ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Gestational Diabetes Mellitus – its Control, Maternal and Perinatal Outcome – A Retrospective Study in Sri Balaji Medical College Hospital, Chennai, Tamil Nadu, India.

L Nandini*, Satya Deepti Surala, K Saraswathi.

Dept. of OBG, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India.

ABSTRACT

To compare pregnancy outcomes in women with GDM to those with normal glucose tolerance and to analyze glycemic control in women with GDM and its effect on perinatal outcome. A 75gm OGCT is done in all the women during their first visit to the antenatal clinic. A diet or insulin regimen is initiated according to clinical judgment and OGCT result. To assess the effectiveness of the treatment regimen, she is followed up with regular fasting plasma glucose (FPG) and post prandial plasma glucose (PPPG) values. Treatment is adjusted accordingly. After delivery, perinatal outcome is assessed. Babies are breast fed soon after birth and allowed to stay with the mother until discharge. FPG and PPPG values were monitored antenatally in the diabetic cohort. The median value was calculated for FPG and PPPG. A minimum of 3 glucose samples were required, and subjects were assigned to a group of good control if FPG < 95mg/dl and PPPG < 120mg/dl, and poor control if FPG > 95mg/dl and/or PPPG > 120mg/dl. Induction of labour was similar between the two groups. There was no difference in maternal characteristics between groups that had good and poor control. Good control was not associated with the treatment regimen used. Two hour glucose values at OGCT were not predictive for future control. Neonatal hypoglycemia was significantly associated with poor control. The incidence of macrosomia, neonatal intensive care unit (NICU) admission prior to discharge was similar, irrespective of glucose control. GDM is associated with adverse perinatal outcome. The degree of glycemic control is not predictive of adverse perinatal morbidity and mortality.

Keywords: Gestational diabetes mellitus, GDM, OGCT, FPG, PPPG, NICU, Induction of labour, LSCS.

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Over 31 million people in India are currently diagnosed with diabetes more than any other country in the world. The world Health Organisation states that 80% of all new diabetes cases are expected to be in developing nations by 2025 [1].

Gestational diabetes mellitus (GDM) is defined as glucose intolerance first diagnosed in pregnancy [2]. Prevalence of GDM in south India (Tamil Nadu), urban area is estimated at nearly 16.2% [4].The condition carries a thirteen fold risk of developing over diabetes [5], and western studies report increased lower segment Caesarean section (LSCS) rates and worse neonatal outcomes [6]. Differences in outcomes has been observed between ethnic groups [7], however there is a scarcity of data from India and other developing countries. [8, 9]

Recent data from the Hyperglycemia and Adverse Perinatal Outcome (HAPO) study reports increasing blood glucose levels affecting maternal and neonatal outcomes, even in ranges thought previously safe [10]. Women from the Indian sub continent have an increased preponderance for GDM [11] and it has been contested that not all perinatal outcomes are affected by the degree of glycaemic control. [8]

This study has two objectives:

- To compare pregnancy outcomes in women with GDM to those with normal glucose tolerance
- To analyze glycemic control in women with GDM and its effect on perinatal outcome.

MATERIALS AND METHODS

This case-control study identified singleton pregnancies at SBMCH between November 2011 to October 2012.

The Diabetes In Pregnancy Study group India (DIPSI) guidelines recommend that all women are given a 75gm OGCT, when they first visit the antenatal clinic [12]. An insulin or diet regimen is initiated according to clinical judgment and OGCT result. To assess the effectiveness of the treatment regimen, the hospital aims to regularly assess
fasting plasma glucose (FPG) and post prandial plasma glucose (PPPG) in the antenatal period. Treatment is adjusted accordingly. Babies are breast fed soon after birth and stay with their mother until discharge.

OGCT with a 75gm glucose load was performed to identify gestational diabetes mellitus. Two hour post glucose ≥ 140mg/dl is diagnosed as GDM (WHO criteria) [13]. FPG and PPPG values were monitored in the antenatal period in the diabetic cohort. The median value was calculated for FPG and PPPG. A minimum of 3 glucose samples were required, and subjects were assigned to a group of good control if FPG≤ 95mg/dl and PPPG ≤ 120mg/dl and poor control if FPG > 95mg/dl and/or PPPG > 120mg/dl.

Maternal characteristics and Outcomes

Whether the patient was booked in the hospital was recorded, and the level of education attained by the mother was categorized as graduate from university, school education or illiterate. Pregnancy induced hypertension (PIH) was recorded, instead of pre – eclampsia, because it was objectively reported in the case notes. It was defined as elevated blood pressure (diastolic≥90mmHg or systolic ≥ 140mmHg) after the 20^{th} week of pregnancy. Preterm delivery was defined as delivery at less than 37 weeks.

Neonatal Outcomes

Neonatal outcomes included congenital anomalies, neonatal hypoglycemia, admission to NICU, stillbirth, mortality prior to discharge and preterm delivery. Neonatal glucose levels were examined in the majority of women with GDM, and investigated in controls if clinically indicated. A diagnosis of neonatal hypoglycemia was made if blood glucose < 40mg/dl within 4 hours of birth. Both weight and gestational age were plotted on female or male Indian growth charts. Macrosomia was defined as >90^{th} centile. Congenital malformations recorded were neural tube defects and other nervous system malformations, congenital heart

disease, internal GU system abnormalities, chromosomal, limb, musculoskeletal and connective tissue disorders.

Calculations and Statistical Analyses

Statistical analysis was performed with Stat view. Student's 't' test was used to compare continuous variables, while chi-square test analyzed nominal variables. Data that did not have a normal distribution was analyzed using non-parametric methods. Statistical significance was considered at $P < 0.05$.

RESULTS

Maternal characteristics and Outcomes

Maternal characteristics and Outcomes for GDM mothers and controls are displayed in table 1. More school were present in the GDM group (70% vs 58%), while more illiterate women were present in the control group (8% vs 2%), however neither educational category reached significance. All GDM women had booked their at the hospital prior to labour, however only 72% of controls had done so. Pregnancy induced hypertension was significantly associated with GDM, and LSCS occurred at an increased frequency compared to controls (49% vs 30%). Induction of labour and was similar between the two groups. Two hour post glucose values were significantly higher in women with GDM compared to controls.

Neonatal Outcome

41% of babies born to mothers with GDM were admitted to NICU compared to 13% of the controls. Neonatal hypoglycemia had an increased incidence in GDM mothers. Preterm delivery and Apgar score at 5 minutes were also comparable between the groups. 3% of GDM pregnancies resulted in macrosomic babies while none were recorded in the control group, however it did not reach significance.

Maternal glycaemic control

Only 48 women with GDM had three or more capillary blood glucose samples prior to delivery. There was no difference in maternal characteristics between groups that had good and poor control (Table:3).Good control was not associated with the treatment regimen used. Two Hour glucose levels at OGCT were not predictive for future control.(Table 4).The mean gestational age, birth weight , Apgar score at 5 minutes were comparable between groups.

Neonatal Glycaemic control

Neonatal hypoglycemia was significantly associated with poor control. The incidence of macrosomia ,admission to Neonatal intensive care unit(NICU) prior to discharge was similar irrespective of glucose control (Table; 5). All women eligible for good and poor control analysis were booked for delivery and there was one meningomyelocele in GDM group and one tracheo-esophageal fistula in control group.

Table 1: Maternal characteristics and outcome

	GDM cases (n=100)	Control cases (n=100)	P value	95%CI
School	70	34	P=0.36	0.41-1.38
Graduate	28	58	P=0.08	0.94-3.03
Illiterate	2	8	P=0.05	0.05-1.13
Booked	100	72	P<0.0001	4.56-22.44
Induced	46	40	P=0.39	0.73-2.24
LSCS	49	30	P=0.006	1.25-4.00
PIH	28	14	P=0.02	1.17-4.88

ISSN: 0975-8585

Table 2: Neonatal outcome

	GDM cases (n=100)	Control cases(n=100)	P value	95%CI
Congenital malformation	1	1	P=0.05	0.05-1.13
Macrosomia	3	0	P=0.08	0.77-72.61
Neonatal hypoglycemia	6	0	P=0.01	1.51-38.58
NICU	41	13	P<0.0001	2.24-9.21
Preterm delivery	18	10	P=0.63	0.45-1.8

Table 3: Maternal characteristics and outcome in women with good poor glycemic control

	Good control	Poor control	P value	95%CI
No. with results/total cases	41/100	7/100		
School	12	0	P=0.09	0.74-28.79
Graduate	28	7	P=0.08	0.05-1.24
Illiterate	1	0	P=0.68	0.01-832.22
Induced	22	4	P=0.86	0.17-4.38
LSCS	21	3	P=0.68	0.28-7.06
PIH	10	1	P=0.56	0.21-18.07
Insulin regimen	12	4	P=0.15	0.06-1.60

Table 4: Continuous variables for neonatal outcome and glucose values at 75g OGCT

	Good control	Poor control	P value
No. with results/total cases	41/100	7/100	
Gestational age	37 +/- 1	37 +/- 1	p=0.41
Birth weight	2.74 +/- 0.60	2.63 +/- 0.63	p=0.67
Apgar score (5min)	8.95 =/- 0.22	8.86 +/- 0.38	p=0.35
2hr glucose at OGTT(mg/dl)	9.44 +/- 1.48	8.96 +/-1.13	p=0.42

Table 5: Neonatal outcomes in good and poor control groups

No. with results/cases	Good control 41/100	Poor control 7/100	P value	95%CI
Stillbirth	0	0		
Mortality prior to discharge	0	0		
Congenital malformations	0	0		
Macrosomia	2	0	P=0.55	0.06-175.12
Neonatal hypoglycemia	1	2	P=0.008	0.005-0.82
NICU	19	3	P=0.86	0.23-5.81
Preterm delivery	5	2	P=0.26	0.05-2.29

DISCUSSION

The findings from SBMCH, Chennai suggest that gestational diabetes mellitus (GDM) adversely affects perinatal outcome. In spite of treatment with insulin or diet on clinical judgment, women with GDM were more likely to have pregnancy induced hypertension (PIH), lower segment Caesarean section (LSCS) and offspring with neonatal hypoglycemia. In- agreement with studies from the west, the results report similar outcomes in spite of ethnic differences [14]. The present study demonstrates the difficulty of identifying a subgroup of high risk GDM women by glycaemic control. Only the number of neonatal hypoglycemia was reduced in the women with good control, while all other outcomes were similar. One case of undescended testis was recorded in the GDM group, none in the control; however this was not considered a congenital malformation.

Aside from the limitations of retrospective data collection, the power of the study was limited by the number of women with GDM who had their glucose monitored on 3 or more occasions, which was chosen as a minimum for data analysis. A reason for fewer glucose values in the remaining 52 women may be because that they did not suffer any symptoms from GDM. Those who presented with symptoms had worse glycaemic control. Surprisingly, birth weight and gestational age at birth were similar between GDM and control. Induction of labour was done in nearly half of women, but not for reducing the incidence of macrosomia.

Previous Indian studies have reported an association between low educational level and low birth weight. [15] Further analysis of educational level and perinatal outcomes would demonstrate if obstetric care currently available is exacerbating health inequalities.

Knowledge of the husband's education may provide greater insight into the educational level of a family and the degree of health inequalities. In south India, usually men play an integral part in taking decisions about the healthcare of their wife. It has been demonstrated that having an educated husband is protective against maternal death. [16, 17]

CONCLUSION

GDM is associated with adverse perinatal outcomes. The degree of glycaemic control in GDM pregnancy is not highly predictive of morbidity and mortality.

REFERENCES

[1] King, H, Aubert, R, Herman, W. Diab Care 1998;21:1414–1431.
[2] Metzger BE and Coustan DR. Diab Care 1998;21:B1–B167.
[3] Zargar AH, Sheikh MI, Bashir MI, et al. Diab Res Clin Prac 2004;66:139–145.
[4] Seshiah V, Balaji V, Madhuri S Balaji, Sanjeevi CB, Green A. J Assoc Physic of India 2004;52: 707–711.
[5] Kale SD, Yajnik CS, Kulkarni SR, et al. Diab Med 2004;21:1257–1258.
[6] Langer O, Yogev Y, Most O, et al. Am J Obs Gynae 2005;192:989–997.
[7] Silva JK, Kaholokula JK, Ratner R, et al. Diab Care 2006;29:2058–2063.
[8] Banerjee S, Ghosh US and Banerjee D. J Assoc Phys India 2004;52:109–113.
[9] Ramachandran A, Snehalatha C, Clementina M, et al. Diab Res Clin Practice 1998;41:185–189.
[10] Hampton T. JAMA 2007;298:613–614.
[11] Berkowitz GS, Lapinski RH, Wein R, et al. Am J Epi 1992;135:965-973.
[12] Seshiah V, Das AK, Balaji V. et al. J Assoc Phys India 2006;54:622–628.
[13] Alberti K and Zimmett P. Diab Med 1998;15:539-53.
[14] Dunne FP, Brydon PA, Proffitt, M. et al. QJM 2000;93:813- 818.
[15] Hirve SS, and Ganatra BR. Indian Ped 1994;31:1221-1225.
[16] Bloom SS and Tsui AO, Plotkin M, et al. J Biosocial Sci 2000;32:237-251.
[17] Ganatra BR, Coyaji KJ and Rao VN. Bulletin WHO 1998;76:591-598.