

Diabetes Mellitus with Pregnancy

Labib K, MBBCh*

*Registrar, Department of Obstetrics and Gynecology, Ain Shams University

Preconceptional Care

- Control diabetes before pregnancy.
- Check Hb A1C. If <9%, allow pregnancy.
- Start supplementation with 5 mg folic acid once daily.

Antenatal Care

Screening for DM

By routine serial dipstick testing for glucosuria at each visit together with looking for the clinical picture of diabetes mellitus during antenatal care.

One hour postprandial test (Glucola test) (O'Sullivan's test):

Patients fast for 4 hrs. Then are given 50gms oral glucose and after one hour blood glucose is measured if:

- <140mg % excludes DM and if >140mg% there may DM so proceed for oral glucose tolerance test to confirm diabetes.

Indications for Blood Testing

- Low risk patients: Glucola test at 24-28 weeks.
- Medium risk patients: Glucola test at booking and if negative repeat at 24-28 weeks.
- High risk patients: oral glucose tolerance test at booking and if negative repeat at 24-28 weeks or at appearance of any risk factor.

Risk Factors

Medium risk

- Positive family history for DM.
- Maternal obesity, grand multiparity, advanced maternal age >35 years.
- Macrosomic baby >4500 gm in the previous pregnancies.

High risk

- Previous gestational diabetes.
- Unexplained intrauterine fetal death.
- Polyhydramnios, fetal macrosomia or persistent glucosuria in the current pregnancy.
- History of congenital fetal anomalies.

Diagnosis of DM

By oral glucose tolerance test:

- Good carbohydrate diet the day before the test.
- Fasting 12 hours.
- Taking a FBS then administering 75gm glucose in 300 ml water.
- Taking another 3 reading 1, 2, 3 hours after the glucose load.
- If 2 values or more are higher than normal range, patient is considered to be diabetic.
- The normal range is less than 105, 190, 165 & 140 mg/dl for the 0,1,2 & 3 hours, respectively.

Medical Care

- Better care is done by a team: Obstetrician, Endocrinologist and a Dietician.
- Antenatal visit frequency: every 2 weeks till 28 weeks.
- Every 1 week till the time of delivery unless complications arise.
- When to hospitalize a diabetic pregnant woman?
- When diabetes couldn't be controlled on out patient basis.
- When diabetic or obstetric complications arise (e.g. Ketoacidosis).
- On initial calculation of the insulin doses especially in unreliable patients.
- Diabetes in pregnancy is either controlled by diet & exercise only or by diet, exercise and insulin.
- There is no role for oral hypoglycemic (teratogenic, can cause fetal hyperinsulinemia).

A) Diet

Usually effective alone in gestational diabetes.

- Supply 30 calories/kg for normal weight and 24 calories /kg for obese patients.
- Divide meals into 6 small meals.
- Decrease fat in diet (about 20%).
- Avoid sugars.
- High fiber diet (vegetables, whole bran bread).
- Proteins (about 25%).

- Increase complex carbohydrates (e.g. Cereals).
- Exercise (light as walking).
- Limit weight gain to 10-12 kg during pregnancy and for obese women 9 kg.

B) Insulin Therapy

It is indicated if:

- Gestational diabetes failed to be controlled by diet alone (rare).
- If patient is already diabetic and was on insulin or oral hypoglycaemic agents before pregnancy.
- The dose is calculated based on body weight.
 - 1st trimester 0.6 units /kg
 - 2nd trimester 0.7 units/kg
 - 3rd trimester 0.8 units/kg.
- Obese women require 0.1 units above recommended doses in each trimester.
- Insulin dose is administered as follows:
 - 2/3 of the dose is given in the morning (7 A.M).
 - 1/3 of the dose is given in the afternoon (5 P.M).
- Mixture of short and medium acting insulin are used e.g. mixtard or humulin 70/30.
- Insulin is given subcutaneous by the insulin syringe (in the thigh, upper arm, buttocks, abdominal wall).the sites of injection should be rotational.
- Patients are instructed to eat within a maximum of 20 minutes after the insulin dose.
- Re-adjust the dose according to the fasting, pre and postprandial blood sugar.
- If resistant to control, consult endocrinologist as may add a 3rd insulin dose.
- Supplement with vitamins especially vitamin B complex.
- The aim is to reach:
 - Fasting and preprandial blood sugar ≤ 105 -110 mg/dl.
 - One hour postprandial blood sugar ≤ 140 mg/dl.
 - Two hour postprandial blood sugar ≤ 120 mg/dl.

Obstetric Care

- Early booking is desired.
- Ultrasound scan is performed.
 - <12 wks for dating

- At 20-24 weeks to detect any congenital anomalies.
- In cases of suspected abnormal growth pattern, repeat scans every 2-4 weeks from 24 weeks onwards.
- Fetal monitoring is required from 24 weeks onwards:
 - Fetal kick chart.
 - CTG twice/week and if repeatedly non reactive proceed to BPP.
 - BPP.
- Monitoring for complications of diabetes (in long term diabetes).
 - Fundus examination, in the first antenatal visit, which may not be repeated if normal.
 - Kidney and liver functions which if normal not repeated unless indicated.
 - Urine analysis for pus cells, urine culture and sensitivity if there is UTI.
 - High vaginal swab if there is infection.

Intrapartum Care

- Time of termination of pregnancy:
 - When diabetic control is optimal and there are no complications to the mother & fetus, you may wait for spontaneous onset at 40 wks but not allowed to post date.
 - If diabetic control is less than optimal, deliver at 38 weeks (unless there are no other indications for earlier termination as fetal distress, severe preeclampsia).
- Mode of delivery:
 - Vaginal delivery can be allowed unless there is an indication for CS (fetal malpresentation, fetal distress, macrosomic baby, previous CS or failed induction).
- During labor:
 - 1st stage: strict monitoring (partogram) and continuous external fetal monitoring.
 - 2nd stage: Anticipate shoulder dystocia and avoid birth tract injuries (a senior staff should attend).
 - 3rd stage: care against traumatic and atonic post partum hemorrhage.

Cover the process of labor by: antibiotics (1st generation cephalosporins or broad spectrum penicillin (e.g ampicillin) given IV 8 hourly.

- Postpartum care:
 - Properly hydrate the patient.

Intrapartum Glycemic Control

Desired level: 80-120 mg% (accepted 70-140 mg/dl)

Monitoring: 1) Blood sugar: on the morning of delivery (7 am) + two hourly thereafter.
2) Urine sugar and ketone every 2 hours

Fluids: (2 lines with a multiline adaptor, or 2 cannulae)

A) Regular Insulin in N. Saline:	+	B) Plain Fluids: 125ml/hr
(According to blood sugar)		=30drops/min
(0.5 unit/hr for every 40mg/dl >140)		= 1 drop/ 2sec.
<100 mg/dl → no insulin	+	G.10%
100-140 → 1 unit/hr	+	G.10%
140-180 → 1.5 unit/hr	+	N saline
180-220 → 2 units/hr	+	N saline

N.B. Preparing the insulin infusion set:

*4 units regular insulin in 500ml N. Saline, then

* 0.5 unit/hr = 60ml/hr (~15 drops/min)

* 1 unit/hr =125 ml/hr (~30drops/min)

*1.5 u./hr =190 ml/hr (~45 drops/min)

* 2 unit/hr = 250ml/hr (~60 drops/min)

- *Patients who develop Ketonuria with the Glucosuria are in ketoacidosis and can't be treated with this regimen.*
 - *Avoid fluid overload by decreasing the rate of plain fluids, and altering the concentrations of insulin and oxytocin drips if higher doses of these drugs are to be used. This is especially important in cardiac, renal and severe preeclamptic patients.*

- After delivery of placenta, in patients with gestational diabetes, stop dextrose and insulin infusions immediately.
- In patients on insulin treatment previous to pregnancy, half insulin infusion rate immediately after placenta is delivered.
- When the mother is ready to eat restart SC insulin half an hour before the expected meal and stop IV insulin one hour after the SC dose.
- Gestational diabetes is checked 6 weeks postpartum for the disappearance of the diabetes (by OGTT).

Future contraception:

- Local methods safely used.
- Progesterone only contraception are safer than combined hormonal contraception and IUCD.
- Tubal ligation (if old age and completed her family).

Some Problems Facing Diabetic Pregnant Women

Premature Rupture of Membranes

Conservative treatment should be the exception not the rule and antibiotic cover is necessary.

Preterm Labor

If tocolysis is indicated then use nifedipine and indomethacine preferred to magnesium sulphate IV.

The use of corticosteroids to accelerate lung maturity should be very selective and under strict control of blood sugar (left to consultant decision).

Diabetic Ketoacidosis

- **Diagnosis:** Air hunger, dehydration, nausea, vomiting, abdominal pain, acetone odor of breath, cloudy consciousness up to

coma.

- Admit to ICU.
- Establish to IV lines and insert urinary catheter to monitor urine output.
- Consult specialist physician.

Investigations

- Blood glucose (usually > 250 mg/dl) and recheck hourly.
- Ketone bodies in urine, Blood PH and recheck every 2 hours.
- Arterial blood gases, serum electrolytes, liver and kidney function tests.

Treatment

- Treat the cause (as infections).
- Rehydration: N. Saline alternating with Ringer's solutions.
 - 500 ml/30 min for the 1st 2 hours. then
 - 500 ml/hour for the next 2 hours. then
 - 500 ml/4 hours for the rest of the 24 hours.

When glucose <200 mg/dl, start to give 5% glucose instead of Saline or Ringer.

Treatment of Hyperglycemia

- 5 units regular insulin IV bolus loading then maintain on 5-10 u/hour guided by Hemotest (blood glucose should drop from 50 – 100 mg% /hour).
- %0 u regular insulin in 50 ml of saline and given 5 ml/h by a syringe pump).

- When blood glucose < 250 mg/dl, SC regular insulin/4 hours can be used.

Hypokalemia

Administer 20-40 mmol of KCL added to infused fluid according to degree of hypokalemia (N=3.5-5mmol/l).

Acidosis

Usually when glucose level and dehydration are corrected, the acidosis is corrected but, in severe cases, sodium bicarbonate may be needed. e.g.: If pH <7.1, give NaHCO₃

Number of mmol of bicarbonate needed = 1/6 body weight multiplied by the deficit.

This should be given slowly IV.

References

1. Summary and Recommendations of the Third International Workshop Conference on Gestational Diabetes. Diabetes 40 (Suppl 2):197, 1991.
2. ACOG Technical Bulletin Number 200. Diabetes and pregnancy, December,1994.
3. Landon MB, Gabbe SG: Insulin treatment of the pregnant patient with diabetes mellitus. In Reece EA, Coustan DR (eds): Diabetes Mellitus and pregnancy. New York, Churchill Livingstone, 1995, p 173.
4. London M, Cataland P, and Gabbe S.: Diabetes mellitus in Gabbe S., Niebyl J. and Simpson J.(eds): Obstetrics: Normal and Problem pregnancies. Philadelphia, Churchill Livingstore,2002, P. 1071-1115.

This guideline was developed based on the local hospital protocols and periodic scientific meetings in Ain Shams University Women's Hospital. Some additions were added based on international literature review. The Guideline was revised by the ASJOG.