

## Study of Clinical Profile of Infant of Diabetic Mother and Evaluation of Perinatal Outcome: An Observational Study

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### Abstract

**Background:** Because of sedentary lifestyles, urbanisation, and rising rates of obesity, diabetes has now spread throughout the world and is becoming more common in developing countries like India. Pregnancy-related cases of diabetes are continuously increasing, most likely concurrently with the increased prevalence of obesity among women of childbearing age. Women who have diabetes are more likely to experience perinatal/neonatal difficulties (such as prematurity, respiratory distress, and metabolic abnormalities including hypoglycemia and electrolyte derangements) and foetal issues (such as congenital malformations, foetal growth abnormalities, and stillbirth). The purpose of this study is to evaluate the perinatal outcome and the clinical profile of a diabetic mother's infant.

**Methods:** From May 2022 to October 2022, the current observational study was carried out in department of Pediatrics at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar. The study includes a total of 46 infants delivered to diabetic mothers. An oral glucose tolerance test, history, and HbA1C are used to screen for gestational diabetes. Preeclampsia, macrosomia, foetal congenital abnormalities, preterm, and perinatal death are only a few of the severe maternal and newborn outcomes associated with poor early glycemic management of the mother during the prenatal period.

**Result:** 46 infants in total were studied. The most frequent complication is hypoglycemia (40%) followed by hyperbilirubinemia (28%), polycythemia (12%), respiratory distress (26%), macrosomia (28%), cardiac anomalies {septal hypertrophy (21%), PDA (17%), and VSD (8%)}. Less common complications are cleft palate (4%), undescended testis (8%).

**Conclusion:** In this study, we discovered that newborns of diabetes mothers with uncontrolled hyperglycemia had a higher incidence of metabolic and structural problems. To optimise maternal and newborn outcomes, it is crucial to keep track of glucose management and HbA1C levels. Neonatal morbidity risk is directly correlated with maternal blood sugar levels. To identify a neonate with asymptomatic hypoglycemia, strict glucose monitoring is necessary.

**Keywords:** Newborn, Diabetic And Perinatal.

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**Introduction**

Pregestational type 2 diabetes is more common than type 1 diabetes, with gestational diabetes accounting for the majority of births to diabetic mothers. Based on periconceptional glycemic management, pregestational diabetes has a substantial connection with congenital anomalies, perinatal mortality, and prematurity [1]. Macrosomia, postnatal hypoglycemia, preterm, metabolic problems such as obesity, decreased glucose metabolism, and probable reductions in long-term neurodevelopmental outcomes later in life are common neonatal morbidities associated with diabetes in pregnancy [2].

Increased insulin resistance is a characteristic of pregnancy itself as the pregnancy advances, peaking in the third trimester [3]. The effects of several placental hormones, including human placental lactogen, progesterone, prolactin, placental growth hormone, and cortisol, result in a condition of relative insulin resistance during pregnancy [4]. While pregnancy hormones provide a setting for the fetus's proper development, the pregnant state allows a smaller window of opportunity for a woman's susceptibility for

carbohydrate intolerance to become apparent [5].

**Material and Methods**

The data of the mother's diabetic state was analysed from historical records at SKMCH, Muzaffarpur, Bihar, from May 2022 to October 2022, resulting in a total of 46 infants of diabetic mothers.

The estimation of FBS and postprandial blood glucose level to determine the glycemic state. Fasting glucose should be under  $\leq 95$  mg/dL, one-hour post-meal glucose should be  $\leq 140$  mg/dL, and two hours post-meal glucose should be  $\leq 120$ mg/dl.

Mother's prenatal histories should include socioeconomic status, diabetes in the family, past cases of macrosomic newborns, and USG reports. For diagnosis of gestational diabetes or during the first trimester for pregestational diabetes, mothers' HbA1c levels should be evaluated. This study followed 46 newborns born to diabetic mothers. In this study, diabetic mothers with other known disorders such as hypertension, asthma, or TB were not included.

**Results****Table 1: Demographic Profile**

S. No.	Sex	No. of cases	Percentage
1	Male	26	56%
2	Female	20	44%
<b>Urban-Rural Distribution</b>			
1	Urban	13	28%
2	Rural	33	72%

There was follow-up on 46 newborns. Since this study is being conducted in a rural region, 33 (72%) of the cases are from the rural sector, and 13 (28%) are from urban women. Male: 26 (56%) and female: 20 (44%) by sex.

**Table 2: Demographic Profile**

S. No.	Birth Weight	No. of cases	Percentage
1	Small for gestational age were	7	16%
2	Large for gestation age	13	28%
3	Appropriate for gestation age	26	56%

Mothers with HbA1c >7 and inadequate glycemic control were 32, or 64% of the population. Based on birth weight, 16 percent (n=7) of babies were underweight for their gestational period, 56 percent(n=26) were within the normal range for gestation period, and 28 percent(n=13) were overweight for gestation period.

**Table 3: Metabolic complication**

S. No.	Metabolic complication	No. of cases	Percentage
1	Hypoglycemia	20	40%
2	Hyperbilirubinemia	14	28%
3	Hypocalcemia	6	12%
4	Polycythemia	6	12%
5	Respiratory distress	13	26%
6	IUD	2	04%
7	Cleft palate	2	04%
8	Undescended testis	4	08%
9	<b>Cardiac defects</b>		
	Septal hypertrophy	10	21%
a	PDA	8	17%
b	VSD	4	08%
C	ASD	2	04%

20 newborns (40%) with hypoglycemia, 12 of them were LGA, 14 infants (28%) had hyperbilirubinemia, 6 (12%) had hypocalcemia, and 6 (12%) had polycythemia. 13 (26%) infants were found to have respiratory distress. Among cardiac defects- Septal hypertrophy was present in 10 (21%), PDA in 8 (17%), VSD in 4 (8%), ASD in 2(4%). IUD in 2(4%), cleft palate in 2(4%), and undescended testis in 4(8%).

## Discussion

The frequency of abnormalities is directly correlated with hyperglycemia during organogenesis (weeks 5 to 8 of gestation), which is manifested by an increase in HbA1C levels. Preeclampsia, macrosomia, foetal congenital abnormalities, preterm, and perinatal mortality are only a few of the severe maternal and neonatal outcomes that are correlated with poor early glycemic management [6]. A diabetic fetopathy caused by maternal hyperglycemia in the second and third trimesters is characterised by macrosomia, hyperinsulinemia, and foetal hyperglycemia. Increased metabolic rates

and higher oxygen consumption are also effects of chronic foetal hyperinsulinemia [7]. Fetal hypoxemia could result from the placental flow not providing enough oxygen. As a result, the foetus experiences enhanced erythropoiesis and metabolic acidosis.

Polycythemia and enhanced catecholamine production are caused by increased erythropoietin synthesis. Fetal hypertension and cardiac hypertrophy are caused by elevated catecholamine levels. Additionally, polycythemia leads to a shift

of iron storage from developing organs to the mass of red blood cells (RBCs), which may have an impact on cardiac and neurodevelopment [8].

### Conclusion

After birth of infants of a diabetic mother, rigorous glycemic control is needed because 40% of newborns developed hypoglycemia. Since IDM has a high incidence of structural and cardiac problems, metabolic testing for hypocalcemia, polycythemia, and hyperbilirubinemia is advised, and 2D echo is suggested to rule out cardiac anomalies. Infants should be closely monitored for any respiratory distress and hypoglycemia.

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