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Original Article

Immediate Outcomes in Neonates Born to Diabetic Mothers

Vijay Kumar Sah*, Sunil Kumar Yadav, Arun Giri, Sandip Kumar Singh

Department of Pediatrics and Neonatology, Nobel Medical College and Teaching Hospital, Biratnagar, Nepal

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Abstract

Background

Infants born to diabetic mothers are at a higher risk of developing complications like macrosomia, hypoglycemia, hypocalcemia, hypomagnesemia, polycythemia, hyperbilirubinemia, prematurity, transient tachypnea of newborn, respiratory distress syndrome, birth asphyxia, congenital heart diseases etc. The predominant causes of mortality are congenital anomaly, birth trauma, respiratory distress syndrome, prematurity and unexplained still birth. Hence this present study was conducted to study the incidence of complications among neonates of diabetic mothers.

Materials and Methods

This was hospital-based observational study conducted in NICU and postnatal ward of a tertiary care hospital among 55 neonates. A detailed maternal history and complications during labor were recorded. Investigations like glucose estimation, PCV, serum calcium, serum bilirubin were done. The incidence of complications was assessed in terms of frequency and percentage.

Results

Complications related to maternal diabetes were observed among 33 (18.15%) neonates. They were hypoglycemia, hypocalcemia, hyperbilirubinemia and polycythemia. Among them, hypoglycemia was the most common complication observed among 13(23.63%) neonates followed by hyperbilirubinemia among 10 (18.18%) neonates.

Conclusion

Hypoglycemia was the most common complication followed by hyperbilirubinemia among infants born to diabetic mothers.

Keywords: *Diabetes mellitus, Neonates, Outcome, Pregnancy*

***Corresponding Author:**
Dr. Vijay Kumar Sah
Associate Professor
Email: drvks18@gmail.com
ORCID: https://orcid.org/0000-0003-2832-937X

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Introduction

Diabetes Mellitus refers to a group of common metabolic disorders that share the common phenotype of hyperglycaemia [1]. It may be before pregnancy (pre-gestational or overt diabetes) or may be detected for the first-time during pregnancy (gestational diabetes).

Infants born to diabetic mothers (IDM) are at increased risk of complications which may be periconceptional, fetal, or neonatal and even long term [2]. They are also at a higher risk of congenital anomalies like macrosomia, hypoglycemia, hypocalcemia, hypomagnesemia, polycythemia, hyperbilirubinemia, prematurity, transient tachypnea of newborn, respiratory distress syndrome, birth asphyxia, congenital heart diseases like interventricular septal hypertrophy, transient hypertrophic sub aortic stenosis, cardiomyopathy, cleft lip, cleft palate, sacral agenesis, jitteriness, seizures, movement disorders [3]. Glucose is the principal substrate for cerebral metabolism, and neonatal hypoglycaemia can cause damage to both neuronal and glial cells, resulting in severe handicap or death [4].

Infants of diabetic mothers (IDMs) have experienced a nearly 30-fold decrease in morbidity and mortality rates since the development of specialized maternal, fetal, and neonatal care for women with diabetes and their offspring [5]. Predominant causes of mortality are congenital anomaly, birth trauma, respiratory distress syndrome, prematurity and unexplained still birth [6]. The objective of the study was to know the complications of babies born from diabetic mother.

Hence there is a need to diagnose diabetes mellitus early in pregnancy and having the knowledge about outcomes among neonates of diabetic mothers. So, the present study was conducted to study the incidence of complications.

Material and Methods

This was a hospital-based observational study conducted in NICU, Nursery and Postnatal ward of Nobel Medical College Teaching Hospital Biratnagar over a period of one year from March 2022 to February 2023. All live babies born to mothers with GDM or pre-gestational DM and admitted in NICU, Nursery and Postnatal ward were enrolled in study. All babies born from diabetic mother were included in study. Cases of twin pregnancy and severe congenital malformations were excluded from study. Ethical clearance was taken from the institutional ethical committee. The sample size was calculated by using the formula $N = z^2 \times p \times q / e^2$. Using formula we get a sample size of 197. However, during the duration of study of 1 year, we expect only about 70 maternal diabetic patients will visit the hospital for delivery (based on previous records). So, using correction for finite population, we have the corrected sample size of 55.

After obtaining written consent from the parents of the newborn, maternal history and complications during labour were recorded. APGAR scores were assessed and investigation for glucose estimation, PCV, serum calcium and serum bilirubin were sent. Chest X-ray was done in babies with respiratory distress. Echocardiography was done in suspected case of congenital heart diseases. Data was entered into excel and analysed by SPSS 20.0. Descriptive statistics were used for analysis.

Results

This was a prospective hospital-based study conducted at a tertiary care hospital, Nobel Medical college teaching hospital Biratnagar over a period of one year from March 2022 to February 2023 among 55 neonates. Majority of neonates 39(70.90%) were males and 14 (25.45%) neonates were females. Maximum number of mothers 39(70.90%) have Gestational diabetes mellitus and were primigravida as shown in Table 1. Maximum number of neonates 40 (72.72%) were delivered at term and by LSCS 39 (70.90%) neonates as shown in Table 1. Respiratory distress was the most common clinical presentation which was present among 21(38.18%) neonates and maximum number of neonates 35(63.63%) were having birth weight Appropriate for gestational age (AGA) as shown in Table 2.

Among the comorbidities, Hypothyroidism and Hypertension was present among 14(25.45%) and 09(16.36%) mothers respectively. On 2D Echocardiography, 44(80%) neonates were normal and atrial septal defect (ASD) with Patent ductus arteriosus (PDA) was present among 03(5.45%) neonates. Cyanotic heart disease was observed among 02(3.63%) patients. On Chest X-ray, Respiratory distress syndrome (RDS) and pneumonia was observed among 06 neonates and 05 neonates respectively. Transient tachypnoea of newborn (TTN) and Meconium aspiration syndrome (MAS) was observed among 02 neonates. Among the complications, hypoglycaemia was the most common complication observed among 13(23.63%) neonates followed by hyperbilirubinemia among 10(18.18%) neonates. Hypocalcaemia was observed among 07(12.72%) neonates and polycythaemia among 03(5.45%) neonates as shown in Table 3.

Table 1: Maternal and neonatal characteristics of diabetic mothers

Maternal and neonatal characteristics	Frequency (N=55)	Percentage
Gender		
Male	39	70.90
Female	14	25.45
Unknown	02	3.63
Type of DM		
GDM	39	70.90
Pregestational DM	16	29.09
HbA1c		
Not applicable	06	10.90
>6.5	23	41.81
<6.5	26	47.27
Gravida		
Multigravida	19	34.54
Primigravida	36	65.45
Gestational age		
Preterm	15	27.27
Term	40	72.72
Type of delivery		
LSCS	39	70.90
NVD	16	29.09

Table 2: Clinical presentation and Birth weight of neonates

Clinical presentation and Birth weight	Frequency (N=55)	Percentage
Clinical presentation		
Asymptomatic	13	23.63
Lethargy	11	20.00
Refuse to feed	05	9.09
Jitteriness	02	3.63
Respiratory distress	21	38.18
Palsy	05	9.09
Birth weight		
AGA	35	63.63
SGA	06	10.90
LGA	14	25.45

Table 3: Distribution of neonates according to Complications

Complications	Frequency (N=55)	Percentage	Mean ± SD
Hypoglycemia	13	23.63	29.23±6.19
Hyperbilirubinemia	10	18.18	13.91±2.10
Hypocalcemia	07	12.72	6.65±0.17
Polycythemia	03	5.45	66.11±5.80

Table 4: Outcome among neonates

Outcome	Frequency	Percentage
Discharge	51	92.72
Death	02	3.63
LAMA	02	3.63
Total	55	100.0

Discussion

This was a hospital-based observational study conducted at a tertiary care hospital in Biratnagar among 55 neonates. In this study, majority 39 (70.90%) neonates were males delivered by LSCS 39 (70.90%) at term 40 (72.72%) and maximum number of mothers 39 (70.90%) were having Gestational diabetes mellitus.

Similar to our study findings, Anjum Sk et al also observed that majority of the neonates were males 55 (55%) and also majority of mothers 86 (86%) were having Gestational diabetes mellitus [3]. Hypoglycemia was the most common complication among 54% neonates similar to our study. There is supporting evidence to our findings in an article by A Stanescu et al stating that nnewborns from diabetic mothers, including diabetes type 1 and 2 and gestational diabetes, represent the group with the highest risk of developing symptomatic hypoglycaemia in the immediate hours after birth [7]. This metabolic risk is believed to be due to the relative foetal hyperin-sulinism, manifested as a feedback mechanism for the balance of the high glucose levels induced by the maternal diabetes.

Mahmood CB et al also observed that majority of mothers 31 (59.6%) were having gestational diabetes mellitus and 21 (40.38%) were having pregestational diabetes mellitus [8]. They also observed that significant number 42 (82.6%) IDMs were delivered by caesarean section which was almost similar to our study findings. Similarly, in a study conducted by OB Ogunfowora et al, 58% of the subjects were delivered by caesarean section [9]. 12 (50%) babies were macrosomic while the most common morbidities among the subjects were hypoglycaemia, neonatal jaundice, and birth asphyxia which were observed in 75%, 75%, and 33.3% of the study population.

Similarly, Bajrond Eshetu et al also observed that 57.8% delivered by caesarean section, 39.9% by spontaneous vaginal delivery [10]. On the contrary, they observed that among the fetal outcomes, preterm delivery was present among 17.9% neonates which were the most common followed by macrosomia among 17.6% neonates. Contrary to our study findings, in a study conducted by Salima A et al, macrosomia was the most common neonatal complication observed among 40 (44.4%) neonates followed by congenital anomalies among 24 (26.7%) neonates [11].

Similar to our study findings, in a study conducted by Chirag Shah et al, hypoglycaemia (20.5%) was the most common metabolic complication followed by pathologic hyperbilirubinemia (19.1%) and respiratory distress (19.1%) [12]. In our

study, the outcome was death among 02(3.63%) neonates. These findings are almost similar to the study conducted by Shazia Imdad et al in which they also observed that about 03(3.75%) neonates expired [13].

In our study, majority 35(63.63%) neonates were AGA and 14 (25.45%) neonates were LGA. These findings were almost similar to the study conducted by Cordeo et al in which 62% neonates were AGA and 36% neonates were LGA [14]. On the contrary, in a study conducted by JG Ray et al women with pregestational diabetes mellitus were at increased risk (compared to those with gestational diabetes mellitus) for Caesarean delivery (OR 3.6, 95%CI 2.3,5.6) [15]. In a study by Lakshmi M et al, Gestational diabetes was seen in (74%) while pre gestational diabetes (26%) [16]. Congenital anomalies were observed in (33%) cases where cardiac malformations were common of which ASD and PDA predominated. Mortality in their study was 3% and all cases were died due to congenital anomaly which was similar to our study. Limitations of study were small sample size and single center study.

Conclusion

The most common complication observed in this study was Hypoglycemia followed by hyperbilirubinemia.

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Conflict of interest: None

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