

Gestational diabetes mellitus

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Gestational diabetes and impaired glucose tolerance (IGT) in pregnancy affects between **2-3%** of all pregnancies and both have been associated with pregnancy complications.

Fasting and 2 hours postprandial venous plasma sugar during pregnancy.

Fasting	2h postprandial	Result
<100 mg/dl	< 145mg/ dl.	Not diabetic
>125 mg/ dl	>200 mg/ dl.	Diabetic
100-125 mg/dl	125-200 mg/dl.	Border line indicates glucose tolerance test.

Risk assessment

Risk assessment

Low-risk status requires no glucose testing, but this category is limited to those women meeting **all** of the following characteristics:

- Age <25 years.
- Weight normal before pregnancy .
- Member of an ethnic group with a low prevalence of gestational diabetes mellitus .
- No known diabetes in first-degree relatives .
- No history of abnormal glucose tolerance .
- No history of poor obstetric outcome .

Risk assessment

A high risk of gestational diabetes mellitus:

- ❖ marked obesity.
- ❖ personal history of gestational diabetes mellitus.
- ❖ Glycosuria.
- ❖ a strong family history of diabetes .

Risk assessment

- high risk patients should undergo glucose testing

A fasting plasma glucose level $>125\text{mg/dL}$ or a casual plasma glucose $>200\text{ mg/dL}$ meets the threshold for the diagnosis of diabetes

In the absence of this degree of hyperglycemia, evaluation for gestational diabetes mellitus in women with average or high-risk characteristics is by glucose tolerance test .

50-g oral glucose challenge

The screening test for GDM, a 50-g oral glucose challenge, may be performed in the fasting or fed state. Sensitivity is improved if the test is performed in the fasting state .

A plasma value above **130 - 140 mg/dl** one hour after is commonly used as a threshold for performing a 3-hour OGTT.

If initial screening is negative, repeat testing is performed at 24 to 28 weeks.

3 hour Oral glucose tolerance test

Prerequisites:

- Normal diet for 3 days before the test.
- No diuretics 10 days before.
- At least 10 hours fast.
- Test is done in the morning at rest.

Giving 75 gm (100 gm by other authors) glucose in 250 ml water orally

Criteria for glucose tolerance test:

The maximum blood glucose values during pregnancy:

- fasting 90 mg/ dl,
- one hour 165 mg/dl,
- 2 hours 145 mg/dl,
- 3 hours 125 mg/dl.

If any 2 or more of these values are elevated, the patient is considered to have an impaired glucose tolerance test.

Monitoring

Monitoring

Urine glucose monitoring is not useful in gestational diabetes mellitus. Urine ketone monitoring may be useful in detecting insufficient caloric or carbohydrate intake in women treated with calorie restriction.

Monitoring

Daily self-monitoring of blood glucose (SMBG) appears to be superior to *intermittent* office monitoring of plasma glucose.

Monitoring

For women treated with insulin, **preprandial** monitoring is **superior to** **postprandial** monitoring. However, the success of either approach depends on the glycemic targets that are set and achieved.

Monitoring

Glycosylated haemoglobin (Hb A1)

It normally accounts for 5-6% of the total haemoglobin mass. A value over 10% indicates poor diabetes control in the previous 4-8 weeks.

If this is detected early in pregnancy, there is a high risk of congenital anomalies .

If this is detected in late pregnancy it indicates increased incidence of macrosomia and neonatal morbidity and mortality.

Monitoring

Glycosylated haemoglobin (Hb A1)

The mean glucose represented by the hemoglobin A1c level can be calculated using the "rule of 8's." A value of 8 percent equals 180 mg/dl, and each 1 percent increase or decrease represents ± 30 mg/dl.

Monitoring

Assessment for asymmetric fetal growth by ultrasonography, particularly in early third trimester, may aid in identifying fetuses that can benefit from maternal insulin therapy

Monitoring

Maternal surveillance should include blood pressure and urine protein monitoring to detect hypertensive disorders.

management

There are insufficient data for any reliable conclusions about the effects of treatments for impaired glucose tolerance on perinatal outcome.

From *The Cochrane Library, Issue 4, 2003*

1-medical nutrition therapy

Medical nutrition therapy should include the provision of adequate calories and nutrients to meet the needs of pregnancy and should be consistent with the maternal blood glucose goals that have been established. Noncaloric sweeteners may be used in moderation.

Diet therapy is critical to successful regulation of maternal diabetes. A program consisting of three meals and several snacks is used for most patients. Dietary composition should be :

- ✓ 50 to 60 percent carbohydrate,
- ✓ 20 percent protein,
- ✓ 25 to 30 percent fat with less than 10 percent saturated fats, up to 10 percent polyunsaturated fatty acids, and the remainder derived from monosaturated sources

2-insulin therapy

insulin therapy is recommended when medical nutrition therapy fails to maintain self-monitored glucose at the following levels:

Fasting whole blood glucose ≤ 95 mg/dL

Fasting plasma glucose ≤ 105 mg/dL

or

1-hour postprandial whole blood glucose ≤ 140 mg/dL

1-hour postprandial plasma glucose ≤ 155 mg/dL

or

2-hour postprandial whole blood glucose ≤ 120 mg/dL

2-hour postprandial plasma glucose ≤ 135 mg/dL

Insulin therapycont.

GOAL

Self-blood glucose monitoring combined with aggressive insulin therapy has made the maintenance of maternal normoglycemia

(fasting and premeal glucose between 50-80mg/dl and 1 hour postprandial glucose <140mg/dl)

Insulin therapycont.

Twice daily (before breakfast and before dinner) injections of a combination of short and intermediate acting insulins are usually sufficient to control most patients otherwise a subcutaneous insulin pump is used.

Insulin therapycont.

The total first dose of insulin is calculated according to the patient's weight as follow:

In the first trimester weight x 0.7

In the second trimester..... weight x 0.8

In the third trimester..... weight x 0.9

If the total dose of insulin is less than 50 units/day, it is given in a single morning dose with the ratio: Short acting (regular or Actrapid)/Intermediate (NPH or Monotard) = 1 : 2

In higher doses, As a general rule, the amount of intermediate-acting insulin will exceed the short-acting component by a 2:1 ratio. Patients usually receive two thirds their total dose with breakfast and the remaining third in the evening as a combined dose with dinner

Insulin Dose adjustment

Home glucose monitoring with a reflectance meter by measuring fasting and preprandial glucose values 4 times a day (30-40 min) before each meal.

preprandial glucose measuring allows adding additional regular insulin to compensate any hyperglycemia already present before meals.

All values are recorded in a daily log.

NEXT 

Insulin Dose adjustment

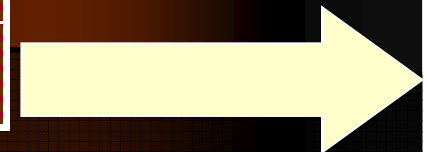
Each time the fasting or premeal glucose is measured, the patient refers to the supplemental regular insulin scale to determine if additional regular insulin is needed

NEXT 

supplemental regular insulin scale

Preprandial glucose mg/dl	Additional units (regular insulin)
<100	0
100-140	2
140-160	3
160-180	4
180-200	5
200-250	6
250-300	8
>300	10

NEXT



Insulin Dose adjustment

When the pattern for additional regular insulin supplementation is identified over 2-3 days, that amount of insulin can then be added to the planned daily dose.

3-Hospitalisation

In patients who are not well controlled, a brief period of hospitalization is often necessary for the initiation of therapy. Individual adjustments to the regimens implemented can then be made.

KETOACIDOSIS

KETOACIDOSIS

As pregnancy is a state of relative insulin resistance marked by enhanced lipolysis and ketogenesis, diabetic ketoacidosis may develop in a pregnant woman with glucose levels barely exceeding 200 mg/dl .

Thus, DKA may be diagnosed during pregnancy with minimal hyperglycemia accompanied by a fall in plasma bicarbonate and a pH value less than 7.30. Serum acetone is positive at a 1:2 dilution.

KETOACIDOSIS

clinical signs of volume depletion follow the symptoms of hyperglycemia, which include

- polydipsia and polyuria.
- Malaise.
- Headache.
- nausea.
- Vomiting.

KETOACIDOSIS

- ❖ Occasionally, diabetic ketoacidosis may present in an undiagnosed diabetic woman receiving β -mimetic agents to arrest preterm labor.
- ❖ Because of the risk of hyperglycemia and diabetic ketoacidosis in diabetic women . Terbutaline and magnesium sulfate has become the preferred tocolytic for cases of preterm labor in these cases.
- ❖ Sometimes Administration of antenatal corticosteroids to accelerate fetal lung maturation can cause significant maternal hyperglycemia and precipitate DKA. In diabetic patients.

KETOACIDOSIS

An intravenous insulin infusion will usually be required and is adjusted on the basis of frequent capillary glucose measurements.

Therapy hinges on the meticulous correction of metabolic and fluid abnormalities.

Every effort should therefore be made to correct maternal condition before intervening and delivering a preterm infant.

ANTEPARTUM FETAL EVALUATION

ANTEPARTUM FETAL EVALUATION

antepartum fetal monitoring tests are now used primarily to reassure the obstetrician and avoid unnecessary premature intervention.

These techniques have few false-negative results, allowing the fetus to benefit from further maturation in utero.

1-Ultrasound

Ultrasound is a valuable tool in evaluating fetal growth, estimating fetal weight, and detecting hydramnios and malformations.

Ultrasound.....cont.

maternal serum α -fetoprotein (MSAFP) at 16 weeks' gestation is often used in association with a detailed ultrasound study during the second trimester in an attempt to detect neural tube defects and other anomalies. Normal values of MSAFP for diabetic women are lower than in the nondiabetic population .

Ultrasound....cont.

Ultrasound examinations should be repeated at 4- to 6-week intervals to assess fetal growth. The detection of fetal macrosomia, the leading risk factor for shoulder dystocia, is important in the selection of patients who are best delivered by cesarean section.

2-Maternal assessment of fetal activity

While the false-negative rate with maternal monitoring of fetal activity is low (~ 1 percent), the false-positive rate may be as high as 60 percent.

Maternal hypoglycemia, while generally believed to be associated with decreased fetal movement, may actually stimulate fetal activity.

3-The nonstress test (NST)

- Done weekly at 28 weeks and Twice weekly at 34 weeks
- remains the preferred method to assess antepartum fetal well-being in the patient with diabetes mellitus
- If the NST is nonreactive, a biophysical profile (BPP) or contraction stress test is then performed .

4-Doppler umbilical artery velocimetry

Doppler umbilical artery velocimetry has been proposed as a clinical tool for antepartum fetal surveillance in pregnancies at risk for placental vascular disease.

It is found that Doppler studies of the umbilical artery may be predictive of fetal outcome in diabetic pregnancies complicated by vascular disease. **Elevated placental resistance as evidenced by an increased systolic/diastolic ratio is associated with fetal growth restriction and preeclampsia in these high-risk patients.**

TIMING AND MODE OF DELIVERY

There is **very little evidence** to support either elective delivery or expectant management at term in pregnant women with insulin-requiring diabetes. Limited data from a single randomized controlled trial suggest that induction of labour in women with gestational diabetes treated with insulin reduces the risk of macrosomia.

From The Cochrane Library, Issue 4, 2003

When antepartum testing suggests fetal compromise, delivery must be considered.

Delivery by cesarean section usually is favored when fetal distress has been suggested by antepartum heart rate monitoring.

If a patient reaches **38 weeks'** gestation with a mature fetal lung profile and is at significant risk for intrauterine demise because of poor control or a history of a prior stillbirth, an elective delivery is planned.

During labor, continuous fetal heart rate monitoring is mandatory. Labor is allowed to progress as long as normal rates of cervical dilatation and descent are documented.

arrest of dilatation or descent despite adequate labor should alert the physician to the possibility of cephalopelvic disproportion.

Insulin Management during Labor and Delivery

- Usual dose of intermediate-acting insulin is given at bedtime.
- Morning dose of insulin is withheld.
- Intravenous infusion of normal saline is begun.
- Once active labor begins or glucose levels fall below 70 mg/dl, the infusion is changed from saline to 5% dextrose and delivered at a rate of 2.5 mg/kg/min.
- Glucose levels are checked hourly using a portable meter allowing for adjustment in the infusion rate.
- Regular (short-acting) insulin is administered by intravenous infusion if glucose levels exceed 140 mg/dl.

Thank you