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Katz School of Science and Health

Systematic Review of Macrosomia Occurrence During Pregnancies of Patients with Diabetes Using Continuous Glucose Monitoring vs. Self-Blood Checks

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ABSTRACT

With diabetes on the rise worldwide, an increasing number of pregnant women are dealing with the associated complications. The most common complication is macrosomia, or large for gestational age (LGA), which can lead to detrimental adverse effects for both the mother and the baby. In conjunction with glycated hemoglobin (HbA1c) measurement, using continuous glucose monitoring systems (CGM) can improve glycemic control. This systematic review evaluates the recent literature to determine if the birth weight of infants born from mothers with diabetes can be improved while using CGMs in comparison to self-blood sugar checks. The interventional group of all three studies reviewed demonstrated a decreased birth weight for the babies born from women using the CGMs.

INTRODUCTION

Diabetes is on the rise worldwide, including among pregnant women.

Diabetic pregnancies are classified as “high risk” due to maternal hyperglycemia which may cause (Murphy et al, 2008):

- Macrosomia (50%, most common)
- Preterm birth
- Birth defects
- Stillbirth

Macrosomia and LGA cause high risk of delivery complications. Immediate adverse effects for infant may include shoulder dystocia and neonatal hypoglycemia. Infants’ adverse effects later in life may include obesity, diabetes, and cardiovascular disease (Davis et al, 2023).

Diabetes management before CGM included self-blood glucose checks and HbA1c every 6 months. The CGM update glucose level every 5 minutes. It allows for informed dietary and activity-based decisions and helps keep glucose “in-range” (Danne et al, 2017).

Study aim: Can the use of CGM for pregnant women with diabetes lower the risk of macrosomia?

The primary outcome observed was birth weight. The secondary outcomes observed were risk of macrosomia, mother’s glycemic control, and neonatal outcomes.

METHODOLOGY

Literature review conducted through electronic database Medline-PubMed.

Search terms:

- Continuous glucose monitoring and pregnancy
- Continuous glucose monitoring and macrosomia
- Continuous glucose monitoring and birth weight

Limitation criteria:

- Human based clinical trials
- Peer-reviewed journal articles
- Published within the last 15 years (2008-2023)

RESULTS

Study #1	
Study type	Prospective, open label randomized controlled trial
Population	71 women, Type 1 or type 2 diabetes, Ages 16-45 years
Results	Decreased average fetal birth weights (p=0.05) Decreased risk of macrosomia through calculation of odds ratio being 0.36 (p=0.05)

RESULTS, Cont.

Study #2	
Study type	Multicenter, open-label randomized controlled trial
Population	325 women (215 pregnant, 110 planning pregnancy), Type 1 diabetes, Ages 18-40 years
Results	Lower odds ratio of LGA infants (p=0.021) Fewer neonatal intensive care admissions > 24 hours (p=0.0157) Fewer neonatal hypoglycemic events (p=0.0250) Shorter neonatal length of hospital stay (p=0.0091)

Study #3	
Study type	Randomized controlled trial
Population	200 pregnant women, Type 1 diabetes, Ages 18-40 years
Results	Population of More time in range (p<0.05) Lower average glucose in the second and third trimesters for non-LGA infants (p<0.05) Both “daytime” and “nighttime” glucose levels were lower for the second trimester non-LGA infants (p<0.05)

DISCUSSION & CONCLUSIONS

- Study #1 demonstrated that CGM usage caused decreased HbA1c measurements, average fetal birth weight, and median birth weight percentiles.
- Study #2 showed CGM users had a slight decrease in their HbA1c but considerable increase in “time in range.” Also, neonatal adverse events were less likely to occur for CGM users.
- Study #3 showed CGM users have lower “daytime” levels.
- CGMs can greatly impact mother’s health as well as their baby’s.
- Increasing mother’s “time in range” decreases risk of macrosomia. Recommend to all women with diabetes who are pregnant or planning a pregnancy.

ACKNOWLEDGEMENTS

Thank you to professor Margaret Ewen and the Katz School of Science and Health Physician Assistant Program.

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