	11(17.18%)	10		2		2	2	
86-90(n=18)	6(33.33%)	5			1	1		
91-95(n=13)	8(61.53%)	6		3	3	4	3	
96-100(n=13)	7(53.85%)	4	1	1			1	
101-105(n=9)	6(66.66%)	5		1		1	1	
≥105(n=17)	11(64.70%)	8		2		1	1	

A graphic representation of the increasing incidence of adverse feto-maternal outcome with increasing FPG is presented below:



Adverse feto-maternal outcome with FPG

This figure suggests the need to revise our cut-off values of FPG being used for GDM screening to probably 90mg/dL to optimize the feto-maternal outcome.

4. Discussion

In a country like ours, in rural areas, pregnant women usually came for their first antenatal visit at around 7th-8thmonth i.e. 24-32 weeks of gestation. Fasting plasma glucose test is feasible at health centre; we can screen pregnant women for abnormal values. If they are abnormal, we can refer them to tertiary health care centre for further investigation and management. So, fasting plasma glucose test as a simple screening test, many advantages by reducing mater al morbidity as well as perinatal morbidity and mortality due to GDM from a group of people who are far from tertiary health care.

References

[1] Patrick M.Catalona: Carbohydrate metabolism and gestational diabetes. Clinical Obstetrics & Gynecology.1994, Volume 37, number 1. Pp25-3.
[2] David Turok, StephenD, Ratcliffe, Elizabeth C. Bexley: Management of gestational diabetes mellitus. American Family Physician, 2003, volume 68, number 9, Number 1.
[3] LuizGuilherme, Kraemer De Aguiar, and Harordo Jose De Matos: Could fasting plasma glucose be used for screening high risk out patients for gestational diabetes mellitus? Diabetes care, May 2001, Volume 24, Number 5.
[4] Angela J. Reichett, Ethel R. Spichler, Laercio J. Franco :Fasting plasma glucose Is a useful test for the detection of gestational diabetes. DiabetesCare November 8, August 1998, vol 21.