

Chapter 27

Pregnancy and Diabetes

Satish Garg, MD
H. Peter Chase, MD

INTRODUCTION

This book has been used primarily by families of children with diabetes. Because of the increased readership recently by people of all ages, this brief chapter on pregnancy has been added.

For a woman with diabetes, the best blood sugar control possible is most important before and during pregnancy. Normal or near-normal blood sugars reduces the risk of miscarriage and birth defects. Unfortunately, many women with (or without) diabetes do not plan their pregnancies.

High sugar levels can:

- ✓ increase the rate of birth defects (heart, spine, lip, etc.) during the first trimester
- ✓ result in the birth of large babies
- ✓ increase the risk for injury during delivery because of a baby's size
- ✓ increase the risk of developing high blood pressure, swelling of feet and protein leakage in urine (pre-eclampsia)

Proper planning for pregnancy will result in better HbA_{1c} values before the beginning of pregnancy. Pregnancy should be delayed until the HbA_{1c} is < 6.5 percent and folic acid has been taken for three months (see Section C).

TOPICS:

Preconception Care, Management During Pregnancy and Gestational Management
Monitoring
Prevent, Detect and Treat Acute Complications
Prevent, Detect and Treat Chronic Complications Through Risk Reduction

TEACHING OBJECTIVES:

1. Present the importance of preconception planning.
2. Define the aspects of intensive diabetes management.
3. Discuss the monitoring necessary to prevent complications.

LEARNING OBJECTIVES:

Learner (parents, significant other, relative or self) will be able to:

1. State the most important consideration when planning a pregnancy.
2. Name the four aspects of intensive diabetes management.
3. List the additional eye/kidney tests, clinic visits and monitoring required during pregnancy.

1. GLUCOSE (SUGAR) CONTROL

Intensive diabetes management is essential during pregnancy. *As discussed in Chapter 8, this involves:*

- A. insulin pump therapy or multiple daily injections (MDI)
- B. frequent glucose monitoring
- C. close attention to nutrition
- D. frequent contact with the healthcare team

Although all four of these have been discussed in earlier chapters, some details related to pregnancy follow.

A. Insulin Pump Therapy or Multiple Daily Injections (MDI)

The two methods now usually used to normalize blood sugar levels are:

- ✓ the **insulin pump** (discussed in detail in Chapter 26). Early use of the pump is often recommended to improve sugar control during pregnancy. It is recommended that this be initiated before pregnancy.
- ✓ **multiple daily injections (MDI)** - discussed under “Intensive Diabetes Management” in Chapter 8)

Most commonly, NPH (N) insulin is used for the intermediate-acting insulin in MDI. Three or four doses per day (in addition to Humalog or NovoLog) are often used (e.g., breakfast, lunch, bedtime).

Either method of intensive diabetes management (insulin pump or MDI) is capable of achieving near-normal glucose levels. Standard diabetes care (two shots a day, etc.) rarely achieves a normal or near-normal HbA_{1c} and thus should not be a choice during pregnancy.

Lantus

Hardly any insulin has been properly and prospectively studied during pregnancy. The safety of Lantus use during pregnancy has not been established. However, isolated reports of using Lantus during pregnancy with successful

outcomes have been reported and thus some physicians now allow patients to continue using Lantus.

Humalog and NovoLog

There are a number of reports on the safety of Humalog or NovoLog and many doctors now recommend their use. Normalizing blood sugars after meals is very important. Higher sugar levels after meals have been associated with “big babies” and adverse outcomes. Numerous studies have shown Humalog or NovoLog to be more effective for this purpose than Regular insulin. Humalog or NovoLog should be taken whenever food is eaten. Use of a pen (Chapter 9) is a convenient way to do this for people choosing MDI.

B. Blood Glucose (Sugar) Testing

Some suggestions:

- ✓ blood sugar level goals are given in Table 1
- ✓ it is best to do 8 to 10 tests per day as outlined in Table 1
- ✓ if HbA_{1c} values are between 5.0 and 6.5 percent, fewer tests may be OK
- ✓ The values one and two hours after meals (Table 1) are important for optimal glucose control. Higher sugar levels after meals have been associated with big babies and adverse outcomes.
- ✓ Stay in close contact with the healthcare providers (see “D” in this Section). During pregnancy this should be at least weekly. (Tables for faxing or e-mailing are included in Chapters 7 and 26.)
- ✓ *Checking blood sugars frequently will:*
 - allow the person to decrease their insulin dosages in the second half of the first trimester (nine to 12 weeks of pregnancy). It is not known why, but blood sugars seem to fall during this time.
 - allow insulin dosages to be increased during the second and third trimesters. This is believed to be due to placental hormones that increase insulin resistance.

Table 1

Target Values for Plasma Blood Sugars and HbA_{1c} Before and During Pregnancy

Blood Sugars

	<u>mg/dl</u>	<u>mmol/L</u>
Fasting	60–90	3.3–5.0
Premeal	60–105	3.3–5.8
2 hours after meal	< 120	< 6.7
2:00 a.m. - 6:00 a.m.	60–120	3.3–6.7
Meter average	100–130	5.5–7.3
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HbA _{1c} (%)	4.5–6% (must be < 6.5%)	



C. Nutrition

Nutrition is important during pregnancy and lactation. Carbohydrate counting and the other methods of food management are discussed in Chapter 12.

Special goals:

1. to provide adequate calories for maternal and fetal weight gain. (This usually involves an additional 300 calories a day during the 2nd and 3rd trimesters and during lactation.) A 25 to 35 pound weight gain is optimal with pregnancy.
2. to provide adequate vitamins and minerals (including iron and calcium). All women wanting to become pregnant should be certain they are taking 400 µg/day of folic acid (preferably for at least three months prior to pregnancy). This helps to prevent birth defects.
3. alcohol must be avoided to prevent fetal alcohol syndrome and serious congenital defects
4. not smoking is important in reducing the risk for a premature or low-birth weight infant

5. regular meals and snacks are important to prevent hypoglycemia. The evening snack is important to prevent lows during the night and ketone formation.

D. Frequent Contact with the Healthcare Team

- ✓ The blood sugars should be faxed or e-mailed weekly.
- ✓ Clinic visits will vary but are usually at least monthly.
- ✓ Care from a doctor with knowledge in the areas of diabetes as well as of pregnancy is essential.
- ✓ Frequent contact with the eye doctor or kidney specialist may also be important (see Section 3).

2. PREVENTING ACUTE COMPLICATIONS

🐾 Low Blood Sugar

- ✓ The frequent blood sugar checking will help to prevent severe hypoglycemia.
- ✓ It is well recognized that severe insulin reactions occur more frequently with tight

control (Chapter 6), especially at night with sleep.

- ✓ There has not been evidence that low blood sugars are damaging to the fetus.
- ✓ They are not pleasant for the mom, however, and should be avoided if possible.

Ketones

- ✓ Frequent blood sugar checking will also help to prevent ketone formation and acidosis (Chapter 15).
- ✓ Acidosis has been related to miscarriage and is important to avoid.

Ketones should be checked:

- anytime a fasting blood sugar is above 240 mg/dl (13.3 mmol/L)
- if a random sugar is above 300 mg/dl (16.7 mmol/L)
- Some doctors advise checking for ketones every morning during pregnancy (see methods in Chapter 5).
- Acidosis is more common if insulin pump therapy is interrupted (Chapter 26). Humalog insulin lasts only four hours.
- It is important to check ketones sooner when pregnant.

3. PREVENTING CHRONIC COMPLICATIONS

A. Kidney (Renal) Damage

- ✓ Kidney damage does not usually worsen as a result of pregnancy in women who do not already have kidney damage. (This is in contrast to the movie, “Steel Magnolias”.)
- ✓ Women planning a pregnancy can do a microalbumin test (and a blood creatinine) prior to pregnancy and after each trimester.
- ✓ If the person **does** have some kidney damage already present, it can get worse.

The following are then suggested:

- urine microalbumin and blood creatinine levels should be done every month
- **ACE-inhibitors (see Chapter 22) must be stopped (possible cause of birth defects) in any woman considering pregnancy**
- if blood pressure increases, other medicines should be used
- clinic visits every 2-4 weeks

B. Eye (Retinal) Complications

- ✓ Women who have had diabetes < 5 years or who do not have eye (retinal) damage already present do not usually get eye damage due to pregnancy. They do need their eyes examined prior to the pregnancy and every three months.
- ✓ If a person already has moderate eye (retinal) damage from diabetes, this may worsen during pregnancy.
- ✓ If control (HbA_{1c}) has not been good and improves dramatically, there is more risk for eye (retinal) changes. These women must be followed closely. The time interval for visits recommended by a retinal specialist is based on the amount of eye changes.

4. BIRTH

- ✓ Large babies (macrosomia) are a result of higher blood sugar levels in the mother.
- ✓ Glucose freely crosses the placenta to the baby resulting in increased insulin output from the fetal beta cells.
- ✓ Due to beta-cell hyperplasia (increased size) babies after birth are at a higher risk of developing hypoglycemia (low sugar) and low calcium levels.
- ✓ Over 50 percent of deliveries are vaginal but many times large babies require a cesarean (C) section.

5. GESTATIONAL DIABETES

Gestational diabetes is diabetes which occurs as a result of insulin resistance resulting from hormones from the placenta. After diagnosis, the care becomes similar to the care for the person who had diabetes prior to pregnancy.

Facts:

- ✓ Regular aerobic exercise and diet may help to lower blood sugars before and after meals.
- ✓ Insulin treatment may be necessary.
- ✓ Most women revert to normal glucose metabolism after pregnancy.
- ✓ Thirty to 50 percent of women will again have gestational diabetes with subsequent pregnancies.
- ✓ There is an increased risk of developing type 2 diabetes later in life.

DEFINITIONS

ACE-inhibitor: A blood pressure medicine often used to treat people with early diabetic kidney disease (Chapter 22). It must be discontinued if pregnancy is being considered.

Birth defects: Abnormalities in the newborn baby such as heart malformations, spinal cord abnormalities or lip or palate defects. These are more common if glucose control for the mother was poor in the first trimester.

Folic acid: One of the B-vitamins that, when deficient in the pregnant mother, is related to birth defects in the baby.

Gestational diabetes: High glucose levels noted during pregnancy (most frequently in the last trimester). It is treated with diet, exercise and sometimes insulin. It usually reverses after pregnancy is over.

Intensive diabetes management: Diabetes treatment directed toward the goal of having blood sugar and HbA_{1c} levels as close to normal as safely possible.

Microgram (µg): A common unit of weight in the metric system. It refers to one thousandth (0.001) of 1g.



