

Original Research Article

Clinical profile and outcome of infant of diabetic mother in a tertiary care sick newborn care units

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ABSTRACT

Background: Diabetes mellitus is the most common metabolic disorder complicating pregnancy. The incidence of pre-gestational (type 1 and type 2) and gestational diabetes mellitus is on the rise in India. Authors aimed to study the clinical profile and outcome of the infant of diabetic mothers.

Methods: The study was conducted in the Sick Newborn Care Unit attached to Stanley Medical College in Chennai over a period of 6 months. All infants born to diabetic mothers during the study period were included in the study.

Results: Among the total of 6236 babies delivered in total during the study period, 566 (9.07%) were born to diabetic mothers. 16.25% were pre-gestational diabetic mothers and 83.75% were GDM Mothers. The incidence of prematurity was 15.2% and LGA was 7.9%. The majority were AGA (495 out of 566). Symptomatic hypoglycemia was observed in 16 babies and asymptomatic hypoglycemia in 35 babies with total occurrence of hypoglycemia in 9% of babies. Hyper-bilirubinemia is the most common problem encountered in 29% of babies, congenital heart disease and renal problems were the most common congenital anomalies noted in IDM 44 out of 566 babies (7.8%).

Conclusions: Early detection and optimal management of diabetic status during the antenatal period along with anticipation, early recognition and management of postnatal complications will reduce the mortality of infants of diabetic mothers.

Keywords: Congenital anomalies, Gestational diabetes, Hypoglycemia, Hyper-bilirubinemia, Pre-gestational diabetes

INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disorder due to either insulin deficiency (relative or absolute) or due to peripheral tissue resistance to the action of insulin. The prevalence of diabetes is increasing globally and India is no exception. Diabetes in pregnancy is associated with increased risk of fetal, neonatal and lifelong complications in the offsprings.¹ Pre-gestational diabetes is present in 1% to 2% of all pregnancies and 13% to 20% of diabetes in pregnancy. This includes women with type 1 diabetes and type 2 diabetes that have been diagnosed & treated prior to conception. Type 2 pre-gestational diabetes mellitus (PGDM) is now more

common than type 1 as obesity prevalence and its associations climb.

Gestational diabetes (GDM) is defined as any carbohydrate intolerance first diagnosed during pregnancy. GDM prevalence has been increasing and GDM currently complicates up to 14% of all pregnancies and amounts for the vast majority of all cases of diabetes in pregnancy.¹

Women with diabetes in pregnancy (type1, type2 and gestational) are at increased risk of adverse pregnancy outcomes. Adequate glycemic control before and during pregnancy is crucial in improving outcome.²

Diabetic mothers have a higher incidence of polyhydramnios, pre-eclampsia, pyelonephritis, preterm labour and chronic hypertension. Their fetal mortality rate is greater than that of the non-diabetic mother, especially after 32 weeks. Most infants born to a diabetic mother are large for gestational age. If diabetes is complicated by vascular disease, infants may be growth restricted. The neonatal mortality rate is 5 times greater than that of non-diabetic mothers.²

The incidence of congenital malformation is dependent upon peri-conceptional glucose levels and many cases with unrecognized diabetes enter prenatal care beyond the organogenesis period. Insulin has been the primary mode of therapy for diabetes complicating pregnancy for many decades. Some of the adverse effects of diabetes in pregnancy can be prevented by the preconceptional counseling, careful planning of mode and time of delivery, better glycemic control, early screening for fetal abnormalities and good neonatal care.

Short term neonatal complications such as hypoglycemia, hypocalcemia, RDS, hypomagnesemia, hyperbilirubinemia or related mainly to fetal hyperinsulinemia, hypoxia and prematurity. Long term complications include an increased rate of childhood and adolescent obesity, impaired glucose tolerance or diabetes mellitus and subtle neuro-psychological dysfunctions.

Authors aim was to study the clinical profile and outcome of the infant of diabetic mothers.

METHODS

The study was conducted at the Sick Newborn Care Unit (SNCU), Govt. RSRM lying in the hospital, and attached institution of Govt. Stanley medical college, Chennai. It was a hospital-based prospective, observational and descriptive study. The study was done for a period of 6 months from May 2019 to October 2019.

Inclusion criteria

All newborn babies born to women known to have diabetes mellitus prior to conception (pre-gestational diabetes mellitus) and those born to women who developed diabetes during pregnancy (gestational diabetes mellitus).

Exclusion criteria

- Infants of diabetes mellitus who were delivered outside (referred from other hospitals after delivery)
- Stillborn babies of diabetic mothers.

The study was approved by the hospital ethical committee. Data regarding the diabetic status of the mother was obtained from antenatal records.

Gestational diabetes was diagnosed based on Carpenter-Coustan criteria after an oral glucose tolerance test. Mother's antenatal history and other associated obstetric and medical problems were noted.

All the deliveries were attended by the pediatrician and the babies evaluated first hand to avoid observer bias. All the babies were shifted to NICU and detailed examination was performed at the time of admission and then daily during the hospital stay and finally at the time of discharge from the hospital.

The weight of each baby was recorded and the gestational age was calculated from the New Ballard Gestational scoring chart. They were grouped as appropriate for gestational age (AGA), large for gestational age (LGA), small for gestational age (SGA) by plotting their weight and gestational age in Fenton's growth chart.

All neonates underwent investigations like complete blood count, X-ray chest, the metabolic profile including blood sugar, serum calcium. Serum bilirubin, ABG analysis & hematocrit were done on a need basis. Blood sugar was done on 0, 1, 2, 3, 6, 12, 24, 36 and 48 hours for the first 48 hours of life by the standard heel prick using glucose reagent strip method.³

All the neonates suspected of having congenital heart disease on clinical grounds, chest X-ray and 4 limb pulse oximetry screening underwent Transthoracic Doppler echocardiography.

All the information was recorded in a pre-structured proforma. Any neonatal complications, if identified in particular hypoglycemia were managed as per the standard protocols outlined for this condition.

RESULTS

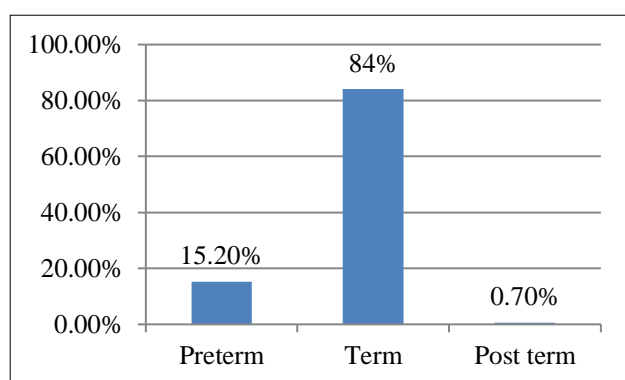
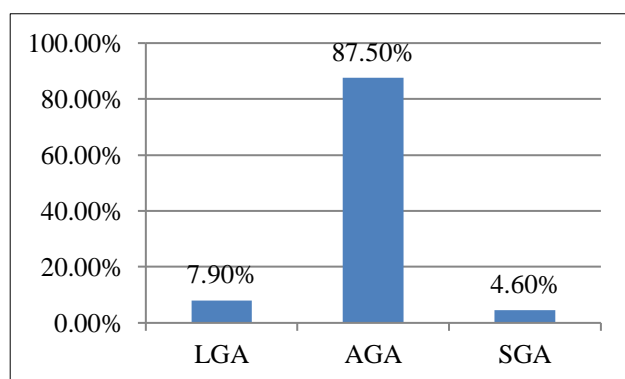
During the study period of six months between May 2019 to October 2019, there were 6236 live births in our hospital. Among them 566 babies were born to diabetic mothers (Both pre-gestational and gestational diabetes). This accounts for 9.07% of total live births during the period. Among the 566 neonates, 92 (16.25%) were born to pre-gestational diabetes and 474 (83.75%) were born to gestational diabetic mothers. The percentage of pre-gestational diabetes was 1.47% and gestational diabetes was 7.6% among total live births in our study (Table 1).

Only 86 babies out of the 566 (15.2%) were born preterm and 476 (84%) babies were term. 4 babies were post-dated (Figure 1).

The majority of the babies were born appropriate for gestational age (AGA). 495 (87.5%) were AGA, 45 babies (7.9%) were large for gestational age (LGA) and 26 babies (4.6%) were small for gestational age (SGA) (Figure 2).

Table 1: Number of pre-gestational diabetes and gestational diabetes delivered month-wise.

Month	Pre-gestational diabetes	Gestational diabetes	Total IDM babies delivered	Total deliveries
May	26	74	100	1027
June	7	52	59	986
July	13	56	69	913
Aug	26	64	90	1070
Sep	11	108	119	1044
Oct	9	120	129	1196
Total	92	474	566	6236
Percentage	1.47%	7.6%	9.07%	

**Figure 1: Distribution of neonates according to gestational age.****Figure 2: Distribution of neonates according to birth weight classification.**

Hypoglycemia occurred in 51 babies (9%) of all IDM babies. 35 babies had asymptomatic hypoglycemia and were managed with oral feeds and maintenance fluid. 16 babies had symptomatic hypoglycemia that required Glucose infusion.

Hypocalcaemia was observed in 4.1% (23 out of 566) babies. Polycythemia was seen in 62 babies (10.96%). Hyperbilirubinemia was the most common problem encountered in IDM Babies in our institution. 165 babies had elevated serum bilirubin levels that required phototherapy.

Among the congenital anomalies, cardiac anomalies were the most common. 34 babies had congenital heart disease among which ASD and VSD were the most common.

Total 8 babies had renal anomalies among which Hydronephrosis and Dilated Pelvicalyceal system were predominant, 2 babies had Dysmorphic facies with limb anomalies, 6 among the 566 IDM neonates delivered during the study period died in our SNCU, 3 babies died of cardiac anomalies and 1 baby died of severe birth asphyxia.

DISCUSSION

India is a developing nation with the largest number of diabetic patients in the world. The WHO has projected that prevalence is increasing in epidemic especially in developing nations.

The present study was conducted in a tertiary care hospital Sick Newborn Care Unit in Chennai. During the study period of 6 months there were 6236 live births in the hospital at an average of 1040 deliveries per month and 35 deliveries per day.

In the present study, the prevalence of total diabetes during pregnancy was 9.07%. Gestational diabetes was 7.6% and pre-gestational diabetes was 1.47% in our study. Cloherty et al in Newborn care manual have given pre-gestational diabetes contributes to 1-2% of all pregnancies and 13-21% of diabetes complicating pregnancy.¹ In our study pre-gestational diabetes contributed to 16.25% of all diabetes complicating pregnancy and 1.47% of all pregnancies.

Cloherty et al in Newborn care manual has given that GDM complicates 6-8% of all pregnancies.¹ In our study the prevalence of GDM was 7.6%. Elango et al in his study have given the prevalence of total diabetes during pregnancy at 1.24%.⁴ That majority of the infants of diabetic mother babies were born term 83.75% in our study with preterm babies contributing to 16.25%. Elango et al in their study had shown a term 81.3% and preterm 17.3% babies.⁴ SY Ingale et al have observed that 76% were born of the term.⁵

In our study, based on birth weight and gestational age, 87.5% were appropriate for gestational age (AGA). 7.9% were large for gestational age (LGA) and 4.6% were small for gestational age (SGA). SY Ingale et al in their study have observed macrosomia in 14% of their babies.⁵ Wasim Rafiq et al had 2% of babies as SGS.⁶

Hypoglycemia as a complication in the immediate newborn period was observed in 9% of babies, among which 68.6% were asymptomatic and 31.4% were symptomatic. The incidence of hypoglycemia was less when compared to other studies. This may be due to most of our patients were urban educated antenatal mothers with better control of their diabetic status during their 3rd trimester.

Statistically 29% of babies developed hyperbilirubinemia as a complication during the first week of life. This was comparable to the results of Yashwanth Rao et al study at their 45% hyperbilirubinemia and Uchendu O. Uchendu et al study of 40.7% hyperbilirubinemia.^{7,8}

Congenital heart disease was the most common congenital anomaly noted in the study, among which ASD and VSD were the most common. The incidence of heart disease was less when compared with other studies, maybe due to only symptomatic babies, infants who presented with the murmur and abnormal four limb saturation by pulse oximetry were subjected to echocardiogram in our study. Only 6 babies out of 566 IDM neonates died, 3 were due to complex heart disease and 1 died of severe birth asphyxia. Overall mortality was compatible with other studies.^{9,10}

CONCLUSION

The incidence of gestational diabetes and pre-gestational diabetes complicating pregnancy is on the rise. Screening of all pregnant mothers and early detection of their metabolic complications of pregnancy helps in reducing the incidence of congenital anomalies. Optimal control of the glucose level in the antenatal period and careful monitoring and feeding in the immediate postnatal period of the babies helps in reducing the immediate postnatal metabolic complications of these neonates.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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