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# Clinical Study of Fetomaternal Outcome of Gestational Diabetes Mellitus

[1]Dr Mutum Matouleibi Chanu, [2]Dr Alisha June Syiemleh,
[3]Dr Bandana Pradhan, [4] Dr.RK.Praneshwarini Devi

***Abstract***
***Objectives:*** *To assess the fetomaternal outcome of pregnancy in mothers with gestational diabetes mellitus (GDM)*
***Method:*** *A cross sectional study, conducted in 123 patients, where 62 were normal pregnant women and 61 pregnant women with risk factors for GDM attending antenatal clinic and admitted in antenatal ward , was carried out in the department of obstetrics & gynecology of RIMS; a tertiary health care referral centre, MANIPUR, over a period of 2 years from AUGUST 2012 to AUGUST 2014.*
***Results:*** *The findings of the present study confirmed that GDM patients are liable to have adverse pregnancy outcomes. As expected, women in present study were found to have a higher maternal and perinatal morbidity and mortality among the GDM present than the GDM absent group. Increasing age(31±5.5years) of patient was significantly associated with GDM. Poor past obstetric history, past history for GDM, positive family history carried significant high risk for GDM.*
***Conclusion:*** *Early detection of GDM, aggressive control of the blood sugar can ameliorate many of the complications for mother and baby and significant reduction in perinatal mortality and morbidity have been reported in GDM patients treated with insulin and diet compared to those on diet alone, which is similar to present findings.*
***Keywords:*** *GDM(gestational diabetes mellitus),insulin, NICU(neonatal intensive care unit),macrosomia.*

## I. Introduction

Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion , insulin action or both(1).It is defined as carbohydrate intolerance of variable severity with an onset or first recognition during pregnancy and develops in around 1-3 % of all pregnancies. Women with gestational diabetes are characterized by a relatively diminished insulin secretion and pregnancy induced insulin resistance primarily present in the skeletal muscle tissue. Normal pregnancy is considered to be a diabetogenic state characterized by exaggerated rate and amount of insulin release , associated with decreased sensitivity to insulin at cellular levels. Many of the changes are results of the progressive rise in the levels of estrogen, progesterone ,human placental lactogen, cortisol and prolactin as pregnancy advances .Many of these hormones are insulin antagonists, causing insulin resistance in the mother and cause abnormal glucose tolerance in some women rendering them to develop gestational diabetes(2). During early pregnancy , glucose crosses the placenta to the fetus by facilitated diffusion resulting in the decrease in fasting blood glucose to 50-65 mg%. As pregnancy progresses 3 factors are responsible for causing post prandial hyperglycemia :insulin antagonists such as estrogen ,progesterone, and human placental lactogen. There is 3fold rise in serum cortisol and human placenta contains enzymes (eg.insulinase) that increase the degradations by potentiating the secretion of insulin ,but in GDM the pancrease fail to respond adequately(3)

GDM is associated with increased fetomaternal morbidity as well as long term complications in mother and babies. American college of obstetricians and gynecologists (ACOG) on contrary advocates selective screening for patients with high risk factors such as history of previous GDM, strong family history of diabetes, member of an ethnic group with high prevalence of GDM, maternal age more than 25 years, obesity, persistent glycosuria, macrosomia (birth weight>4gm,)polycystic ovarian syndrome, spontaneous abortions and unexplained still births(4). Maternal complications are increased incidence of asymptomatic bacteriuria, urinary tract infections, increased incidence of pre ecclamsia,10% risk of polyhydramnios which may increase the incidence of preterm labour, placental abruption and post partum hemorrhage. Risk of developing diabetes mellitus and the complications in fetus are macrosomia, which will increase risk of operative delivery and shoulder dystocia, increase incidence of hypoglycemia, hypocalcemia, congenital malformations, polycythemia, hyperbilirubinemia, respiratory distress syndrome, and long term complications are obesity, development of type 2 diabetes mellitus during childhood, impaired motor functions and higher rates of in attention and hyper activity(5).

Several studies have shown that 50% GDM developed diabetes mellitus within 10 – 20 years of index pregnancy. Furthermore , there were reported increased incidence of hypertension, hyperlipedimia, proteinuria, abnormal ECG and higher morbidity and mortality. The incidence of juvenile diabetes mellitus in offspring is 20 times more than in the controlled population. Attempts to detect unrecognized diabetes in pregnancy should be practiced in antenatal clinics which are justified by the increased risk of maternal, perinatal and neonatal morbidity mortality among women with abnormal OGTT in pregnancy. There is no perfect test for screening a subclinical disease entity such as GDM despite the confusion of terminology and diagnostic criteria.

**Objective**

To assess the fetomaternal outcome of pregnancy in mothers with gestational diabetes mellitus (GDM).

## II. Material & Methods

This was a cross sectional, conducted in 123 patients, 62 normal pregnant women as control and 61 pregnant women with risk factors for GDM attending antenatal clinic and admitted in antenatal ward ,carried out in the department of obstetrics & gynecology of RIMS; a tertiary health care referral centre, MANIPUR, over a period of 2 years from AUGUST 2012 to AUGUST 2014.

Age, weight, parity, religion, period of gestation, history of still birth, history of recurrent abortions, random blood sugar, oral glucose tolerance test, family history of diabetes, prior history of GDM, history of hypertension, mode of delivery, maternal complications, neonatal outcome were taken as variables. Informed consent was taken from the patients and a fixed protocol was followed as per the proforma. Patients with high risks factors were subjected to blood glucose sampling at 24 weeks of pregnancy. Any women whose RBS >120 mg% were subjected to oral glucose tolerance test, following DIPSI guidelines and patients with GDM were diagnosed.

**Exclusion criteria:**

Pregnant women with pre existing diabetes

Statistical analysis was done using SPSS software, for categorical data frequency and percentage were calculated and $x^{2-}$ test and Fisher's exact test were advocated for significance test among the groups.

## III. Results & Observations

Mean age of GDM cases was (31±5.5 years)**,** whereas (28.85 ±5.88 years) was the mean age in those without GDM.

GDM was found to be higher among the Muslim community(71%) and among literate groups(73%). Majority belonged to urban areas (79%) and G2-G4 gravida**.** Presence of Family history was higher among GDM patients (88%).Number of abortions were higher among GDM cases **.**Number .of ventouse and lower segment caesarean section were seen relatively higher among GDM cases but not statistically significant. Babies with birthweight <2.5 Kg &>4Kg are relatively higher among GDM cases (P=0.002)(table1)

Preterm deliveries were more common among GDM cases(83%).All maternal complications ( IUGR, polyhydramnios,pregnancy induced hypertention and preterm labor) were relatively higher among cases with GDM.(table2)

All fetal complications were relatively higher among babies born to GDM patients(table3,4,5)

**Table 1: Association of the two groups with different variables of interest, n=123**

| **Religion** | **Cases with GDM(61)** | **Cases without GDM(62)** | **p-value** |
|---|---|---|---|
| Hindu | 40(43%) | 53(57%) | .036 |
| Muslim | 15(71%) | 6(29%) | |
| Christian | 6(67%) | 3(33%) | |
| **Educational status** | | | |
| Literate | 53(47%) | 59(53%) | .10 |
| Illiterate | 8(73%) | 3(27%) | |
| **Residence** | | | |
| Rural | 20(28%) | 51(72%) | .000 |
| Urban | 41(79%) | 11(21%) | |
| **Family History** | | | |
| Absent | 39(40%) | 59(60%) | .000 |
| Present | 22(88%) | 3(12%) | |
| **Gravida** | | | |
| Primi | 19 (41%) | 27 (59%) | .12 |
| $G^2$ –$G^4$ | 37( 52%) | 34 ( 48%) | |
| >$G^4$ | 5 (83%) | 1 (17%) | |
| **POG** | | | |
| Preterm | 10(83%) | 2(17%) | .01 |

| | | | |
|---|---|---|---|
| Term | 51(46%) | 60(54%) | |
| **No. of Abortion** | | | |
| Nil | 43(43.9%) | 55(56.1%) | 0.06 |
| 1 | 9(64.3%) | 5(35.7%) | |
| >2 | 9(89%) | 2(18%) | |
| **MOD** | | | |
| NVD | 24(42%) | 33(58%) | 0.3 |
| Ventouse | 5(56%) | 4(44%) | |
| LSCS | 32(56%) | 25(44%) | |
| **WEIGHT** | | | |
| <2.5Kg | 9(69%) | 4(31%) | .002 |
| 2.5-3.9 | 38(41%) | 55(59%) | |
| >/=4 | 14(82%) | 3(18%) | |

**Table 2: Maternal complications among the groups**

| Complications | Cases with GDM(61) | Cases without GDM(62) |
|---|---|---|
| Poly hydramnios | 11(100%) | 0(0%) |
| IUGR | 5(71%) | 2(28.57%) |
| Gestational HTN | 4(67%) | 2(33%) |
| Preterm labour | 10(91%) | 1(9%) |
| No | 31(35%) | 57(65%) |

**Table 3: Fetal complications among the groups**

| Complications | Cases with GDM(61) | Cases without GDM(62) |
|---|---|---|
| Birth asphyxia | 4(80%) | 1(20%) |
| Hypoglycaemia | 2(100%) | 0(0%) |
| IUD | 1(100%) | 0(0%) |
| prematurity | 2(50%) | 2(50%) |
| Nil | 53(48%) | 58(52%) |

**Table 4: NICU admissions**

| NICU admission | Cases with GDM(61) | Cases without GDM(62) |
|---|---|---|
| Yes | 8(67%) | 4(33%) |
| No | 53(48%) | 58(52%) |

**Table 5: Congenital deformity**

| Congenital deformity | Cases with GDM(61) | Cases with GDM(62) |
|---|---|---|
| Yes | 2(100%) | 0(0%) |
| No | 59(49%) | 62(51%) |

## IV. Discussion

GDM has been diagnosed as a clinical entity for the past 50 years. Early studies have strongly indicated untreated carbohydrate intolerance during pregnancy is associated with higher rates of maternal morbidity and mortality. The purpose of screening , treatment and management of GDM is to prevent stillbirth, congenital anomalies, recurrent abortion, pre ecclampsia, intra uterine death and decrease incidence of macrosomic babies, thereby reducing maternal and perinatal morbidity and mortality. The findings of the present study confirmed that GDM patients are liable to have adverse pregnancy outcomes. As expected, women in present study were found to have a higher maternal and perinatal morbidity and mortality among the cases than the control group.

Present study showed the mean maternal age to be 31±5.5years with majority belonging to age group of 28years. Similarly, Ismail NA et al (7) reported the mean maternal age of GDM in their study to be 27.9years. Thus increasing age of patient was significantly associated with GDM.Increased incidence of GDM in patients with higher parity is not always a consistent finding when different studies are compared. In the present study, 45% of GDM women were primi gravida is comparable as seen in Serirat et al (9) showing 42.2% women with GDM occurred in primi gravida.

Poor past obstetric history of spontaneous abortion , stillbirth and neonatal deaths are important factors in detection of GDM. The present study showed that of 29.5% GDM cases had abortions compared to 11.3% among non GDM. Similarly, Serirat et al(9) showed that 14% GDM had history of unexplained stillbirths or abortions.

In this study recurrence rate of GDM was seen in the current pregnancy among 21.3%of women which was higher than the findings of Turkey Gaisim et al(9) was 9.5%).Another significant risk factor for GDM is positive family history .In present study positive family history were 36.1% which was comparatively higher to findings of Serirat S et al(23.1%) and Wahi P et al(10)(24.19%).Several studies indicate a positive correlation between GDM and development of pre ecclampsia.Polyhydramnios was noted in 31.1% GDM cases. However , in the findings reported by Ismail NA et al and Turki Gaisim et al ,the association was 2.65% and 3.2 respectively.

Mode of delivery was often dictated by the increased size of the baby, poor past obstetric history, fetal distress. In this study caeserian section was required in 52.5% which is higher compared to the findings of DM, Jensen et al(12), Abdul Bari Bener et al(13) and Pike Saxena et al (14)who observed CS rate as 33%, 27.9%, 42 % respectively. The main indications for CS being post caeserian, cephalopelvic disproportion, fetal distress, malpresentation and macrosomic babies. Adverse perinatal outcome has been observed with glucose control and diabetes as early as 1920.The present study showed 1.6% of perinatal deaths in GDM compared to no deaths in control group.In this preterm delivery was observed in 16.4% women with GDM which is similar to figure reported by Turki Gaisim(9) (11.4%) and Abdul Bener et al(13)(12.6%).

NICU admission required in 13.1% newborn of GDM women in present study. However , Rabinder D et al(15) and Garcia Patterson et al showed frequency of 3.4% and 3% respectively. Higher NICU admission in the present study may be reflected by the routine policy of managing these infants at referral hospital.Mean Apgar score at birth was satisfactory in 86.66% of newborn which was similar to the non-GDM group. Similarly , Fadl HE et al(16) observed no difference in apgar score between babies born to women with GDM and non diabetic group.

Macrosomia or babies weighing >4kg at birth in GDM, was noted in 23% of the study group. This observation is contradictory to the observations of Akhter et al(11), Wahi P et al(10) and Abdul Bari Bener et al(13) where macrosomia range in GDM was 13%,16.2%,and 10.3% respectively. The higher percentage of macrosomia in the present group can be due to poor glycemia control, pre gravid weight /obesity, excessive weight gain by mother during pregnancy and less extensive treatment.

In the present study , 45.9% of GDM cases were on insulin and diet. Several studies have concluded that the aggressive control of the blood sugar can ameliorate many of the complications for mother and baby and significant rates of perinatal mortality and morbidity have been reported in GDM patients treated with insulin and diet compared to those on diet alone, which is similar to present findings.

## V. Conclusion

In the present study 62 pregnant women with high risks factors for GDM attending antenatal clinic or admitted in antenatal ward were screened for RBS after 24 weeks of pregnancy. Women with RBS>110 were subjected to OGTT. The study concluded that risks factors for GDM include increased maternal age, obesity, poor past obstetric history, family history of DM and previous history of GDM . There was increased frequency of pre ecclamsia, gestational hypertension , preterm delivery, operative interference, macrosomia, in GDM in women.The increased fetal complications observed in the study were intrauterine death, NICU admission, respiratory distress syndrome but the over all perinatal outcome was similar to that of normal pregnancies. hence considering the risk to the mother and the baby, both during pregnancy and perinatal period, screening of GDM and identifying those at risk is important for subsequent management and reduction of maternal and perinatal morbidity and mortality.

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