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Morbidity and Mortality amongst Infants of Diabetic Mothers (IDM) Admitted Into Neonatology Unit of G. B. Pant Children Hospital Srinagar

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Abstract:
Objective: *This study was done to evaluate morbidity and mortality pattern amongst infant of diabetic mothers (IDMs).*
Material Methods: *This study was conducted Prospectively at G. B. Pant Children hospital Srinagar between June 2014 to January 2015 which is tertiary care hospital and is associated hospital of Government Medical College Srinagar India. Data on delivery mode, Gestational age, birth weight, other associated morbidities, investigation results, treatment, duration of hospital stay and outcome were collected and compared with those of infants of non-diabetic mothers matched for gestational age and birth weight admitted within same period. Maternal data were collected and reviewed retrospectively.*
Results: *59.6% of the IDMs were born to mothers with gestational diabetes, while 40.3% were born to mothers with pre-gestational diabetes. 45 (78.8%) were born by caesarean section of which 22 (38.5%) were born by emergency caesarean section. There was no significant difference in emergency CS rates when compared with controls, but non- IDMs were delivered vaginally. The mean GA of IDMs was 37.84±1.88 weeks. 33 (57.8%) were macrosomic. The commonest morbidities were hypoglycemia (significantly higher in IDMs than non-IDMs) and hyperbilirubinemia in 35 (61.4%) and 30 (52.6%) respectively. There was no difference in morbidity pattern between infants of pre-gestational and gestational diabetic mothers. Mortality rate was not significantly higher in IDMs.*
Conclusion: *The incidence of macrosomia in IDMs was high but high rates of emergency Caesarean Section (CS) was not peculiar to them. Hypoglycemia and hyperbilirubnemia were commonest morbidities in IDMs.*
Keywords: *Morbidity, Mortality, Infant of diabetic mothers, Gestational and pre-gestational diabetes mellitus.*

I. Introduction

Gestational Diabetes occurs in over 8% of all pregnancies[1] and is associated with increased risk of some adverse pregnancy outcome such as macrosomia, shoulder dystocia, caesarean delivery and perinatal mortality[2-4]. Gestational diabetes mellitus (GDM), a form of carbohydrate intolerance diagnosed only during pregnancy, complicates 2% to 5% of pregnancies and is associated with both neonatal morbidity and obstetric complications[5,6]. The major morbidities associated with infants of diabetic mothers include respiratory distress, growth restrictions, polycythaemias, hypoglycemia, congenital malformations, hypocalcemia, hypomagnesaemia. However associated macrosomia and increased prevalance of of caesarean sections contribute to higher mortality[7,8]. Perinatal mortality amongst offspring of diabetic mothers has remained high and was previously an indication for termination of pregnancy. The cause of increased perinatal morbidity and mortality is not known but has attributed to increased insulin levels leading to hyperanabolism[9,10].' Perinatal outcome associated with poor glycemic control in mothers is associated with as high as 42.9% mortality[11]. The condition has been implicated as a risk factor for future diabetes and obesity in women as well as for impaired carbohydrate metabolism in their offspring[12,13]. The purpose of the screening, treatment and management of GDM is two fold: to prevent stillbirths and to decrease the number of large for gestational age births, ultimately reducing neonatal and maternal morbidity and mortility[14]. Although stillbirth rates have decreased dramatically over the last 20 years, the rates of caesarean section and large for gestational age birth weight have remained high and in some cases are unchanged among women with GDM despite the introduction of prophylactic insulin therapy[14,15,].

II. Material And Methods

This was a study of morbidity and mortality among infant of diabetic mothers (IDMs), carried out prospectively in Neonatology unit of G. B. Pant children hospital Srinagar India between June 2014 to January 2015. G. B. Pant children hospital is tertiary care hospital and is associated hospital of Government Medical College Srinagar India. All infants of diabetic mothers admitted into the Neonatology unit within the period,

were consequently recruited into the study. Informed consent was obtained from the mothers/caregivers. Infants of mothers with pregestational diabetes mellitus (type 1 and type 2) and gestational diabetes mellitus (GDM) were included. Maternal data were received retrospectively. Information obtained included: a) characteristic of mothers; age , parity, type and duration of diabetes, treatment received, presence or absence of others illnesses, pregnancy complications, mode of delivery, maternal outcome and b) characteristic of babies; gestational age, birth weight, diagnosis, results of investigations, treatment received, duration of hospital stay and outcome. For each IDM, an infant of non-diabetic mother admitted into the unit within same period, matched for gestational age, and birth weight was recruited as controls.

Patients were classified into large for gestational age (LGA), appropriate for gestational age (AGA), and small for gestational age (SGA), according to the relationship between intrauterine growth and gestational age. Infants whose birth weighs were at least 4000 g regardless of gestational age were defined as macrosomic, while those who weighed less than 2500 g were defined as low birth weight.

Investigations that were done included: random blood sugar, chest radiographs, serum electrolytes, serum bilirubin, complete blood counts and blood cultures. Some of these were done once applicable. Hypoglycemia was defined as blood sugar concentration <2.6 mmol/l, Polycythaemia was defined as peripheral venous hematocrit greater than 65, and hyperbilirubinemia was defined as serum level of indirect bilirubin greater than 12 mg/dl (204 µmol/l) and /or any hyperbilirubinemia requiring treatment (Phototherapy and/or exchange transfusion). Hypocalcemia was defined as total serum calcium values lower than 1.5mmol/L (6 mg/dl). Echocardiography was not done routinely in these patients. All babies who were asphyxiated, had significant respiratory distress, or whose mothers were too ill to breastfeed were placed on dextrose infusion until they or their mothers were fit to feed and breast feeding had been well established. All the babies were fed exclusively on breast milk in line with the Hospitals breast feeding policy.

Hypoglycemia was corrected with 10% dextrose water while as hypocalcemia was corrected with 10% calcium gluconate. All babies with suspected sepsis were placed on broad spectrum antibiotics till blood culture results were reviewed.

III. Results

The age range of mothers of IDMs was 25-45 years with mean of 33.15±4.17 years. All the mothers received antenatal care or some have been referred from other peripheral hospitals because of bad obstetric history or because they were diabetic. 31.5% of the mothers of IDMs were primiparous. Twenty three (40.3%) had pregestational DM, while 34 (59.6%) had gestational DM. Mean blood glucose levels of the mothers as at their last antenatal visit was 11.65±5.19 with a range of 5.0-22.0 mmol/l. Glycosylated hemoglobin (HbA1c) levels were not routinely not measured. Forty five (78.8%) women were delivered via caesarean section either as emergency (38.5%) or elective (40.3%) while 35 (61.3%) had previous foetal or neonatal deaths. There was no maternal death. Table one shows characteristic on mothers in this study.

Table-1 Characteristics of mothers of infants who were recruited into the study

Characteristic	Number	Percent (%)
Parity		
1	18	31.5
2	15	26.3
3	7	12.2
4	8	14
≥4	9	15.7
Total	57	100
Type of Diabetes		
GDM	34	59.6
Type 1	13	22.8
Type 2	10	17.5
Total	57	100
Previous foetal/neonatal deaths		
Foetal	25	43.8
Neonatal	10	17.5
None	22	38.5
Total	57	100
Mode of delivery		
Elective CS	23	40.3
Emergency CS	22	38.5
Spontaneous vaginal	9	15.7
Assisted vaginal (Vacuum delivery)	3	5.2
Total	57	100

Of the IDMs, 37 were males and 20 were females with a ratio of 1.85:1. Gestational age ranged from 31-41 weeks with mean of 37.84 weeks. The mean birth weight was 4.14 kg±0.838 (2.0-6.0 kg). 33 (57.8%) were macrosomic. Mean Apgar scores at 1 minute was 6.96 ±1.62; and at 5 minutes, 8.45±1.16.

Table-2 Characteristics of infants of diabetic mothers

Characteristics	Number	Percent (%)
Gestational age (weeks)		
<37	10	17.5
37-41	40	70.1
≥41	7	12.2
Total	57	100
Birth weight (kg)		
<2.5	7	12.2
2.5-3.99	17	29.8
≥4	33	57.8
Total	57	100
Feeding commenced (hours)		
<24	17	29.8
24-72	22	38.5
>72	18	31.5
Total	57	100
Duration of admission (days)		
≤3	14	24.5
4-7	25	43.8
≥7	18	31.5
Total	57	100

The commonest morbidities were hypoglycemia 35 (61.4%), neonatal jaundice 30 (52.6%) and respiratory distress 20 (35%). The mean blood sugar level of all IDMs within the first hour was 2.93± 1.51 mmol/l. Of all the IDMs with neonatal jaundice, 17 were macrosomic and 6 required exchange blood transfusion. There was no statistically significant difference in the occurrence of jaundice between macrosomic and non-macrosomic babies (p=0.49).There was a radiological evidence of transient tachypnea of the new born in 12, congenital pneumonia in 7 and respiratory distress syndrome in 2. Eighteen babies (31.5%) had features of sepsis but only 4 had culture proven sepsis. Six (10.5%) had polycythaemia, of which one has partial exchange transfusion. Hypocalcemia occurred in 13 (22.8%) babies. Table 3 shows morbidities and treatment received

Table-3 Morbidities and treatment received

Diagnosis	Number	Percent (%)
Hypoglycemia	35	61.4
Neonatal jaundice	30	52.6
Respiratory distress	20	35
Neonatal sepsis	18	31.5
Birth asphyxia	9	15.7
Polycythaemia	6	10.5
Birth injuries	3	5.2
Seisures	2	3.5
Hypocalcaemia	13	22.8
Hypomagnesaemia	8	14
Hypophosphatemia	5	8.7
Others	3	5.2
Treatment		
Phototherapy	35	61.4
Dextrose infusion	57	100
Antibiotics	40	70.1
Oxygen therapy	10	17.5
Calcium supplements	13	22.8
Exchange blood transfusion	8	14

Mortality was recorded in 3 (5.2%) of all babies. The babies who died were macrosomic and severely asphyxiated, and were delivered via emergency caesarean section following prolonged obstructed labour and late presentation to hospital. There was no significant difference in the morbidity pattern between infants of gestational and pregestational diabetic mothers.

Table-4 Clinical and biochemical characteristics of pre-gestational and gestational diabetes mothers/infants.

	Pre-gestational DM N=21	Gestational DM N=36
Mode of delivery		
EMCS	9	14
ELCS	7	16
SVD	5	6
Birth weight (kg)		
<2.5	3	4
2.5-3.99	8	11
≥4	10	21
Hypoglycemia	9	22
Normoglycemia	12	14
Jaundice	13	17

There were 22 controls with gestational ages ranging from 32-41 weeks (38.8±1.424). The mean birth weight was 4.37±0.772, (2.3-6.0kg), mean Apgar scores at one minute were 5.95±2.12 and at 5 minutes, 7.80±2.093. Thirteen babies were macrosomic. Table 5 shows a comparison of some parameters between IDMs and non-IDMs. The commonest morbidities among the controls were birth asphyxia, neonatal sepsis, and respiratory distress. Transient tachypnoea of the newborn and pneumonia accounted for all the cases of respiratory distress. There was no case of respiratory distress syndrome or polycythaemia. There was no mortality recorded in the control group.

Table-5 Comparison of delivery mode and common morbidities between IDMs and non-IDMs

	IDMs N=57	Non-IDMs N=22
Delivery mode		
EMCS	30	10
ELCS	21	2
SVD	6	10
Common morbidities		
Hypoglycemia	31	3
Neonatal jaundice	30	4
Neonatal sepsis	21	9
Respiratory distress	20	7
Birth asphyxia	10	7
Birth injuries	3	8
Mortality	3	0

IV. Discussion

Our study revealed that 35 (61.3%) of the diabetic mothers had previous foetal or neonatal deaths. This shows that diabetes still contributes significantly to perinatal and neonatal mortality in our environment. This study also showed low mortality rate among IDMs, although still higher than in non-IDMs. Although perinatal mortality among this group has declined[16,17], neonatal morbidity remains a significant challenge[18,19,]. There was a high incidence of macrosomia among IDMs in this study, This is consistent with a some literature[20]. The caesarian section (CS) rate in this study was very high with emergency CS rates being higher than elective CS rates evev amongst the controls, The high rate of operative deliveries, similar to the other study[20] is related to high incidence of macrosomia in IDMs and their matched controls. Our findings were however in contrast to the findings in a Sri-Lankan study[21] where elective CS rates were much higher than emergencies. Hypoglycemia was the commonest neonatal problem recorded in the IDMs, occurring in significantly higher proportions than in the non-IDMs. The high rate of hypoglycemia in our study is similar to other studies[22,23] and has been identified as a marker of poor glycaemic control in the mothers. Hypocalcemic was the other common metabolic problem in this study. This is similar to other studies[22,23]. Neonatal jaundice was seen frequently in our IDMs, irrespective of type of maternal diabetes. Its incidence was not significantly higher than in the control group, probably because these were matched controls who had been admitted for other illnesses and also probably because of our small sample size. Hyperbilirubinemia ia a recognized problem of IDMs, and has show to occur with increased frequency in marosomic IDMs[24]. Congenital pneumonia and transient tacypnoea of newborn (TTN) were common causes of respiratory distress in all the babies in this study. This is supported by two studies[25,26].There was also high rate of TTN among controls, which was expected because most of them were also macrosomic and delivered by caesarian section, which on its own is a known risk factor.

The study did not show any significant difference in morbidity pattern between infants of mothers with pre-gestational diabetes and those with gestational diabetes. Atahis is a pointer to the need for screening of all pregnant women for diabetes and also anticipatory and active management if IDMs irrespective of type of

maternal diabetes. The mortality rate was lower among the non-IDMs but the difference was not statistically significant. This shows that proper care, live born IDMs without major congenital malformations have a good chance of survival.

V. Conclusions

The study shows a high incidence of macrosomia, hypoglycemia and hyperbilirubnemia but absence of obvious congenital malformations in IDMs. They were more likely to be delivered by caesarian sections than non-IDMs but rates of emergency CS among the two groups were similar. Mortality pattern was identical in both infants of pre-gestational and gestational diabetes mellitus. Screening of all pregnant women for diabetes, good glycemic control and active managemrnt of their infants will reduce perinatal morbidity and mortality. Opening of maternal-infant centers with standard protocols for prevention and treatment of diabetes in pregnancy on a national scale will go a long way in reducing the scourge of this condition.

References

[1]. Moore T. Diabetes in pregnancy. In: Creasy RK, Resnik R, Iams JD, editors. Maternal-fetal medicine: Principles and practice. 5th ed. Philadelphia. Saunders, 2004;1023-61.
[2]. Lucas MJ. Diabetes complicating pregnancy. Obstet Gynecol Clin North Am 2001;28:513-36.
[3]. Sermer M, Naylor CD, Farine D, Kenshole AB, Ritche JW, Gare DK, et al. The Toronto tri-hospital gestational diabetes project. A preliminary review. Diabetic Care 1998;2:33-42.
[4]. Beischer NA, Wein P, Sheedy MT, Steen B. Identification and treatment of women with hyperglycemia diagnosed during pregnancy can significantly reduce perinatal mortality rates. Aust. NZ J Obstet Gynecol 1996;239-247.
[5]. Casey BM, Lucas MJ, Mclntire DD, Leven KJ. Pregnancy outcomes in women with gestational diabetes compared with general obstetric population. Obster Gynecol 1997;90:869-73.
[6]. Gabbe SG, Mestman JH, Freeman RK, Anderson GV, Lowensohn RJ. Management and outcome of class A diabetes mellitus. Am J Obstet Gynecol 1977;127:467-9.
[7]. Otolorun EO, Famuyiwa oo, Bello AF, Da-Wodu AH, Adelusi B: Reproductive performance following active management of diabetic pregnancies at University College Hospital, Ibadan, Nigeria. Afr J Med Sci 1985, 14(3-4):155-60.
[8]. Engelgau MM, Herman NH, Smith PJ, German RR, Aubert RE: The epidemiology of diabetes and pregnancy in US. 1988. Diabetic care 1995, 18(7):1029-1033.
[9]. Butle NF: Carbohydrate and lipid metabolism in pregnancy:normal compared with geatational diabeytes mellitus. Am J Clin Nutr 2000, 71(5):12565-12615.
[10]. Ferrara A, Hedderson MM, Selby JV: Prevalance of gestational diabetes mellitus detected by National Diabetes Data group or the carfactor and cousin plasma glucose threshold. Diabetes Care 2002, 25(9):1625-1630.
[11]. Otolorun EO, Famuyiwa oo, Bello AF, Da-Wodu AH, Adelusi B: Reproductive performance following active management of diabetic pregnancies at University College Hospital, Ibadan, Nigeria. Afr J Med Sci 1985, 14(3-4):155-60.
[12]. Moses RG, Moses J, Knight S. Birth weight of women with gestational diabetes. Diabetes care 1999;22:1059-62.
[13]. Gunton JE,McEelduff A, Sulway M, StielbJ, Kelso I, Boyee S, et al. Outcome of pregnancies complicated br pre-gestational diabetes mellitus. Aust N Z J Obstet Gynecol 2000;40:38-40.
[14]. Langer O, Mazze R. The relationship between large-for-gestational age infants and glycemic control in women with gestational biabetes. Am J Obstet Gynecol 1988;159:1478-83.
[15]. Jimenez-Moleon JJ, Bueno-Cavanillas A, Luna-del-Castillo J, Gracia-Martin M, Lardelli-Claret P, Galves-Vargas R. Impact of different levels of carbohydrate intolerance on neonatal outcomes classically associated with gestational diabetes mellitus. Eur J Obstet Gynecol Reprod Biol 2001;102:36-41.
[16]. Landon MB, Gabbe SG, Piana R, Mennuti MT, Main EK: Neonatal morbidity in pregnancy complicated by diabetes mellitus: predictive value of maternal glycemic profiles. Am Obstet Gynecol 1987, 156:1089-1095.
[17]. Gregory R, Scott AR, Mohajer M, Tattersall RB: Diabetic pregnancy 1977-1990: have we reached a plateau? J R Coll Physicians Lond 1992, 26:162-166.
[18]. Hod M, Merlob P, Friedman S, Schonfeld A, Ovadia J: Gestational diabetes mellitus: a survey of perinatal complications in the 1980s. Diabetes 1991, 40:74-78.
[19]. Cordero L, Landon MB: Infant of diabetic mother. Clin Perinatol 1993, 20:635-648.
[20]. Thorpe LE, Berger D, Ellis SA, Bethegowda VR, Brown G, Matte T, Basset M, Frieden TR: Trends and racial ethnic disparities in gestational diabetes among pregnant women in New York City, 1990-2001.
[21]. Senanayake MP, Gunawardene MKS: neonatal morbidity following control of maternal diabetes mellitus with human insulin, Sri Lanka journal of child health 2000, 29:11-14.
[22]. Cordero L, Landon MB: Infant of diabetic mother. Clin Perinatol 1993, 20:635-648.
[23]. Nasrat HA, Salleh M, Ardawi M, Ghafouri H: Outcome of pregnancy in diabetic mothers. Int J Gynecol Obstet 1993, 43:29-34.
[24]. Soler NG, Soler SM, Malins JM: Neonatal morbidity in infants of diabetic mothers. Diabetes care 1978, 1:340-350.
[25]. Lawn JE, Cousens S, Zupan J: 4 Million neonatal deaths: when? Where? Why? Lancet 2005, 365:891-900.
[26]. Stoll BJ, Kleiegman RM: Infants of diabetic mothers: In Nelson Textbook of Paediatrics. 17th edition. Edited by Behrman RE, Kleigman RM. Philadelphia Sauders; 2003:614-616.