

**PREGESTATIONAL DIABETES AND STUDY OF PREGNANCY OUTCOME**Poornima M<sup>1</sup>, Susheela Bai<sup>2</sup><sup>1</sup>Assistant Professor, Department of Obstetrics & Gynaecology, JSS Medical College, Mysuru.<sup>2</sup>Professor & Unit Chief, Department of Obstetrics & Gynaecology, MOSC Medical College, Kolenchery, Kerala.**ABSTRACT****OBJECTIVE**

To study the effect of pregestational diabetes on pregnancy and to work out a protocol for management to reduce the maternal and foetal complications.

**MATERIAL AND METHODS**

Study was conducted over a period of 15 months in Dept. of OBG, MOSC Medical College, Kolenchery, Kerala from 1<sup>st</sup> September 2006 to November 2007. Out of 4029 deliveries, 40 patients had overt diabetes complicating pregnancy. Patients were followed during antenatal period and delivery and complications and pregnancy outcome noted.

**RESULTS**

Incidence of PGDM is 0.99%. Antenatal and perinatal complications are more in uncontrolled diabetes. HbA1c level correlates with poor pregnancy outcome.

**KEYWORDS**

Pregestational Diabetes, Insulin Therapy, Pregnancy Outcome.

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**INTRODUCTION:** Diabetes is the most common endocrine disorder complicating pregnancy. Incidence of both Type I and Type II diabetes is increasing throughout the world.<sup>(1)</sup> "Pregnancy is a diabetogenic state". Diabetes may manifest itself for the first time in pregnancy or a diabetic woman may become pregnant. Pregnancy that occurs in a woman who already has diabetes is termed 'Pregestational Diabetes Mellitus' or Overt Diabetes, and is associated with increased maternal morbidity and foetal mortality.<sup>(2)</sup> At the beginning of the century, women suffered from infertility and those women achieving pregnancy faced a dismal prognosis like spontaneous abortions, congenital anomalies, hydramnios, intrauterine deaths, and a high rate of maternal morbidity and perinatal mortality.<sup>(3)</sup> All the untoward effects of diabetes mellitus complicating pregnancy were mainly due to poor blood sugar control. Early diagnosis of disease, periconceptional strict control of blood sugar and adequate blood sugar control throughout pregnancy and labour, and proper intrapartum and postpartum care helps us to minimise the complications of mother and foetus. HbA1c values in Trimester I gives idea about control of sugar in periconceptional period and its value correlates with incidence of congenital anomalies.<sup>(4)</sup>

**MATERIALS AND METHODS:** The study was conducted over a period of 15 months in the department of obstetrics and gynaecology, MOSC Medical College & Hospital, Kolenchery, Kerala, India. There were 4029 deliveries during the study period from 1<sup>st</sup> of September 2006 to 30<sup>th</sup> November 2007. Study group included 40 antenatal subjects diagnosed to have overt diabetes complicating pregnancy.

All patients diagnosed as diabetes prior to pregnancy on OHA or insulin are advised HbA<sub>1c</sub> levels to know previous 4-10 weeks control and correlation with complications. A thorough clinical evaluation was done following admission. After routine investigations, counselling was done about diet, sugar monitoring and adjustment of insulin dose.

FBS and PPBS values checked at first visit and daily till satisfactory control is achieved. Since it is not convenient and practicable for patients to come for followup weekly with sugar values, if control is satisfactory patient followed up once in two weeks. If any time blood sugar levels are unsatisfactory, patient is re-admitted for control of sugars and insulin dose adjusted accordingly.

**Antepartum Foetal Surveillance:** Dating scan was done in 1<sup>st</sup> trimester in all patients. Anomaly scan was done at 18-22 weeks. Repeat USG in trimester III was done for foetal growth and wellbeing.

Daily foetal movement chart was advised. NST was done at each visit after 32 weeks and if non-reactive complete BPP done.

Pregnancy continued till 37 weeks if all the parameters are under control. In cases of complications like previous IUD, PIH in present pregnancy and IUGR, labour was induced at or near-term. Caesarean section was done as an elective or emergency procedure for obstetric indications.

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**Intrapartum Management:**

**Insulin:** As the requirement of insulin is low during labour and delivery, morning dose of insulin was not given to the patients scheduled for induction or caesarean section. During labour, insulin infusion given according to blood sugar values.

**Antibiotics:** In cases of ARM or PROM, antibiotic cover was given

**Pain Relief:** Once labour established, inj. tramadol 100 mg with inj. Phenergan 25 IM or epidural analgesia was given.

Uterine contractions, foetal heart rate, maternal pulse, blood pressure and blood sugar values were strictly monitored. The progress of labour was assessed by partogram. If the progress is unsatisfactory or if there is evidence of foetal distress immediate caesarean delivery was done.

The neonate was examined by the neonatologist and observed in the NICU for few hours. Early breast feeding was advised. Neonatal complications till discharge noted.

Patient was discharged after her condition was satisfactory and advised for postnatal checkup after six weeks. Before discharge fasting & post prandial blood sugar estimation was done. OHA/Insulin according to prepregnancy doses advised. Advice about contraception given. Regular follow up with physician was advised.

**OBSERVATION AND STATISTICAL ANALYSIS:** There were total 40 cases of pregestational diabetes mellitus patients among 4029 deliveries during the period from 1<sup>st</sup> September 2006 to November 2007 (15 months). Incidence of disease in present study is 0.99%.

- 1. Age:** Age wise distribution of the women in present study is shown in the table below the youngest women in the study was 19 years and the oldest 39 years.

Age groups	No	%	X <sup>2</sup> =39.0
≤ 20 yrs	2	5 %	P<.0.000
21-25 yrs	3	7.5 %	(Highly significant)
26-30 yrs	23	57.5 %	
31-35 yrs	9	22.5 %	
≥ 35 yrs	3	7.5 %	

**Table 1: Showing the Age Distribution of 40 Patients in our Study**

- 2. Gravidity:**

Gravidity	No	%	X <sup>2</sup> =19.25
G1	7	17.5 %	P<0.001
G2	18	45 %	(H.S)
G3	8	20 %	
G4	6	15 %	
G5	1	2.5 %	

**Table 2: Showing Gravidity in 40 Patients**

- 3. Weight Gain in Pregnancy:**

Weight gain during pregnancy (Kg)	No	%	X <sup>2</sup> =24.35
< 10	7	17.5 %	P< 0.000
10-15	28	70 %	(HS)
>15	5	12.5 %	

**Table 3: Showing Weight Gain in Pregnancy in 40 Patients**

- 4. Family History:** Positive family history is found is 60% of patients.

- 5. Insulin Requirement:**

Total dose of Insulin units/day	Number	%	X <sup>2</sup> =29.75
≤ 20	4	10 %	P< 0.000
21-40	21	52.5 %	(HS)
41-60	6	15 %	
61-80	8	20 %	
81-100	1	2.5 %	

**Table 4: Showing the Insulin Requirement in 40 Patients**

- 6. Antenatal Complications:**

Complication	No	%	X <sup>2</sup>	P	(HS)
Abortion	2	5%	32.40	0.000	
Pre-eclampsia	8	20%	14.40	0.000	
PROM	6	15%	19.60	0.000	
UTI. Candidiasis	8	20%	14.40	0.000	
PTL	4	10%	25.60	0.000	
Polyhydramnios	3	7.5%	28.90	0.000	
IUD	2	5%	32.40	0.000	
Anomalies	5	12.5%	22.50	0.000	

**Table 5: Showing Antenatal Complications**

Two patients who ended up with abortion had poor periconceptional sugar control and high HbA<sub>1c</sub> more than 10%. Preconceptional counselling about control of blood sugars was not followed. Pre-eclampsia was noted in 8 patients. 7 patients had caesarean section and one patient had outlet forceps delivery. Pre-eclampsia was not the indication for caesarean section. These patients had other obstetric indication also. But the incidence of pre-eclampsia was more in the diabetic population (20%) than among general population (10%). PROM was noted in 4 patients. These patients had good glycaemic control and all had uneventful vaginal delivery.

Infections – UTI and candidiasis were seen in 8 patients. These patients had poor sugar control at the time of diagnosis. Insulin dose was increased and treated with antibiotics. No patient had recurrent infection.

4 patients had preterm labour (10%). 2 patients had vaginal delivery and 2 patients underwent caesarean section for breech presentation and foetal distress. One caesarean baby had RDS.

3 patients had polyhydramnios. 1 baby had anencephaly which was terminated at 24 weeks. Other two patients had fluctuating postprandial blood sugars throughout pregnancy and had caesarean section for CPD.

There were two cases of IUD. One was anomalous baby which was missed in anomaly scan at 18 weeks and patient had IUD at 28 weeks. This baby had hydrops fetalis. Periconceptional sugars were not well controlled and HbA<sub>1c</sub> was 8.4%. Pregnancy was terminated by caesarean section due to associated central placenta praevia. Another case was unexplained term IUD at 37 weeks.

5 patients had major congenital anomalies and pregnancy was terminated. One patient had anencephaly with polyhydramnios. Two patients had hydrops fetalis. One patient had hydrocephalus with phocomelia and one patient had multiple anomalies like short limbs, spina bifida and facial defects.

**Mode of Delivery:**

Mode of delivery	Number	%	X <sup>2</sup> =22.0
Normal vaginal delivery	13	32.5	P< 0.000
Instrumental delivery	3	7.5	(HS)
Caesarean Section	17	42.5	
Termination (anomalies)	5	12.5	
Abortion	2	5	

**Table 7: Showing Mode of Delivery**

Mode of delivery	Percentage
Normal Delivery	56%
Instrumental delivery	12 %
Caesarean section	32 %

**Table 8: Showing Mode of Delivery among Total Obstetric Patients in our Hospital**

Primary caesarean section – 14%.  
Repeat caesarean section – 18%.

Problems	No	%	X <sup>2</sup>	P	HS
Macrosomia	2	5.25	32.40	0.000	
RDS	2	5.26	32.40	0.000	
Hyperbilirubinaemia	8	21.05	14.40	0.000	
Congenital anomalies	5	13.15	22.50	0.000	
Birth trauma	1	2.63	36.10	0.000	
Perinatal mortality rate	2	5.26	32.10	0.000	
Hypocalcaemia	1	2.63	36.10	0.000	
Prematurity	4	10.52	25.60	0.000	
Hypoglycaemia	14	35	6.60	0.000	

**Table 9: Showing the Perinatal Problems**

Mean birth weight in diabetic population 3.2 kg.  
In general population mean birth weight is 2.8 kg.

Gestational age	No	%	X <sup>2</sup> =10.75
Early termination	7	17.5	P<0.030
< 37 weeks (PTL)	4	10	(significant)
37-38 weeks	4	10	
38-39 weeks	15	37.5	
39-40 weeks	10	25	
> 40 weeks	Nil	-	

**Table 10: Showing Gestational Age**

**HbA<sub>1c</sub>:** This forms one of the most important parameter as it gives the picture of diabetic control over the last 4-10 weeks.

HbA <sub>1c</sub>	No	%	X <sup>2</sup> =12.20
<6	14	35	Patients< 0.007
6-8	15	37.5	(HS)
8-10	10	25	
>10	1	2.5	

**Table 11: Showing Glycosylated Haemoglobin Levels**

Maximum was 10.2% in a patient who had spontaneous miscarriage at 8 weeks of gestation.

**Pregnancy outcome in correlation to HbA<sub>1c</sub>:** HbA<sub>1c</sub> values were checked at first visit in First trimester and repeated in each trimester to know about glucose control in previous 8-10 weeks.

There were 14 patients in less than 6% HbA<sub>1c</sub> group. These patients had well controlled blood sugar periconceptionally and throughout pregnancy. Their fasting blood sugars were maintained between 60-100 mg% and PPBS between 120-140 mg%. 10 patients had vaginal delivery and 4 patients had caesarean section. No major foetal or maternal complication were noted in this group.

15 patients had HbA<sub>1c</sub> between 6-8. Even though their blood sugars were controlled later, they had more fluctuating blood sugar values and needed more admission. 7 patients had vaginal delivery and 8 patients had caesarean section. One is of anomalous baby seen in this group. More antenatal and perinatal complications were seen in this group. 5 had infections, 2 preeclampsia, 2 polyhydramnios, 6 babies had hypoglycaemia, 1 RDS and 1 baby had hydrops fetalis.

10 patients had HbA<sub>1c</sub> between 8-10. They needed more admission for sugar control. Five patients had vaginal delivery and 4 patients had caesarean section. One patient had missed abortion at 8 weeks. 4 anomalous babies seen in this group. One patient had IUD at 37 weeks. 2 babies had hypoglycaemia and 1 baby shoulder dystocia. Birth weight of babies were more than 3.5 kg in this group.

One patient had HbA<sub>1c</sub> 10.2% who had spontaneous abortion at 8 weeks.

**DISCUSSION:** Diabetes mellitus is the most common endocrine disorder seen during pregnancy. It places the mother and foetus at increased risk for complications. Modern approach to the diagnosis, treatment and monitoring of diabetic pregnancies and the advancement in perinatology and neonatology have made it possible to achieve a near normal obstetric outcome.

**Incidence:** Incidence of diabetes in pregnancy reported in various studies are different, ranges from 4.9–12.8%. Obstetrics and Gynaecology clinics of North America (2007) report increasing trend in prevalence of diabetes. According to Nurses health study, II prevalence was 10.6% in Americans and 10.5% in Asians. Among these 90% are GDM & 10% are overt DM. That means 0.49–1.28% of overt DM.

Siri Vangan et al quote incidence of PGDM as 1/100.<sup>5</sup> Incidence in present study is 0.99%.

**Antenatal Complications:** Abortions were noted in (5%). One of these patients had HbA<sub>1c</sub> – 10.2% and another 9.6%. Both are known DM and not received any preconceptional care. Alberto et al in their study quote the incidence of abortion as 7.9%,<sup>6</sup> good preconceptional blood glucose control can control the abortion rate.

Incidence of major congenital anomalies were 12.5%, among 5 patients with anomalies, one was anencephaly, two hydrups fetalis, one hydrocephaly with phocomelia and one patient with multiple anomalies like short limbs, spina bifida and facial defects.

Most studies observe a 3-5 fold increase in the rate of lethal congenital anomalies.

**Mode of Delivery:** There was significant increase in the rate of primary caesarean section (22.5%) compared to general population (14%). CPD accounts for 33.3% of caesarean sections. Mean birth weight among the study group was 3.042 Kg. and among general group was 2.8 kg. Incidence of macrosomia was 5.26%. Caesarean section was more liberalized to prevent traumatic delivery.

Alerbs et al<sup>7</sup> quote two fold increases in Caesarean section rate.

**Perinatal Problems:** Hypoglycaemia was the main neonatal problem seen in the babies (35%). Nold J L et al quote the incidence of hypoglycaemia infants of diabetic mother as 25–50%.<sup>8</sup> Incidence of hypoglycaemia in non-diabetic infants range between 3-5%. Maintenance of blood sugar during labour as <105 mg% reduces the incidence of hypoglycaemia in newborn. Hyperbilirubinaemia was the most common perinatal problem. (21.05%). Incidence of hyperbilirubinaemia in general population in our hospital is around 6%. Compared to general population incidence of hyperbilirubinaemia was significantly more in the babies of diabetic mother. Polycythaemia, birth trauma, instrumental delivery may be the attributing factors. Increasing birth weight of the babies in the diabetic mothers significantly contribute to all neonatal complications. Andrea et al<sup>9</sup> state the incidence of macrosomia as 17% and LGA as 29% in

women with uncontrolled DM. Diabetes in early pregnancy study state 28.5% of LGA in diabetic group<sup>10</sup>. One baby had shoulder dystocia.

Prematurity was 10.50% in the present study which correlates with incidence stated in other studies<sup>11</sup>. There were two cases of perinatal mortality. One was undiagnosed anomalous baby and other was unexplained IUD at 37 weeks.

Congenital anomalies were seen in five patients. (12.5%), which was significantly more compared to general population (4%). All these patients did not have preconceptional counselling and periconceptional blood sugars were not controlled.

**Correlation with HbA<sub>1c</sub>:** HbA<sub>1c</sub> values of the patients were compared with the complications. 14 patients (35%) had good preconceptional control with HbA<sub>1c</sub> < 6% and comparatively good perinatal outcome. No anomalies and pregnancy loss seen in this group. Abortions, and anomalies were seen in the group who had HbA<sub>1c</sub> >8%. In the study of Steel and colleagues,<sup>12,13</sup> low HbA<sub>1c</sub> concentration in first trimester had lower congenital malformations (1.4%) than in the uncontrolled group (10.5%). In present study, congenital malformation rate was 12.5% which was noted in patients with uncontrolled diabetes. All these patients had HbA<sub>1c</sub> values >8%. Antenatal and perinatal complications were more with HbA<sub>1c</sub> of >8%.

**CONCLUSIONS:** Poor diabetic control in periconceptional period (HbA<sub>1c</sub> level >8%) leads to abortions and congenital anomalies. Proper diabetic control throughout pregnancy and labour can minimise complications due to macrosomia, polyhydramnios, preterm labour and perinatal problems. Congenital anomalies are the major cause of pregnancy loss in overt diabetic patients. With pre-pregnancy counselling, good glycaemic control, proper foetal surveillance, timely decision on pregnancy termination and mode of delivery and with good neonatal care, a diabetic patient can have normal outcome of pregnancy.

#### REFERENCES:

1. Peter WN, Lucilla Poston, Paul D Tailor. In utero exposure to maternal obesity and diabetes: animal models that identify and characterise implications for future health. *Obstet Gynecol Clin N Am* 2007;34(2): 201–212.
2. Miller E, Hare JW, Cloherty JP. Elevated maternal HbA<sub>1c</sub> in early pregnancy and major congenital anomalies in infants of diabetic mothers. *N Engl J Med* 1981;304:1331-1334.
3. Chris Feudtner, Steven G Gabbe. Diabetes and pregnancy: four motifs of modern medical history. *Clin Obstet Gynecol* 2000;43(1):4-16.
4. Gabbe SG. A story of two miracles: the impact of the discovery of insulin on pregnancy in women with diabetes Mellitus. *Clin Obstet Gynecol* 1992;79(2):295-299.

5. Rosenn B, Miodovnik M, Combs CA, et al. Preconceptional Management of insulin- dependent diabetes: improvement of pregnancy outcome. *Clin Obstet Gynecol* 1991;77(6):846-849.
6. Midovik M, Mimouni F, Siddiqi TA, et al. Spontaneous abortions in diabetic pregnancies: a relationship with glycemic control. *Clin Obstet Gynecol* 1990;75(1):75-77.
7. Johnstone FD, Nasrat AA, Prescott RJ. The effect of established and gestational diabetes on pregnancy outcome. *Br J Obstet Gynecol* 1990;97(11):1009-1015.
8. Hosamane US, Malhotra S, Narang A, et al. Perinatal outcome in relation to maternal glycemic control in diabetic mothers. *Ind J Med Res* 1990;92:216-219.
9. Steel JM, Johnstone FD, Hepburn DA, et al. Can prepregnancy care of diabetic women reduce the risk of abnormal babies? *Br Med J* 1990;301:1070-1074.
10. Sessaiah V, Venkataraman S, Manjula N, et al. Foetal loss in pregnancies associated with abnormal glucose tolerance. *Intnl J Diab Dev Countries* 1991;11:25-26.
11. Piper JM, Langer O. Does maternal diabetes delay foetal pulmonary maturity. *Am J Obstet Gynecol* 1993;168(3 pt 1):783-786.
12. Buchanan TA, Metzger BE, Fienkel N, et al. Insulin sensitivity and  $\beta$ -cell responsiveness to glucose during late pregnancy. *Am J Obstet Gynecol* 1990;162(4):1008-1014.
13. Bertini AM, Silva JC, Taborda W, et al. Perinatal outcomes and the use of oral hypoglycemic agents. *J Perinat Med* 2005;33(6):519-523.