

# Vitamin D Levels and the Prevention and Management of Gestational Diabetes and the Effects on Maternal Outcomes and Neonatal Outcomes

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## Abstract

Gestational diabetes mellitus (GDM) is an increasingly common condition in pregnancy and is associated with significant short- and long-term risks for birthing people and their infants, including cardiovascular complications and metabolic dysfunction. Vitamin D deficiency is prevalent among reproductive-aged individuals and has been linked to impaired glucose regulation, increased inflammation, and insulin resistance—pathways central to the development of GDM. Management of Vitamin D deficiency may prevent GDM.

## Introduction

Existing research demonstrates that there are increased maternal and fetal complications associated with a maternal GDM diagnosis. GDM rates are increasing thus the complications surrounding it are also on the rise. A patient with a pregnancy affected by GDM may not be able to complete the increase monitoring and appointments that is expected of them due to social determinants of health. A proactive approach is the shift that is needed to help a pregnant patients and decrease maternal mortality and neonatal complications related to GDM.

## Methods

PubMed and Google Scholar were searched. Inclusion criteria were limited to publication within the last 5 years, availability in English, and applicability to study purpose, specifically those looking at maternal and neonatal outcomes or GDM management.

## Results

Study	Methods	Findings
Aslan et al., 2022	889 pregnant women were screened for vitamin D deficiency and then were later screened for GDM	They found that vitamin D deficiency in the first trimester was linked to development of GDM later in the pregnancy. After adjusting for co-variables, those that were vitamin D deficient still had great chance of getting GDM.
Ma et al., 2023	Pregnant women were given supplementation of Vitamin D at 24-28w pregnant for 2 months. One group received 400IU/d another got 1,600 IU/d and another got no supplementation.	<ul style="list-style-type: none"> <li>- the control group had increased fasting glucose levels at delivery</li> <li>- the intervention groups had decreased fasting plasma glucose</li> <li>- the greatest decrease was seen in patients with vitamin D level greater than 50 nmol/L and in those with GDM, multiple pregnancies, and who were overweight</li> </ul>
Wang et al., 2021	19 RCT were reviewed that focused on vitamin D supplementation in those diagnosed with GDM and the maternal and fetal outcomes.	<ul style="list-style-type: none"> <li>- Supplementation had decreased fasting glucose, insulin concentration, and insulin resistance.</li> <li>- Also had decreased cesarean sections, maternal hospitalizations, and postpartum hemorrhage.</li> <li>- For neonates: decreased hyperbilirubinemia, fetal distress, and premature delivery.</li> </ul>
Wu et al., 2023	20 RCT were chosen. 1682 GDM patients total of which 837 got vitamin D supplementation. They looked at maternal cardiac risks and neonatal risks	<ul style="list-style-type: none"> <li>- the intervention groups had improved cholesterol panels → decreasing cardiac risk factors</li> <li>- for neonates, the intervention group had decreased premature birth, hyperbilirubinemia, and neonatal hospitalization</li> </ul>
Yin et al., 2024	1,537 pregnant patients with the same cardiac risk factors were chosen. Starting vitamin D levels were <75 nmol/L. Supplementation: One group received 1,600IU/d. one group received 400 IU/d and one received none. They looked at lipids, inflammatory cytokines and endothelial function	<ul style="list-style-type: none"> <li>- improvement of HDL, TC, hs-CRP, and SBP was seen in women with GDM diagnosis in the intervention group and was not seen in those without the diagnosis</li> <li>- Reduced cardiac risks</li> </ul>
Yu et al., 2025	98 patients with GDM were looked at. One group had 400 IU/d of vitamin D supplementation and the other had none.	<ul style="list-style-type: none"> <li>- intervention group had achievement of glycemic control faster and required less insulin</li> <li>- improvements in HbA1C, fasting glucose, LDL, hs-CRP, and BMI were also seen</li> <li>- intervention group had decreased rates of pregnancy complications, adverse outcomes, and neonatal issues</li> </ul>

## Discussion

The literature reviewed above provides evidence that Vitamin D deficiency causes an increased risk in the development of Gestational Diabetes Mellitus (GDM) as well as poor glucose control in GDM..

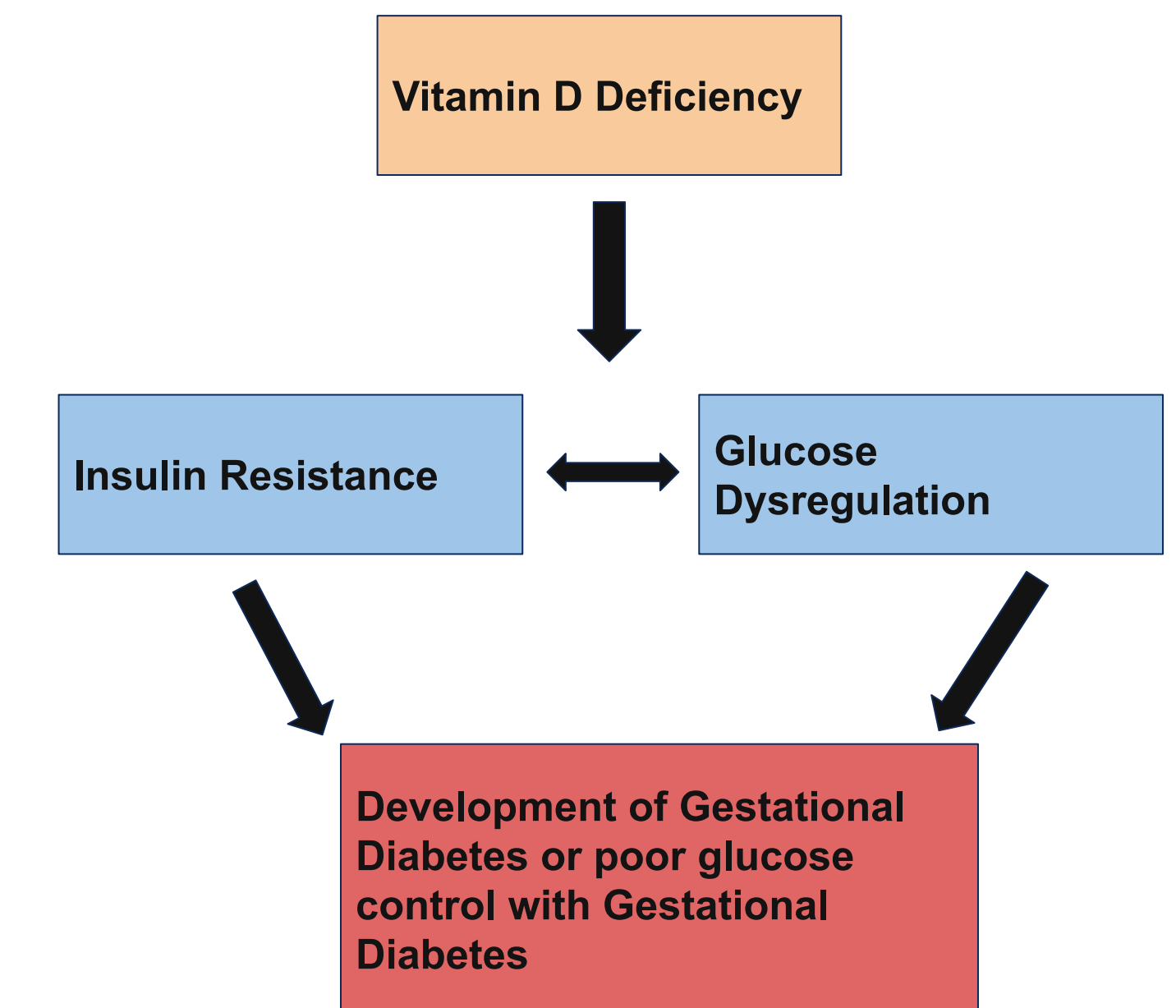
Higher risks are seen in:

- Patients who live in geographic locations that lack exposure to UVB certain times a year
- Patients who live in areas where weather can prevent outdoor activities
- Patients who work long hours indoors or work nights
- Patients who live in unsafe neighborhoods

**Solutions to mitigate these risks can include Vitamin D monitoring when seeing patients for family planning care or early pregnancy care. Vitamin D supplementation can be obtained OTC and is affordable for both prevention and management of Vitamin D. Supplementation can range from 400 IU/day to 4,000 IU/day.**

## Figures

Example of Vitamin D deficiency and the metabolic effects that can lead to development of Gestational Diabetes



## Conclusions

Thorough monitoring and management of perinatal Vitamin D deficiency, providers can reduce the risk of development of GDM, can improve management of GDM and improve maternal and neonatal outcomes.

## References

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