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Gestational diabetes

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What is gestational diabetes?

Gestational diabetes (GD) simply means elevated blood sugar during pregnancy. To understand it, you must first understand the normal changes in pregnancy metabolism (34). When you are pregnant, certain hormones make your insulin less effective at transporting glucose, the body's fuel, out of your bloodstream into your cells. This increases the amount of circulating glucose, making it available to your baby for growth and development. This "insulin resistance" increases as pregnancy advances. As a result, your blood glucose levels after eating rise linearly throughout pregnancy. By the third trimester, you will tend to have higher blood glucose levels after eating than nonpregnant women (hyperglycemia), despite secreting normal and above normal amounts of insulin. During overnight sleep, the excess insulin has a chance to mop up, which causes morning glucose levels to be lower on average than in nonpregnant women (hypoglycemia).

In the 1950s, some researchers wondered whether sugar values at the high end of the range for pregnancy would predict the development of diabetes later in life. They tracked a population of women and in 1964, they reported that, yes, it did (40). The extra stress of pregnancy revealed a woman's "prediabetic" status. This shouldn't have surprised anyone, because high-weight women are much more likely to have higher glucose values in pregnancy than average-weight women and to eventually develop diabetes. However, doctors knew diabetes posed grave threats to the unborn baby, so they worried that glucose levels that were high, but not in the diabetic range, might also do harm. This concern launched what eventually became an avalanche of studies that ended by defining a whole new category of pregnancy complication called "gestational diabetes," although "glucose intolerance of pregnancy" would be a more accurate description. Those studies, and their premise, were fundamentally flawed.

Is gestational diabetes a health risk?

The theory that GD could have the same adverse effects of diabetes was faulty on its face, because GD does not share the risk factors of either type of true diabetes. In Type I diabetes, extremes of low and high blood sugar early in pregnancy can cause malformations or miscarriage. GD women make normal or above-normal amounts of insulin and have normal blood-sugar metabolism in the first trimester (22). Either Type I or II, long-standing diabetes can damage maternal blood vessels and kidneys, causing hypertension or kidney complications. These can in turn jeopardize the fetus. Gestational diabetics do not have long-standing diabetes. The one problem GD shares with both types is that chronic hyperglycemia can overfeed the fetus, resulting in a big baby. This is generally defined as a birth weight of more than 8 lbs. 13 oz. (4,000 grams) or a birth weight in the upper ten percent for length of pregnancy (large for gestational age).

Theory aside, the studies designed to test it had significant weaknesses. They included women who were known diabetics prior to pregnancy. They selected women for glucose testing based on such risk factors as prior stillbirth, current hypertension, or extreme overweight, indications that alone could explain poorer outcomes (12). They failed to account for compounding factors, such as that glucose intolerance associates with increasing maternal weight and age, which themselves strongly predict large babies and maternal hypertension. Finally, they used management protocols that increased risks such as starvation diets, early induction and withholding nourishment from the newborn (18). Despite these flaws, researchers concluded that mildly deviant glucose values in pregnancy caused serious harm.

We now know that GD doesn't increase the risk of stillbirth or congenital malformations (4). A couple of modern studies have concluded otherwise, but they didn't take into account that women with high blood sugar are more likely to have other risk factors for poor outcome, or that some women had undiagnosed diabetes prior to pregnancy (17,24). Indeed, the fact that these studies were of women whose blood sugar had been normalized by treatment proves that GD is not the culprit. Besides, GD testing and treatment could not affect the incidence of congenital malformations under any circumstances, because testing isn't done until the third trimester. By that time, the baby is long since fully formed.

We also know that maternal glucose level correlates poorly with birth weight. While GD somewhat increases the odds of having a baby weighing in the upper ten percent (16,36), most of this results from GD's association with other factors, in particular, maternal weight (10,13,21,28,43,57).

Other supposed risks of GD are preeclampsia, glucose intolerance in the child and childhood obesity. As before, GD is only found in company with these complications; it doesn't cause them. For example, studies show that blood glucose level plays little if any role in high-weight children compared with maternal weight before pregnancy (8,25). Also, as before, normalizing blood sugar fails to prevent these problems, which absolves GD (42,44-45,53).

All this being said, there is a needle in the haystack. About one in a thousand pregnant women tested will have sugar values in the range of true diabetes (2). These women may have been diabetic before pregnancy and not known it, or pregnancy may have been enough of a metabolic stress to tip them into diabetes. These women may benefit from being identified and treated.

How do practitioners test for gestational diabetes?

Testing for GD is a two-stage process. The first step is a screening test, which is generally administered to all pregnant women. The screening test is usually given somewhere between week 24 and 28. For this test, you may be asked to drink a glucose solution and have a blood sample drawn an hour later, or you may simply be asked to give a blood sample. If your blood glucose value exceeds a threshold amount, you will be asked to return for an Oral Glucose Tolerance Test (OGTT). The various protocols disagree on the amount of glucose and the threshold value (29).

For the OGTT, you will be asked to come in after fasting overnight. Blood will be drawn, you will be given a glucose solution to drink, and blood will be drawn one, two and three hours later. The glucose solution may make you nauseous. As with the screening test, the recommended amount of glucose and the diagnostic thresholds vary from protocol to protocol (29). Some guidelines only stipulate a fasting glucose and a two hour value (29).

What are the problems with gestational diabetes testing?

A diagnostic test should be reproducible, meaning you get the same results when you repeat the test. Thresholds should be values at which complications either first appear or incidence greatly increases; and normal ranges should apply to the population being tested. The OGTT is none of the above.

Obstetricians adopted data from the original 1950s studies as the normative curve for all pregnant women, but they shouldn't have. For one thing, those researchers tested women without regard to length of gestation, whereas today, doctors typically test women at the beginning of the third trimester. Glucose values rise linearly throughout pregnancy, but no corrections have been made for this (15). For another, they studied a population that was sixty percent white and forty percent black. Hispanics, Native Americans and Asian women average higher blood sugars than black or white women (10,57). This means values for that 1950s population have been established as norms for all women, which in turn means that some women are being identified as diseased simply because of race.

The OGTT also isn't reliable. When pregnant women undergo two OGTTs a week or so apart, individual test results disagree twenty to twenty-five percent of the time (5,23). A person's blood sugar values after ingesting glucose (or food) vary widely depending on many factors. For this reason, the OGTT has been abandoned as a diagnostic test for true diabetes in favor of high fasting glucose values, which show much greater consistency, or values after eating of 200 mg/dl or more, which are rare (46,52). Moreover, pregnancy compounds problems with reproducibility. Because glucose levels rise linearly throughout pregnancy, a woman could "pass" a test in gestational week 24 and "fail" it in week 28 (55). These same reproducibility problems hold true for the glucose screening test that precedes the OGTT (47,55).

More importantly, no threshold has ever been demonstrated for onset or marked increase in fetal complications below levels diagnostic of true diabetes. The original researchers chose their cutoffs for convenience in follow-up, but all studies since have used their criteria or some modification thereof as a threshold for pathology in the current pregnancy. Numerous studies since have documented that birth weights and other outcomes fail to correlate with the 1950s or anybody else's

thresholds. Today's researchers acknowledge that the risks of glucose intolerance almost certainly form a continuum and that screening and diagnostic thresholds are arbitrary (7,29-30,48,51).

Several organizational bodies that have looked critically at the GD research have come out against GD testing. A Guide to Effective Care in Pregnancy and Childbirth, the bible of evidence-based care, relegates screening for gestational diabetes to "Forms of Care Unlikely to be Beneficial (12)." The American College of Obstetricians and Gynecologists says no data support the benefits of screening (1). The U.S. Preventative Services Task Force and the Canadian Task Force on the Periodic Health Examination both conclude that there is insufficient evidence to justify universal GD screening (4,11).

How is gestational diabetes treated?

The main elements of GD treatment are:

1. Normalizing blood sugar: The first step is a diet low in sugars and carbohydrates. Some diets also limit calories. If diet fails to control blood glucose levels, insulin injections are prescribed.
2. Monitoring blood sugar: In most cases this will mean pricking your finger and testing your blood once, and more commonly, several times a day.

Many protocols include:

- Monitoring fetal well-being: Many practitioners order repeated fetal surveillance tests beginning at or before the due date. The most common is the nonstress test, which looks at the fetal heart rate changes in response to fetal movements or Braxton-Hicks contractions (normal, nonlabor tightening of the uterus).
- Ultrasound scan to estimate fetal weight
- Planned delivery: This may be either induction of labor or elective cesarean section. Induction is often at, or sometimes before, the due date.
- Monitoring newborn blood sugar: Some protocols call for checking the baby's blood sugar, which involves a heel stick.

What are the problems with gestational diabetes treatment?

The two questions asked of any therapy are: "Is it safe?" and "Is it effective?" GD management is neither.

GD treatment per se has never been shown to have benefits. In fact, it is virtually untested. The first and only random assignment trial, the standard for determining care because this design eliminates many sources of bias and ensures similar groups, was published in 1997. It concluded that intensive treatment offered no advantages over advising women to eat healthy (16). Meanwhile, several studies have found that identification as a gestational diabetic in and of itself substantially increases the odds of cesarean section (3,19,38,50).

Individual components of GD protocols also fail the safety/effectiveness test:

- Diet or diet plus insulin therapy: The standard GD diet is a healthy diet. However, while it reduces blood glucose to normal range in most women, it has little or no effect on birth weight (54). Many women, though, are prescribed limited calorie diets. Reducing calorie intake by more than one-third causes the body to switch to a starvation metabolism (ketosis) that produces byproducts known to be harmful to the baby (31). Limiting food intake can also lead to malnutrition (27). Aggressive insulin use can cause underweight babies and symptomatic episodes of low blood sugar (hypoglycemia) (3,32). A Guide to Effective Care in Pregnancy and Childbirth lists both diet treatment and diet plus insulin treatment under "Forms of Care Unlikely to be Beneficial (12)."
- Tests of fetal well-being: Of the four random assignment trials of nonstress testing, the most commonly used fetal surveillance test, none found any benefit for testing, although they were in populations of women at moderate to high risk (41). All tests of well-being have high false-positive rates, meaning the test says there is a problem when there isn't. This leads to unnecessary inductions and cesareans with all their attendant risks.
- Fetal weight estimates: Ultrasound predictions that the baby will weigh over 4,000 grams are wrong one-third to one-half of the time (6,9,14,20,33,56). As with fetal well-being tests, the belief that the baby is big leads to unnecessary inductions and cesareans. Two studies showed that when obstetricians believed, based on ultrasound,

that women were carrying babies weighing over 4,000 grams, half had cesareans, versus less than one-third of women not thought to have babies this big, but who actually did (35,56).

- Induction of labor or planned cesarean: Many doctors induce labor in the belief it averts cesareans due to big babies. Some think induction or planned cesarean prevents shoulder dystocia (the head is born, but the shoulders hang up). Studies of induction and planned cesarean for suspected big baby show no benefits for either practice (6,9,14,20,33,49,56).
- Monitoring newborn blood sugar: The reasoning behind this is that if the mother has high blood-sugar levels, the baby will produce extra insulin. After birth, this excess insulin can cause low blood sugar. No studies have tested whether checking the blood sugar of a baby who shows no symptoms of low blood sugar has any value. However, test results can lead to the baby being given a bottle of sugar water or formula, which interferes with establishing breastfeeding, separation from the mother for observation in the nursery, or both.

Finally, treatment also fails to prevent increased incidence of preeclampsia, impaired glucose tolerance in children, and childhood overweight (42,44-45,53).

Another rationale given for diagnosing and treating gestational diabetics is identifying women at risk for developing Type II diabetes. However, predicting who is likely to develop diabetes can be done equally well on the basis of race, ethnicity, and weight.

Curiously, while several prominent GD researchers and experts acknowledge the lack of sound data supporting their recommendations, none have backed off (1,26,37,39). These experts devise GD guidelines for practicing doctors and midwives, most of whom have no idea how shaky the GD edifice is. Even those who doubt the value of screening all or most women for GD may have little choice if testing and treatment is the community standard of care.

How does diagnosis as a gestational diabetic affect your pregnancy and birth?

The standard GD diet is a good one; adequate calories, limit simple sugars, moderate fat intake, eat whole grains and plenty of fruits and vegetables and eat smaller meals more frequently. Also beneficial is the advice to engage in moderate, regular exercise. If that was all that happened, identification as a gestational diabetic would be a good thing. Some tracking of blood sugars to make sure they aren't drifting into the true diabetic range is probably also a good thing, as is identifying the one in a thousand women who has or will develop glucose values in that range. However, most women will find themselves caught up in frequent doctor visits, multiple daily blood tests, restrictive diets, possibly insulin injections, repeated fetal surveillance tests and a considerable chance of a labor induction or cesarean section.

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