



# A Narrative Review on Gestational Diabetes Mellitus: Challenges and Management in Maternal Health

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## ABSTRACT

Gestational Diabetes Mellitus (GDM) is emerging as a major concern in maternal health due to its increasing prevalence and associated complications for both the mother and the baby. This narrative review explores the biological basis, risk contributors, diagnostic pathways, and current strategies for managing GDM. Based on an analysis of 30 scholarly articles and relevant guidelines, six thematic areas are discussed: underlying mechanisms, risk identification, screening protocols, adverse maternal-fetal outcomes, management plans, and post-delivery care. Emphasis is placed on early diagnosis, individualized care, and integrated follow-up systems to improve outcomes and mitigate long-term risks.

**Keywords:** Gestational diabetes, maternal complications, hyperglycemia in pregnancy, postpartum care, insulin resistance, screening, WHO.

## Introduction

Gestational Diabetes Mellitus (GDM) refers to glucose intolerance first identified during pregnancy, typically in the second or third trimester [1]. It is among the most frequently encountered metabolic issues in pregnancy, affecting approximately 13.4% of pregnancies worldwide [2]. In India, the reported prevalence ranges from 10% to 20%, depending on population demographics and diagnostic practices [3].

GDM increases the likelihood of adverse pregnancy outcomes such as preeclampsia, macrosomia, and neonatal hypoglycemia. It also places the mother at elevated risk for type 2 diabetes in the years following childbirth [4]. Similarly, children born to mothers with GDM are more prone to developing obesity and glucose intolerance later in life [5].

With shifting dietary habits, sedentary lifestyles, and increasing maternal age, the prevalence of GDM is expected to rise. Public health programs must therefore prioritize early detection, health education, and timely interventions to address this growing issue effectively.

## Objective

To explore the current understanding and evolution of practices in the prevention, diagnosis, and management of Gestational Diabetes Mellitus, with an emphasis on maternal and neonatal health outcomes.

## Methodology

- **Review Type:** Narrative Review
- **Databases Searched:** PubMed, Scopus, Web of Science, Google Scholar, WHO Library
- **Search Terms:** “Gestational diabetes”, “pregnancy hyperglycemia”, “GDM screening”, “GDM complications”, “WHO guidelines”, “diabetes in pregnancy India”
- **Date Range:** January 2000 – May 2025
- **Languages:** English
- **Inclusion Criteria:** Peer-reviewed studies, WHO/IADPSG guidelines, and Indian public health documents addressing epidemiology, diagnosis, complications, and treatment of GDM
- **Exclusion Criteria:** Articles not related to GDM, animal studies, case reports, editorials, and non-English language publications

- **Articles Included:** 30

#### Review Search Strategy and Study Selection Process

Component	Details
Review Type	Narrative Review
Databases Searched	PubMed, Scopus, Web of Science, Google Scholar, WHO Library
Search Period	January 2000 – May 2025
Search Date Range	Articles reviewed between January 2024 and May 2025
Search Terms Used	“Gestational diabetes” OR “GDM” OR “pregnancy hyperglycemia” OR “GDM complications” OR “GDM management” OR “diabetes in pregnancy”
Boolean Operators	AND, OR
Filters Applied	English language, full-text access, human studies
Study Designs Included	Systematic reviews, observational studies, clinical guidelines, policy reports
Inclusion Criteria	Studies related to GDM risk factors, diagnosis, outcomes, and care strategies; published in English between 2000 and 2025
Exclusion Criteria	Unrelated topics, duplicate articles, case reports, animal studies, and non-English publications
Initial Records Identified	278
Duplicates Removed	58
Records Screened (Title/Abstract)	220
Full-Text Articles Reviewed	65
Articles Included in Final Review	30 (25 peer-reviewed + 5 guidelines/policies)

## Results and Thematic Analysis

### Theme 1: Biological Basis of GDM

GDM occurs due to reduced insulin sensitivity combined with insufficient insulin secretion. Pregnancy-related hormones like estrogen, cortisol, and human placental lactogen create insulin resistance, which is normally countered by increased insulin production. In GDM, the pancreatic  $\beta$ -cells fail to meet this demand, leading to elevated glucose levels [6][7].

### Theme 2: Risk Factors and Vulnerable Populations

Common risk factors for GDM include:

- Advanced maternal age ( $>25$  years)
- Higher body mass index ( $\text{BMI} \geq 25$ )
- Previous history of GDM or macrosomic infant
- Family history of diabetes
- Belonging to high-risk ethnic groups (e.g., South Asians, African Americans) [8][9]

Lifestyle factors like lack of exercise and micronutrient deficiencies also contribute [10].

### Theme 3: Diagnosis and Screening

Diagnosis typically involves a glucose tolerance test. Two methods are used:

- **One-step:** 75g OGTT with specific thresholds at fasting, 1 hour, and 2 hours [12].
- **Two-step:** 50g glucose challenge followed by a 100g OGTT if the initial test is abnormal [11].

In India, DIPSI recommends a single 75g test irrespective of meal timing [13].

#### Theme 4: Complications Associated with GDM

GDM increases the risk of:

- **Maternal:** Preeclampsia, excessive amniotic fluid, higher cesarean rates
- **Neonatal:** Macrosomia, birth injuries, low blood sugar, respiratory distress [14][15]

Long-term complications include metabolic syndrome and early-onset diabetes in offspring [16].

#### Theme 5: Treatment and Control

Management starts with:

- **Medical Nutrition Therapy (MNT):** Structured diet focused on complex carbs and adequate fiber [17]
- **Physical Activity:** Moderate daily exercise enhances insulin function [18]

If glucose remains high, insulin therapy is introduced. Metformin and glyburide may be used but with caution [19][20].

#### Theme 6: Postpartum Follow-Up and Prevention

Women with GDM have a higher chance of developing type 2 diabetes post-delivery. The ADA recommends screening 6–12 weeks postpartum, and at regular intervals thereafter [21][22]. Lifestyle interventions like breastfeeding, exercise, and weight management can delay or prevent future diabetes [23].

### Discussion

The increasing incidence of GDM reflects broader lifestyle and demographic shifts such as delayed pregnancies and poor diet. Although most cases resolve after childbirth, GDM serves as an early warning for chronic diseases. Gaps remain in universal screening practices and postpartum follow-up systems [24].

India's approach must focus on locally adapted screening models, counselling, and integration into maternal health programs. Policies aligned with the WHO Global NCD Framework could help reduce the burden [25].

### Conclusion

Gestational Diabetes Mellitus is a significant contributor to maternal and neonatal health issues. Addressing it effectively requires early detection, evidence-based management, and long-term follow-up. A comprehensive public health strategy that integrates clinical care, education, and lifestyle modification is essential to mitigate the growing impact of GDM in India and globally.

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