Diabetes Mellitus and Pregnancy

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Gestational diabetes mellitus (GDM) is defined as glucose intolerance of variable degree with onset or first recognition during pregnancy. A study by Stuebe et al found this condition to be associated with persistent metabolic dysfunction in women at 3 years after delivery, separate from other clinical risk factors.[1]

Infants of mothers with preexisting diabetes mellitus experience double the risk of serious injury at birth, triple the likelihood of cesarean delivery, and quadruple the incidence of newborn intensive care unit (NICU) admission.

Gestational diabetes mellitus accounts for 90% of cases of diabetes mellitus in pregnancy, while preexisting type 2 diabetes accounts for 8% of such cases.

**Essential update: Supplemental calcium and vitamin D may improve metabolic profile of women with GDM**

According to a randomized, placebo-controlled study of pregnant women with GDM, supplemental calcium plus vitamin D at 24 to 28 weeks' gestation may have beneficial effects on metabolic profile.

Researchers found that women treated with 1,000 mg calcium per day for six weeks and 50,000 U vitamin D3 at baseline and on day 21 of the 6-week intervention showed significant improvements in fasting plasma glucose, serum insulin levels, serum low-density lipoprotein cholesterol levels, and high-density lipoprotein cholesterol levels.[2, 3]

**Screening for diabetes mellitus during pregnancy**

*Gestational diabetes*

The following 2-step screening system for gestational diabetes is currently recommended in the United States:

- 50-g, 1-hour glucose challenge test (GCT)
- 100-g, 3-hour oral glucose tolerance test (OGTT) - For patients with an abnormal GCT result

Alternatively, for high-risk women or in areas in which the prevalence of insulin resistance is 5% or higher (eg, the southwestern and southeastern United States), a 1-step approach can be used by proceeding directly to the 100-g, 3-hour OGTT.

The US Preventive Services Task Force (USPSTF) recommends screening for gestational diabetes mellitus after 24 weeks of pregnancy. The recommendation applies to
asymptomatic women with no previous diagnosis of type 1 or type 2 diabetes mellitus. The recommendation does not specify whether the 1-step or 2-step screening approach would be preferable.

**Type 1 diabetes**

- The disease is typically diagnosed during an episode of hyperglycemia, ketosis, and dehydration
- It is most commonly diagnosed in childhood or adolescence; the disease is rarely diagnosed during pregnancy
- Patients diagnosed during pregnancy most often present with unexpected coma - Early pregnancy may provoke diet and glycemic control instability in patients with occult diabetes

**Type 2 diabetes**

According to the American Diabetes Association’s "Standards of Medical Care in Diabetes-2010," the presence of any one of the following criteria supports the diagnosis of diabetes mellitus:

- **Hemoglobin A1C** (HbA1C) = 6.5%
- Fasting plasma glucose = >126 mg/dL (7.0 mmol/L)
- A 2-hour plasma glucose level = 200 mg/dL (11.1 mmol/L) during a 75-g OGTT
- A random plasma glucose level = 200 mg/dL (11.1 mmol/L) in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis

In the absence of unequivocal hyperglycemia, a diagnosis based on any of the first 3 criteria should be confirmed by repeat testing on a different day.

**Prediabetes**

Women with prediabetes identified before pregnancy should be considered at extremely high risk for developing gestational diabetes mellitus during pregnancy. As such, they should receive early (first-trimester) diabetic screening.

**Postdiagnostic testing**

Once the diagnosis of diabetes is established in a pregnant woman, continued testing for glycemic control and diabetic complications is indicated for the remainder of the pregnancy.

**First-trimester laboratory studies**

- HbA1C
- Blood urea nitrogen (BUN)
- Serum creatinine
Thyroid-stimulating hormone
- Free thyroxine levels
- Spot urine protein-to-creatinine ratio
- Capillary blood sugar levels

Second-trimester laboratory studies

- Spot urine protein-to-creatinine study in women with elevated value in first trimester
- Repeat HbA1C
- Capillary blood sugar levels

Ultrasonography

- First trimester - Ultrasonographic assessment for pregnancy dating and viability
- Second trimester - Detailed anatomic ultrasonogram at 18-20 weeks and a fetal echocardiogram if the maternal glycohemoglobin value was elevated in the first trimester
- Third trimester - Growth ultrasonogram to assess fetal size every 4-6 weeks from 26-36 weeks in women with overt preexisting diabetes; perform a growth ultrasonogram for fetal size at least once at 36-37 weeks for women with gestational diabetes mellitus

Electrocardiography

If maternal diabetes is longstanding or associated with known microvascular disease, obtain a baseline maternal electrocardiogram (ECG) and echocardiogram.

Management

Diet

The goal of dietary therapy is to avoid single large meals and foods with a large percentage of simple carbohydrates. The diet should include foods with complex carbohydrates and cellulose, such as whole grain breads and legumes.

Insulin

The goal of insulin therapy during pregnancy is to achieve glucose profiles similar to those of nondiabetic pregnant women. In gestational diabetes, early intervention with insulin or an oral agent is key to achieving a good outcome when diet therapy fails to provide adequate glycemic control.

Glyburide and metformin
The efficacy and safety of insulin have made it the standard for treatment of diabetes during pregnancy. Diabetic therapy with the oral agents glyburide and metformin, however, has been gaining in popularity. Trials have shown these 2 drugs to be effective, and no evidence of harm to the fetus has been found, although the potential for long-term adverse effects remains a concern.\textsuperscript{[8]}

Prenatal obstetric management

Various fetal biophysical tests can ensure that the fetus is well oxygenated, including fetal heart rate testing, fetal movement assessment, ultrasonographic biophysical scoring, and fetal umbilical Doppler ultrasonographic studies.

Management of the neonate

Current recommendations for infants of diabetic mothers—the most critical metabolic problem for whom is hypoglycemia—include the employment of frequent blood glucose checks and early oral feeding (ideally from the breast) when possible, with infusion of intravenous glucose if oral measures prove insufficient.