



## PREVALENCE, CLINICAL PROFILE AND FETOMATERNAL OUTCOME OF GESTATIONAL DIABETES MELLITUS IN A TERTIARY HOSPITAL OF UTTARAKHAND

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### ABSTRACT

**Background:** Gestational Diabetes Mellitus, defined as glucose intolerance with onset or first recognition during pregnancy. Women with GDM are at increased risk for adverse obstetric and perinatal outcome. Early detection and management is done to ensure better fetomaternal outcome.

**Aims:** To evaluate prevalence of GDM using Diabetes In Pregnancy Study Group India (DIPSI) criteria and assess its fetomaternal outcome in Uttarakhand.

**Materials and Methods:** The present study was carried out in 525 antenatal patients using DIPSI guidelines. Patients with plasma glucose  $\geq 140$ mg/dl were designated GDM, and were followed up.

**Results:** Prevalence of GDM was 16%. Pre-eclampsia and polyhydramnios were common maternal complications; while hyperbilirubinemia, macrosomia and hypoglycemia occurred in fetuses.

**Conclusion:** GDM is associated with higher maternal and foetal morbidity. Therefore; early screening, detection, close monitoring, and intervention is essential to reduce maternal and foetal complications.

**KEYWORDS :** Gestational diabetes mellitus, morbidity, DIPSI

### INTRODUCTION

Diabetes mellitus is one of the most challenging health problem in the 21st century. It has become a global pandemic because of aging population, sedentary lifestyle, urbanization, and increasing incidence of obesity. As prevalence of diabetes is rising in epidemic proportion, more women of childbearing age are at increased risk of diabetes during pregnancy.

Gestational diabetes mellitus is a metabolic disorder defined as "any degree of carbohydrate intolerance causing hyperglycemia with onset or first recognition during pregnancy".<sup>1</sup> The definition applies whether insulin or only diet modification is used for treatment and whether or not the condition persists after pregnancy.

Pregnancy is diabetogenic state characterized by physiological insulin resistance, attributed to Human Placental Lactogen (HPL) which is maximum at 24–28 weeks of pregnancy, making the mother more prone to GDM during the second trimester. Carbohydrate intolerance causes significant fetomaternal morbidity. The maternal complications range from pre-eclampsia, bacterial vaginosis, chorioamnionitis, postpartum endometritis, post-partum haemorrhage to higher incidence of caesarean section and instrumental deliveries. Infants are at higher risk of preterm delivery, macrosomia or large for gestational age (LGA), which is associated with birth injury, respiratory distress, neonatal hypoglycemia, hyperbilirubinemia, hyaline membrane disease, traumatic delivery and hyperviscosity syndrome. Also, GDM has long-term consequences including predisposition to obesity, metabolic syndrome, type-2 diabetes and cardiovascular diseases later in life. Fortunately, many of these risks can be reduced by timely identification and prompt intervention to reduce maternal antenatal hyperglycemia.

The Diabetes In Pregnancy Study group of India (DIPSI) has reported guidelines for GDM in the Indian environment.<sup>2</sup> Due to higher prevalence of GDM in Asian-ethnicity, screening is essential for all Indian pregnant women. This one step procedure of challenging women with 75grams of glucose and diagnosing GDM is simple, economical and feasible.

GDM is preventable disease and in order to avoid complications, it's necessary to identify risk indicators at earliest. It is our duty to make the public aware of GDM. Present study was thus conducted to

determine prevalence, clinical profile and fetomaternal outcome of GDM at tertiary-setup in Uttarakhand. By doing this study, we could diagnose and timely intervene to decrease maternal and foetal morbidity.

### MATERIALS AND METHODS

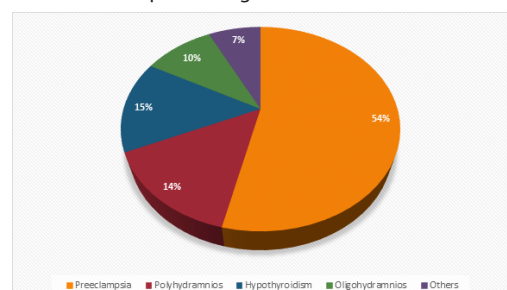
Present study was conducted in Department of Obstetrics and Gynaecology at Susheela Tiwari Government Hospital, Haldwani. Booked antenatal patients were included in the study; while patients who did not give consent for the study, known cases of diabetes mellitus and multiple pregnancy were excluded.

All antenatal patients were subjected to detailed clinical history regarding age, parity and were screened for high-risk factors like history of big size baby, polycystic ovarian syndrome, anomalous baby, GDM in previous pregnancy or family. Informed consent was taken and patients were given 75grams oral-glucose irrespective of last meal. Venous sample was drawn after 2 hours according to DIPSI-guidelines and plasma-glucose was estimated; value  $\geq 140$ mg/dl is diagnostic of GDM. If levels were  $\leq 140$ mg/dl, patient was subjected to test again at 24–28 weeks and at 32–34 weeks of pregnancy. The test if found positive ( $\geq 140$  mg/dl) categorized the patient under GDM.

GDM patients were followed and fetomaternal outcome was studied. All cases were managed by multidisciplinary-team involving an obstetrician, physician, dietician, and paediatrician.

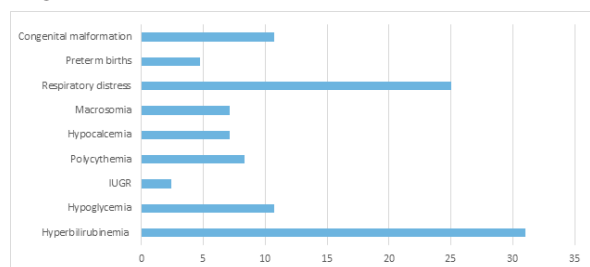
### OBSERVATIONS AND RESULTS

Comorbidities like pre-eclampsia, polyhydramnios and hypothyroidism were frequently seen in GDM patients. Maternal outcome has been depicted in figure 1.



**Figure 1: MATERNAL OUTCOME IN GDM PATIENTS**

Hyperbilirubinemia, respiratory distress and hypoglycemia was common in babies born to diabetic mothers. Macrosomia, anomalous babies and polycythemia were also seen as summarized in figure 2.

**Figure 2: FOETAL OUTCOME IN GDM PATIENTS****DISCUSSION**

The primary objective of this research is to determine prevalence, assess clinical profile, and evaluate associated fetomaternal morbidities in GDM.

GDM prevalence has been reported variably from 1.4 to 14% worldwide.<sup>1</sup> In our study, 84 women were diagnosed GDM out of 525 antenatal-patients studied. The prevalence was 16%, implying Uttarakhand is high-prevalence zone of gestational-diabetes. Nilofer in Karnataka, performed similar study and found prevalence of 6% while Wahi et al from Jammu found prevalence of 6.94%.<sup>3,4</sup>

In our study, majority of cases (76.2%) were in age group 20-30 years. Our findings are similar to Indian-studies like Bhattacharya et al in which 34.4% patients were in age group 20-25 years and 33.7% in age group 25-30 years.<sup>5</sup>

Most patients in our study were multigravida (70.24%) which is similar to studies conducted by Binny Thomas et al in which 50.36% were multigravida.<sup>6</sup>

35.71% diabetic-mothers were overweight and 34.52% were obese in present study. In study conducted by Priyanka et al 66.67% were overweight and 18.18% were obese.<sup>7</sup> Aruna et al assessed that 52% were obese patients.<sup>8</sup> Hence, excessive weight gain during pregnancy and having high pre-pregnancy weight are risk-factors for GDM. The demographic profiles have been compared in table 1.

**Table 1: COMPARISON OF DEMOGRAPHIC VARIABLES IN STUDY POPULATION**

DEMOGRAPHIC VARIABLE	Binny Thomas et al <sup>6</sup>	Priyanka kalra et al <sup>7</sup>	Present Study
Age group 20-30 years	27.02%		76.2%
Age group 31-40 years	22.25%		16.6%
Primigravida	47.74%		29.76%
Multigravida	50.36%		70.24%
BMI 25-29 kg/m <sup>2</sup> (Overweight)	53.60%	66.67%	35.71%
BMI ≥ 30 kg/m <sup>2</sup> (Obese)	27.02%	18.18%	34.52%
Family history in mother	42%	18.18%	22.61%
Family history in father	31.5%	9.09%	19.04%

Pre-eclampsia (14.4%), Oligohydramnios (3.6%), Hypothyroidism (2.25%), Polyhydramnios (2.7%) were associated co-morbidities in study by Binny et al.<sup>6</sup> In our study, pre-eclampsia was seen in 26.19% patients; while polyhydramnios, hypothyroidism, oligohydramnios occurred in 7.14%, 7.14%, 4.76% respectively.

Our study demonstrated 7.14% newborns were macrosomies. Initial hyperglycemic episodes lead to elevation of foetal-growth factors,

increased expression of GLUT1 receptors, and eventually sustained acceleration of foetal-growth leading to macrosomia.

The incidence of hyperbilirubinemia and hypoglycemia were 31% and 10.71% respectively. Elevated erythropoietin levels causes polycythemia seen in 8.33% babies, further contributing to postnatal-hyperbilirubinemia.

In study by Mahalakshmi et al in South India, 19% were preterm live-birth.<sup>9</sup> Preterm-births in present study were 4.76%, attributed to premature preterm rupture of membranes and preterm-labour.

In present study, 2 intrauterine-deaths were observed. Both had poor glycemic-control and weren't on insulin. 6% intrauterine-deaths reported in study by Saxena et al.<sup>10</sup>

Congenital malformations were identified in 9 babies (10.71%) which were largely anatomical defects (cleft-lip, cleft-palate) or those involving nervous-system (anencephaly, meningomyelocoele). Similar result was observed in study by Saxena et al in which 10% babies were anomalous.<sup>10</sup> The present figure is much higher than reported by another Indian study (1.4%), which might be because of associated folic-acid deficiency.

The importance of GDM is that two generations are at risk of developing diabetes in future. Women with history of GDM are at increased risk of future diabetes as are their children. Infants of mothers with preexisting diabetes experience double-risk of serious injury at birth, triple likelihood of cesarean, and quadruple incidence of NICU admission.<sup>11</sup> Therefore, it's necessary to devote special attention to this segment of population.

Our findings are largely at tandem with those of literature at national and international level. Therefore, we infer that Uttarakhand, despite its food-habits, and living-standards is very much part of diabetes spectrum world over. The adverse outcomes reflect negative impact of gestational-diabetes which can be reduced by identification of risk-factors, good antenatal-care, improved nutrition and lifestyle, careful vigilance of high-risk cases and timely decisions.

**CONCLUSION**

GDM constitutes a major-health problem worldwide; incidence of which is escalating tremendously, paralleling high incidence of obesity and sedentary-lifestyle.

35.71% diabetic mothers were overweight and 34.52% were obese in present study. Obesity as significant risk-factor for GDM is supported by several studies, suggesting that obesity predisposes to GDM. This maybe due to increased demands on maternal metabolism during pregnancy from excess weight, resulting in imbalances in carbohydrate regulation mechanisms, and insulin-resistance.

45.23% GDM patients had positive family-history of diabetes in first-degree relatives which means diabetes runs in families. Thus, predisposing babies of diabetic mothers to develop diabetes in future.

In our study, 62% women were diagnosed as GDM in 2<sup>nd</sup> trimester. This can be attributed to elevated levels of HPL which promotes insulin-resistance and weight-gain.

Our study revealed that most common maternal complication seen in GDM was pre-eclampsia noted in 26.19% patients; followed by polyhydramnios and hypothyroidism. The associated comorbidities have adverse effect on the fetomaternal outcome.

Most common foetal complication was hyperbilirubinemia (31%) followed by respiratory distress (25%). Hypoglycemia, congenital anomaly, IUGR, preterm birth and IUD were other complications noted.

7.14% babies were macrosomic at birth. Insulin being a potent growth-factor promotes lipogenesis, protein synthesis, and therefore growth of foetus. Hence, history of prior delivery of macrosomic baby is also indicative of existence of GDM in previous pregnancies. In our study, 5.95% gave history of previous delivery of big-baby.

### SUMMARY

The present study supports Gestational Diabetes has adverse fetomaternal outcomes. Hence, it is imperative that early detection and management is done to ensure well-being of mother and baby. Saving two-lives is truly a noble deed.

The only expenditure involved is simple screening test by DIPSI. It is recommended that all antenatal-patients should be universally screened for GDM. Multidisciplinary-team management and antepartum foetal-surveillance can go a long way in preventing adverse outcomes.

Women with GDM pose an important public-health problem because diabetes not only affects fetomaternal outcome, but these women and their foetuses are also at increased risk of developing diabetes in future.

Thus, we conclude GDM should be regarded as sentinel event in a woman's life that presents challenges; favorable fetomaternal outcome depends upon the care by committed team of diabetologists, obstetricians and neonatologists. Intensive monitoring, diet and insulin is the corner-stone of GDM management. Better identification and treatment of mothers and fetuses at risk may have far-reaching implications for maternal and child health.

Out of 8 goals stated by the United Nations Millennium Development Goals (MDG), 4th goal targets the reduction in child-mortality and 5th goal states upgrading of maternal-health. Pregnancy with complication has to be identified and timely action should be taken for safer deliveries, so as to achieve these goals. In conclusion, a short-term intensive care gives a long-term pay-off in primary prevention of obesity, impaired glucose-tolerance and diabetes in offspring, as preventive medicine starts before birth.

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