International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622

www.gynaecologyjournal.com
2020; 4(2): 24-28
Received: 12-01-2020
Accepted: 14-02-2020

Dr. K Kalaivani
Supeintendent, Govt. RSRM Hospital, Chennai, Chennai, Tamil Nadu, India

R Jeyachandar
Scientist-B (Non-Medical), NIRRH Field unit, ICMR, Govt. RSRM Hospital, Chennai, Tamil Nadu, India

Corresponding Author:
Dr. K Kalaivani
Supeintendent, Govt. RSRM Hospital, Chennai, Chennai, Tamil Nadu, India

Perinatal outcome of gestational diabetes mellitus pregnant mothers at a Teritiary hospital

Dr. K Kalaivani and R Jeyachandar

DOI: https://doi.org/10.33545/gynae.2020.v4.i2a.499

Abstract
Background: Gestational diabetes is diagnosed by screening all the pregnant women during the pregnancy because GDM generally have few or no symptoms. High level of glucose in the blood samples is detected inappropriately by the diagnostic test. Depending upon the population studied, 3 to 10% of pregnancies are affected by GDM.
Babies born to mothers with gestational diabetes mellitus have increased risk for macrosomia, hypoglycemia, respiratory distress, still birth, hypocalcemia, shoulder dystocia, seizures, hyperbilirubinemia, intrauterine death, perinatal morbidity.
Aims and objectives
- To determine perinatal outcome in relation to maternal fasting and postprandial (2 hours) blood sugar control in gestational diabetes mellitus.
- Perinatal outcomes included are macrosomia, Respiratory distress syndrome, hypoglycemia, seizures, hyperbilirubinemia, NICU admission, Anomaly, IUD, Stillbirth, perinatal injury, perinatal mortality.

Methodology: This was prospective/observational study the study was conducted at Government RSRM Hospital, Attached to Stanley Medical College, Chennai.
Study Period: The study was conducted for a period of one year from December 2018 to September 2019.
Results: A total of 150 patients were included in the study. In these 63 patients were on meal plan, 79 patients were on insulin, 6 patients initially on meal plan were converted to insulin, 2 patients initially on insulin were converted to meal plan.
Conclusion: There is relationship between fasting and postprandial blood sugar values and neonatal outcomes. Early diagnosis and treatment of gestational diabetes with adequate antenatal care are essential to reduce the adverse neonatal outcomes. So universal screening in early gestation is recommended. Early detection of GDM and adequate blood sugar control is done to reduce the adverse neonatal outcomes.

Keywords: GDM, perinatal outcome

Introduction
Pregnancy is a condition where the metabolic adaptations occur to accommodate rapidly growing tissue transplant, conceptus. Placenta, new organ arises de novo during the pregnancy, develops and matures till it is expelled at the completion of gestation. The conceptus for its own normal development causes alteration in the maternal metabolism characterized by hyperinsulinemia, low fasting and postprandial blood sugar levels when compared to the non-pregnant state. The placenta facilitates embryogenesis, growth maturation and synthesis of peptide and steroid hormones and transport of fuel to the fetus from the mother. Thus, metabolism in normal pregnancy is characterized by facilitated action of insulin in the first half of pregnancy and diabetogenic stress in the second half of pregnancy.
Gestational diabetes mellitus is defined as carbohydrate intolerance of variable severity resulting in hyperglycemia with the onset or first recognition during pregnancy. This is applicable regardless of the patient whether they are on insulin or only on diet modification.
GDM represents an unidentified pre-existing disease or because of the stress in pregnancy leading to a compensated metabolic abnormality which is unmasked or a direct consequence leading to altered maternal metabolism in pregnancy. Thus, importance of GDM lies in fact that it is associated with higher risk of type 2 diabetes in their later life in future. Most women control blood sugar with medical nutritional therapy and moderate exercise but who fail to control blood sugar needs anti diabetic medication like insulin.
Gestational diabetes is diagnosed by screening all the pregnant women during the pregnancy because GDM generally have few or no symptoms.

High level of glucose in the blood samples is detected inappropriately by the diagnostic test. Depending upon the population studied, 3 to 10% of pregnancies are affected by GDM.

Babies born to mothers with gestational diabetes mellitus have increased risk for macrosomia, hypoglycemia, respiratory distress, still birth, hypocalcemia, shoulder dystocia, seizures, hyperbilirubinemia, intrauterine death, perinatal morbidity. Women with adequate blood glucose control can decrease the risk of adverse neonatal outcomes when gestational diabetes are treated effectively. These offspring are more prone for developing obesity in childhood and type 2 diabetes in their later life.

Aims and objectives

- To determine perinatal outcome in relation to maternal fasting and postprandial (2 hours) blood sugar control in gestational diabetes mellitus.
- Perinatal outcomes included are macrosomia, Respiratory distress syndrome, hypoglycemia, seizures, hyperbilirubinemia, NICU admission, Anomaly, IUD, Stillbirth, perinatal injury, perinatal mortality.

Study place

The study was conducted at Government RSRM Hospital, Attached to Stanley Medical College, Chennai.

Study design

This was prospective study / observational study.

Study period

The study was conducted for a period of one year from December 2018 to September 2019.

Participants

The study group consisted of 150 patients after considering the exclusion and inclusion criteria.

Inclusion criteria

- Singleton pregnancy
- Cut off value for FBS is $\leq$ 95mg/dl and PPBS (2 hours) is $\leq$120 mg/dl
- Blood sugar taken at the time of diagnosis of GDM, 2nd trimester and 3rd trimester towards term.
- Age < 35 years
- Primi and multigravida
- Antenatal GDM mothers on meal plan and insulin
- Cephalic presentation
- Women booked and immunized in KGH
- Women with regular antenatal visits
- Neonatal outcomes are observed for macrosomia, hypoglycemia, respiratory distress syndrome, seizures, hyperbilirubinemia, anomaly, stillbirth, IUD, perinatal morbidity and mortality.

Exclusion criteria

- Overt diabetes
- Abnormal presentation
- Preterm and PROM
- Associated medical disorders like hypothyroidism and hypertension
- Multiple pregnancy and IUGR
- First visit to KGH
- Normal antenatal mothers without GDM

Method of study

All antenatal mothers attending the OPD are subjected to 75 gm of glucose challenge test in first, second and third trimester. If GCT is elevated above 140 mg/dl, these patients are advised meal plan for 2 weeks. Fasting and postprandial blood sugars (2hours) are done.

If FBS and PPBS are normal, the patient is labeled as GDM on meal plan. If fasting > 96 mg/dl and 2-hr postprandial blood sugar > 121 mg/dl, insulin is started along with diet modification and patient is labeled as GDM on insulin. In patients with GDM on insulin FBS and PPBS are taken according to the blood sugar control and the dose of insulin is adjusted. In case of GDM on meal plan, FBS and PPBS are taken every 15 days.

If the GCT is normal is 1st trimester, it is repeated again in 2nd trimester at 24 weeks and 3rd trimester in 32 weeks. If it is normal in 2nd trimester, it is again done in 3rd trimester.

Results

Total no. of cases: 150

GDM on treatment

A total of 150 patients were included in the study. In these 63 patients were on meal plan, 79 patients were on insulin, 6 patients initially on meal plan were converted to insulin, 2 patients initially on insulin were converted to meal plan.

Table 1: GDM on treatment

GDM	No. of patients	%
Meal plan	63	42.0
Insulin with meal plan	79	52.7
Meal plan converted to insulin	6	4.0
Insulin converted to insulin	2	1.3
Total	150	100

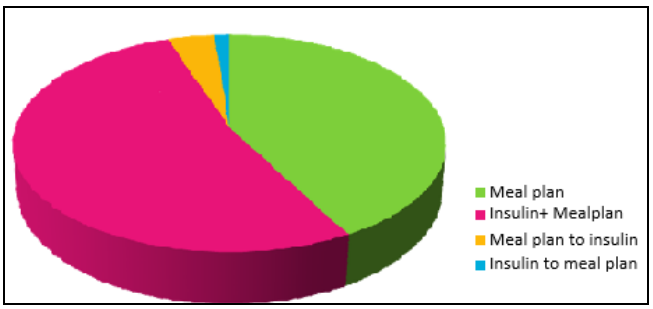

Fig 1: No. of patients

Age distribution

Table 2: Shows the age distribution in GDM .60% of the patients were in age group of 26 to 30 years

Table 2: Age Distribution.

Age	No. of patients	%
20 - 25	26	17.3
26 -30	90	60
>30	34	22.7
Total	150	100

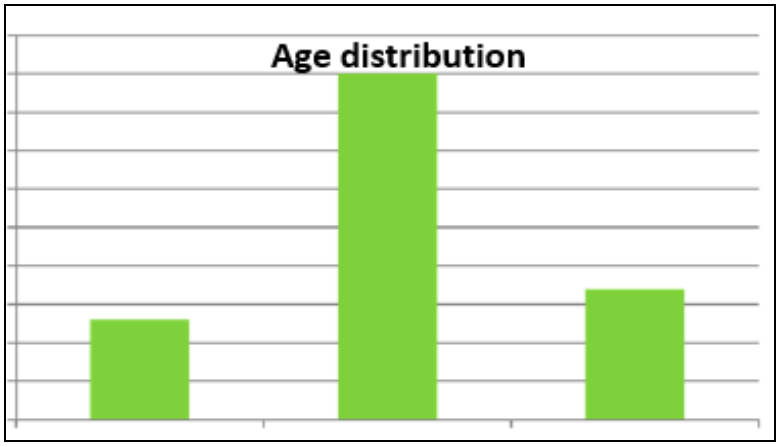

Fig 2: Age Distribution.

Table 3: Shows the relation of BMI with GDM.

GDM on treatment							
BMI		**Meal plan**	**Insulin and Meal plan**	**Meal Plan to insulin**	**Insulin to meal plan**	**Total**	**P Value**
18-24	No.	39	0	0	0	39	.000
	%	100.0	0	0	0		
25-30	No.	24	59	4	2	89	
	%	27.0	66.3	4.5	2.2		
>30	No.	0	20	2	0	22	
	%	0	90.9	9.1	0		
Total	No.	63	79	6	2	150	
	%	42.0	52.7	4.0	1.3		

P< 0.05, there was significant association between BMI and GDM.

Family history of diabetes was present in 24.7% of the patients.
Table 4 shows the family history of diabetes in patients with GDM.

Table 4: Family history of diabetes

GDM on treatment							
Family history		**Meal plan**	**Insulin and meal plan**	**Meal plan to insulin**	**Insulin to meal plan**	**Total**	**%**	**P Value**
Present	No.	3	30	3	1	37	24.7	.000
	%	8.1	81.1	8.1	2.7			

P< 0.05, there was significant association between presence of family history of diabetes and the occurrence of GDM.

Previous history of GDM was present in 27.3% of cases.

Table 5: Previous GDM

GDM on treatment							
Previous GDM		**Meal plan**	**Insulin and meal plan**	**Meal Plan to insulin**	**Insulin to meal plan**	**Total**	**%**	**P Value**
Present	No. of patients	1	37	3	0	41	27.3	.000
	%	2.4	90.2	7.3	0			

P< 0.05, there was significant association between the presence of GDM in previous pregnancy and the occurrence of GDM in present pregnancy.

At the time of diagnosis 60.7% of patients had FBS ≤ 95 mg/dl and 46% of patients had PPBS ≤ 120 mg/dl.

Table 6: FBS& PPBS at time of diagnosis

FBS (in mg/dl)	**No. of patients**	**%**
<95	91	60.7
96-119	50	33.3
>120	9	6.0
PPBS (in mg/dl)	**No. of patients**	**%**
< 120	69	46.0
121-159	26	17.3
160-199	52	34.7
> 200	3	2.0

The percentage of patients who had caesarean section was 42% the most common indication being Previous LSCS and CPD. (Both LSCS and repeat LSCS),

Table 7: Mode of Delivery

Mode of delivery	No. of patients	%
Labor natural	82	54.7
Instrumental delivery	5	3.3
LSCS	34	22.7
Repeat LSCS	29	19.3
Total	150	100.0

Shows the number of adverse neonatal outcomes in GDM.

Table 8: Adverse neonatal outcomes

GDM on treatment							
Adverse neonatal outcomes		**Meal plan**	**Insulin and Meal Plan**	**Meal plan to insulin**	**Insulin to meal plan**	**Total**	**P Value**
Macrosomia	No.	0	13	0	0	13	.005
	%	0	100	0	0		
RDS	No.	0	5	0	0	5	.199
	%	0	100	0	0		
Hypoglycemia	No.	0	9	0	0	9	.035
	%	0	100	0	0		
Hyperbilirubinemia	No.	0	5	0	0	5	.199
	%	0	100	0	0		
IUD	No.	0	1	0	0	1	.824
	%	0	100	0	0		
Perinatal morbidity	No.	0	2	0	0	2	.610
	%	0	100	0	0		
NICU Admission > 3 days	No.	1	17	0	0	18	.002
	%	5.6	94.4	0	0		

The percentage of cases presented with Macrosomia was 8.7%, RDS 3.3%, hypoglycemia 6%, hyperbilirubinemia 3.3%, IUD 0.7%, perinatal injury 1.3%, NICU admission requiring more than 3 days of admission was 12%. There were no cases of seizures (due to hypoglycemia or hypocalcemia), still birth, anomaly, perinatal mortality.

P< 0.05, there was significant association between GDM and occurrence of macrosomia, hypoglycemia and NICU admission $\geq$ 3 days in neonates. *P*>0.05, there was no significant association between GDM and the occurrence of RDS, hyperbilirubinemia, IUD, perinatal morbidity.

Discussion

Glucose intolerance in pregnancy can be of varying severity depending on risk factors and the glycemic control. Therefore, early diagnosis, adequate treatment and follow up are essential in managing the patients with GDM.

WHO criteria 75 gm of glucose load and 2hour plasma glucose was able to correctly identify the patients with GDM [8]. In present study WHO criteria was followed for screening and patients with GDM were detected. ACOG criteria was used for cut of values to maintain normal blood sugar FBS $\leq$ 95mg/dl and PPBS $\leq$ 120 mg/dl.

Risk factors

According to ACOG criteria, age > 25 years and BMI > 30 were considered as high-risk factor**.** In present study, 82.7% patients were > 25 years and 14.7% of the patients had BMI > 30. Since P value < 0.05, it was concluded that there were significant association between age and BMI with GDM since P value < 0.05.

Multiparous women (65.3%) were more affected than primigravida (34.7%). Since P value >0.05, there was no significant association between parity and occurrence of GDM.

In a study by Catherin *et al* (2007) [21] family history of diabetes mellitus were present in 35% of cases. In present study family history was present in 24.7% of cases. Since P value is < 0.05, there was a significant association between family history of diabetes mellitus and occurrence of GDM in pregnancy.

In a study by Catherin *et al* (2007) [21] history of gestational diabetes in previous pregnancy was associated with occurrence of GDM in present pregnancy. In present study, previous history of GDM was present in 27.3% of cases. There was a significant association between previous GDM history with onset of GDM in index pregnancy since P value < 0.05. In study by Yogev *et al* the incidence of preeclampsia in GDM with good glycemic control was 7.8%, in present study it was 8.7% of cases.

There was a significant association between number of risk factors and the occurrence of GDM.

But there was no significant association between the number of risk factors and the occurrence of adverse neonatal outcomes.

Summary

Total of 150 patients were included in the study. Of which 63 was on meal plan, 79 was on insulin and meal plan, 6 was on meal plan converted to insulin, 2 was on insulin converted to meal plan.

Age >25 years was the single most important risk factors. There was a significant association between age and the occurrence of GDM.

BMI > 30 was also a risk factor for GDM. There was a significant association between BMI and the occurrence of GDM.

There was a significant association between the presence of family history of diabetes and the occurrence of GDM in the index pregnancy.

There was also a significant association between the presence of GDM in previous pregnancy and its occurrence in index pregnancy.

History of PIH was also a risk factor associated with GDM.

So to conclude there was a significant association between the number of risk factors and the occurrence of GDM.

Most cases of GDM were detected in 2nd trimester of pregnancy.

Ideal fasting blood sugar level of $\leq$ 95 mg /dl was seen in 60.7%

of patients at the time of diagnosis, with treatment effective blood sugar control was achieved in 99.3% of patients. Ideal post prandial blood sugar level of ≤ 120 mg/dl was seen in 46% of patients at the time of diagnosis; with treatment effective blood sugar control was achieved in72.7% of patients.

Caesarean section was done in 42% of patients (Both LSCS and repeat LSCS), the most common indication being Previous LSCS (46%) and CPD (22.2%).

The percentage of cases presented with Macrosomia was 8.7%, RDS 3.3%, hypoglycemia 6%, hyperbilirubinemia 3.3%, IUD 0.7%, perinatal injury 1.3%, NICU admission requiring more than 3 days of admission was 12%. There were no cases of seizures (due to hypoglycemia or hypocalcemia), still birth, anomaly, perinatal mortality.

There was a significant association between GDM and the occurrence of macrosomia, hypoglycemia and NICU admission ≥ 3 days in neonates and there was no significant association between GDM and the occurrence of RDS, hyperbilirubinemia, IUD, perinatal morbidity.

There was a significant association between FBS and PPBS and the occurrence of adverse neonatal outcomes.

Conclusion

There is relationship between fasting and postprandial blood sugar values and neonatal outcomes. Early diagnosis and treatment of gestational diabetes with adequate antenatal care are essential to reduce the adverse neonatal outcomes. So universal screening in early gestation is recommended. Early detection of GDM and adequate blood sugar control is done to reduce the adverse neonatal outcomes. There is no relationship between the number of risk of risk factors and adverse neonatal outcomes. But when the number of risk factors increases the risk for GDM is increased.

References

1. American diabetic association: Report of the expert committee on the diagnosis and the classification of gestational diabetes mellitus. Diabetes Care January. 2003; 26(1s):103-s105.
2. American Diabetes Association. Gestational Diabetes Mellitus. Diabetes Care. 2004; 27:88-90. PMID 14693936
3. White P. Pregnancy complicating pregnancy diabetes. Am J Med. 1949; 7:609. PMID 15396063
4. ACOG. Precis V. An update on Obstetrics and Gynecology. ACOG, 1994, 170. ISBN 0915473224
5. Carr DB, Gabee S. Gestational diabetes: Detection, Management, and Implications. Cli Diabetes 1998; 16(1):4
6. Buchanan TA, Xiang AH. Gestatioanl diabetes mellitus. J Clin Invest. 2005; 115(3):485-491. PMID 15765129.
7. Bartha JL, Martinez-Del Fresno P, R Comino- Delga d, Early diagnosis of gestational diabetes and prevention of diabetes related complications, Eurr J. Obstet Gynecol Reprod, Biol. 2003; 109(1):41-44.
8. Balaji V, Balaji MS, Seshiah V, Mukundan S, Datta M, Maternal glycemia and neonatal birthweight in asian women, Diabetes Res Clin Prac. 2006; 73(2):223-4.
9. Nahum GG, Wilson SB, Stanislaw H, Early pregnancy glucose screening for gestational diabetes, J Repro Med. 2002; 47(8):656-62
10. Reiher H, Fuhramann K, Noack S, Woltanski KP, Jutzi E, Hahn von Dorsche H *et al*. Age-dependent insulin secretion of the endocrine pancreas in vitro from fetuses of diabetic and non-diabetic patients. Diabetes Care. 1983; 6(5):446-51.
11. Schwartz R, Gruppuso PA, Petzold K, Brambilla D, Hiilesmaa V, Teramo KA Hyperinsulinemia and macrosomia in the fetus of the diabetic mother.Diabetes Care. 1994; 17(7):640-8.
12. Seshiah V, Cynthia A, Balaji V, Balaji MS, Ashalata S, Sheela R *et al*. Detection and Care of women with gestational diabetes mellitus from early weeks of pregnancy results in birth weight of newborn babies appropriate for gestational age. Diab Res Clin Pract. 2008; 80(2):199-202.
13. Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Arthi T, Thamizharasi M, *et al*. Gestational Diabetes Mellitus manifests in all trimesters of pregnancy. Diabetes Res Clin Pract. 2007; 77(3):482-4.
14. Sullivan O', Mahan SB, Choles CM, Dandrow DR. Screening criteria for high risk gestational diabetic patients. Am. J Obstetric Gynecology. 1973; 116:895-900.
15. Cosson E, *et al*. Screening and insulin sensitivity in gestational diabetes. 40th Annual Meeting of the EASD, September 2004, A350.
16. Anjalakshi Chandrasekar, Evaluation of diagnostic criteria for abnormal glucose tolerance in south India pregnant women, Diabetes in pregnancy study group India, 2002, 34-37.
17. Beischer NA, Oats JN, Henry OA, Sheedy MT, Walstab JE. Incidence andseverity of gestational diabetes mellitus according to country of birth in women living in Australia. Diabetes. 1991; 40(Suppl 2):35-8.
18. Dornhorst A, Paterson CM, Nicholls JS, Wadsworth J, Chiu DC, Elkeles RS, *et al*. High prevalence of GDM in women from ethnic minority groups. Diabet Med. 1992; 9(9):820-5.
19. Cousins L, Bani L, Chez R, Coustan D, Gabee S, Sacks D, Singh s: Screening recommendations for GDM; Am. J. Obstet gynecol. 1991; 165:493-6.
20. Ardawi MS, Nasart HA, Jamal HS, Al-Sagaef HM, Mustafa BG. Screening for GDM in pregnant females; Saudi med J. 2000; 21:155-60.
21. Catherine Kim, MD, MPH1**,** Laura N. McEwen, PHD2**,** John D. Piette, Risk Perception for Diabetes Among Women with Histories of Gestational Diabetes Mellitus. Diabetes Care. 2007; 30(9):2281-2286.