

# Influence of Free Fatty Acids During Pregnancy on Gestational Diabetes Mellitus in Newborn Weights

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## Introduction:

**Gestational Diabetes:** During pregnancy, some women develop high blood glucose levels. This condition is understood as gestational DM (GDM) or gestational diabetes. Gestational diabetes typically develops between the 24th and 28th weeks of pregnancy.

According to the Centers for Disease Control and Prevention, it's estimated to occur in 2 to 10 percent of pregnancies in the United States.

If you develop gestational diabetes while you're pregnant, it doesn't mean that you had diabetes before your pregnancy or will have it afterward. But gestational diabetes does raise your risk of developing type 2 diabetes in the future.

If poorly managed, it can also raise your child's risk of developing diabetes and increase the risk of complications for you and your baby during pregnancy and delivery.

During pregnancy free fatty acids (FFA) and glycerol, are mainly driven to maternal liver, where FFA are converted to ketone bodies and glycerol to glucose, which easily cross the placenta and sustain fetal metabolism. Lipolytic products reaching maternal liver are also used for triglyceride synthesis and are in turn released to the circulation where, together with an enhanced transfer of triglycerides among the different lipoprotein fractions and a decrease in extrahepatic lipoprotein lipase activity, they increase the content of triglycerides in all the lipoprotein fractions. Gestational diabetes mellitus (GDM) seems to lower fetal free fatty acids through impaired placental transfer.

## Causes of Gestational Diabetes:

The exact cause of gestational diabetes is unknown, but hormones likely play a role. When you're pregnant, your body produces larger amounts of some hormones, including:

- human placental lactogen (hPL)
- hormones that increase insulin resistance

These hormones affect your placenta and help sustain your pregnancy. Over time, the amount of these hormones in your body increases. They may start to make your body resistant to insulin, the hormone that regulates your blood sugar.

Insulin helps move glucose out of your blood into your cells, where it's used for energy. In pregnancy, your body naturally becomes slightly insulin resistant, so that more glucose is available in your blood stream to be passed to the baby. If the insulin resistance becomes too strong, your blood glucose levels may rise abnormally. This can cause gestational diabetes.

## Tests:

### Glucose challenge test

Some doctors may begin with a glucose challenge test. No preparation is needed for this test.

You'll drink a glucose solution. After one hour, you'll receive a blood test. If your blood sugar level is high, your doctor may perform a three-hour oral glucose tolerance test. This is considered two-step testing.

Some doctors skip the glucose challenge test altogether and only perform a two-hour glucose tolerance test. This is considered one-step testing.

### One-step test

1. Your doctor will start by testing your fasting blood sugar levels.
2. They'll ask you to drink a solution containing 75 grams (g) of carbohydrates.
3. They'll test your blood sugar levels again after one hour and two hours.

They'll likely diagnose you with gestational diabetes if you have any of the following blood sugar values Trusted Source:

- fasting blood sugar level greater than or equal to 92 milligrams per deciliter (mg/dL)
- one-hour blood sugar level greater than or equal to 180 mg/dL
- two-hour blood sugar level greater than or equal to 153 mg/dL

### Two-step test

1. For the two-step test, you will not need to be fasting.
2. They'll ask you to drink a solution containing 50 g of sugar.
3. They'll test your blood sugar after one hour.

If at that point your blood sugar level is greater than or equal to 130 mg/dL or 140 mg/dL, they'll conduct a second follow-up test on a different day. The threshold for determining this is decided by your doctor.

1. During the second test, your doctor will start by testing your fasting blood sugar level.
2. They'll ask you to drink a solution with 100 g of sugar in it.
3. They'll test your blood sugar one, two, and three hours later.

They'll likely diagnose you with gestational diabetes if you have at least two of the following values:

- fasting blood sugar level greater than or equal to 95 mg/dL or 105 mg/dL
- one-hour blood sugar level greater than or equal to 180 mg/dL or 190 mg/dL
- two-hour blood sugar level greater than or equal to 155 mg/dL or 165 mg/dL
- three-hour blood sugar level greater than or equal to 140 mg/dL or 145 mg/dL

**Objectives:** To compare FFA and blood glucose concentrations of newborns derived from healthy to hyperglycemic mothers.

**Methods:** The study included 50 newborns of GDM mothers. The control group consisted of the same number of healthy newborns, selected randomly, born in the same hospital during the same period. All infants were assessed for gestational age, anthropometric measures on birth, gender, FFA, glycemia. Biochemical analyzes were taken from blood of the umbilical vein immediately after birth. The venous blood (cubital) of GDM mothers as well as healthy mothers was biochemically tested instantly after labor.

**Results:** The average age of GDM mothers was 31.18 years, and in the control group it was 27.6 years ( $p > 0.05$ ). Median gestational age in infants of women with GDM was 38.6 GN, while in the control group it was 39.25 GN ( $p > 0.05$ ). 71.5% of mothers with GDM had fetal birth weights above the 90% tile. Normal mothers had fetal birthweights above the 90% tile-6% ( $p < 0.01$ ).The mean FFA concentration in a group of healthy mothers was 0.83 mmol/l, while the group of mothers with GDM measured 0.79 mmol/l. Mean concentration of FFA in newborns of healthy mothers was 0.62 mmol/l, while the group of infants of women with GDM showed 0.22 mmol/l. A statistically significant correlation of values of FFA ( $p < 0.05$ ,  $r = 0.424$ ) was found in the group of healthy mothers and their newborns. No such correlation was found in GDM group ( $p > 0.05$ ,  $r = 0.639$ ). The average glycemia in newborns of GDM mothers was 3.733 mmol/L, while the mean glycemia in newborns of healthy mothers was 4.434 mmol/Analysis of the data showed were a statistically significantly different between the groups ( $p < 0.01$ )

**Conclusion:** High levels of fetal insulin suppressing lipolysis increases the transfer of free fatty acids through the placenta, whereas fetal pancreas, reacting to the increase of concentration of free fatty acids and glucose, responds with insulin production, signifying the most essential reason for the occurrence of fetal macrosomia