VOLUME - 10, ISSUE - 07, JULY- 2021 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Paediatrics

NEONATAL OUTCOME IN INFANT OF DIABETIC MOTHER

Dr Songa Narayana Rao — Assistant Professor Of Pediatrics, Department Of Pediatrics , King George Hospital , Visakhapatnam.

Dr Rama Rajyam* — Assistant Professor Of Pediatrics, Department Of Pediatrics , King George Hospital , Visakhapatnam. *Corresponding Author

ABSTRACT

The prevalence of diabetes is increasing globally and India is no exception. The 1997 WHO estimates of the prevalence of diabetes in adults showed an expected total rise of > 120% from 135 million in 1995 to 300 million in 2025. These numbers also include GDM and should alert physicians to the need to direct special attention to this population, especially in developingcountries.[1] Abnormalities of carbohydrate metabolism occur frequently during pregnancy and between 3 and 5 % of all pregnant women show glucose intolerance. Approximately 90% of these women have gestational diabetes.[2] Diabetes is an important cause of maternal and perinatal morbidity and mortality. The present study is aimed to estimate Neonatal outcome in infant of diabetic mother.

Methodology: It was a hospital based cross-sectional study conducted on Neonates of mothers diagnosed to have gestational diabetes mellitus or overt diabetes mellitus of sample size was 50**.** The study was done in NICU King George Hospital, Visakhapatnam during August 2018 to July 2020.

Results: Majority of the infants (74%) were born to GDM mothers and (26%) were born to overt DM mothers. Majority of the infants (56%) were delivered by cesarean section. Most of them were born term (92%) and were males(66%). The mean birth weight was 3.20±0.66 Kg and majority of them were born appropriate for gestational age (80%). Hypoglycemia (52%) was the most common metabolic abnormality, followed by hypocalcemia in (42%).The occurrence of hypoglycemia was statistically significant in infants born to GDM mothers. Polycythemia (44%) was the most common hematologic abnormality, followed by hyperbilirubinemia (42%). Both were significant in infants born to GDM mothers. Congenital anomalies were detected in 16% of the infants. The most common congenital anomaly involved cardiovascular system, in whom VSD was the commonest constituting 50% of all cardiovascular anomalies. Birth injuries were found in 5(10%) IDMs. Erbs' palsy 3(6%) being the commonest, followed by shoulder dislocation and clavicle fracture in 1(2%) each of IDMs. Total deaths were 2(4%).

Conclusion: Most common neonatal out come with neonate of diabetic mother hypoglycemia **(52%)**was statistically significant in infants born to GDM mothers. Polycythemia (44%) was the most common hematologic abnormality, followed by hyperbilirubinemia (42%).

KEYWORDS : Neonatal outcome, Diabetic Mother, hypoglycemia

INTRODUCTION

The prevalence of diabetes is increasing globally and India is no exception. The 1997 WHO estimates of the prevalence of diabetes in adults showed an expected total rise of > 120% from 135 million in 1995 to 300 million in 2025. These numbers also include GDM and should alert physicians to the need to direct special attention to this population, especially in developingcountries.[1] Abnormalities of carbohydrate metabolism occur frequently during pregnancy and between 3 and 5 % of all pregnant women show glucose intolerance. Approximately 90% of these women have gestational diabetes.[2] Diabetes is an important cause of maternal and perinatal morbidity and mortality. Before insulin was discovered in 1921, diabetic women never survived their pregnancy. Pregnancy termination was recommended routinely for pregnant diabetics because of high mortality rates.[3] Historically, infant of diabetic mothers are at significantly greater risk for spontaneous abortion, stillbirth, congenital malformations, perinatal morbidity and mortality.[4] Diabetes mellitus is a chronic metabolic disorder which can be due to either insulin deficiency or due to tissue resistance to the action of insulin.[5]Women are divided into Pregestational or overt type (diagnosed before pregnancy) and those diagnosed during pregnancy as Gestational.[6]The infant born to diabetic mother may have higher risks for serious problems during pregnancy and at birth. Problems during pregnancy may include increased risks of abortions and stillbirths. Abnormal fetal metabolism during pregnancy complicated by maternal diabetes mellitus results in multiple neonatal sequelae, including abnormalities of growth, glucose and calcium metabolism, hematologic status, cardiorespiratory function, bilirubin metabolism, and congenital anomalies.[4] There are various causes of the fetal and neonatal sequelae of maternal diabetes. Most of the complications of the fetus depend on the maternal glycemic control which can be prevented by good periconceptional and prenatal care.[4] The present study is aimed to estimate Neonatal outcome in infant of diabetic mother.

OBJECTIVES:

- To estimate the occurrence of metabolic and hematologic abnormalities in infant of diabetic mothers.
- To estimate the occurrence of congenital anomalies in infant of diabetic mothers.
- To compare the outcome in infants of GDM mothers and overt DM mothers.

METHODOLOGY:

It was a hospital based cross-sectional study conducted on Neonates of mothers diagnosed to have gestational diabetes mellitus or overt diabetes mellitus of sample size was 50**.** The study was done in NICU King George Hospital, Visakhapatnam during August 2018 to July 2020. Inclusion Criteria: Singleton neonates of diabetic mothers.

Exclusion Criteria: Neonates of diabetic mothers with medical complications such as heart disease and renal disease, Neonates of diabetic mothers with pregnancy induced hypertension and eclampsia, Twin neonates of diabetic mothers

All the singleton neonates of diabetic mothers admitted in NICU, King George Hospital were included in the study. Neonates of mothers with other comorbidities like Pregnancy induced hypertension, Eclampsia, Cardiac and Renal diseases were excluded After taking the informed written consent from the parent or guardian, the relevant information from the history, physical examination and investigation

findings were recorded in a predesigned proforma. Maternal characteristics recorded includeage, parity, gestational age, h/o previous abortions, stillbirths and mode of delivery. After the infant is born, assessment was made on the basis of APGAR scores to determine the need for any resuscitative efforts. Baby was weighed and the gestation is assessed. A screening physical examination for the presence of major congenital anomalies was performed. Investigations were performed Blood glucose levels,Serum calcium, Hematocrit, Echocardiography,Ultrasound abdomen, Chest x ray, Total serum bilirubin.

STATISTICAL ANALYSIS:

The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software version 21.0. The presentation of the Categorical variables was done in the form of number and percentage (%). The association of the variables which were qualitative in nature were analysed using Chi- Square test/Fisher's Exact test. For statistical significance, p value of less than 0.05 was considered as significant.

RESULTS:

A total of 50 neonates were studies out of which 37 neonates were born to mothers with gestational diabetes and 13 neonates were born to mothers with overt diabetes.

Table 1: Distribution Of Various Parameters Type Of Delivery, Sex Differentiation, Birth Weight,metabolic Abnormalities,congenital Abnormalities.

TYPE OF DELIVERY	NUMBER	PERNCENTAGE(n=50)
LSCS	28	56
NVD	14	28
AVD	10	19
SEX DIFFERENTIATION		
MALES	33	66
FEMALES	17	34
BIRTH WEIGHT		
2-2.49KG	8	16
2.5-2.99KG	10	20
3-3.49KG	11	22
3.5- 4KG	15	30
>4 KG	6	12
METABOLIC ABNORMALITIES		
HYPOGLYCEMIA	26	52
HYPOCALCEMIA	21	42
POLYCYTHEMIA	22	44
HYPERBILIRUBINEMIA	21	42
CONGENITAL ANOMALIES		
CVS	6	12
VSD	3	50
ASD	2	33.3
SEPTAL HYPERTROPHY	1	16.6
CNS	1	2
RENAL	1	2
BIRTH INJURIES		
ERBS PALSY	3	6
SHOULDER DISLOCATION	3	6
CLAVICLE FRACTURE	1	2

Most of the GDMs were delivered by LSCS (67.6%) and most of the infants of OVERT DM mothers were delivered normally (53.8%). majority of the neonates (62.1% in GDM, 76.9%in Overt DM) were males. Majority birth weights were in the range of 2.0-2.49 kg in overt DM and 3.50-3.99 kg in GDM.

Hypoglycemia was found in most of the infants born to GDM mothers, which is statistically significant.

Hypocalcemia was seen in majority of infants born to GDM mothers.None of the infants were symptomatic and were managed with 8 ml/kg Injection Calcium gluconate 10% IV for 48 hrs followed by 4 ml/kg for 24hrs.

The occurrence of Polycythemia was more in infants born to GDM mothers when compared to the infants of overt DM mothers and was statistically significant. All the 22 infants with polycythemia were managed conservatively with hydration.

The occurrence of hyperbilirubinemia was significantly high in infants of GDM mothers.. All the infants were managed with double surface phototherapy. None of them required exchange transfusion. CNS anomaly Lumbar Myelomeningocele was seen in 1 infant born to Overt diabetes mother and renal anomaly was present in 1 infant born to GDM mother.

DISCUSSION:

Various studies are being conducted worldwide for evaluating the complications of diabetic pregnancies, and changes are being made in the treatment guidelines based on the results of these studies. Both the treating obstetricians and paediatricians should know the newer guidelines in the management of diabetes complicating pregnancies. In the present study, the prevalence of total diabetes during pregnancy was 0.75% and GDM was 0.5%, which was similar to the study undertaken by Ramachandran A et al[7], at Diabetes research centre, Madras in the year 1994 to know the prevalence of diabetes in pregnant women a study from south India, reports that prevalence of total diabetes and GDM were 1.19% and 0.56%, respectively.[7]

In the present study, good glycemic control was observed in 92.85% overt DM mothers whereas; good glycemic control was seen in only 27.5% of GDM mothers. This may be due to the fact that, mothers with overt DM were diagnosed before pregnancy and were advised regarding the complications during pregnancy. Hence strict glycemic control with regular follow up was maintained in them, while most of the mothers with GDM were diagnosed at the time of delivery or retrospectively after the delivery in few cases. Most of the complications occurring in an infant of diabetic mother can be prevented by good glycemic control in the mother with regular follow up and frequent monitoring of blood glucose levels, HbA1clevels and strict adherence to the treatment prescribed.

In the present study, total number of IDMs was 50. Among them 37(74%) neonates were born to gestational diabetic mothers. Among the overt DM mothers, 7(53.8%) were Type 1 and 6(46.2%) were Type 2. The proportions of gestational diabetes and overt diabetes were comparable to previous studies described above.

Comparison of preterm vs term deliveries: In the present study, 92%of IDMs were born term and 8% were born preterm. Similar observation of 93% term and 7% preterm infants was made in Mahmood CB et al[16] in their study. This was different from the study done by Ranade et al[10] and Cordero et al[14], where 36% of the IDMs were reported to be preterms. This difference may be attributed to the fact that, in the study undertaken by Ranade et al[10], all the pregnancy related and medical complications during pregnancy were included.

The incidence of LGA(12%) in our study was similar to study by Ingale et al(15%).All other studies have relatively higher percentage of LGA babies when compared to our study, the lower percentage may be attributed to the intensive glycemic control of the mother and fetal growth monitoring during the antenatal period in accordance to the latest guidelines.

Table 2 : Comparison Of Complications Seen In Idms In Various Studies

Complication	Present Study	Deorari et al[8]	Mangal aet al[9]	Alam et al[12]
Hypoglycemia	52%	16.3%	18.4%	-
Hypocalcemia	42%	2.0%	-	15%
Hyperbilirubinemia	42%	8.4%	15.3%	30%
Birth injuries	10%	-	-	17.5%
Congenital anomalies	16%	3.8%	7.9%	10%

In the present study, hypoglycemia was the commonest problem observed in IDMs seen in 52% of IDMs. The high incidence of hypoglycemia in the present study may be because the cut off level considered for diagnosis of hypoglycemia was 40 mg/dl irrespective of gestational age. In some studies, a lower cut off level has been used to define hypoglycemia in preterm babies and also the cut off level used to define hypoglycemia in general is also less. Since serum bilirubin and serum calcium levels were done as a part of routine screening in our study, hyperbilirubinemia and hypocalcemia were picked up earlier even before the frank clinical manifestations. Hence incidence was found higher when compared to the other studies. The rate of congenital anomalies was also high in the present study (16%), this can be because all IDMs were subjected to 2D – Echocardi ography.

Comparison of hypoglycemia: In the present study, the occurrence of hypoglycemia was statistically significant in infants of GDM. This was different from the studies done by Mahmood CB et al[16] and NiliFirouzeh et al[18], where the incidence of hypoglycemia was statistically significant in overt DM. This difference may be attributed to good glycemic control in overt DM and poor glycemic control in GDM mothers as, in most of the situations, the diabetes was detected during delivery and in few instances, diabetes was diagnosed retrospectively after the delivery.

Comparison of Hypocalcemia: In the present study, the occurrence of hypocalcemia was not significant in either of nfants born to GDM mothers or overt DM mothers. Similar observation was made in the study undertaken by Mahmood CB et al[16]. This was different from the observation made by NiliFirouzeh et al[18] where, the occurrence of hypocalcemia was significantly high in infants born to overt DM mothers. This difference may be because of more preterm infants, as the study included all mothers with diabetes during pregnancy. Preterm infants themselves are known to have risk of hypocalcemia where as in the present study, all the pregnancy related and medical complications were excluded. Since serum calcium levels were done as a part of routine screening in our study, hypocalcemia was picked up earlier even before the frank clinical manifestation. Hence incidence of hypocalcemia was found higher when compared to the other studies

In the present study, the occurrence of polycythemia was high in GDM (54.1%) when compared to Overt DM (15.3%) which was similar to the observation made by Mohsin F et al[43] in his study but the overall incidence of polycythemia was less in his study, this can be attributed to the fact that routine hematocrit estimation was done in all our patients even when they didn't show any symptoms leading to higher detection of polycythemia

In the present study, occurrence of hyperbilirubinemia was 51.3% in neonates born to GDM mothers and 15.3% in neonates born to Overt DM mothers. The percentage of neonates born to GDM showing hyperbilirubinemia was lower in the study conducted by NiliFirouzeh et al[18].The incidence of hyperbilirubinemia was higher for neonates born to Overt DM mothers in the study conducted by NiliFirouzeh et al[18], the possible cause can be that all the pregnancy related complications were excluded in the present study whereas complications like Pregnancy induced Hypertension, Twin gestation ,Placental abnormalities which can lead to increase in preterm deliveries thus increasing the incidence of hyperbilirubinemia.

The overall incidence of Hyperbilirubinemia was higher in the present study, this can be due to routine examination of bilirubin levels in all the neonates and also due to higher incidence of polycythemia in the present study.

In the present study, birth injuries occurred in 5(10%) IDM. Erb's palsy 3(6%) was the commonest, followed by shoulder dislocation and clavicle fracture in 1(2%) of IDMs. All the infants who had birth injuries were born to GDM mothers and were delivered vaginally.

Erbs palsy occurs due to injury to c5 and c6 motor roots, the condition is more common in males and injury to supraclavicular portion of the arm is the cause of erbs palsy and therefore a skilled obstetric technique, mainly in the use of forceps should be employed

Clavicle is the most common bone to get fractured in birth injuries, usually it is of greenstick type but occasionally the fracture can be a complete type. Neonatal Clavicle fractures are usually unilateral whereas bilateral clavicle fractures are extremely rare, In the present study unilateral clavicle fracture was present and was managed conservatively.

The incidence of birth injuries was 17.5% in the study conducted by Alam et al and 2% in the study conducted by Ranade et al[10].Cardiac anomaly comparison with other studies: The most common Congenital heart disease in the current study was VSD (50%) followed by ASD (33.3%) and septalhypertrophy(16.6%).All the infants of diabetic mothers admitted to Neonatal intensive care unit were subjected to echocardiography.

In the study done by basavaraj et al[19] the commonest congenital heart disease was VSD followed by ASD and equal percentage of septal hypertrophy and TGA. The results observed were similar to the present study. In the study done by Ingale et al[17] the commonest cardiac defect was ASD (55.2%) followed by PDA (39.4%) and in the study done by HaiderShirazi et al[20] Septalhypertrophy (71.1%) was the commonest congenital heart disease followed by VSD and PDA.

In the present study the mortality rate was only 4% which is identical to the studies done by Deorari et al, sudarshan et al and senthilkumar et al. In the present study, there were 2 deaths. One child died suddenly within 6 hours of life, Evaluation of which could not be done because of poor general condition of the infant, other child with lumbosacral meningomyelocele died on day 3 of life secondary to sepsis.

Limitations of the Study: The sample size of this study was small and it was difficult to compare the complications in mothers with good glycemic control against the complications in mothers with poor glycemic control.

CONCLUSION:

Majority of the infants (74%) were born to GDM mothers and (26%) were born to overt DM mothers. Majority of the infants (56%) were delivered by cesarean section. Most of them were born term (92%) and were males(66%). The mean birth weight was 3.20±0.66 Kg and majority of them were born appropriate for gestational age (80%). Hypoglycemia (52%) was the most common metabolic abnormality, followed by hypocalcemia in (42%). The occurrence of hypoglycemia was statistically

significant in infants born to GDM mothers. Polycythemia (44%) was the most common hematologic abnormality, followed by hyperbilirubinemia (42%). Both were significant in infants born to GDM mothers. Congenital anomalies were detected in 16% of the infants. The most common congenital anomaly involved cardiovascular system, in whom VSD was the commonest constituting 50% of all cardiovascular anomalies. Birth injuries were found in 5(10%) IDMs. Erbs' palsy 3(6%) being the commonest, followed by shoulder dislocation and clavicle fracture in 1(2%) each of IDMs. Total deaths were 2(4%).

REFERENCES:

1. Seshiah V, Balaji V, Madhuri S Balaji, Sanjeevi CB, Green A. Gestational Diabetes Mellitus in India. Japi.2004sept;52:707-711.
2. Fernando Arias, Shirish N Daftary, Amarnath G Bhide. Practical Guide to High-Risk Pregnancy and Delivery: Diabetes and Pregnancy 3rd ed. New Delhi: Elsevier; 2009: p 240- 265.
3. Eleen E Tyrala. Infant of the diabetic mother, Obstetrics and Gynecology Clinics 1996 Mar;23(1):221-241.
4. J.L. Nold, M.K. Georgieff. PediatrClin N Am; 51 (2004):619–637.
5. DuttaDC.Diabetes mellitus in pregnancy.In:DuttaDC.The textbook of Obstetrics. 6th ed. Calcutta: New central book agency; 2006: p 289-290.
6. Cunningham, Leveno, Bloom, Hauth, Rouse, Spong. Diabetes. In: Williams Obstetrics.23rd ed. McGraw Hill;2010: p1104-1126.
7. Ramachandran A, Snehalatha C, Shyamala P, Vijay V, Viswanathan M. Diabetes Res ClinPract. 1994Aug;25(1):71-4.
8. DeorariAK, KabraSK, Paul VK, et al. Perinatal outcome of infants born to diabetic mothers. Indian Pediatrics,1991; 28:1271-1275.
9. MangalaR, MhaskarR, MhaskarA, et al. Perinatal outcome in pregnancies complicated by diabetes. International journal of diabetes in developing countries, 1991; 11: 22-24.
10. Ranade, Merchant AY, Bajaj RH, Joshi RT. Infants of diabetic mothers--an analysis of 50 cases Indian-Pediatr. 1989 Apr; 26(4):366-70.
11. AkhlaghiFand HamediAB. Comparison of Maternal and fetal / Neonatal complications in gestational and pregstational diabetes mellitus. ActaMedica Iranica, 2005; 43 (4):263-267.
12. AlamM, RazaSJ, Sherali AR and AkhtarSM. Neonatal complications in infants born to diabetic mothers. JCPSP 2006, 16 (3):212-215.
13. Metzger AM, LubinD, KuintJ. Hypoglycemia Rates in the First Days of Life among Term Infants Born to Diabetic Mothers. Neonatology 2009; 96:80-85.
14. Cordero L, TreuerSH, Landon MB, GabbeSG. Management of Infants of Diabetic Mothers. Arch PediatrAdolescMed. 1998; 152:249-254.
15. BarkatMN, RandaM, JawadA,Al-Lawati. Pregnancy outcomes of diabetic women: charting Oman'sprogress towards the goals of the St.Vincent Declaration. Ann Saudi Med 2010: 30(4):265-270.
16. Mahmood CB, Kayes MI. Problems and immediate outcome of infant of diabetic mother. J Bangladesh CollPhysSurg 2008; 26:67-72.
17. Ingale SY, RaghavKakar et al. A clinical study of neonates of diabetic mother with special reference to blood glucose levels. International Journal of Medical and Health Research. Volume 3; Issue 11; November 2017; Page No.74-77.
18. NiliFirouzeh ,Mahdaviani Comparision of morbidities between infants of pregestational and gestational diabetic mothers. MJIRI.2004May;18(1):13-19.
19. Prabhavathi R, Basavaraj et al. A study of perinatal and neonatal outcome in infants born to diabetic mothers, Int J Adv Med. 2015 Aug;2(3):246-249.
20. HaiderShirazi, SadiaRiaz et al. Neonatal Outcome of Diabetic Pregnancy. Ann. Pak. Inst. Med. Sci. 2010; 6(2): 107-112.
21. SudarshanK, Jain S, Jain RK, et al. Study of morbidity and mortality pattern in infants born to diabetic mothers. Journal of Obstetrics and Gynaecology of India, 1987; 37: 481-484.
22. Senthilkumar KM, Shanthi R. Clinical profile and outcome of infant of diabetic mother in a tertiary care sick newborn care units. Int J Contemp Pediatr 2020;7:1069-72.