Section: Obstetrics and Gynaecology

Original Research Article

# BURDEN OF GESTTIONAL DIABETES MELLITUS AND ITS OBSTETRICAL OUTCOME IN A TERTIARY CARE CENTRE

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***Received*** *: 05/06/2024*
***Received in revised form*** *: 27/07/2024*
***Accepted*** *: 10/08/2024*

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**DOI:** 10.70034/ijmedph.2024.3.143

**Source of Support:** Nil,
**Conflict of Interest:** None declared

**Int J Med Pub Health**
2024; 14 (3); 798-804

ABSTRACT

**Background:** GDM is one of the most common medical complications experienced during pregnancy, affecting approximately 10% of all pregnant women. It occurs when the body is unable to produce or use enough insulin, leading to elevated blood sugar levels. While GDM usually resolves after childbirth, it can have serious consequences for both the mother and the baby if not properly managed.

**Materials and Methods:** Study type: This cross-sectional observational study was conducted in the department of Obstetrics and Gynaecology of Government Doon Medical College and Associated Hospital, Dehradun, Uttarakhand.
Study period – 1 year
Sample size –Number of GDM patients were admitted to our labour room in the duration of 12 months for delivery. All pregnant women with gestational age 24 weeks onwards with attended to OPD and labour room emergency were screened for gestational diabetes, with 50 gm ORAL GLUCOSE CHALLENGE TEST (OGCT). Those antenatal women whose blood sugar level found >/140mg/dl second step of diagnostic 100 gm ORAL GLUCOSE TOLERANCE TEST (OGTT) was conducted on these screen positive antenatal women. All women with gestational age less than 24 weeks, with OGCT value less than 140mg/dl, rescreened between 24 to 28 weeks. All pre-gestational diabetic patient or already known case of diabetic were not included in the study.

**Results:** Total cases of GDM was found to be 332 (4%) in our hospital There were 8316 total deliveries occurred in our hospital during the study period. Total 332 GDM patient's outcome was measured. Here total 8 patients were noncompliant, 1 patient was admitted to labour room at term pregnancy with decrease foetal movements. IUD was confirmed by the ultrasonography. Rest 7 five patients had uncontrolled blood sugar which is mainly responsible for sudden IUD in case of preterm babies. Among them 213 babies were alive and healthy but 119 babies have significant perinatal outcome.

**Conclusion:** Gestational Diabetes Mellitus (GDM) is a common pregnancy complication that requires vigilant management to prevent adverse maternal and neonatal outcomes. Through early diagnosis, regular monitoring, and appropriate treatment, the impact of GDM can be mitigated, ensuring the well-being of both mother and baby.

**Keywords:** GDM, IUD, OGCT, OGTT, MNT, BMI

## INTRODUCTION

Diabetes is a major public health problem in India, where both Type 2 diabetes mellitus (DM) and gestational diabetes mellitus (GDM) exhibit alarming prevalence rates. Gestational diabetes is a predisposing factor for future diabetes mellitus. Thus, screening for gestational diabetes during pregnancy is crucial, as it not only identifies those at risk but also presents an opportunity for early intervention and lifestyle modifications, ultimately reducing the likelihood of developing future diabetes mellitus. Prevalence of diabetes in pregnancy in urban areas reporting rates between 4.6% and 14%, and rural areas ranging from 1.7% to 13.2%, the overall impact on public health is profound. [1]

The projected increase in Type 2 DM cases to 79.4 million by 2025 emphasizes the urgent need for effective strategies to curb this epidemic. Concurrently, the escalating prevalence of GDM, observed from 3.8% in Kashmir to as high as 41% in Lucknow, points to a concerning trend. Geographical variations are apparent, potentially linked to diverse factors such as age and socioeconomic status. As these statistics highlight, GDM has become a pressing health issue affecting around 4 million women in India at any given time, demanding comprehensive attention and targeted interventions. [2]

The Government of India's guidelines necessitating age-appropriate Gestational Diabetes Mellitus (GDM) screening during regular antenatal check-ups at primary health centres (PHCs) are essential for maternal and foetal health. [3,4]

GDM is one of the common medical complications experienced during pregnancy, affecting approximately 10% of all pregnant women. [5] It occurs when the body is unable use enough insulin due increase in antagonizing pregnancy hormones, leading to elevated blood sugar levels. While GDM usually resolves after childbirth, it can have serious consequences for both the mother and the baby if not properly managed. [6] It also heightens the risk of developing type 2 diabetes later in life. For the baby, GDM can lead to excessive growth (macrosomia), making delivery more difficult and increasing the likelihood of birth injuries and the most distressing event of sudden intrauterine death. It can also result in low blood sugar levels, respiratory distress syndrome in neonatal period and an increased risk of developing obesity and type 2 diabetes later in life. [7,8,9]

It is essential to diagnose GDM early and manage it effectively to minimize the risks associated with the condition. This typically involves making dietary modifications, adopting regular physical activity, and, in some cases, using insulin or other medications to control blood sugar levels. Regular monitoring of blood sugar levels, regular prenatal check-ups, and working closely with healthcare professionals are crucial to ensuring the best possible outcomes for both the mother and the baby.

Due to a decline in the age of onset of diabetes and an increase in the childbearing age, it is common for women to have undiagnosed diabetes before becoming pregnant. Therefore, it is crucial for all pregnant women to undergo early testing during pregnancy to rule out overt diabetes, as well as later in the 2nd and 3rd trimesters to detect gestational diabetes (GDM). Since women with GDM have a high risk of developing diabetes within 5-10 years after giving birth, it is essential to follow up with them after delivery. [10]

## MATERIAL AND METHODS

This cross-sectional, prospective study was conducted in the department of Obstetrics and Gynaecology, Government Doon Medical College and Associated Hospital, Dehradun, Uttarakhand from April 2023 to March 2024. All women diagnosed with GDM admitted to labour room for delivery during this period of 1 year included in this study.

All pregnant women attended OPD, labour room emergency was screened for gestational diabetes in first visit irrespective of gestational age, then again between 24 to 26 weeks in whom test was done in first trimester with ORAL GLUCOSE CHALLENGE TEST (50gm glucose in water irrespective of meal, and venous blood sample taken after 1 hour). Those antenatal women whose blood sugar level found >/140mg/dl second step of diagnostic ORAL GLUCOSE TOLERANCE TEST(OGTT) was conducted on these screen positive antenatal patients and additional HbA1C level was also done. With 8 hours fasting, 100gm glucose water ingested within 30 mins, four venous blood samples fasting, 1,2,3 hours samples were collected and read according to carpenter and coustan criteria. All women with gestational age less than 24 weeks, with OGCT value less than 140mg/dl, rescreened between 24 to 28 weeks. All pre-gestational diabetic patient or overt diabetic were not included in the study.

All patient with diagnosed GDM were studied in details. Patients relevant information regarding age, weight, height, BMI, gravida, risk factors hypertension, obesity, hypothyroidism, family history, previous obstetrical outcome history in details, dietary habits their life style were noted. Treatment in the form of medical nutrition therapy (MNT) or oral hypoglycaemic drugs (OHA) or insulin therapy or combination were given to patients according to their blood sugar levels with targeted fasting level below 95mg/dl and 2hours postprandial below 120mg/dl. Patient reviewed 2 weekly on OPD basis, patient with uncontrolled sugar level was admitted and treated accordingly with metformin and insulin or both and all diagnosed GDM patients

studied in details regarding their maternal and perinatal outcomes.

## RESULTS

Total cases of GDM was found to be 4% in our hospital There were 8316 total deliveries occurred in our hospital. The age of the 332 participants ranged from 20 to 40 years. In which 10.5% women falls under 20-25 years and 33.13% patients comes under 26-30 years age group. While majority of the patients 54.21% comes from 31-35 years age group. Only 2.1% fall under age group of 36-40 years.

Among the various risk factors associated with gestational diabetes mellites most common risk factor was found to be overweight 39.1%, followed by sedentary lifestyle 16.5% and advanced maternal age 14.7%. The BMI of all 332 participants were calculated. About 6.92 % had normal weight, 27.4% were overweight, 42.7% were obese class I and only 22.8% were obese class II. Out of 332 participants 33 were primigravida, 155 were secondary and 144 were G3/>G3.

The participants were managed by different methods. Majority 24.3% of them on MNT, 51.5% took OHA, 18.9% took insulin, 5.12% were on both insulin and OHA. Out of 332 participants, 164 patients were delivered vaginally out of which 35.9% delivered spontaneously and 64.02% were induced. While 168 patients were under went LSCS including 42.8 % were electively taken for LSCS, 18.4% for fetal distress and 23 % were taken for LSCS due to failed induction. Gestational diabetes mellitus is associated with various complications most common is preeclampsia (21.6%) which is followed polyhydramnios (20.4 %) and macrosomia (19.2%) and hypothyroidism (11.44%). It may also lead to preterm labour as seen in 4.81% participants.

Out of 332 delivered babies, 213 were alive and healthy and 119 had significant perinatal outcome, in which 11.14% were preterm babies, 0.6% had congenital anomaly, 2.4% were IUD and 0% babies were stillbirth whereas 21.6% babies were admitted in NICU. Out of 332 delivered babies 3.61% weighed <3kg. 37.34% weighed between 3-3.5kg whereas 40.96% babies weighed 3.5-4 kg and only 18.07 % babies were having macrosomia.

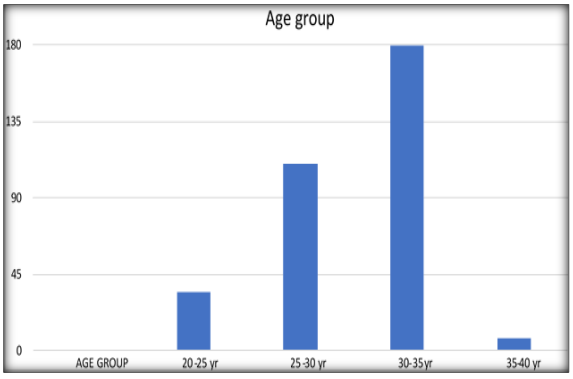


**Figure 1: Age wise distribution of enrolled cases**

Total 332 patients with gestational diabetes were delivered in above 1year study period.

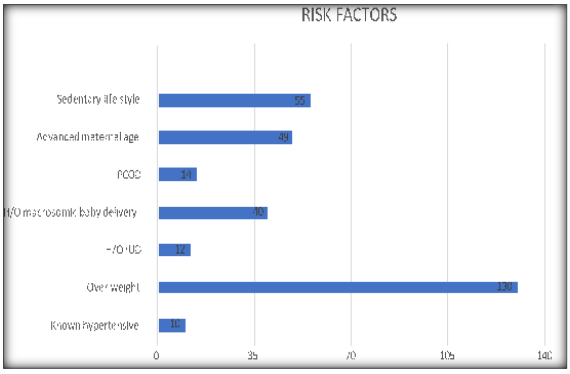


**Figure 2:**

Most of the patient was having multiple risk factors like overweight, family history and PCOS.[Table 2]

Most of the diabetic pregnant females fall in BMI between 30 -35. [Table 3 and Fig 3]

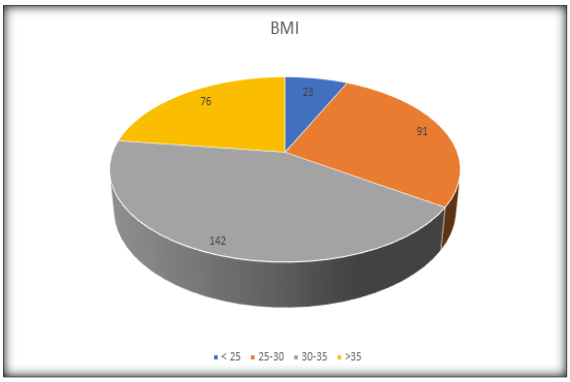


**Figure 3: BMI**

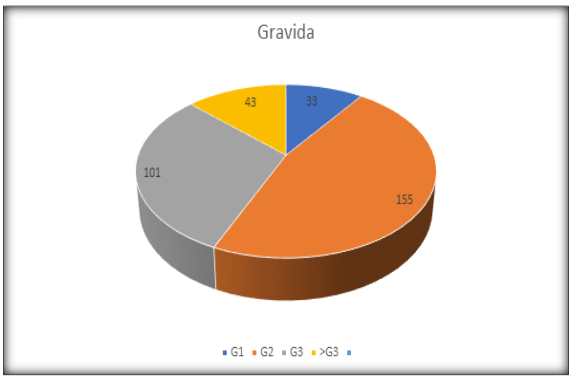


**Figure 4: Gravida**

Maximum patient diagnosed with gestational diabetes, were with gravida 2, this was due to ratio of antenatal patient with gravida 2 were more than patient with gravida 3 and onwards. [Table 4]

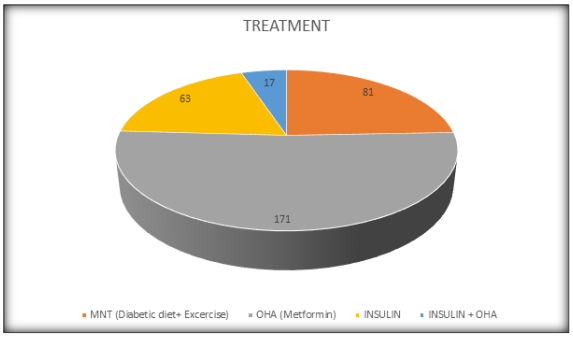


**Figure 5: Treatment**

Our most of patient with milder forms of diabetes were well controlled with medical nutrition therapy 81(24.3%) and almost 50 % had well controlled sugar on metformin alone. [Table 5]

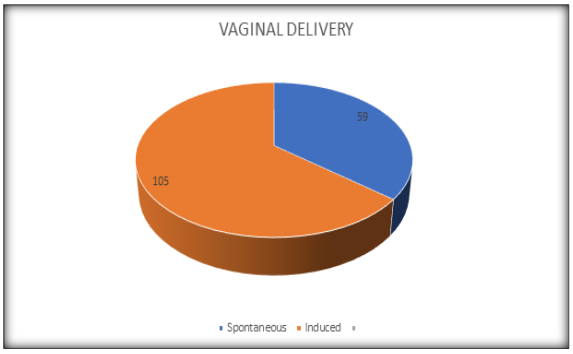


**Figure 6.1 Vaginal Delivery**

The common indications for induction of labour was uncontrolled sugar, and in patient with well controlled diabetes mellitus on drugs pregnancy was terminated at 39 weeks in our study. Those patient with sugar level controlled on MNT induction was done after completed 40 weeks. [Table 6.1]
About 50% patient pregnancy was terminated by for elective LSCS, most common reason was macrosomia, next was associated other medical disorder in pregnancy. [Table 6.2]

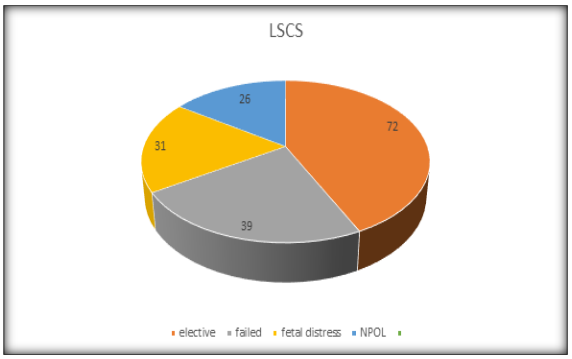


**Figure 6.2 LSCS**

Pre-eclampsia was commonly associated complication found with gestational diabetes, next was milder forms of polyhydramnios. [Table 7]

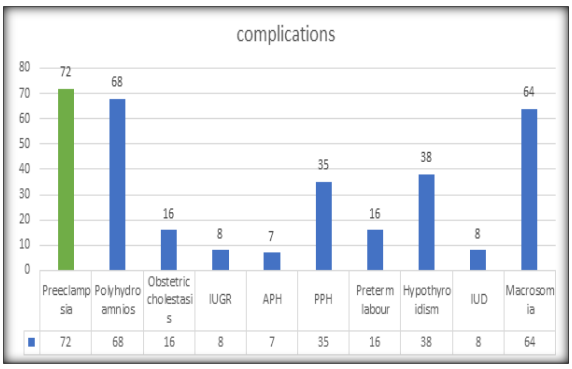


**Figure 7: Complications**

**Perinatal Outcome**

In our study 332 GDM patients Here total 8 patients were diagnosed with Intrauterine demise (IUD) and diagnosis was confirmed by the ultrasonography. Among which 7 patients had uncontrolled blood sugar which is mainly responsible for sudden IUD in case of preterm babies and 1 case was associated with obstetrics cholestasis with bile acid level 36mg/dl. Among them 213 babies were alive and healthy but 119 babies have significant perinatal outcome which described in the table below. [Table 8]

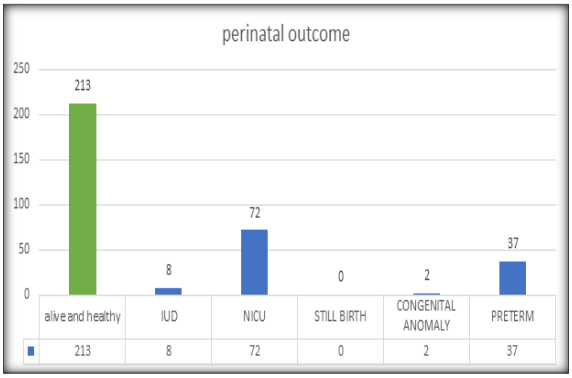


**Figure 8: Perinatal outcome**

Two foetus were diagnosed with congenital anomaly cleft palate other with club foot which were not detected in level 2 ultrasound.[Table 8]

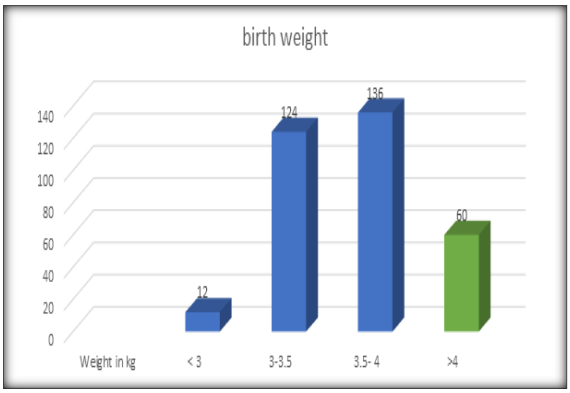


**Figure 9: Birht Weight.**

**Table 1: Age Group**

| AGE GROUP (in years) | TOTAL (332) | Percentage |
|---|---|---|
| 20-25 | 35 | 10.54% |
| 25-30 | 110 | 33.13% |
| 30-35 | 180 | 54.21% |
| 35-40 | 7 | 2.10% |

**Table 2: Risk Factors**

| Risk factors | Total= 332 | Percentage |
|---|---|---|
| Family H/O diabetes | 22 | 6.62% |
| Known hypertensive | 10 | 3.01% |
| Over weight | 130 | 39.1% |
| H/O IUD | 12 | 3.6% |
| H/O macrosomic baby delivery | 40 | 12.04% |
| PCOD | 14 | 4.21% |
| Advanced maternal age | 49 | 14.7% |
| Sedentary life style | 55 | 16.5% |

**Table 3: BMI**

| BMI | Total 332 | Percentage |
|---|---|---|
| < 25 | 23 | 6.92% |
| 25-30 | 91 | 27.4% |
| 30-35 | 142 | 42.7% |
| >35 | 76 | 22.8 % |

**Table 4: Gravida**

| Gravida | Total (332) | Percentage |
|---|---|---|
| G1 | 33 | 9.9 % |
| G2 | 155 | 46.6% |
| G3 | 101 | 30.4% |
| >G3 | 43 | 12.95% |

**Table 5: Treatment**

| TREATMENT | TOTAL (332) | Percentage |
|---|---|---|
| MNT (Diabetic diet+ Exercises) | 81 | 24.3% |
| OHA (Metformin) | 171 | 51.5% |
| INSULIN | 63 | 18.9% |
| INSULIN + OHA | 17 | 5.12% |

**Table 6: Mode of Delivery**

**Table 6.1. Vaginal Delivery**

| Vaginal delivery | Total (164) | Percentage |
|---|---|---|
| Spontaneous | 59 | 35.9% |
| Induced | 105 | 64.02% |

**Table 6.2: LSCS**

| LSCS | | Total (168) | Percentage |
|---|---|---|---|
| Elective LSCS | | 72 | 42.8% |
| Emergency LSCS | Failed induction | 39 | 23.2% |
| | Foetal distress | 31 | 18.4% |
| | NPOL | 26 | 15.4% |

**Table 7: Complications During Pregnancy**

| Complications | Total patients (332) | Percentage |
|---|---|---|
| Pre-eclampsia | 72 | 21.6% |
| Polyhydramnios | 68 | 20.4% |
| Obstetric cholestasis | 16 | 4.81% |
| IUGR | 8 | 2.40% |
| APH | 7 | 2.10% |
| PPH | 35 | 10.54% |
| Preterm labour | 16 | 4.81% |
| Hypothyroidism | 38 | 11.44% |
| IUD | 8 | 2.4% |
| Macrosomia | 64 | 19.2% |

**Table 8: Perinatal Outcome**

| Perinatal outcome | | | Number | Percentage% |
|---|---|---|---|---|
| Alive and healthy | | | 213 | 64.15% |
| IUD | Preterm | 7 | 8 | 2.40% |
| | Term | 1 | | |
| NICU admission* | RDS | 10 | 72 | 21.6 |
| | MSL | 50 | | |
| | Jaundice | 12 | | |
| Still births | | | 0 | 0% |
| Congenital anomaly | | | 2 | 0.6% |
| Preterm | | | 37 | 11.14% |

**Table 9: Birth Weight**

| Weight in kg | Total (332) | Percentage |
|---|---|---|
| < 3 | 12 | 3.61% |
| 3-3.5 | 124 | 37.34% |
| 3.5- 4 | 136 | 40.96% |
| >4 | 60 | 18.07% |

## DISCUSSION

In India Gestational diabetes mellitus is a rising major public health problem in pregnant women. It not only affects the health of the mother, but also affects the outcome of pregnancy and health of the neonate. The findings indicate a relatively low prevalence of GDM (4%), which is comparable to previous studies in India and other developing countries. [1]

The majority of our pregnant patients hailed from hilly regions, where they engaged in moderate to high levels of physical activity as part of their daily routine. Consequently, their average BMI was lower, and their good physical activity levels likely contributed to a reduced risk of developing Gestational Diabetes Mellitus (GDM). Majority of the participants (53.7%) were between 31-35 years old, which is a critical age group for GDM development. The study also found a significant association between advanced maternal age (≥30 years) and GDM, which is consistent with previous research. [1]

Overweight and obesity were the most common risk factors for GDM, affecting 72.5% of the participants. This highlights the need for pre-conception counselling and weight management strategies to reduce the burden of GDM. These findings were similar to study conducted by Amrini FN in 2018. [8]

The study also found a significant association between sedentary lifestyle and GDM, emphasizing the importance of physical activity during pregnancy.

The management of GDM varied among participants, with the majority (55.7%) receiving medical nutrition therapy (MNT) alone. A significant proportion (37.6%) took oral hypoglycemic agents (OHA), while a small percentage (1.5%) required insulin therapy. Notably, 5% of participants received both insulin and OHA, indicating more severe cases of GDM. These findings highlight the importance of individualized management of GDM, as the severity and response to treatment vary among patients.

The delivery outcomes showed that 164 participants (49.39%) delivered vaginally, among which 35.9% delivering spontaneously and 64.02% requiring induction. The cesarean section rate was 50.60%, with 42.8% being elective and 18.4% due to fetal distress. Notably, 23.2% of cesarean sections were performed due to failed induction, highlighting the importance of careful monitoring and decision-making during labor. These findings have important implications for clinical practice. Healthcare providers should be aware of the high rate of induction and cesarean section in this population and strive to optimize labor management and fetal monitoring to minimize unnecessary interventions.

The findings of this study highlight the significant complications associated with Gestational Diabetes Mellitus (GDM). The high prevalence of preeclampsia, polyhydramnios, and hypothyroidism among participants underscores the need for vigilant monitoring and management of GDM during pregnancy. The study's results also emphasize the impact of GDM on perinatal outcomes. The high rate of preterm births, NICU admissions, and congenital anomalies among babies born to mothers with GDM is concerning. Furthermore, the occurrence of intrauterine deaths in this population is a stark reminder of the potential consequences of uncontrolled GDM.

The study's findings on birth weight distribution are also noteworthy. The relatively high proportion of macrosomic babies (18.07%) is a concern, as this can lead to complications during delivery and increase the risk of future metabolic disorders.

These results have important implications for clinical practice and public health policy. Healthcare providers should prioritize early screening and diagnosis of GDM, as well as implement evidence-based management strategies to mitigate its complications. Moreover, public health initiatives aimed at promoting healthy lifestyles and reducing the incidence of GDM are crucial.

## CONCLUSION

Gestational Diabetes Mellitus (GDM) incidence is in increasing trend among Indian pregnant leading to

multiple maternal and fetal complications that requires vigilant management to prevent adverse maternal and neonatal outcomes. Through early diagnosis, regular monitoring, and appropriate treatment, the impact of GDM can be mitigated, ensuring the well-being of both mother and baby. In Our study most of pregnant females covered was, maximum from hilly areas with moderate physical activity therefore underscores the incidence and curtailing the risk of GDM in patient starting pregnancy with normal BMI and good carbohydrates metabolism during pregnancy and this, highlights the need for early screening, intervention, and prevention strategies to reduce the burden of GDM and its associated complications. By prioritizing GDM management, we can improve maternal and neonatal health outcomes, enhancing the quality of life for families and communities.

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