

Research Article

A study of perinatal and neonatal outcome in infants born to diabetic mothers

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ABSTRACT

Background: Diabetes is the common medical complication in pregnancy. It affects about 0.5-5% of all pregnancies. Infants of diabetic mother are at increased risk of periconceptional, fetal, neonatal and long term complications.

Methods: We conducted prospective hospital based study in ESIC MC & PGIMSR, Rajajinagar, Bengaluru during one year period from June 2014 to May 2015 to assess the outcome in infants of diabetic mother and association of various complications to glycaemic status of mother.

Results: The incidence of diabetes in pregnant mothers in our hospital was 3.5%. Various complications like hypoglycaemia, hypocalcaemia, polycythemia, hyperbilirubinemia, macrosomia, prematurity, respiratory distress syndrome, congenital heart diseases were observed in infants of diabetic mothers. Among them hypoglycaemia was most commonly observed complication with frequency of 28% followed by macrosomia (20%). Significant association was found between various complications and glycaemic control in mothers.

Conclusions: High frequency of complications is seen in infants born to diabetic mothers. Strict glycaemic control in mother and proper monitoring in babies is required to prevent morbidity and mortality in infants of diabetic mother.

Keywords: Infant of diabetic mother, Hypoglycaemia, Glycaemic control

INTRODUCTION

Diabetes is the common medical complication in pregnancy. It affects about 0.5 to 5% all pregnancies.¹ It may antedate pregnancy (pre gestational diabetes) or may be detected for the first time during pregnancy (gestational diabetes). Of these 80% are caused by gestational diabetes mellitus as opposed to pre gestational diabetes mellitus.² Infants of diabetic mother are at increased risk of periconceptional, fetal, neonatal and long term complications.³ Infants of diabetic mother are at risk of multitude of metabolic complications and congenital anomalies such as hypoglycaemia, hypocalcaemia, hyperbilirubinemia, polycythaemia, macrosomia, prematurity, respiratory distress syndrome, birth asphyxia, congenital heart diseases, cleft lip, cleft palate and sacral agenesis. A fourfold higher rate of

congenital anomalies of CNS, heart, kidneys, intestine and skeletal system has been documented in IDMs, suggesting a strong association between congenital anomalies and glycaemic control.⁴ Perinatal mortality among offspring of diabetic mothers still remains high. The cause of increased perinatal morbidity and mortality is not known but has been attributed to increased insulin levels in babies leading to hyper anabolism. Studies have shown that strict control of maternal glucose during pregnancy has a favourable influence on the perinatal outcome.⁵

In view of high mortality and morbidity associated with babies born to diabetic mother, need for closer monitoring of these babies is essential. The present study was aimed to know the perinatal outcome and its relation to glycaemic control in mothers (HbA1c levels).

METHODS

This prospective hospital based study was conducted at ESIC MC & PGIMSR, Rajaji nagar, Bengaluru, Karnataka during the period from June 2014 to May 2015. All the infants born to diabetic mother in our hospital were admitted to NICU for evaluation. Maternal history was taken and detailed examination of those babies was done. Laboratory investigations like blood sugar, serum calcium, serum bilirubin, haematocrit were carried out. Chest X ray, ECG, 2D echo was done in selected cases. Maternal blood glucose and HbA1c levels were noted. The mothers were grouped into pregestational diabetes and gestational diabetes mellitus. GDM was defined as any degree of glucose intolerance with onset or first recognition during pregnancy.⁶ GDM diagnosis made if plasma glucose values met or exceed:

Fasting: 92 mg/dl (5.1 mmol/l)
 1 hr.: 180 mg/dl (10 mmol/l)
 2 hr.: 153 mg/dl (8.5 mmol/l)

The mothers with HbA1c levels less than 8.5% were labelled as having a satisfactory glycaemic control whereas mothers with HbA1c levels more than 8.5% were grouped as having unsatisfactory glycaemic control.⁷ We analysed the data by using two tailed Z test.

RESULTS

During the one year study period from June 2014 to May 2015 there were 3400 deliveries in our hospital of them 120 (3.5%) were diagnosed to have diabetes mellitus. Diabetic mothers with gestational diabetes mellitus (GDM) were 105 (87.5%) while pregestational diabetes

was seen in 15 mothers (12.5%). Among the GDM mothers 19% (20/105) received insulin therapy during pregnancy whereas 81% (85/105) were managed on diet alone. 68.3% (82/120) mothers with diabetes had HbA1c value <8.5%, whereas 31.6% (38/120) mothers had HbA1c value >8.5%. Vaginal delivery was done in 58% (70/120) cases while 42% (50/120) were delivered by caesarean section. Preterm delivery was observed in 15% (18/120) while the rest were delivered at term. Out of 120 new born IDMs, 60% (72) were males and 40% (48) were females.

Hypoglycaemia at birth was documented in 28% (34/120) of cases and hypocalcaemia was seen in 12.5% (15/120) babies. Macrosomia (birth weight >4 kg) was observed in 20% (24/120) cases while 15% (18/120) were having low birth weight (birth weight <2.5 kg). Hypoglycaemia at birth was strongly associated with macrosomia and low birth weight. Polycythaemia and hyperbilirubinemia were seen in 7% (8/120) and 18% (22/120) cases respectively. 8% (10/120) babies had respiratory distress syndrome, among them four babies required CPAP. No birth injuries were seen in our study.

Congenital anomalies were seen in 16.6% (20/120) cases. Cardiac anomalies were predominant in our study which constituted 80% all congenital anomalies and with overall incidence of 13% (16/120). We had one case each of cleft palate, renal anomaly (hydronephrosis), neural tube defect and arthrogyposis. Among the CHDs, ventricular septal defect was seen in 7 cases, atrial septal defect in 5, transposition of great arteries in 2 and intra ventricular septal hypertrophy in 2 cases. No case of sacral agenesis was found in our study.

Table 1: Frequencies of the neonatal complications observed in our study (n=120).

Complications	GDM	Pregestational diabetes	Total
Hypoglycemia	30	04	34 (28%)
Macrosomia	20	04	24 (20%)
Hyperbilirubinemia	18	04	22 (18%)
Prematurity	16	02	18 (15%)
Low birth weight	16	02	18 (15%)
CHD	12	04	16 (13%)
Hypocalcaemia	12	03	15(12.5%)
RDS	08	02	10 (8%)
Polycythaemia	06	02	08 (7%)

Table 2: Incidence of neonatal complications in relation to maternal HbA1c levels.

Complications	Maternal HbA1c<8.5%	Maternal HbA1c>8.5%	P value
Hypoglycaemia	10/82 (12%)	24/38 (63%)	<0.001
Macrosomia	04/82 (5%)	20/38 (52%)	<0.001
Polycythaemia	02/82 (2.4%)	06/38 (16%)	<0.01

DISCUSSION

In our study, the diabetic mothers constituted 3.5% of all deliveries. This is in conformation with the published data where figures vary from 0.5 to 5%¹. A study by Haider Shirazi et al. from Islamabad has shown an incidence of 1.25%⁸ whereas similar results were found in study by Mangala R et al. from St. John's medical college hospital, Bangalore (0.7%).⁹ In our study GDM was found in 87.5% and pregestational diabetes in 12.5% cases. A study by Mohammad Hussain, Mohammad Irshad has shown incidence of 71.4% of GDM cases.¹⁰ Similar results were seen in study by Haider Shirazi et al. (84%).

Hypoglycaemia accounted to 28% (34) cases in our study and it was the most common complication. Similar results were found in study by Haider Shirazi et al. and Peace I Opera et al.¹¹ (28% and 64% respectively). Macrosomia was found to be second most common complication in our study with incidence of 20%. These results were in comparison with other studies by Mohammad Hussain, Haider Shirazi et al. and Mangala R et al. who have found macrosomia in 40%, 16% and 36.8% respectively. Incidence of preterm deliveries in our study was 15% which is in comparison to study by Haider Shirazi et al. where the incidence was found to be 19%. Whereas study by Niranjana Thomas has shown high incidence of preterm deliveries (35%).¹² The incidence of congenital anomalies in our study was 16.6% whereas few studies have shown incidence of 34%.⁸ Congenital heart diseases accounted for 80% of all the congenital anomalies. A study by Haider Shiraz et al. has shown incidence of 32% of all IDMs (94% of all congenital anomalies) whereas study by Mohammad Husain et al. showed lower incidence of 4.7% of all IDMs.¹⁰ In our study we observed strong association between neonatal complications like hypoglycaemia, polycythaemia and macrosomia with poor maternal glycaemic control. Incidence of complications was more in mothers with HbA1c levels >8.5%. Similar results were found by Haider Shiraz et al. and others.

No deaths were seen in our study. This is in accordance to the literature report from western countries but the figures from some countries are higher, up to 7.5%.¹³ The good survival rate in our study could be due to good maternal and neonatal services in our hospital otherwise other factors contributing to the mortality were same.

CONCLUSION

The data in our study indicate that there was a high frequency of complications associated with IDMs. Poor glycaemic control in the pregnancy led to large for gestational age babies with higher frequency of other complications. Prompt treatment of pregnant mother is essential to have good glycaemic control so that perinatal and neonatal complications can be reduced. Babies born

to diabetic mothers should be monitored properly to reduce the morbidity and mortality.

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