The Relationship between Vitamin D Levels in Pregnancy and Blood Glucose at the Gestational Diabetes Screening

Jeanine Senti, APRN-BC, MS, PhD(c), CNS, IBCLC
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Hyperglycemia in Pregnancy

- Hyperglycemia in pregnancy can result in problems for mother and baby
- Gestational diabetes mellitus (GDM) is most common
- GDM affects 2-13% of pregnancies
- Harm can occur at levels lower than for diabetes
Hyperglycemia and GDM

• Progression
  – Insulin resistance
  – Impaired glucose tolerance
  – Hyperglycemia

• Interventions are needed to prevent hyperglycemia in pregnancy
Vitamin D and Glucose Metabolism

- Vitamin D influences beta-cells of pancreas
  - Affects insulin production
  - Influences insulin sensitivity
Overview of Vitamin D

- Cutaneous synthesis from direct sunlight
- Some foods or supplements
- Considered both a vitamin and pro-hormone
Is there a correlation between vitamin D and blood glucose levels in pregnancy?
Method

• Secondary analysis of de-identified data set
• Original study was a convenience sample of women who responded to recruitment methods
• 52 nulliparous women in upper Midwest
Data Collection

• Intake interview
• Vitamin D checked at three points
  • 10-14 weeks (early)
  • 22-26 weeks (mid)
  • 32-26 weeks (late)
• Medical record used for
  • Blood glucose at 24-28 weeks
  • Body mass index (BMI)
  • Age
Ethnicity of Sample
## Known Confounding Variables

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>18.8</td>
<td>35.8</td>
<td>25.9</td>
<td>4.18</td>
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<tr>
<td>BMI (kg/m²)</td>
<td>19.3</td>
<td>39.4</td>
<td>27.2</td>
<td>5.08</td>
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</table>

Mean BMI in overweight category
Vitamin D Levels at Three Points in Sample

Vitamin D in Early Pregnancy

Vitamin D in Mid Pregnancy

Vitamin D in Late Pregnancy

10-14 weeks

22-26 weeks

32-26 weeks
Serial Vitamin D Levels in Pregnancy

<table>
<thead>
<tr>
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<th>1st trim</th>
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<tr>
<td>Ainy, Ghazi, Azizi</td>
<td>51.5</td>
<td>64.3</td>
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<td>Marwaha et al</td>
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<tr>
<td>The Endocrine Society Target</td>
<td>75</td>
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</table>
Statistical Analysis
Vitamin D Levels

• Statistically significant correlation among the vitamin D levels ($p < 0.01$)
• Vitamin D levels did not change over the three time points
• Suggests current measures do not improve vitamin D levels
Statistical Analysis--Two Groups

• Compared two groups
  – Inadequate vitamin D levels (< 75 nmol/L)
  – Adequate vitamin D levels (> 75 nmol/L)
• $t$-test to look for a difference between groups
• Not statistically significant
Statistical Analysis

- Multiple regression analysis
- Relationship between vitamin D and blood glucose
- Controlled for confounding variables (age, BMI)
- Not statistically significant
Vitamin D and Blood Glucose

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>R Square</th>
<th>Std. Error</th>
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<tbody>
<tr>
<td>VitD-early and BG</td>
<td>.290</td>
<td>.084</td>
<td>20.12</td>
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<tr>
<td>VitD-mid and BG</td>
<td>.267</td>
<td>.071</td>
<td>20.24</td>
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<tr>
<td>VitD-late and BG</td>
<td>.274</td>
<td>.075</td>
<td>20.20</td>
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</table>

• Not statistically significant at any point
• Controlled for age and BMI

(i.e. The R square of 0.084 means 8.4% of variance is explained by the regression model, etc.)
Vitamin D and BMI

- Inverse association between vitamin D and BMI in early pregnancy ($p < 0.01$) and mid-pregnancy ($p < 0.05$)

- $\uparrow$ BMI = high risk $\downarrow$ D

- Should vitamin D levels be checked?
Nursing Practice

• Hypovitaminosis-D is common
• Consider vitamin D level
  – BMI > 30.0
  – Live at higher latitude
  – Lifestyle with little sunlight on skin
• Teach patients about vitamin D
Implications for Action

- Should recommendations for vitamin D intake change for pregnancy?
- Do prenatal vitamins have enough vitamin D?
- Should vitamin D levels be checked?
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