Gestational Diabetes

Underpinning Principles, Surveillance, and Management

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KEYWORDS

• Gestational diabetes • Glycemic intolerance • Fetal programming • Macrosomia
• Neonatal hypoglycemia • Maternal glucose control • Antenatal testing • Pregnancy

KEY POINTS

- Gestational diabetes mellitus (GDM) is defined as glycemic intolerance diagnosed at or beyond the achievement of 20 completed weeks of gestation.
- In women who ultimately develop GDM, pancreatic beta-cell compensation fails to meet the metabolic demands, creating a hyperglycemic state.
- Observational data demonstrate risks with poorly controlled GDM, including abnormal fetal growth, hypertensive disorders of pregnancy, difficult labor and vaginal delivery, increased risk of cesarean section, and the neonatal metabolic complications, including hypoglycemia, hyperbilirubinemia, and the potential for delayed pulmonary maturity.
- Poorly controlled GDM places the fetus at risk for adult-onset metabolic diseases (obesity, diabetes, hypertension, cardiovascular disease).
- Seventy percent of women with GDM will develop DM at some point in their life, and 40% to 50% of those women will develop DM within 10 years.

INTRODUCTION

The objective of this review is to provide the clinician with a working framework to evaluate and manage gestational diabetes mellitus (GDM). The American Congress of Obstetricians and Gynecologists (ACOG) defines gestational diabetes as onset of carbohydrate intolerance in pregnancy.[1] Groups such as the American Diabetes Association (ADA), World Health Organization (WHO), and International Federation of Gynecology and Obstetrics have attempted to distinguish women with likely preexisting diabetes that are first recognized in pregnancy from women whose carbohydrate intolerance is a transient condition due to pregnancy-related

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insulin resistance.[2,3] Thus, these organizations define GDM as glycemic intolerance diagnosed at or beyond the achievement of 20 completed weeks of gestation.[1–3]

Depending on the population sampled, GDM affects 3% to 25% of pregnancies.[1–4] There is an increased prevalence of GDM among African American, Pacific Islander, Hispanic, and Native American women.[2] The global prevalence of GDM has been increasing likely because of the increase of maternal obesity, delayed child bearing, and sedative lifestyles.[1–3]

Observational data demonstrate risks with poorly controlled GDM, including abnormal fetal growth, hypertensive disorders of pregnancy, difficult labor and vaginal delivery, increased risk of cesarean section, and the neonatal metabolic complications, including hypoglycemia, hyperbilirubinemia, and the potential for delayed pulmonary maturity.[1] Risks for the fetus are not limited to the gestation and subsequent neonatal period. Because of imprinting and environmental effect on gene activation, these babies are at risk for adult onset of metabolic disorders, diabetes, hypertension, obesity, cardiovascular disease, and shorter lifespan[1–4] (**Table 1**). These risks highlight the need for accurate diagnosis and proper management of GDM.[4] In the course of this review, the authors additionally discuss the emphasis on diet and activity/exercise as means of controlling blood sugars, the usual schedule of glucose monitoring, indications for medical treatment, fetal surveillance, timing of delivery, neonatal care, and postpartum care.

Physiology

In normal pregnancy, a myriad of physiologic alterations occur to promote the growth and development of the conceptus. A euglycemic state is maintained despite the fetus' energy demands via a compensatory and proliferative response within the maternal pancreas, namely the beta islet cells.[5] Conversely, in women who ultimately develop GDM, the beta-cell compensation fails to meet the metabolic demands, creating a hyperglycemic state. Data obtained from observational studies in humans and animal models have generated insights into the molecular biology leading to glycemic intolerance. Such studies demonstrate a down-regulation of insulin receptors on maternal cell surfaces in GDM.[5,6] Accordingly, these same women are biologically predisposed toward development of diabetes mellitus, type 2 later in life.[5–7] The underlying processes all lead to the assortment of metabolic derangements affecting both mother and baby that are called GDM.

Table 1
Risks associated with gestational diabetes

Maternal	Fetal
Labor dystocia	Macrosomia
Cesarean section	Hypoglycemia
Vaginal laceration	Shoulder dystocia/brachial plexus injury
Preeclampsia/gestational hypertension	Preterm delivery
Increased gestational weight gain	Delayed pulmonary maturity
DM	Metabolic syndrome in adulthood (obesity, hypertension, DM)
Cardiovascular disease	Polyhydramnios
Postpartum weight retention	Polycythemia
	Hyperbilirubinemia