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Gestational Diabetes In Women With Normal OGTT: Emerging Evidence And Diagnostic Debates: A Review Article

Manal Alqahtani[1], Amjad Alshahrani[1], Halah Sarrani [2], Zanah Ibrahim Mohammad Assiri[3]

[1:] Saudi Board in Family Medicine, JPFM, Khamis Mushait
[2:] Medical Secretary / Cooperative Training Supervisor, Armed Forces Hospital (2023–Present)
[3:] General nursing, Assir health care cluster, Al-Shalfa Primary Health Care Center

ABSTRACT

Background: Gestational diabetes mellitus (GDM) is traditionally diagnosed using oral glucose tolerance testing (OGTT), yet growing evidence suggests that a subset of pregnant women exhibit adverse metabolic, obstetric, and neonatal outcomes despite having OGTT values within current "normal" diagnostic thresholds. These observations have raised concerns that the existing criteria may fail to capture milder dysglycemia, postprandial hyperglycemia, or glycemic variability that still confer clinically relevant risk.
Aim of work: This review aims to synthesize emerging data on gestational diabetes–related phenotypes in women with normal OGTT results, highlight proposed alternative biomarkers and diagnostic strategies, and critically discuss ongoing debates regarding threshold selection and underdiagnosis.
Methods: A narrative literature review will be conducted using PubMed, Scopus, and Google Scholar to identify clinical trials, observational studies, and consensus statements published from 2010 to 2025 that evaluate maternal and neonatal outcomes, glycemic markers, and diagnostic performance in pregnant women with normal OGTT but suspected dysglycemia. Search terms will include "gestational diabetes," "normal OGTT," "borderline GDM," "mild hyperglycemia in pregnancy," "continuous glucose monitoring," and "diagnostic criteria."
Results: Preliminary evidence indicates that women with OGTT values in the high-normal range or with abnormal postprandial profiles on continuous glucose monitoring may have increased risks of hypertensive disorders, large-for-gestational-age infants, cesarean delivery, and metabolic complications compared with women with lower glycemic indices. Studies evaluating HbA1c, fasting plasma glucose, one-step versus two-step screening, and CGM-based metrics suggest that current OGTT-based thresholds may underestimate risk in certain subgroups, although findings remain heterogeneous and methodologically variable.
Conclusion: Emerging data support the hypothesis that clinically important gestational dysglycemia can occur even when OGTT results meet current diagnostic standards, prompting calls to re-examine cut-off points, integrate complementary biomarkers, and adopt more individualized risk stratification. However, any revision of criteria must carefully balance earlier detection against the potential for overdiagnosis, overtreatment, and unnecessary healthcare burden, underscoring the need for robust prospective studies and consensus-driven guidelines.
Keywords: Gestational diabetes; Dysglycemia in pregnancy; Normal OGTT; High-normal glucose; Maternal outcomes; Neonatal outcomes; Continuous

glucose monitoring; Diagnostic criteria; Risk stratification; Postpartum metabolic risk.

INTRODUCTION

Gestational diabetes mellitus (GDM) is one of the most common medical complications of pregnancy, affecting up to one in six pregnancies worldwide and contributing substantially to both maternal and neonatal morbidity and mortality. Standard diagnostic pathways rely predominantly on oral glucose tolerance testing (OGTT), yet accumulating evidence indicates that adverse pregnancy outcomes may occur even among women whose OGTT values fall within currently accepted normal ranges. This observation has intensified concerns that traditional thresholds may overlook milder degrees of dysglycemia that still exert meaningful clinical impact on both mother and fetus [1].

Emerging data suggest that women with high-normal OGTT values, subtle postprandial hyperglycemia, or abnormal glycemic patterns detected by continuous glucose monitoring (CGM) may experience higher rates of large-for-gestational-age infants, cesarean delivery, hypertensive disorders, and neonatal metabolic complications compared with women with lower glycemic indices. These findings raise critical questions regarding the sensitivity of OGTT-based criteria and the extent to which current diagnostic cut-offs adequately capture the full spectrum of gestational dysglycemia. At the same time, expanding diagnostic boundaries without robust evidence risks overdiagnosis, overtreatment, and increased healthcare costs, underscoring the need for careful, evidence-based reassessment [2].

Debates around redefining GDM in women with normal OGTT have focused on the limitations of single-time-point glucose measurements, inter-laboratory variability, and the influence of maternal age, body mass index, ethnicity, and genetic background on glycemic response during pregnancy. Alternative or adjunctive markers—such as fasting plasma glucose, HbA1c, CGM-derived time-in-range, and postprandial capillary profiles—have been proposed to refine risk stratification, but consensus on their optimal use and cut-off values remains lacking [3].

In parallel, large epidemiological cohorts and post hoc analyses of GDM trials have begun to explore “borderline” glycemic categories, revealing a more continuous, dose–response relationship between maternal glucose levels and adverse outcomes rather than a clear-cut threshold effect. Such data support the concept of a spectrum of gestational dysglycemia, in which women with biochemically normal OGTT but elevated clinical risk factors or subtle glycemic deviations may still carry a clinically meaningful burden of risk. This spectrum-based view challenges the traditional binary classification of “GDM” versus “non-GDM” and strengthens calls for more nuanced diagnostic frameworks [4].

Gestational diabetes in women with apparently normal OGTT values also has important implications for long-term metabolic health, as subtle antenatal dysglycemia has been linked in several cohorts to higher postpartum rates of impaired glucose tolerance, type 2 diabetes, and cardiometabolic risk factors in the mother, as well as increased susceptibility to obesity and glucose dysregulation in offspring later in life. These findings reinforce the notion that “high-normal” OGTT results may signal the beginning of a prolonged trajectory of metabolic vulnerability rather than a transient, benign deviation limited to pregnancy [5].

Against this background, the concept of “gestational diabetes in women with normal OGTT” has emerged as a distinct diagnostic and research challenge, sitting at the intersection between classic GDM and normoglycemic pregnancy. Clarifying how best to define, detect, and manage dysglycemia in this group is essential for optimizing maternal–fetal outcomes while avoiding unnecessary medicalization. The present review therefore examines the emerging evidence and ongoing diagnostic debates surrounding this entity, with particular emphasis on metabolic profiles, pregnancy outcomes, and proposed refinements to current screening and diagnostic strategies.

AIM OF WORK

This review aims to investigate gestational diabetes–related dysglycemia in pregnant women with conventionally normal oral glucose tolerance test (OGTT) results by summarizing available evidence on their metabolic and clinical characteristics, associated maternal and neonatal outcomes, and proposed alternative or complementary diagnostic approaches, with the goal of clarifying current diagnostic debates and informing future guideline development.

METHODS

This review collected data from peer-reviewed articles through literature searches conducted in Google Scholar and PubMed, which serve as major repositories for biomedical and clinical research. The search strategy combined keywords and Boolean operators using terms such as “gestational diabetes,” “normal OGTT,” “borderline GDM,” “mild hyperglycemia in pregnancy,” “high-normal glucose in pregnancy,” “continuous glucose monitoring in pregnancy,” and “diagnostic criteria for GDM.” A structured search framework using these terms allowed a comprehensive exploration of dysglycemia phenotypes and diagnostic debates in pregnant women with conventionally normal OGTT results.

Screening of titles and abstracts followed predefined eligibility criteria designed to capture high-quality, clinically relevant evidence. The review included original research articles, cohort and case–control studies, randomized or quasi-experimental trials, and systematic reviews or meta-analyses published in English between 2020 and 2025 that examined maternal metabolic profiles, pregnancy outcomes, or diagnostic performance in women with normal OGTT but suspected gestational dysglycemia. Studies were excluded if they were duplicate publications, non–peer-reviewed sources, commentaries, conference abstracts without full data, animal or purely experimental laboratory studies without human clinical correlation, or articles not specifically addressing pregnancy-related glucose tolerance. The final selection of articles provided a focused body of evidence to describe clinical characteristics, outcomes, and proposed diagnostic refinements in this subgroup.

RESULTS

This review analyzed studies that explored gestational diabetes–related dysglycemia in women whose oral glucose tolerance test (OGTT) values fall within conventional normal ranges, focusing on metabolic characteristics, pregnancy outcomes, and proposed diagnostic refinements. The included publications, mainly from the last decade, provided recent data on “high-normal” glycemic profiles, subtle postprandial hyperglycemia, and continuous glucose monitoring (CGM) patterns in this subgroup.

This review additionally identified several illustrative patterns reported across individual studies, which help clarify how dysglycemia may present in women with normal OGTT values. Some cohorts described pregnant women whose fasting and 2-hour OGTT results remained within the conventional normal range, yet who showed repeated postprandial capillary glucose elevations or abnormal CGM profiles, together with higher frequencies of complications such as hypertensive disorders, cesarean delivery, and large-for-gestational-age infants. Other investigations highlighted that women with high-normal OGTT values and multiple clinical risk factors—such as obesity, advanced maternal age, or a history of gestational diabetes—often shared metabolic features and outcome patterns similar to those of formally diagnosed GDM cases, despite not crossing current diagnostic cut-offs. Building on these observations, several authors proposed refined or complementary diagnostic strategies, including greater emphasis on postprandial monitoring, selective use of CGM, and integration of fasting glucose and HbA1c into risk-based algorithms for women with normal OGTT, suggesting growing recognition that conventional OGTT criteria may not fully capture the spectrum of clinically important gestational dysglycemia.

DISCUSSION

- Overview of gestational diabetes and current OGTT-based diagnostic criteria

Gestational diabetes mellitus (GDM) is defined as glucose intolerance with onset or first recognition during pregnancy and represents one of the most frequent medical complications affecting pregnant

women worldwide. Current diagnostic strategies in most guidelines rely primarily on the oral glucose tolerance test (OGTT), using either one-step or two-step protocols with predefined fasting and post-load glucose thresholds to categorize women as having GDM or normal glucose tolerance. These criteria are largely derived from epidemiological data demonstrating a continuous association between maternal glucose levels and adverse outcomes, yet they impose pragmatic cut-off points on what is inherently a graded risk continuum [6].

Despite the widespread adoption of OGTT-based pathways, important limitations have been recognized, including variability in testing protocols between countries, differences in glucose load and timing of sampling, and pre-analytical and analytical factors that can affect results. In addition, OGTT captures glycemia at a limited number of time points under standardized conditions and may therefore miss postprandial excursions, day-to-day variability, or more subtle dysglycemia that still has clinical relevance. These constraints have motivated increasing interest in understanding whether a subset of pregnant women classified as normoglycemic by OGTT may nonetheless exhibit metabolic profiles and pregnancy outcomes that resemble those of women with GDM, raising questions about the sufficiency of current diagnostic thresholds [7].

- **Gestational dysglycemia in women with conventionally normal OGTT values**

Evidence synthesized in this review indicates that a subset of pregnant women who meet conventional "normal" oral glucose tolerance test (OGTT) thresholds nonetheless exhibit biochemical and clinical features consistent with milder forms of gestational dysglycemia. These women may have fasting and 2-hour OGTT values within guideline-defined ranges, yet demonstrate elevated postprandial capillary glucose readings, abnormal continuous glucose monitoring (CGM) profiles, or clustering of metabolic risk factors such as obesity, prior GDM, polycystic ovary syndrome, or strong family history of type 2 diabetes. Such findings suggest that normo-OGTT status does not invariably equate to truly low-risk glycemic physiology during pregnancy [8].

Several observational cohorts have reported that women with "high-normal" OGTT values or subtle postprandial abnormalities share intermediate phenotypes between normoglycemic pregnancies and overt GDM, including higher gestational weight gain, more frequent need for obstetric intervention, and increased neonatal complications. In some studies, metabolic markers such as fasting insulin, HOMA-IR, triglycerides, or inflammatory indices were also less favorable in this group, supporting the concept of underlying insulin resistance and beta-cell stress despite OGTT results remaining below diagnostic cut-offs. Collectively, these patterns reinforce the view of gestational dysglycemia as a spectrum condition in which women with conventionally normal OGTT values can still occupy a higher-risk segment that may warrant more nuanced assessment and follow-up than current binary classification systems provide [9].

- **Clinical significance of "high-normal" glucose profiles for maternal and neonatal outcomes**

The reviewed literature suggests that "high-normal" glucose profiles during pregnancy are not metabolically benign and may be associated with a graded increase in adverse maternal and neonatal outcomes compared with clearly low-normal glycemic levels. Women whose OGTT results remain within guideline-defined normal ranges but cluster near the upper limits—particularly when combined with elevated postprandial readings or CGM-detected excursions—have been reported to experience higher rates of large-for-gestational-age infants, cesarean delivery, gestational hypertension, and neonatal hypoglycemia in several cohorts. These observations are consistent with large epidemiological analyses showing a continuous relationship between maternal glucose and perinatal risk, supporting the concept that conventional diagnostic thresholds may underestimate clinically important risk in parts of the so-called normal range [10].

From a neonatal perspective, even modest elevations in maternal glucose within high-normal ranges can promote increased fetal insulin secretion and accelerated growth, predisposing to macrosomia, birth trauma, respiratory difficulties, and early metabolic instability after delivery. For mothers, subtle dysglycemia has been linked not only to intrapartum complications and operative delivery but also to a

higher likelihood of postpartum glucose intolerance and future type 2 diabetes, suggesting that high-normal profiles may mark the early stages of a longer cardiometabolic trajectory rather than a transient pregnancy-limited phenomenon. Recognizing the clinical significance of these high-normal patterns is therefore crucial for refining risk stratification, informing decisions about targeted lifestyle counseling or glucose monitoring, and guiding future research on whether earlier or more individualized intervention in this group can meaningfully improve maternal and neonatal outcomes [11].

- **Alternative glycemic markers and continuous glucose monitoring in normo-OGTT pregnancies**

A growing body of research has evaluated alternative glycemic markers in pregnant women who have normal oral glucose tolerance test (OGTT) results but are suspected of having gestational dysglycemia based on risk factors or clinical course. Biomarkers such as fasting plasma glucose, HbA1c, fructosamine, and indices of insulin resistance have been proposed as adjuncts to OGTT, with several studies demonstrating that elevated values within the "non-diabetic" range can identify additional women at increased risk of adverse pregnancy outcomes or postpartum glucose intolerance. Although these markers are attractive because of their practicality and ability to reflect longer-term glycemic exposure than single OGTT time points, there is still no consensus on optimal cut-off values or how best to integrate them into routine antenatal screening algorithms for normo-OGTT women [12].

Continuous glucose monitoring (CGM) has emerged as another promising tool to characterize glycemic patterns in pregnancies labeled as normoglycemic by OGTT, capturing day-to-day variability, nocturnal excursions, and postprandial peaks that may be missed by conventional testing. Studies using CGM in this context have reported that some women with normal OGTT exhibit increased time above target range and higher postprandial spikes, which correlate with larger birthweight, higher rates of large-for-gestational-age infants, and greater need for obstetric intervention, even in the absence of formal gestational diabetes mellitus (GDM) diagnosis. However, CGM remains relatively costly and resource-intensive, and standardized thresholds for defining abnormal patterns in pregnancy are still evolving, limiting its current use mainly to research settings or selected high-risk patients rather than as a universal screening tool in normo-OGTT populations [13].

- **Diagnostic challenges, controversies, and limitations of existing GDM thresholds**

The evidence summarized in this review underscores several diagnostic challenges inherent in current gestational diabetes mellitus (GDM) thresholds, particularly when applied to women with conventionally normal oral glucose tolerance test (OGTT) results. Existing criteria were derived from large epidemiological studies that demonstrated a continuous relationship between maternal glucose levels and adverse outcomes, yet pragmatic cut-offs were chosen to balance sensitivity, specificity, and healthcare feasibility. As a result, women with glucose values just below these thresholds may carry risks that are only modestly lower than those of formally diagnosed GDM, creating a "grey zone" in which clinically relevant dysglycemia is possible despite a normal test classification [14].

Controversy also arises from substantial international variation in screening strategies (one-step versus two-step), glucose loads, sampling time points, and diagnostic cut-offs, leading to significant differences in GDM prevalence and in which women are labeled as affected. Methodological issues—such as pre-analytical handling of samples, timing of testing relative to gestational age, and the influence of maternal obesity, ethnicity, and background type 2 diabetes prevalence—further complicate interpretation and limit the generalizability of any single threshold set across diverse populations. Additionally, reliance on a single OGTT snapshot does not account for day-to-day glycemic variability or postprandial excursions captured by alternative markers and continuous glucose monitoring, which may better reflect real-world fetal glucose exposure in some women with normal OGTT [15].

Efforts to lower diagnostic thresholds or broaden GDM definitions to include high-normal glycemic ranges have been met with debate, as they may improve detection of at-risk pregnancies but also increase the number of women labeled as GDM, with implications for anxiety, medicalization of pregnancy, resource use, and potential overtreatment. The lack of robust randomized trials specifically

targeting women with normal OGTT but suspected dysglycemia means that the net clinical benefit of intensifying surveillance or interventions in this group remains uncertain, contributing to ongoing disagreement among professional bodies regarding optimal criteria. Together, these limitations highlight the need for more nuanced, context-sensitive diagnostic approaches that integrate traditional OGTT with additional risk markers while carefully weighing the trade-offs between early risk identification and the burdens of overdiagnosis [16].

- **Clinical implications for risk stratification and management in women with normal OGTT**

The recognition that some women with conventionally normal oral glucose tolerance test (OGTT) results may still exhibit clinically meaningful dysglycemia has important implications for how risk is stratified and managed in antenatal care. Rather than relying solely on a binary GDM versus non-GDM classification, several authors advocate for a more nuanced approach that integrates OGTT values with clinical risk factors, alternative glycemic markers, and, where feasible, postprandial or continuous glucose monitoring data to identify "higher-risk" normo-OGTT subgroups. In practice, this could involve closer surveillance and individualized counseling for women with high-normal glucose values combined with obesity, advanced maternal age, previous GDM, or a strong family history of type 2 diabetes, even when formal diagnostic thresholds are not met [17].

From a management perspective, most studies support prioritizing lifestyle-based interventions—such as tailored nutritional advice, weight-gain optimization, and encouragement of appropriate physical activity—as first-line strategies for normo-OGTT women who appear to have elevated metabolic risk, given their low cost and favorable safety profile. Selective use of home postprandial capillary monitoring or short-term continuous glucose monitoring may also be reasonable in high-risk normo-OGTT cases to detect unrecognized postprandial hyperglycemia and guide non-pharmacological adjustments, while reserving pharmacotherapy for situations where clear glycemic targets are persistently exceeded or fetal overgrowth emerges despite conservative measures. However, in the absence of strong randomized trial evidence specific to this group, guidelines generally stop short of recommending systematic treatment of all women with high-normal profiles, emphasizing instead shared decision-making, cautious resource use, and the need for postpartum follow-up to address long-term cardiometabolic risk [18].

- **Future directions and recommendations for refining assessment of gestational dysglycemia**

Future research on gestational dysglycemia in women with normal oral glucose tolerance test (OGTT) values needs to prioritize well-designed prospective cohort studies and randomized controlled trials that specifically enroll this "intermediate-risk" group, rather than extrapolating from classic GDM populations. Such studies should evaluate whether targeted interventions—such as structured lifestyle programs or tailored glucose monitoring—can meaningfully reduce rates of large-for-gestational-age infants, cesarean delivery, hypertensive disorders, and neonatal metabolic complications in women with high-normal glycemia. In parallel, harmonized definitions of "borderline," "high-normal," or "subclinical" gestational dysglycemia are required, ideally developed through international consensus that accounts for population differences in ethnicity, obesity prevalence, and baseline type 2 diabetes risk [19].

Refinement of assessment strategies is also likely to involve more systematic integration of alternative glycemic markers and continuous glucose monitoring (CGM) into risk models, supported by work to define pregnancy-specific thresholds and composite indices that better reflect fetal glucose exposure than single OGTT time points alone. Clinical guidelines may gradually move toward tiered or risk-based algorithms in which OGTT results are interpreted alongside clinical risk factors, HbA1c or fasting glucose, and, in selected cases, short-term CGM, with clear recommendations on which subgroups warrant intensified surveillance, postpartum follow-up, or preventive cardiometabolic care. Ultimately, any proposed expansion or modification of diagnostic criteria should be evaluated not only for its impact on perinatal outcomes but also for its consequences on healthcare resources, maternal psychological well-being, and the potential for overdiagnosis, ensuring that refinements to gestational dysglycemia assessment achieve a net clinical and public-health benefit [20].

CONCLUSION

Gestational dysglycemia in women with conventionally normal oral glucose tolerance test (OGTT) values is emerging as a clinically relevant entity that challenges the traditional binary distinction between gestational diabetes mellitus (GDM) and normoglycemic pregnancy. The literature indicates that high-normal glucose profiles and subtle postprandial abnormalities can still be associated with increased risks of adverse maternal and neonatal outcomes, as well as less favorable long-term metabolic trajectories, despite not meeting current diagnostic thresholds. Appropriate refinement of assessment in this subgroup should therefore integrate OGTT findings with clinical risk factors, alternative glycemic markers, and, where feasible, continuous glucose monitoring within risk-stratified care pathways, while avoiding indiscriminate expansion of the GDM label that may lead to overdiagnosis and unnecessary intervention. Sustained adherence to evidence-based guidelines, coupled with high-quality prospective research focused on women with normal OGTT but suspected dysglycemia, will be essential to optimize maternal and fetal outcomes and to develop balanced, consensus-driven criteria that reflect the full spectrum of gestational glycemic risk.

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