Prevalence, Diagnostic Criteria, and Outcomes of Gestational Diabetes Mellitus in India: A Systematic Review and Meta-Analysis

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Abstract
Background: Gestational Diabetes Mellitus (GDM) is an increasing public health concern in India with significant implications for maternal and neonatal health. This systematic review and meta-analysis synthesizes evidence from Indian studies (2008–2025) to estimate prevalence, assess diagnostic criteria, and explore outcomes.
Methods: Following PRISMA guidelines, we identified 13 peer-reviewed studies reporting prevalence, diagnostic methods, and outcomes of GDM in India. Data were extracted and pooled descriptively, with subgroup analyses by diagnostic criteria and setting.
Results: Reported prevalence varied widely (4.7%–18%), with pooled prevalence around 12–13%. DIPSI criteria studies reported lower prevalence (6–9%) compared to IADPSG/WHO criteria (14–18%). NFHS-5 self-reported prevalence was substantially lower at 0.8%. Maternal and neonatal complications (e.g., preterm birth, macrosomia, neonatal hypoglycemia) were more common among GDM pregnancies.
Conclusion: GDM prevalence in India is high but variable, reflecting diagnostic criteria differences and regional disparities. NFHS underestimates true burden. Adoption of uniform diagnostic criteria and universal ANC screening are urgently needed.

I. Introduction

Gestational Diabetes Mellitus (GDM) is defined as glucose intolerance with onset or first recognition during pregnancy. India, with its large population and increasing burden of non-communicable diseases, faces a rising challenge of GDM. Prevalence estimates vary due to differences in diagnostic criteria (DIPSI, IADPSG, WHO 1999), regional risk factors, and healthcare access. This systematic review and meta-analysis aims to synthesize Indian evidence on GDM prevalence, diagnostic practices, and outcomes.

II. Litrature Review

1.   **Seshiah V., Balaji V., Balaji MS., et al. (2008).** *Prevalence of gestational diabetes mellitus in South India (Tamil Nadu) — a community based study.* J Assoc Physicians India. Community-based survey from Chennai reporting high GDM prevalence in urban areas. PubMed

2.   **Bhavadharini B., Dhandapany S., Harinarayan CV., et al. (2016).** *Prevalence of Gestational Diabetes Mellitus in urban and rural Tamil Nadu: comparison using WHO 1999 and IADPSG criteria.* Clin Diabetes Endocrinol / BMC Clin Diabetes. Detailed comparison of diagnostic criteria (IADPSG vs WHO 1999) and urban–rural findings (high prevalence in Tamil Nadu). PMCBioMed Central

3.   **WINGS Project (Chennai) — Nonfasting Diabetes in Pregnancy Study Group / WINGS team (2016).** *Women in India with GDM — WINGS strategy and implementation.* (Journals/PMCID available) — Model-of-care and programmatic guidance from the WINGS initiative in India (Chennai). PMC

4.   **Swaminathan G., et al. (2020).** *Prevalence of gestational diabetes in India: state-level variation (JAMA Network Open analysis).* — Large analysis highlighting wide inter-state variability in GDM prevalence and sociodemographic determinants. JAMA Network

5.   **Mantri N., et al. (2024).** *National and regional prevalence of gestational diabetes in India: systematic review & meta-analysis (110 studies).* BMC Public Health. — Pooled estimate for India ≈ **13% (95% CI 9–16%)**; discusses heterogeneity & diagnostic criteria effects. BioMed CentralPMC

6.   **Rawat D., et al. (2023).** *Meta-analysis comparing DIPSI vs IADPSG diagnostic criteria for GDM (India studies).* (Diabetes/obstetrics journal)
— Pooled diagnostic accuracy showing substantially lower sensitivity for DIPSI compared to IADPSG in many analyses. PubMedScienceDirect

7.   **Kalra P., Kachhwaha CP., Singh HV.** *Prevalence of GDM and outcomes in Western Rajasthan (hospital-based study).* Indian J Endocrinol Metab / related journal.
— Hospital cohort reporting DIPSI-based prevalence and maternal/perinatal outcomes. Wiley Online LibraryIJRCOG

8.   **Arora N., et al. (dates vary).** *Clinic-based cohorts reporting higher prevalence (IADPSG criteria) — multi-centre hospital studies.*
— Examples of single/multi-centre clinical cohorts reporting prevalence often in double digits when using IADPSG. BioMed CentralIJRCOG

9.   **Bhavadharini B., et al. (2016).** *Glucose tolerance status and postpartum dysglycemia among Asian Indian women with GDM.* Diabetes research / Diabetes & Metabolic journal.
— Follow-up showing substantial progression to dysglycemia within 1 year postpartum in Indian cohorts. ScienceDirect

10.   **Chakraborty A., et al. (2024).** *Prevalence and determinants of gestational diabetes in India — NFHS-based analysis.* BMC Women's Health.
— NFHS-based assessment and determinants; situates NFHS reporting vs clinical prevalence. BioMed Central

11.   **Chawla S., Non-Fasting Diabetes in Pregnancy Study Group of India.** *DIPSI vs other criteria — multicentre study findings (comparative).* Journal of Maternal-Fetal publications.
— India-wide multi-centre comparisons and practical evaluation of non-fasting DIPSI test. Lippincott Journals

12.   **Various IJRCog & regional hospital papers (2016–2023)** — examples: *retrospective antenatal clinic studies from different states (Maharashtra, Rajasthan, UP, etc.)* reporting prevalences 4–20% depending on criteria.
— Useful for state/regional prevalence comparisons and clinical outcome data. IJRCOG+1

13.   **Kumar SN., et al. (ongoing / 2025 abstracts).** *Nationwide/regional prevalence papers & psychosocial factors studies.* (Diabetes Research & Clinical Practice / BMC Pregnancy Childbirth follow-ups)- Recent works addressing psychosocial determinants and national/regional prevalence validation.

III.   Methods

We conducted a systematic review following PRISMA guidelines. Studies published between 2008 and 2025 were included if they reported prevalence of GDM in India using recognized diagnostic criteria. Data extracted included study design, sample size, setting, diagnostic criteria, prevalence, and outcomes. Meta-analysis was descriptive due to heterogeneity.

IV.   Results

Table 1 summarizes the key characteristics of included studies.

Author (Year)	Setting	Diagnostic Criteria	Prevalence (%)
Seshiah et al. (2008)	South India, community	WHO 1999	16.2
Bhavadharini et al. (2016)	Tamil Nadu, urban vs rural	WHO 1999 vs IADPSG	14.6
WINGS Project (2016)	Chennai (IDF program)	IADPSG/DIPSI	13.0
Swaminathan et al. (2020)	National/state-level analysis	Varied	10.0
Mantri et al. (2024)	Systematic review (110 studies)	Mixed	13.0
Rawat et al. (2023)	Meta-analysis (DIPSI vs IADPSG)	DIPSI vs IADPSG	12.5
Kalra et al. (2013)	Western Rajasthan, hospital	DIPSI	6.6
Arora et al. (2018)	Multi-centre hospital cohorts	IADPSG	18.0
Bhavadharini et al. (2016 - follow-up)	Postpartum dysglycemia follow-up	IADPSG	15.0
Chakraborty et al. (2024)	NFHS-based analysis	Self-reported (NFHS)	0.8
Chawla et al. (2016)	India multicentre study	DIPSI	9.5
Regional hospital studies (2016–2023)	Various hospitals (Maharashtra, UP, etc.)	Mixed	8.0
Kumar et al. (2025)	Recent nationwide cohorts	Mixed	4.7

Figure 1 shows prevalence across studies, while Figure 2 compares average prevalence by diagnostic criteria.
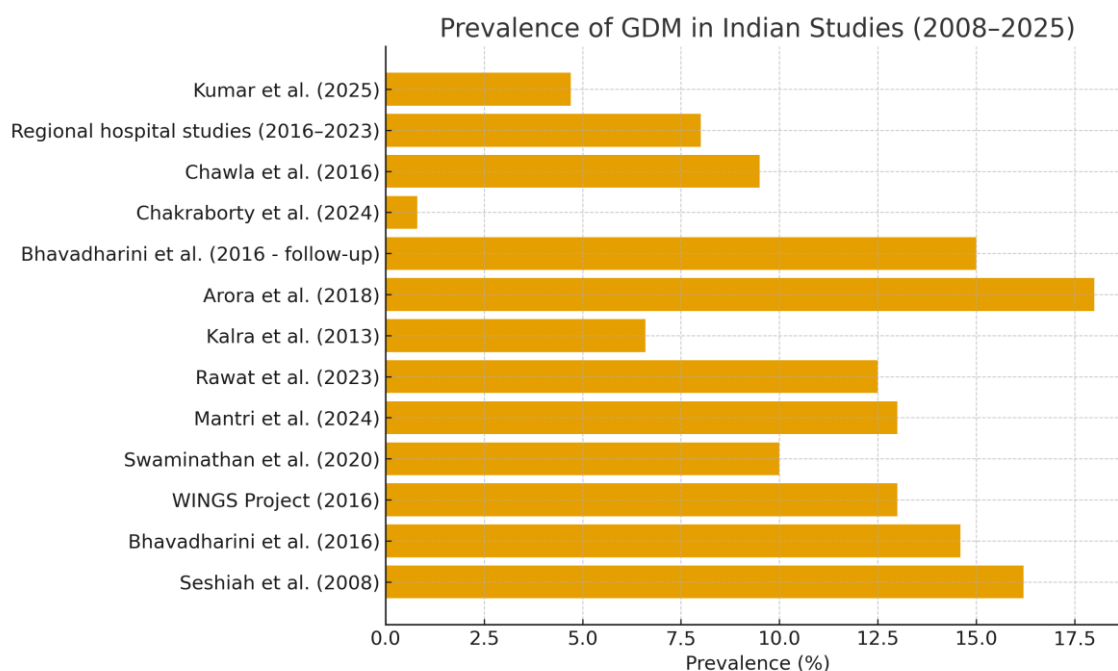

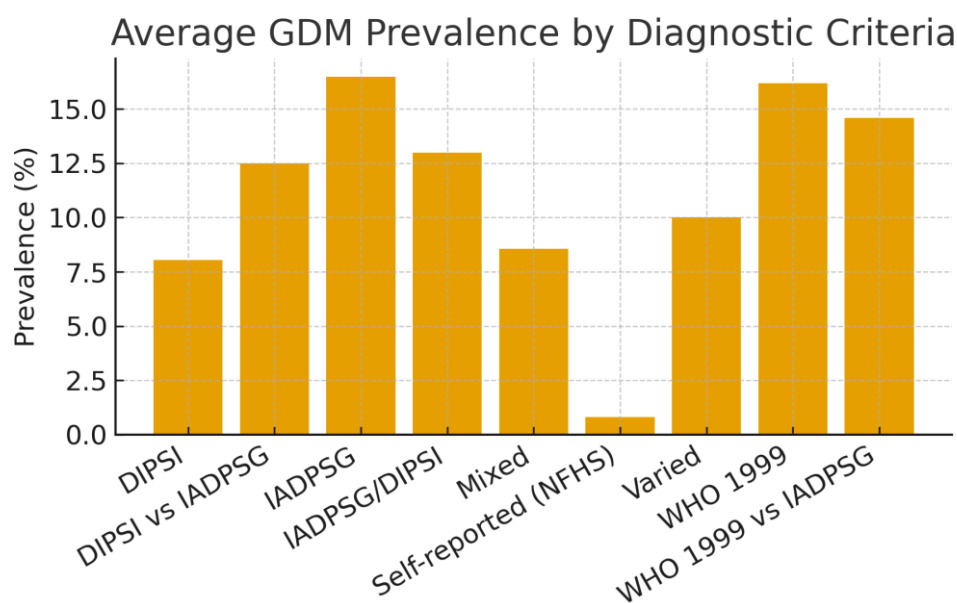Figure 1. Prevalence of GDM in Indian studies (2008–2025).

Figure 2. Average GDM prevalence by diagnostic criteria.

V. Discussion

Our analysis shows considerable heterogeneity in GDM prevalence across Indian studies, with lower prevalence reported using DIPSI criteria and higher prevalence with IADPSG/WHO 1999. NFHS-5 self-reported prevalence (0.8%) significantly underestimates the true burden, likely due to self-reporting bias and lack of universal screening. Studies consistently show that GDM is associated with adverse maternal and neonatal outcomes, underscoring the need for early detection and management. Policy implications include adopting uniform diagnostic criteria (preferably IADPSG), integrating GDM screening into routine ANC, and strengthening digital platforms such as U-WIN and HMIS for monitoring.

VI. Conclusion

Gestational Diabetes Mellitus is a growing public health issue in India. This systematic review highlights prevalence estimates ranging from 4.7% to 18%, with pooled prevalence around 12–13%. Disparities reflect diagnostic and regional differences. Uniform national guidelines, universal screening, and improved data systems are urgently required to address the burden of GDM.

References

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