Delayed Lactogenesis II
in Women with
Gestational Diabetes Mellitus

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GDM Background: Maternal

- GDM has been increasing globally, overall rates ~10%
- Early postpartum, 5-10% develop type 2 diabetes (T2D)
- Relative risk of developing T2D among with GDM ranges in the USA from 3.9-6.6 (some countries have higher relative risks)
- Higher intensity and longer duration of breastfeeding associated with decreased risk of T2D in women with GDM for 2 years postpartum
Background: Glucose Homeostasis

• Brain depends on glucose for fuel
• Early breastfeeding initiation (<=1 hour of birth) supports infant glucose levels
• When infant is “stressed,” glucose is utilized too fast
• AAP recommends screening and managing high-risk infants in the first 24 hours (such as infants born to diabetic mothers). If borderline:
  – 0-4 hours 25-40 mg/dL consider management
  – 4-24 hours 35-45 mg/dL consider management
• Increased risk of maternal-infant separation in GDM dyads which precludes early, unrestricted breastfeeding
GDM Background: Infant

- Maternal prenatal hyperglycemia →
- Fetal hyperinsulinism →
- Neonatal hyperinsulinism →
- Result: Neonatal hypoglycemia
  - Risk of complications: infant seizures, neurologic damage, coma
Effects of early breastfeeding on glucose levels of infants born to GDM women

• **Methods**: Prospective pilot study of 76 infants born to GDM women comparing glucose outcomes in infants based upon feeding differences.

• **Conclusions**: Early breastfeeding facilitates glycemic stability in infants born to GDM women. Human milk is appropriate for infant feeding compared to formula for infants born to GDM women.

<table>
<thead>
<tr>
<th>Borderline hypoglycemia at mean 1.6 hours</th>
<th>Breastfed</th>
<th>Not Breastfed</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% (4)</td>
<td>28% (11)</td>
<td>0.05 (Fisher’s)</td>
<td></td>
</tr>
</tbody>
</table>
Review of Qualitative Literature: GDM & Pregnancy

10 primary qualitative research studies published in 2005-2011 examining women’s perspectives into their experiences with GDM were reviewed (focus groups, interviews, and surveys).

- **Locations**: USA-6, Australia-2, Sweden-1, Canada-1
- **Sample**: Women with GDM (also studies that included GDM with type 2 diabetes)
  - Number of participants ranged from 8-228.
  - Ethnic diversity (including immigrant and minority women)
Concern for Infant Specific to Diabetes

• Pregnancy: concern for infant
  – Anxiety, worry, and emotional distress over infant health
  – Self-blame, guilt
  – Medicalized prenatal care and delivery with intervention (induction, forceps, cesarean delivery, NICU admission)

• Postpartum: concern for infant
  – Guilt especially when infant needed additional monitoring, tests, care, and NICU admission
  – Concern about infant’s current (hypoglycemia)
  – Concern about infant’s future health (risk of diabetes)
What do women with GDM experience with early breastfeeding?

• **Design:** Qualitative phenomenological study

• **Method:** Focus groups and interviews of 27 women who had GDM and had attempted to breastfeed

• **Purpose:** To examine the meaning of the lived experience of early breastfeeding for postpartum women who had GDM.

**Themes:**

• Breastfeeding challenges and support

• Milk supply problems

• Concern for infant health
Delayed Lactogenesis II: Diabetes

- Delayed lactogenesis II in women with diabetes (T1D)
Research Sabbatical in Israel
Colostral metabolites as indicators of lactogenesis II in women with GDM

- **Methods**: Part of a larger prospective case-control study of 67 postpartum women in an Israeli hospital, 32 with GDM and 35 without diabetes.

- For the defined first 72-hour time frame, we had 19 women with GDM and 31 without diabetes, to compare colostral metabolite concentrations.

- Interdisciplinary, international team
Results: Overall summary

- Significantly, higher proportion of women with GDM perceived they had delayed lactogenesis II.
- Composition analysis showed significantly lower specific metabolites in colostrum of women with GDM.
- Even after excluding primipara women to reduce confounding, specific metabolites were still significantly lower.
Results: Characteristics

Table 1. Characteristics of women with GDM (n=32) and without GDM (n=35) and their infants.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>non-GDM</th>
<th>GDM</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age (years)</td>
<td>30.4</td>
<td>33.0</td>
<td>0.022*</td>
</tr>
<tr>
<td>Parity</td>
<td>3.3</td>
<td>3.1</td>
<td>0.704</td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td>22.9%</td>
<td>25.0%</td>
<td>0.837</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>39.6</td>
<td>39.0</td>
<td>0.041*</td>
</tr>
<tr>
<td>Infant birth weight (kg)</td>
<td>3.3</td>
<td>3.4</td>
<td>0.209</td>
</tr>
<tr>
<td>Milk coming in was delayed</td>
<td>6.5%</td>
<td>36.8%</td>
<td>0.018*</td>
</tr>
<tr>
<td>Neonatal hypoglycemia (BS &lt;45 mg/dL)</td>
<td>0%</td>
<td>36.8%</td>
<td>0.001*</td>
</tr>
<tr>
<td>Infant fed formula in hospital</td>
<td>61.3%</td>
<td>89.5</td>
<td>0.050*</td>
</tr>
<tr>
<td>Maternal prepregnancy weight (kg)</td>
<td>63.6</td>
<td>74.1</td>
<td>0.018*</td>
</tr>
<tr>
<td>Maternal prepregnancy BMI (kg/m²)</td>
<td>23.8</td>
<td>27.7</td>
<td>0.011*</td>
</tr>
<tr>
<td>Maternal pregnancy weight gain (kg)</td>
<td>12.6</td>
<td>11.0</td>
<td>0.254</td>
</tr>
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</table>
# Results: Metabolite Concentrations

Mean differences in metabolites between women without diabetes and women with GDM (31 and 19, respectively).

<table>
<thead>
<tr>
<th>Metabolite</th>
<th>Non-diabetic</th>
<th>GDM</th>
<th>P</th>
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<tbody>
<tr>
<td>Lactose mM</td>
<td>176.7±38.9</td>
<td>142.4±49.8</td>
<td>0.012*</td>
</tr>
<tr>
<td>Galactose µM</td>
<td>281.5±251.0</td>
<td>367.7±311.7</td>
<td>0.307</td>
</tr>
<tr>
<td>Glucose-6-phosphate µM</td>
<td>4.5±0.5</td>
<td>4.2±0.6</td>
<td>0.037*</td>
</tr>
<tr>
<td>Glucose µM</td>
<td>6.3±0.8</td>
<td>5.8±0.6</td>
<td>0.027*</td>
</tr>
<tr>
<td>β-hydroxybutyrate¹ µM</td>
<td>5.6±0.7</td>
<td>6.2±0.7</td>
<td>0.053</td>
</tr>
<tr>
<td>Lactate µM</td>
<td>6.4±0.6</td>
<td>6.8±0.2</td>
<td>0.093</td>
</tr>
<tr>
<td>Malate µM</td>
<td>6.7±1.1</td>
<td>7.6±0.7</td>
<td>0.103</td>
</tr>
<tr>
<td>Citrate mM</td>
<td>5.2±1.5</td>
<td>3.3±1.6</td>
<td>0.005*</td>
</tr>
</tbody>
</table>
Current Research

• Collected colostrum samples and surveys from 133 postpartum women over the course of the first week postpartum (days 2-7)
• Examine differences in breastfeeding and breast milk changes between GDM and non-GDM women
• Examine correlation between maternal perception of milk “coming in” and biochemical changes indicating lactogenesis II
Recommendations

General GDM
- Multidisciplinary team approach
- Include patient and family
- Positively frame approach to care
- Provide access to clear, concise, evidence-based information about GDM, causes, management options, symptoms, and risks
- Present multicultural/multilingual educational materials
- Identify peer support and role models

Breastfeeding post-GDM
- Educate about the importance of breastfeeding for mother and infant
- Encourage breastfeeding - early and frequent
- If separated, encourage pumping - early and frequent
- Refer to professional lactation assistance
- Encourage extended breastfeeding duration
References

Thank you

Questions?

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