

## Study of Prevalence, Maternal and Perinatal Outcome in Gestational Diabetes in Rural Population

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### Abstract

**Background-**Gestational Diabetes Mellitus (GDM) is a disorder of carbohydrate metabolism with adverse consequences for both the mother and child. Diabetes in Pregnancy study group India (DIPSI) method to diagnose GDM was used.

**Objectives-**1) To find out the prevalence Gestational Diabetes in rural population. 2) To analyze the maternal outcome in gestational diabetes mellitus 3) To analyze the perinatal outcome in gestational diabetes mellitus.

**Material and Methods-** It was a prospective descriptive longitudinal study done on 500 pregnant women between 24-28 weeks of gestation over a period of two years. Cases with two hours plasma glucose value 140 mg% were diagnosed as GDM. All GDM cases were followed up and treated with medical nutrition therapy (MNT) and or insulin therapy till delivery to know the maternal and perinatal outcome.

**Results-**The prevalence of GDM in the present study was 5.20% using DIPSI method. GDM was observed more frequently in age > 25 years (62%), BMI >25 (89%), Multi-para (81.00%), Maternal morbidity was seen in the form of febrile illness (19.24%) surgical site infections (11.54%) and inadequate lactation (15.39%). The perinatal mortality in the present study was 23%. The stillbirth rate was 15.38%. Caesarean sections were carried out 54% of cases of gestational diabetes. Thirty six percent of caesarean sections were carried out for cephalo-pelvic disproportion.

**Conclusion-**Gestational diabetes mellitus is becoming a common medical disorder during pregnancy. It is associated with adverse maternal outcome in the form of increased operative interventions and obstetric complications. It is also associated with adverse fetal outcome in the form of still births, birth asphyxia, fetal macrosomia. Universal Screening of pregnant women for GDM and achieving euglycemia can prevent maternal and fetal complications hence, universal instead of selective screening should be the policy in all antenatal clinics.

**Keywords** - Gestational Diabetes Mellitus, DIPSI, Fetal macrosomia, Stillbirths

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### Introduction

Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance of varying severity with onset or first recognition during pregnancy.[1] The diagnosis of gestational diabetes is important, because of the increased risk of adverse maternal and fetal neonatal outcomes. In addition, GDM also confers a future risk of type 2 diabetes to mothers and their fetuses.[2] Gestational diabetes mellitus affects about 7% of all pregnancies worldwide

and recent studies have reported an increase in the prevalence in last two decades.[3-7] In India, the prevalence ranges from 6% to 9% in rural and 12-21% in urban areas, with most studies being done in either South or North India.[8-11]

The GDM has become an important public health problem as the prevalence of GDM is steadily increasing from 2% in 1982 to 7.2% in 1991 and 16.5% in 2002.[12-13] The maternal metabolic adaptation maintains the mean fasting plasma glucose of  $74.5 \pm 11$  mg/dl and the post prandial peak of  $108.7 \pm 16.9$  mg/dl.[14] The fine tuning of glycaemic level during pregnancy is possible due to the compensatory hyper-insulinaemia, as the normal pregnancy is characterised by insulin resistance. A pregnant woman who is not able to increase her insulin secretion to overcome the insulin resistance that occurs even during normal pregnancy develops gestational diabetes.

Gestational diabetes mellitus (GDM) is characterized by carbohydrate intolerance of varying severity with onset or first recognition during pregnancy.[15] A major challenge in evaluating the evidence on GDM screening is the range of adverse maternal and neonatal outcomes associated with untreated GDM. The importance of GDM is that two generations are at risk of developing diabetes. Although GDM is asymptomatic, the consequences may be substantial. The 2003 United States Preventive Services Task Force (USPSTF) evidence review suggested that hyperglycaemia's impact on adverse maternal and fetal outcomes is probably continuous.[16]

Women with GDM have a greater incidence of preeclampsia which affects 10- 25% of all pregnant diabetics. There is also a higher incidence of chorioamnionitis and postpartum endometritis, postpartum bleeding due to uterine over distension which is due to the macrosomic baby. More of women with GDM undergo caesarean sections and instrumental deliveries with more incidence of shoulder dystocia. The consequences of GDM to the fetus are more serious than those to the mother. Amongst the fetal effects, the frequency of congenital anomalies is increased in women with poorly controlled type 1 DM and the incidence of fetal macrosomia is increased in women with GDM and DM type 2. The fetus can get affected with various congenital anomalies (caudal regression syndrome, transposition of great vessels, VSD, ASD), hypoglycaemia, hyperviscosity syndrome, hyaline

membrane disease, macrosomia, hypocalcaemia, apnoea, bradycardia, traumatic delivery and perinatal death. Pregnancy adversely affects DM by causing rapid progression of diabetic nephropathy, diabetic retinopathy, and increased risk of death in patients with diabetic cardiomyopathy.

A vast number of people with diabetes in India live in rural areas with inadequate access to health care, lack of awareness, lack of a balanced nutrition and limited opportunities for exercise despite increasing economic growth. Increasing mechanization and urbanization of rural populations has been associated with an increasing occurrence of type 2 diabetes in rural areas of India too. Understanding prevalence of GDM in this particular population will help in directing the appropriate resources for care of mothers and children affected by this disorder. The fact that GDM causes innumerable complications to the mother as well as the fetus and also increases the future risk, should alert the physicians the necessity to devote special attention to this segment of population in developing countries. Timely action taken in screening all pregnant women for glucose tolerance, achieving euglycaemia in them and ensuring adequate nutrition may prevent, in all probability, the vicious cycle of transmitting glucose tolerance from one generation to another. Study objectives were to find out the prevalence Gestational Diabetes in rural population, to analyze the maternal and perinatal outcome in gestational diabetes mellitus

## Materials And Methods

A descriptive longitudinal study was carried out at Department of Obstetrics and Gynaecology of Rural Medical College, Loni, Maharashtra over a period of 2 years from 15th September 2014 to 14th September 2016. Five hundred pregnant were screened for gestational diabetes using DIPSI guidelines.

**Inclusion Criteria :** 1) Pregnant women preferably in first and second trimester of pregnancy, undergoing screening test for gestational diabetes (GTT) and who delivered at Pravara Rural Hospital. 2) Women who gave consent to be the subject for the study.

## Exclusion Criteria

1) Type -1 diabetes mellitus 2) Women who subsequently delivered outside Pravara Rural Hospital 3) Women with

other associated serious medical disorders (hypertension, renal disease ,moderate to severe anaemia ,thyroid disorder etc) .interfering with maternal and perinatal outcome. 4) Women who were lost to follow up after initial work up.

**Methodology** ? Patient information leaflet on gestational diabetes was prepared in local language and was distributed to women coming for antenatal check up. Five hundred consecutive pregnant women at first antenatal visit or preferably before 24-28 weeks of gestation, who were willing to participate in the study and those who fulfilled inclusion criteria were enrolled in the study Women chosen as study subjects were explained about the importance of screening for diabetes mellitus during pregnancy, method of screening and effects of untreated diabetes on mother and baby. Written informed consent was obtained from the study subjects. ? In the antenatal clinic, a pregnant woman after undergoing preliminary clinical examination, was given 75 gram oral glucose load, irrespective of whether she was in the fasting state and without regard to the time of the last meal as suggested by -

**Dipsi Guidelines** 20 A venous blood sample was collected at 2 hours for estimating plasma glucose by the GOD-POD method in the central clinical laboratory. GDM is diagnosed if 2-hour PG is e" 140 mg/dL (7.8 mmol /L). A two hour plasma glucose value of e"140mg/dl was considered abnormal and was the criteria for labeling her as a case of gestational diabetes.. ? **Target blood sugar level**– Maintaining a mean plasma glucose (MPG) level ~105–110 mg/ dL was targeted for a good fetal outcome. ( FPG and 2-hour postprandial peaks are ~90 mg/dL and ~120 mg/dL, respectively ) **Materials and Methods** 59 ? **Medical Nutrition Therapy (MNT)** All women with GDM were offered nutritional counseling. The meal pattern provided adequate calories and nutrients to meet the needs of pregnancy. The expected weight gain during pregnancy was 300–400 g per week and total weight gain of 10–12 kg by term. ? **Initiating Insulin Therapy** Once GDM is diagnosed, medical nutritional therapy (MNT) was advised initially for 2 weeks. If MNT failed to achieve control, i.e. FPG ~90 mg/dL and/or post-meal glucose ~120 mg/dL, insulin was initiated in consultation with physician ? Each subject diagnosed as GDM was advised to come for regular antenatal check up throughout the pregnancy. ? Spontaneous labour was allowed unless contraindicated. Mode of delivery was individualized. Both

mother and baby were kept under surveillance for complications of gestational diabetes till discharge from the hospital. All newborn babies were kept under care of neonatologist. Women were advised regarding different measures she should adopt to keep her blood sugar under control .She was explained about the importance of follow up visits to know her glycemic control. Periodic visits to physician for diabetic evaluation were encouraged. The information related to different variables (prevalence of gestational diabetes, maternal morbidity and mortality and perinatal morbidity and mortality ) was collected from various sources like OPD register, OPD paper, patients indoor case file, labour room register, operation theatre register, neonatal ward register and records kept in hospital medical record department The relevant data related to individual case was entered in study proforma .The data was compiled , cleaned and then transferred to excel sheet. Statistical analysis was done by descriptive statistic as mean, SD, percentage etc. comparison of proportion / percentages of variables under study were done by applying Z test of difference between two sample means. Level of significance was at 5 % and 1% .The statistical software namely SYSTAT version 12 (made by Cranes Softwares , Bangalore) was applied.

## Results

Present prospective study was undertaken to find the prevalence of GDM by the DIPSI criteria and to analyze the maternal and perinatal outcome in gestational diabetes. Five hundred antenatal women were enrolled in the study using inclusion and exclusion criteria. They were subjected to blood glucose estimation as per DIPSI guidelines, between 24-28 weeks of gestation. The prevalence of GDM by the DIPSI test was 5.2%.(**Table 1**) The mean blood glucose value observed in the present study using Dipsi guideline was 89.65 grams%. (**Table 2**) The prevalence of GDM was increasing as age of the woman advanced. Similarly, multigravida women had more prevalence than primigravida. There was strong statistical relationship between GDM and high BMI. There was positive co relationship between prevalence of GDM and higher socio economic class. The women with gestational diabetes were advised medical nutrition therapy and or insulin. Over all there was good compliance of women regarding regular antenatal visits and therapy. Seventy percent of women reached term , whereas approximately

thirty percent women delivered preterm. The incidence of Preeclamsia ,polyhydramnios, congenital fetal anomalies

**Table No. 1 : Distribution of cases of Gestational Diabetes Mellitus as per gestational age at the time of**

| Gestational age at the time of diagnosis |                       |                               |  |   |
|--|-----------------------|-------------------------------|--|---|
| Sr. No.                                  | Gestational age(wks.) | No. of cases screened (n=500) | No. of cases with high blood glucose values (n=26) | % of cases with high blood glucose values |
| 1  | 24 – 26               | 192                           | 09   | 04.68                                     |
| 2  | 27 – 28               | 210                           | 14   | 06.66                                     |
| 3  | 29 – 30               | 70                            | 01   | 01.42                                     |
| 4  | > 30                  | 28                            | 02   | 07.14                                     |
|  | Mean ± SD             | 26.87 w ± 7.49w               | 27.28w ± 6.46w                                     | 05.20                                     |

**Table No 2:-Distribution of women as per Blood glucose values at the time of screening**

| Distribution of Cases of Gestational Diabetes as per Blood glucose value |                     |                      |            |
|--|---------------------|----------------------|------------|
| Sr. No.  | Blood glucose Value | No. of Cases (n=500) | % of Cases |
| 1  | d" 100              | 372                  | 74.40      |
| 2  | 101 - 120           | 94                   | 18.80      |
| 3  | 121 - 140           | 8                    | 01.60      |
| 4  | 141 - 160           | 10                   | 02.00      |
| 5  | > 160               | 16                   | 03.20      |
|  | Mean ± SD           | 89.65 ± 12.06        |            |

**Table No. 3:- Distribution of cases of Gestational Diabetes Mellitus as per Mode of Delivery**

| Mode of Delivery |                               |                            |                   |
|------------------|-------------------------------|----------------------------|-------------------|
| Sr. No.          | Mode of delivery              | No. of cases of GDM (n=26) | % of cases of GDM |
| 1                | Spontaneous vaginal delivery  | 10                         | 38.46             |
| 2                | Instrumental vaginal delivery | 02                         | 07.69             |
| 3                | Caesarean section             | 14                         | 53.85             |

was not increased in GDM. The rate of caesarean section was 54% in GDM. (Table 3)

Common indications of caesarean were cephalopelvic disproportion, Fetal distress, failed induction, postdated

pregnancy, caesarean on demand. Maternal morbidity was seen in sixty percent cases. It was in the form of transient febrile illness, surgical site infections, genital tract injuries during labour or mild postpartum haemorrhage. All these complications were seen in women with obesity, anaemia, hyperglycemia and operative interventions. One woman

**Table No. 4:- Maternal Morbidity in Gestational Diabetes Mellitus**

| Maternal Morbidity in Gestational Diabetes Mellitus |                          |                  |            |
|---|--------------------------|------------------|------------|
| Sr. No.   | Morbidity                | No. cases (n=15) | % of cases |
| 1   | Mild Febrile illness     | 5                | 33.33      |
| 2   | Inadequate lactation     | 4                | 26.67      |
| 3   | Surgical site infections | 3                | 20.00      |
| 4   | Vaginal /cervical tear   | 2                | 13.33      |
| 5   | Atonic PPH               | 1                | 6.67       |

required admission in intensive care unit as she presented with features of diabetic ketoacidosis. (Table 4)

There was no maternal mortality in the present study. Seventy seven percent of babies were alive at the time of

**Table No. 5:- Perinatal Outcome in Gestational Diabetes Mellitus**

| Perinatal Outcome |   |                   |                   |
|-------------------|---|-------------------|-------------------|
| Sr. No.           | Outcome                                 | No. babies (n=26) | % of cases of GDM |
| 1                 | Live birth                              | 20                | 76.92             |
| 2                 | Still birth (IUD and Fresh stillbirths) | 4                 | 15.38             |
| 3                 | Neonatal death                          | 2                 | 07.69             |

discharge. There were six perinatal deaths.(two each were IUD, Fresh stillbirths and neo natal deaths. (Table 5)

The average birth weight of babies of mother with gestational diabetes was higher by three hundred grams. Fifty four percent of the newborn babies had birth weight more than 3000 grams and fifteen percent had birth weight more than 3500 grams. Perinatal deaths were due to prematurity ,birth asphyxia ,neonatal sepsis. Neonatal morbidity was seen in fifty percent of babies. common complications were hypoglycemia ,hyper-bilirubinaemia ,respiratory distress syndrome and birth asphyxia. All these complications were related to prematurity and low birth

weight. Hypoglycemia was noticed in babies with large birth weights ie above 3800 grams. (Table 6)

**Table No. 6:- Neonatal Morbidity In Gestational Diabetes Mellitus**

| Neonatal Morbidity |                              |                  |            |
|--------------------|------------------------------|------------------|------------|
| Sr. No.            | Causes of neonatal morbidity | No. cases (n=10) | % of cases |
| 1                  | Hypoglycemia                 | 04               | 40         |
| 2                  | Hyper-bilirubinemia          | 03               | 30         |
| 3                  | RDS                          | 02               | 20         |
| 4                  | Birth asphyxia               | 01               | 10         |

### Conclusion

Gestational diabetes is a medical disease associated with pregnancy. It is a temporary disturbance of carbohydrate metabolism. Asians women are more prone for its development. There are various screening methods for diagnosis of GDM. DIPSI guidelines for screening and management of GDM are accepted and approved by government. The method is easy, one step, feasible and detect maximum number of cases of GDM. The study findings revealed that the prevalence of GDM is lower in rural population. Family history of diabetes, past history of GDM, high BMI, multiparity and age above twenty five years have positive co relationship with development of GDM. Early detection of hyperglycemia by universal screening of all pregnant women after 24 weeks of pregnancy is recommended. Medical nutrition therapy (MNT) and insulin treatment for women, who are not responding to MNT forms main stay of management. Continuous supervision, regular monitoring of glycemic control, fetal growth monitoring and institutional delivery are necessary for optimum maternal and perinatal outcome. Maternal and fetal complications are related to poor glycemic control, fetal macrosomia and increased operative interventions and can be avoided by early detection of GDM.

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