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.

	Breastfed	Not Breastfed	P
Borderline hypoglycemia at mean 1.6 hours	10% (4)	28% (11)	0.05 (Fisher's)

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)
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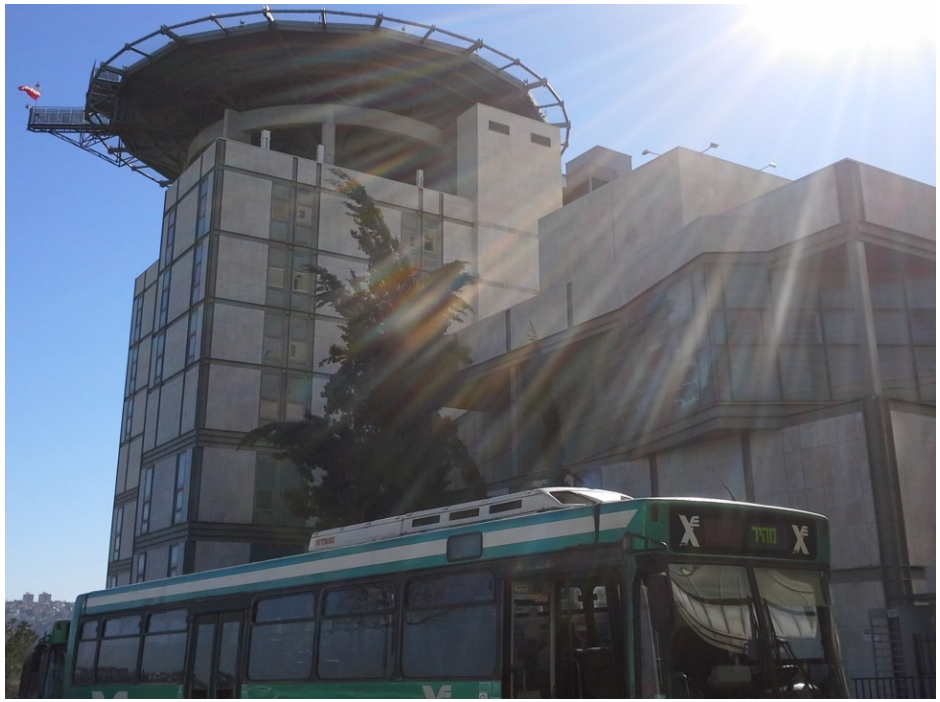
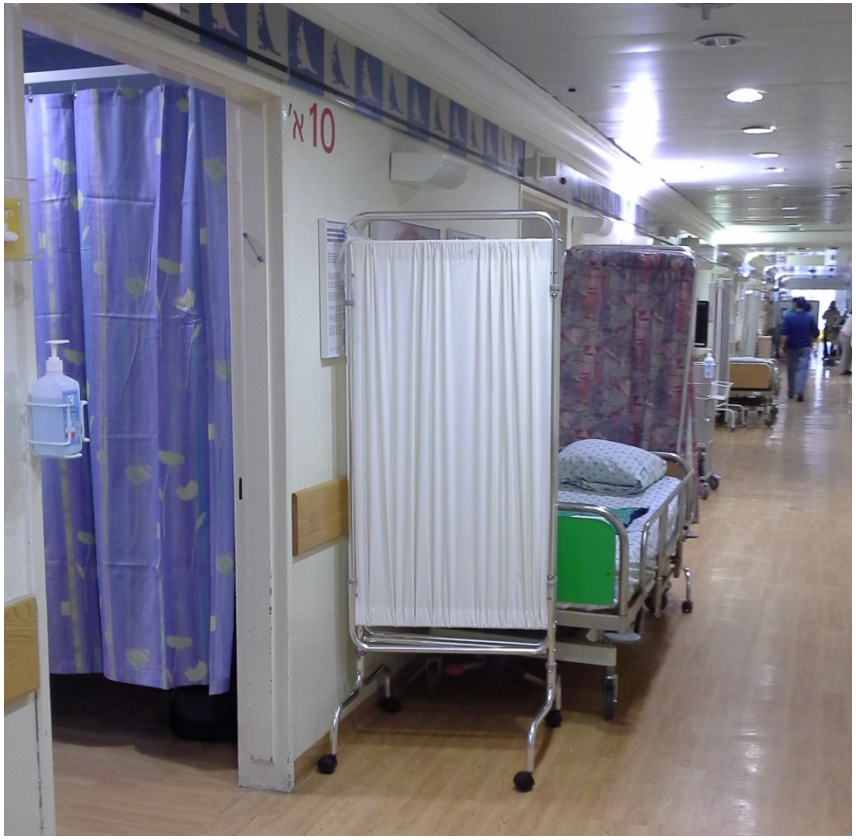
  - Hartmann, Cregan. (2001). Lactogenesis and the effects of insulin-dependent diabetes mellitus and prematurity. J Nutr, 131, 3016S-3020S.
  - *Matias, Dewey, Quesenberry, Gunderson. (2014). Maternal prepregnancy obesity and insulin treatment during pregnancy are independently associated with delayed lactogenesis in women with recent gestational diabetes mellitus. Am J Clin Nutr, 99, 115-121. [GDM women- finally!]

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.			
Characteristic	non-GDM	GDM	p
Maternal age (years)	30.4	33.0	0.022*
Parity	3.3	3.1	0.704
Cesarean delivery	22.9%	25.0%	0.837
Gestation (weeks)	39.6	39.0	0.041*
Infant birth weight (kg)	3.3	3.4	0.209
Milk coming in was delayed	6.5%	36.8%	0.018*
Neonatal hypoglycemia (BS <45 mg/dL)	0%	36.8%	0.001*
Infant fed formula in hospital	61.3%	89.5	0.050*
Maternal prepregnancy weight (kg)	63.6	74.1	0.018*
Maternal prepregnancy BMI (kg/m^2)	23.8	27.7	0.011*
Maternal pregnancy weight gain (kg)	12.6	11.0	0.254

Results: Metabolite Concentrations

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

Metabolite	Non-diabetic	GDM	P
Lactose mM	176.7±38.9	142.4±49.8	0.012*
Galactose µM	281.5±251.0	367.7±311.7	0.307
Glucose-6-phosphate µM	4.5±0.5	4.2±0.6	0.037*
Glucose µM	6.3±0.8	5.8±0.6	0.027*
β-hydroxybutyrate[1] µM	5.6±0.7	6.2±0.7	0.053
Lactate µM	6.4±0.6	6.8±0.2	0.093
Malate µM	6.7±1.1	7.6±0.7	0.103
Citrate mM	5.2±1.5	3.3±1.6	0.005*

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

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Thank you

Questions?

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