

433 Teams

OBSTETRICS & GYNECOLOGY

Gestational Diabetes Mellitus (GDM)

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Gestational Diabetes Mellitus (GDM)

1. Define GDM and Pre-gestational DM
2. Identify how common is GDM in Saudi Arabia and worldwide.
3. Discuss how pregnancy predisposes to the development of GDM
4. Describe the maternal and fetal complications of D.M.
5. Describe the screening and diagnostic tests for GDM.
6. Identify the importance of multidisciplinary approach of management of these cases.

Gestational Diabetes Mellitus (GDM)

Types of Diabetes:

- ✓ **Type I Diabetes:** Early onset insulin dependent
- ✓ **Type II Diabetes:** Late onset insulin non dependent
- ✓ **Gestational Diabetes:** Carbohydrate intolerance that occurs in pregnancy after the 24th week of gestation

Carbohydrate Metabolism in Pregnancy

- ✓ Pregnancy is potentially diabetogenic
- ✓ Diabetes maybe aggravated by pregnancy
- ✓ **Normal pregnancy is characterized by:**
 - Mild fasting hypoglycemia , ↑ insulin level
 - Post Prandial hyperglycemia
 - Hyper insulinemia
 - Suppression of glucagon (role of glucagon in pregnancy is not fully understood)

Define GDM and Pre-gestational DM

- **GDM is defined as glucose intolerance with onset or first recognition during pregnancy.**
 - Diabetes can be diagnosed for the 1st time during pregnancy
 - If diagnosis is prior to 24 weeks of gestation, this is **overt diabetes** and not gestational.
- The terms **pregestational and preexisting diabetes** refer to type 1 or type 2 diabetes mellitus diagnosed prior to a woman's pregnancy¹. In pregestational diabetes, maternal complications include worsening nephropathy and retinopathy, a greater incidence of preterm preeclampsia and a higher likelihood of diabetic ketoacidosis. **Hypoglycemia is much more common because of the tighter control attempted during pregnancy.** Fetal complications include an increased rate of abortions, anatomic birth defects, fetal growth restriction, and prematurity.

Identify how common is GDM in Saudi Arabia and worldwide.

- **The prevalence of diabetes mellitus has greatly increased in the last 20 years.** Reports show a rate of 3% to 8% of gestational diabetes mellitus (GDM). Pregestational diabetes is present in about 1% of pregnancies. Overall, 90% of diabetes in pregnant women is gestational and about 10% pregestational.

Discuss how pregnancy predisposes to the development of GDM

- **Pregnancy is associated with progressive insulin resistance. Due to the effect of:**
 1. Human placental lactogen
 2. Progesterone
 3. prolactin
 4. Cortisol
 5. tumor necrosis factor
- **What are the effects of Pregnancy on diabetes:**
 1. Insulin antagonism happens in pregnancy due to the action of PHL produced by the placenta as well as estrogen and Progesterone → difficulty in controlling diabetes.
 2. ↑ Infection rate
- **Patients presenting with the following are easy to diagnose:**
 1. Hyperglycemia
 2. Glucosuria
 3. Ketoacidosis

Describe the maternal and fetal complications of D.M.

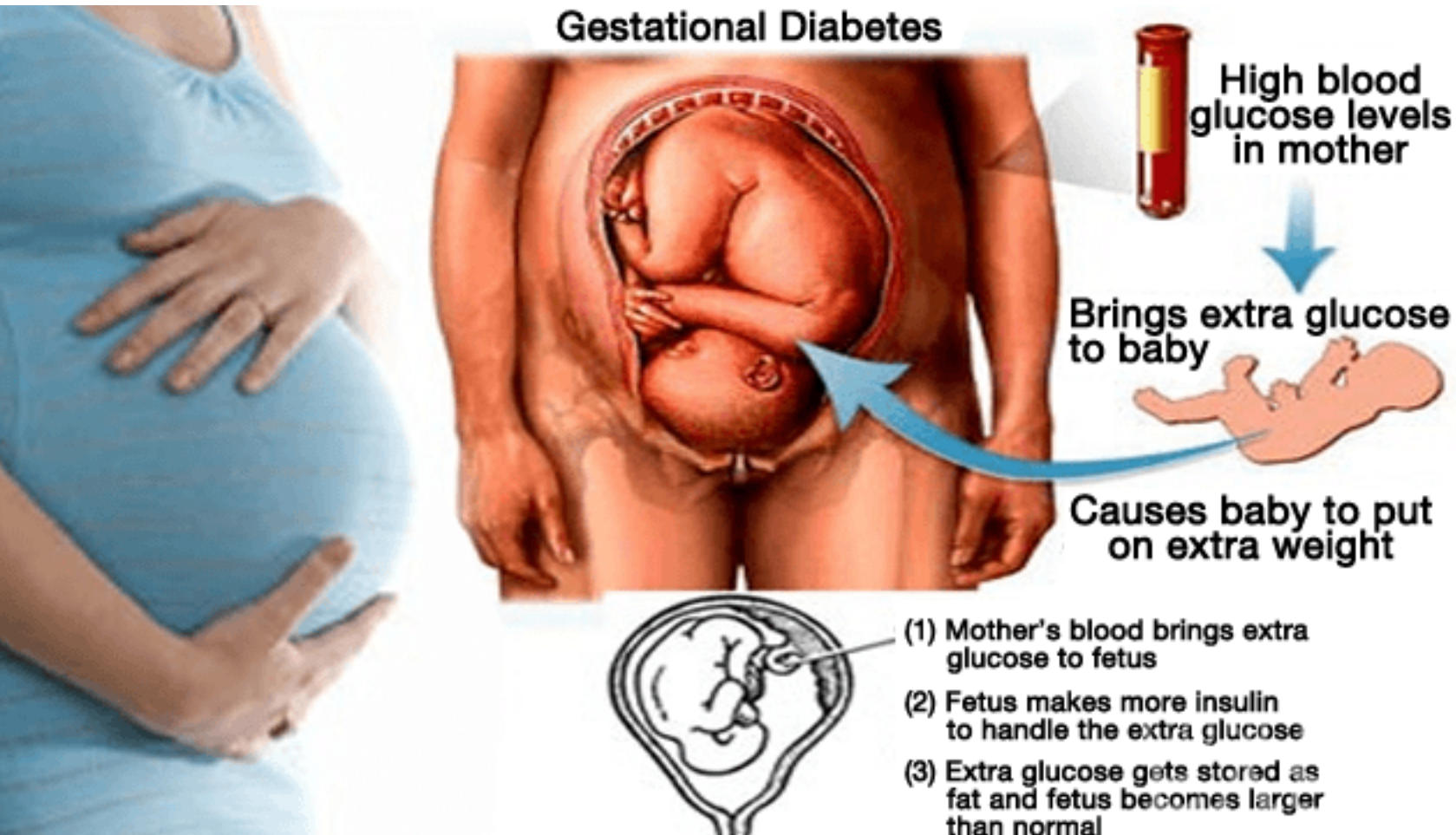
Maternal hyperglycemia:
Glucose from the mother
crosses the placenta easily by
facilitated diffusion

causing fetal
hyperglycemia

which stimulates
pancreatic β cells
and results in fetal
hyperinsulinism.

Fetal hyperglycemia
during the period of
embryogenesis is
teratogenic

- ✓ There is a direct correlation between birth defects in diabetic pregnancies and increasing glycosylated hemoglobin levels (HbA1C) in the first trimester.
- ✓ **It is to be noted that congenital anomalies and abortion are not a risks with gestational diabetes.**



The baby's mother was suffering from undiagnosed gestational diabetes that resulted in baby being born at a higher birth weight, according to a translated news release from the University Hospital Leipzig. (<http://abcnews.go.com/blogs/health/2013/07/31/13-pound-baby-born-naturally-but-world-record-stands/>)

TABEL 1

MATERNAL AND FETAL COMPLICATIONS OF DIABETES MELLITUS

MATERNAL COMPLICATIONS	FETAL AND NEONATAL COMPLICATIONS
OBSTETRIC COMPLICATIONS <ol style="list-style-type: none"> 1. Polyhydramnios 2. Preeclampsia 3. Infections, e.g., urinary tract infection and candidiasis 4. Cesarean delivery 5. Genital trauma 	Macrosomia with traumatic delivery shoulder dystocia, Erb's palsy
DIABETIC EMERGENCIES <ol style="list-style-type: none"> 1. Hypoglycemia 2. Diabetic coma 3. Ketoacidosis 	DELAYED ORGAN MATURITY Pulmonary, hepatic, neurologic, pituitary-thyroid axis; with respiratory distress syndrome, hypocalcemia
VASCULAR AND END-ORGAN INVOLVEMENT OR DETERIORATION (IN PATIENTS WITH PREGESTATIONAL DIABETES MELLITUS) <ol style="list-style-type: none"> 1. Cardiac 2. Renal 3. Ophthalmic 4. Peripheral vascular 	CONGENITAL DEFECTS <ol style="list-style-type: none"> 1. Cardiovascular anomalies 2. Neural tube defects 3. Caudal regression syndrome 4. Other defects, e.g., renal
NEUROLOGIC <ol style="list-style-type: none"> 1. Peripheral neuropathy 2. Gastrointestinal disturbance 	FETAL COMPROMISE <ol style="list-style-type: none"> 1. Intrauterine growth restriction 2. Intrauterine fetal death 3. Abnormal fetal heart rate patterns
LONG-TERM OUTCOME <ol style="list-style-type: none"> 1. Type 2 diabetes 2. Metabolic syndrome 3. Obesity 4. Cardiovascular disease 	

Describe the screening and diagnostic tests for GDM

1. Screening for gestational diabetes is generally performed **between 24 and 28 weeks** of gestation with a **50-g 1-hour oral glucose challenge test (GCT)**, given without regard to last oral intake. (see table 2 for normal values)

❖ **Patients with mild carbohydrate metabolic disturbance need to be screened early based on the following risk factors:**

1. Strong family history of diabetes
2. History of giving birth to large infants \geq
3. Obesity
4. Unexplained fetal loss
5. Glucosuria which does not always indicate impaired glucose tolerance, but rather \uparrow glomerular filtration rate, nonetheless the detection of glucosuria in pregnancy mandates further investigations.
6. age greater than 25 years
7. Previous history of GDM

If the first-trimester screen is negative, it should be repeated at 24 to 28 weeks. Glucose values above 130 to 140 mg/dL on a GCT are considered abnormal

2. An abnormal screening GCT is **followed with a diagnostic 3-hour 100-g oral glucose tolerance test**. This involves checking the fasting blood glucose after an overnight fast

If there are two or more abnormal values on the 3-hour GTT, the patient is diagnosed with GDM.

If the 1-hour screening (50-g oral glucose) plasma glucose exceeds 200 mg/dL, a glucose tolerance test is not required and may dangerously elevate blood glucose values.

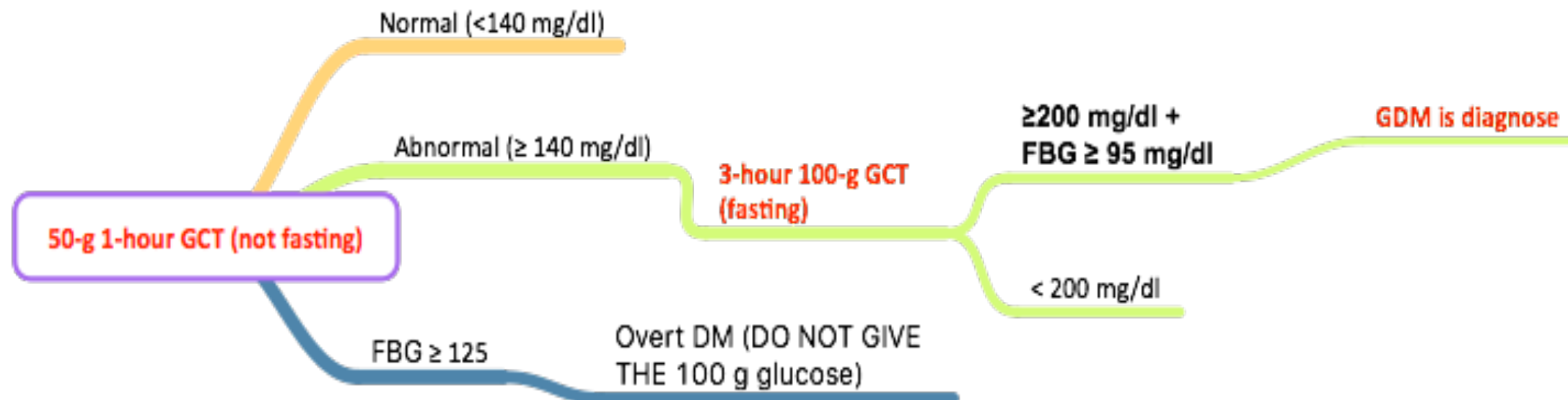
TABEL 2

THREE-HOUR ORAL GLUCOSE TOLERANCE TEST

Test	Maximal Normal Blood Glucose (mg/dL)
Fasting	95
1 hr	180
2 hr	155
3 hr	140

MIND MAP 1

SCREENING FOR GESTATIONAL DIABETES



Identify the importance of multidisciplinary approach of management of these cases.

The diabetic team	Strategies to achieve maternal euglycemia, and avoidance of fetal-neonatal compromise.
Achieving euglycemia	Strict metabolic control before and during pregnancy to decrease the incidence of congenital anomalies, perinatal morbidity and mortality.
Diet	<p>Put patient on diet x 3 days 30-35 kcal /kg of ideal body weight.</p> <p>The diet comprises about</p> <ul style="list-style-type: none"> • 50% carbohydrate, • 20% protein • 20% fat. • Generous amount of fiber.
Exercise	Diabetic patients should be encouraged to engage in mild to moderate aerobic exercise (e.g., brisk walking) for about half an hour after meals.

If controlled continue with monitoring if not → start insulin

Insulin use is the gold standard to maintain euglycemia in pregnancy.

- 2/3 of total daily dose in morning (2/3 NPH, 1/3 lispro or regular)
- 1/3 of total daily dose in evening (½ NPH, ½ lispro or regular)

A method for calculating insulin dosage: Insulin units = body weight (kg)

×0.6 (First trimester)

×0.7 (Second trimester)

×0.8 (Third trimester)

Continue management

- Oral hypoglycemic agents have traditionally **not been recommended for pregnant women** because of the risks for teratogenesis and neonatal hypoglycemia. However, oral hypoglycemic agents (e.g., **glyburide**), which do not appear to enter the fetal circulation in appreciable quantities, have been used successfully to treat gestational diabetes after the first trimester.

Antepartum Obstetric Management

- ✓ first-trimester dating ultrasound followed by a detailed obstetric ultrasonic study
- ✓ fetal echocardiogram
- ✓ and maternal serum alpha-fetoprotein level should be obtained at 16 to 20 weeks to check for congenital malformations.
- ✓ Maternal renal, cardiac, and ophthalmic functions must be closely monitored.
- ✓ **The HbA_{1c} should be obtained at the first prenatal visit, which is preferably scheduled early in the first trimester. Individuals with significantly elevated values (>8.5%) should be particularly targeted for careful ultrasonic assessment for congenital anomalies.** Regular electronic, biochemical, and ultrasonographic fetal monitoring should be performed.
- **Timing and Mode of Delivery:**
 - ✓ Induction of labor at completed 38 weeks for diabetics on insulin
 - ✓ Induction of labor at term for diabetics on diet. Provided sugar is well controlled.
 - ✓ C/S for obstetric indications

Continue management

Intrapartum Management

- ✓ **Intrapartum management of a diabetic patient requires the establishment of maternal euglycemia during labor.** This may be achieved by giving a continuous infusion of regular insulin. **Plasma glucose levels are measured frequently, and insulin dosage is adjusted accordingly to maintain a plasma glucose level between 80 and 120 mg/dL.**
- ✓ Not all insulin-dependent patients require exogenous insulin during labor.
- ✓ Continuous electronic **fetal heart rate monitoring is recommended for all diabetic patients.**

Postpartum Period

- ✓ **After delivery of the fetus and placenta, insulin requirements drop sharply because the placenta, which is the source of many insulin antagonists, has been removed.**
- ✓ **Plasma glucose levels should be monitored and lispro or regular insulin given when plasma glucose levels are elevated.**
- ✓ **A fasting blood glucose or a 75-g oral glucose tolerance test should be performed at 6 to 12 weeks postpartum.**

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