

FREQUENCY OF VARIOUS NEONATAL COMPLICATIONS IN INFANTS BORN TO DIABETIC MOTHERS - A HOSPITAL BASE STUDY

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ABSTRACT

Objective: To determine the frequency of various complications occurring in infants of diabetic mothers.

Methodology: This descriptive study was conducted in the neonatal unit and obstetric units of Lady Reading Hospital, Peshawar from January to July 2010. Forty two consecutive cases of infants of diabetic mothers were enrolled in the study. Maternal history especially obstetric history and history regarding diabetes mellitus was obtained and complete neonatal examination was performed. The physical findings and anthropometric measurements were recorded into a printed Proforma. Serum glucose, serum calcium, hematocrit and echocardiography was performed in all enrolled babies.

Results: Out of 42 diabetic mothers, gestation diabetes was seen in 71.4% while pre-conceptional diabetes was seen in 28.5%. The male Infants of Diabetic Mothers in this study were 69%. Infant of Diabetic Mothers delivered by C-section were 45%. Macrosomia 40.4% (n=42) was found to be the most common complication followed by hypoglycaemia 23.8%. The mortality rate in our study was 4.7% (n=2).

Conclusion: This study confirms the high occurrence of complications in newborns, born to diabetic mothers. Large for gestational age and hypoglycemia were the commonest complications.

Key Words: Macrosomia, Diabetes, Pregnancy, Neonates.

INTRODUCTION

Diabetes is one of the commonest and important metabolic disorder that affects the health of pregnant women and infants¹. About 3 – 10% of all pregnancies are complicated by diabetes^{2,3}.

Despite significant improvement in obstetric and paediatric care the preinatal morbidities and mortalities remain high in such pregnancies⁴. Adverse outcomes are not confined to known diabetics (pre-gestational diabetes) alone. Maternal and infant morbidity and mortality is also high amongst gestational diabetes mellitus (developed glucose intolerance during pregnancy)^{3,5}. Infants born to diabetic women are at increased risk compared to those of non-diabetic women^{6,7}. These babies are macrosomic and have a higher haematocrit⁸. They are more likely to be hyperbilirubinaemic⁹, hypocalcaemic and hypomagnesaemic^{10,11}. They have a higher

mortality rate^{5,12}.

They are usually born prematurely and are at greater risk of developing respiratory distress and hypoxic ischaemia¹³.

Infants of diabetic mothers are more likely to be separated from their mothers after birth^{7,14}.

Moreover ignorance, poverty, poor metabolic control and lack of proper obstetric and neonatal care, has worsened the morbidity and mortality of the babies born to diabetic mother in our set-up¹⁵. A study from Europe has shown that babies born to diabetic Asian mothers have worsened outcome as compared to diabetic Caucasian mothers¹⁶. Our objective for conducting this study was to determine the range of complications occurring in infants of diabetic mothers presented to Lady Reading Hospital, Peshawar.

METHODOLOGY

This study was conducted at the neonatal unit and obstetric units of Postgraduate Medical Institute, Lady Reading Hospital, Peshawar from January 2010 to July 2010.

All infants born to diabetic mothers and presented within 24 hours to the neonatal unit, Lady Reading Hospital, Peshawar were included in the study. Infant of Diabetic Mothers presented to neonatal unit after 24 hours of delivery or who had other problems like hypertension, chronic infections etc. were excluded from the study.

Total of 42 diabetic mothers and their newly born infants were studied. Mothers known to have diabetes mellitus before conception were labeled as pre-conceptional diabetes and those mothers who developed glucose – intolerance during pregnancy were regarded as gestation diabetes. All the mothers enrolled after deliveries along with their babies were duly attended by Paediatric Registrar/Senior Paediatrics, postgraduate - resident with the backup of the consultant when required. APGAR scores were assessed and all babies delivered to these diabetic mothers were admitted to Nursery unit, Postgraduate Medical Institute, Lady Reading Hospital, Peshawar for 48 to 72 hours. Relevant information, about the mothers were obtained and a detailed physical examination of the newborns were performed. Detailed physical examination of the newborns, included the anthropometric measurements and their classification as large for gestation age (LGA) [also known as Macrosomia], appropriate for gestational age (AGA) and small for gestational age (SGA) according to the Centile

charts of weight and length. Infants born at a weight greater than the 90th percentile for age (gestational age) are considered LGA for this study while babies born between 10th to 90th percentile were considered AGA and less than 10th percentile as SGA.

Blood glucose level of all enrolled neonates were monitored at birth, then half hourly for 2 hours and later at 4, 8, 12 and 24 hours. Haemoglobin, haematocrit were evaluated at admission and later when required. Serum calcium was estimated at 6 and 24 hours of birth. Echocardiography was performed in all cases and cardiac complications were recorded. Ultrasound brain was carried out in Infants of Diabetic Mothers with birth asphyxia and those with congenital anomalies. Where needed serum bilirubin, X-ray chest, ABGs, Electrolytes, urea, creatinine and Ultrasound skull were performed. All the information was recorded on a formatted printed proforma after taking informed consent from the mother.

RESULTS

A total number of 42 diabetic mothers were included in this descriptive study. The median age of the diabetic mothers was 31 years. The youngest diabetic mother was 22 and the eldest was 40 years old. Thirty one (73%), out of 42 diabetic mothers were multigravida and eleven (26%) mothers were primigravida. Gestational diabetes was seen in thirty (71.4%) while pre-conceptional diabetes-PCD (known diabetic before pregnancy) was seen in twelve (28.5%). Amongst them, twenty (47.6%) mothers received insulin therapy during pregnancy and twenty two (52%) did not take insulin.

Table 1: Profile of the mothers included in the study (n=42)

		No.of mothers	%age
Parity	Primarygravida	11	26
	Multigravida	31	73
Types of the mothers	Booked cases with LRH Obstetrics Unit	15	35.7
	Un-booked cases with LRH Obstetrics Unit	15	35.7
Types of diabetes	Pre-conceptional diabetics	12	28.5
	Gestational diabetics	30	71.4
Therapy	Insulin therapy (during pregnancy)	20	47.6
	Non-Insulin therapy	22	52.3

Twenty nine (69%) of the newborn Infants of Diabetic Mothers were male and thirteen (31%) were female. In 23 (54.7%) the mode of delivery was spontaneous vaginal delivery while 19 (45.2%) were delivered by Caesarean Section. Out of 42 babies, 37 (88%) were born full term, whereas 5(11.9%) were delivered prematurely. Out of all (n=42), 17 (40.4%) were large for gestational age, 24 (57%) were appropriate for gestational age, and 2% were small for gestational age.

Regarding the complications, macrosomia was the most common complication 40.4%, followed by hypoglycaemia 23.8%, perinatal asphyxia 19%, hyperbilirubinaemia 19%, hypocalcaemia 16.6%, birth injury 14% and polycythaemia 12%. Respiratory distress was observed in almost 15% of the newborn Infants of

Diabetic Mothers – including transient tachypnoea of newborn 11.9% and meconium aspiration syndrome 2%.

Of the macrosomic babies 23.8% belonged to mothers with gestational diabetes mellitus (GDM) while 16.6% belonged to preconceptional diabetic mothers (PCD). Macrosomia was also found in association with other complication. Five (62.5%) out of 8 asphyxiated Infants of Diabetic Mothers were macrosomic. 83% of newborn Infants of Diabetic Mothers with birth injuries were contributed by macrosomic babies. In only 2 (4.7%) of the total 42 Infants of Diabetic Mothers, congenital heart defects were noted Ventricular Septal Defect and Patent Ductus Arteriosus and no cardiomyopathy was identified. Two newborn Infants of Diabetic Mothers (4.7%) expired within 72 hours. All other were discharged.

Table 2: Profile of the babies included in the study (n=42)

		Number of babies	%age
Sex	Male	29	69
	Female	13	31
Mode of delivery	Spontaneous Vaginal Delivery	23	54.7
	Caesarean Section	19	45.2
Gestational age	Pre-term	5	11.9
	Full term	37	88

Table 3: Complications found in Infants of Diabetic Mothers babies included in study (n=42)

Complications	Pre-conceptual Diabetics (n)	Gestational Diabetics (n)	Total
Macrosomia	7	10	17 (40.4%)
Low birth weight	1	0	1 (2%)
Perinatal asphyxia	3	5	8 (19%)
Birth injury	2	4	6 (14%)
Hypoglycaemia	2	8	10 (23.8%)
Hypocalcaemia	1	6	7 (16.6%)
Hyperbilirubinaemia	1	7	8 (19%)
Polycythaemia	2	3	5 (12%)
Congenital defects			
Congenital Heart Disease	0	2	2 (4.7%)
Hydrocephalus	1	0	1 (2%)
Transient Tachypnoea of newborn	2	3	5 (11.9%)
Meconium Aspiration Syndrome	0	1	1 (2%)

DISCUSSION

Hypoglycaemia is the most common cause of morbidity in the Infants of Diabetic Mothers and can be a challenging and protracted problem to manage. In our study the hypoglycaemia was noted in 23.8%, which is supported by other similar studies conducted locally and internationally¹⁷⁻²⁰

Macrosomia is another major complication of the diabetic pregnancies contributing heavily to birth injuries and asphyxia^{1, 15}. In this series 40.4% Infants of Diabetic Mothers were macrosomic, which is similar to the data (45%) from Karachi¹⁵. A study from Islamabad reported a relatively lower occurrence of macrosomia (28%), which may be due to a better glycaemic control in mothers. As strict metabolic control with insulin in mothers with gestational diabetes mellitus has proven to attenuate the risk of LGA (macrosomia), diabetic fetopathy and influence of maternal Body Mass Index on fetal growth^{21, 22}.

The commonest obstetric factors leading to perinatal mortality in diabetic pregnancy are related to asphyxia and traumatic vaginal delivery^{15, 23}. The rate of Caesarean Section in our study was 45.2% which is higher than the study from Islamabad (31%) and lower than the study from Karachi (55%) but correlated well with other international data^{15, 19, 22, 24}.

Birth injuries were seen in 14%, which is in accordance with other similar national studies^{15, 19}. In this study 83% of the birth injuries were associated with macrosomia. The birth injuries include 2(33%) fracture humerus, 1(16.6%) fracture clavicle, 1 (16.6%) Erb's Palsy, 1 fracture forearm bones and 3 cephalhaematoma. This is close to that reported in national and international data^{7, 15, 19, 25}.

Perinatal asphyxia was noted in 19% in this series, which is supported by Alam's study (17.5%)¹⁵. Mimouni et al in his prospective study reported 27% perinatal asphyxia, which is high despite the fact that the majority of the women were delivered by caesarean section in their study²⁶. This shows that there are other factors like placental vascular disease and reduced placental blood flow in maternal diabetes – mellitus that predispose the Infants of Diabetic Mothers to hypoxic ischaemia²⁶.

The occurrence of hyperbilirubinemia in this study was 19% which is rather lower than the local and international data^{15, 27}. Increased red cell mass is probably the reason for increased incidence of hyperbilirubinaemia in these babies. As the frequency of polycythaemia in our study was 12% and almost all of them had developed hyperbilirubinaemia. The polycythaemia 12% of

this study is in accordance with the study from Islamabad 8% while lower than the study from Karachi 25% and another international study (29.4%)^{15, 19, 28}

Hypocalcaemia was found in 16.6% in our study, which is similar to the data presented from Karachi 15% and India 14%^{15, 18} while hypocalcaemia reported in the study from Islamabad was high from this study¹⁹.

Congenital Heart Diseases were observed in 4.7% of this study. This is in conformity with a large prospective population based study from Northern England between 1995 and 2000, showed 3.6% Cardiovascular malformations in Infant of Diabetic Mothers²⁹. In our study cardiomyopathy was not identified in any of the babies, which also is in conformity with the results of an International descriptive study carried out by the UK's confidential enquiry into Maternal and Child Health (CEMACH – study)³⁰. But cardiomyopathy has been long recognized as a complication of poorly controlled maternal diabetes⁷, as seen in other local and international data^{15, 19, 31, 32}.

The frequency of respiratory problems TTN and MAS were found in 14.9% in this group. This finding supports the experience and observations of other workers^{18, 33, 34}.

Mortality in this study was 4.7%. This incidence is supported by the study from Karachi 7.5%¹⁵. The mortality could be avoided with proper awareness, better glycaemic control compliance to therapy during pregnancy, good antenatal follow-up and low threshold for C-section.

CONCLUSION

This study confirms the high occurrence of complications in newborns, born to diabetic mothers. Large for gestational age and hypoglycemia were the commonest complications.

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