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The clinical evaluation of the infants of diabetic mothers (IDMS) born in a tertiary care hospital

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ABSTRACT

Background: The clinical evaluation of the infants of diabetic mothers (IDMs) born in a tertiary care hospital. It was a prospective study carried out at tertiary care hospital.

Methods: 34 infants born of diabetic mother over the period from January 2012 to December 2012 were included in the study.

Results: Infants born of the diabetic mothers who had suboptimal glycemic control during pregnancy had maximal functional and structural complication. Respiratory Distress was the commonest complication seen in 20 (58.82%) IDMs followed by Hypoglycemia in 15 (44.11%) and congenital anomalies in 16 (47.05%) cases. Septal hypertrophy was the most common cardiac anomaly observed in 6 (17.64%) PDA in 3 (8.82%), only 1 (2.94%) IDM had combination of ASD, Fallot variant and VSD is seen in 2 (5.88%) of infant.

Conclusions: In current study, metabolic and structural complication are more common in the infant of the diabetic mother with poor glycemic control.

Keywords: Glycemic control, Infants of diabetic mothers, Suboptimal optimal, Septal hypertrophy

INTRODUCTION

Diabetes mellitus is chronic metabolic disease in which either body do not produce insulin hormone or tissues are insensitive to insulin; which results in high blood sugar level and complications due to it. There are three main types of diabetes mellitus (DM).

Type-1 DM in which body does not produce enough insulin, so par enteral inject able insulin is required throughout the life for survival.

This is also referred to Insulin-Dependent Diabetes Mellitus (IDDM) or "juvenile" diabetes. In type -2 DM body cells fail to respond to available insulin properly,

this is sometimes combined with an absolute insulin deficiency. Lastly a third type of diabetes occurs in pregnant women, who never had been diabetic before which is known as Gestational Diabetes mellitus (GDM). Gestational Diabetes mellitus is defined as pregnant women with any degree of carbohydrate intolerance, which is first recognized during pregnancy only. The recent studies suggest that the prevalence of the diabetes among pregnant women is increasing. It is attributable to advance maternal age, multi fetal gestation, increased body mass index, strong family history, sedentary life style, change in the diet, continued immigration.

Gestational diabetes generally has few symptoms and it is most commonly diagnosed by screening during

pregnancy. Most women are screened for GDM between 24 and 28 weeks' gestation by oral administration of 50gm sugar. A positive result is a blood glucose equal to or greater FBS >105 mg/dl, 1 hr post prandial value >190 mg/dl, 2 hour post prandial value >165 mg/dl and 3 hr post prandial value >145 mg/dl. Uncontrolled GDM can lead to fetal macrosomia and concomitant risk of fetal injury at the time of delivery. GDM shares many features with type 2 diabetes. Women diagnosed with GDM have a 50% lifetime risk of developing overt type-2 diabetes. The most important complication is diabetic embryopathy resulting in various congenital anomalies. Congenital anomalies are associated with 50% of perinatal deaths among infant of diabetic's mothers as compared to 25% among infant of non-diabetic women. The risk of congenital anomalies is related to the glycemic profile at the time of conception. Babies of diabetic mothers are often large, although some are normal-sized or smaller than expected; depending on how severe is the diabetes. Infants of diabetic mothers are at risk of other complications including hypocalcaemia, hypoglycemia, heart problems, and certain birth defects. Treatment is to keep diabetes under control during pregnancy which can greatly reduce the risk of harmful effects on mother and baby.

If mother has type 1 diabetes, the risk of the offspring developing the disease is 1% to 4%. If the father has type 1 diabetes, the risk to the offspring is 10%. If both parents are diabetic, the risk is approximately 20%.

In recent years, prevalence of diabetes is increasing in India. In Rajasthan, there is no recent study about prevalence of GDM and its effect on growing fetus. Thus, we want to conduct a study to know the prevalence of GDM and its effect on Fetus and infants of diabetic mothers.

METHODS

The study was conducted in the Department of Pediatrics and Department of gynecology and obstetrics, Umaid Hospital for Women and Children, Regional Institute of Maternal and Child Health, Dr. S.N. Medical college, Jodhpur from January 2012 to December 2012.

All the pregnant diabetic women who were admitted in the antenatal ward in the umaid hospital for normal delivery or elective caesarian section, those who had complication during previous delivery and those who were taking treatment for diabetics were selected. Data regarding the diabetic status of the mother was obtained from antenatal records.

Diabetic mothers were grouped into two categories: pregestational (type I DM and Type II DM) and gestational DM. The diagnosis of GDM was based on National Diabetes Data Group (NDDG). [NDDG criteria: FBS > 105 mg/dl, 1 hr post prandial value >190 mg/dl, 2 hr post prandial value >165 mg/dl and 3 hr post prandial

value >145 mg/dl. If two or more values are met or exceeded, the diagnosis of GDM is established.²

The glycemic status of the diabetic mothers was ascertained based on the serial estimation of fasting and post prandial glucose levels. Each patient's fasting and 2 hr post prandial blood glucose values were averaged, yielding one mean value per patient per blood glucose type (fasting or 2 hr post prandial). Blood glucose control was defined according to American college of obstetricians and gynecologist's guidelines: a mean fasting value of <95 mg/dl or mean 2 hour post prandial value of <120 mg/dl. Two groups were identified: women with blood glucose averages within the recommended guidelines (blood glucose controlled or optimal control) and women with blood glucose averages higher than the recommended guidelines (blood glucose not controlled or suboptimal control)

Mother's antenatal history included data regarding their socio-economic status, urban/rural background, family history of diabetes mellitus (in parents) and ultrasonography findings. HbA1c levels during pregnancy (in I trimester in presentational DM and at diagnosis in GDM) was estimated. Other associated obstetrical and medical problems were noted.

Inclusion criteria

All live born infants of diabetic mothers born during the period from January 2012 to December 2012 at the Department of Pediatrics and Department of gynecology and obstetrics, Umaid Hospital for Women and Children, Regional Institute of Maternal and Child Health, Dr. S.N. Medical College, Jodhpur, were included in this study.

RESULTS

Amongst Thirty-Four mothers 18(52.94%) mothers belong rural Sector compared to 16(47.05%) mothers urban Sector. 23 (67.64%) had IDDM whereas 8 (23.52%) and 3 (8.82%) pregnant mothers had GDM and NON-IDDM, respectively. Family History of DM (in either of parents of the mothers) was present in 50% of the mothers, A total of 22 (64.70%) diabetic women had suboptimal glycemic control, thirty-four infants were born of diabetic mother among them 23 (67.64%) were males and 11 (32.35%) were females. 10 (29.41%) of them were preterm and 22 (70.58%) were term neonates. 4 (11.76%) baby's Birth Weight was <2.5 Kgs, 20 (58.88 %) weighed between 2.5-4 Kgs and 10 (29.41%) babies had birth weight >4 Kgs. Infant of diabetic mother classified according to birth weight for gestation age 10 (29.41%), 19 (55.88%), 5 (14.70%) were LGA, AGA, SGA respectively. Among infants of diabetic mother's Respiratory Distress was the commonest complication seen in 20 (58.82%), followed by congenital anomalies, Hypoglycemia, Birth Injuries, Hypoxic ischemic encephalopathy, Hyperbilirubinemia and Polycythemia in 16 (47.05%) 15 (44.11%), 9 (26.47%), 8 (23.52%), 7

(20.58%) and 7 (20.58%) cases respectively. Among the infant of diabetic mother metabolic complication like Hypoglycemia was most common metabolic abnormality observed in 8 (53.33%) of LGA babies followed by 5 (33.33%), 2 (13.33%) in AGA and SGA babies respectively. Hypocalcaemia was found in 2 (66.66%) and 1 (33.33%) of LG A and AGA babies. Polycythemia and Hyperbilirubinemia occurred in 1 (14.28%), 4 (57.14%) and 2 (28.57) of LGA, AGA and SGA respectively. Hypoglycemia was more commonly observed in IDMs with birth weight >4Kgs 7 (46.66%) followed by 6 (40%) and 2 (13.33) of birth weight 2.5-4 Kgs and <2.5Kgs respectively. Out of all infants of diabetic mothers, septal hypertrophy, P.D.A., V.S.D., ASD. fallot variants were detected in 6 (17.64%), 3 (8.82%), 2 (5.88%), 1 (2.94%) and 1 (2.94%) infants respectively. Among the infant of diabetic mother's seven (20.58%) babies were expired of whom two babies were IUD; all the babies who were expired their mother had Sub optimal maternal glycemic control.

DISCUSSION

Diabetes Mellitus is the most common medical complication of pregnancy. The emerging problem of childhood obesity across the world has led to an increasing incidence of Type-II DM early in life. The first manifestation of this could be variable degree of glucose intolerance first detected during pregnancy. More than half of the women with GDM ultimately develop overt diabetes in the ensuing 20 years, and there is mounting evidence for long-range complications that include obesity and diabetes in their off springs.

The infant of diabetic mother is at an increased risk of complications compared to infants of non-diabetic mothers. The causes of the fetal and neonatal sequelae of maternal diabetes are multifactorial; however, many of the perinatal complications can be traced to the effect of maternal glycemic control on the fetus. Many of the perinatal complications in IDMs can be prevented by appropriate peri-conceptional and prenatal care.

The two infants were born dead to IDDM diabetic mothers whose glycemic control was suboptimal were weighing 1.400 and 4.000 Kgs. Ranade et al observed family history of diabetes was present in 20%.³ Amongst diabetes mothers 23 (67.64%) had IDDM whereas 8 (23.52%) and 3 (8.82%) pregnant mothers had GDM and NON-IDDM, respectively

In the present study, 12 (12.29%) of the mothers had optimal glycemic control during pregnancy and 22 (64.70%) had suboptimal control. In the present study, the incidence of prematurity was 29.41%. Gabbe SG et al observed 11% Watson et al observed 46%.^{4,5} The incidence of prematurity in the present study correlates with the study done by Deorari et al.⁶

A study conducted by Ranade et al, Deorari et al, Deorari et al, Mangala et al, B.lore had 40%, 41.5%, 20.2% and 36.8% of LGA respectively as compared to 29.41% in our study.^{3,6-8}

A study conducted by Ranade et al, Deorari et al, Deorari et al, Mangala et al, B.lore and Sudarshan et al, had 50%, 8.5%, 16.3%, 18.4% and 28.6% of hypoglycemia respectively. 3.6-9 In the present study, hypoglycemia was the commonest problem observed in IDMs seen in 44.11% of cases. 45.45% LGA babies were born to mothers with suboptimal glycemic control during pregnancy. The incidence of hypoglycemia was higher in suboptimal glycemic control. Quintero et al observed 19.8%.

Sulaiman A et al, Riyadh had 38% and 38% of PDA and Hypertrophic Cardiomyopathy Wren C et al, observed 14.4% and 3.2% of TGA and Hypoplastic Left Heart respectively. 10,11

In our study, Septal hypertrophy was the most common cardiac anomaly observed in 6(17.64%) PDA in 3 (8.82%), only 1 (2.94%) IDM had combination of ASD, Fallot variant and VSD is seen in 2 (5.88%) of infant

The mortality rate in IDMs in the present study was 20.58% and the study done by Ranade et al, Deorari et al, Deorari et al, Sudarshan et al observed 20%, 7.4%, 8.1% and 3% of perinatal mortality.^{7,9}

CONCLUSION

In current study, metabolic and structural complication are more common in the infant of the diabetic mother with poor glycemic control.

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