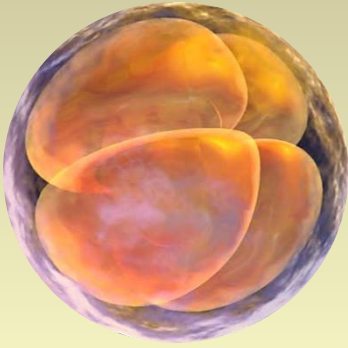


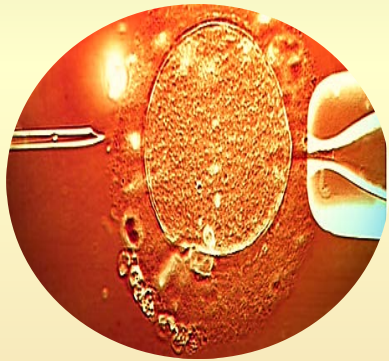


Welcome





GESTATIONAL DIABETES (GDM)



Prof. Md. Ismail Patwary

FCPS, MD, FACP, FRCP

Sylhet Women's Medical College

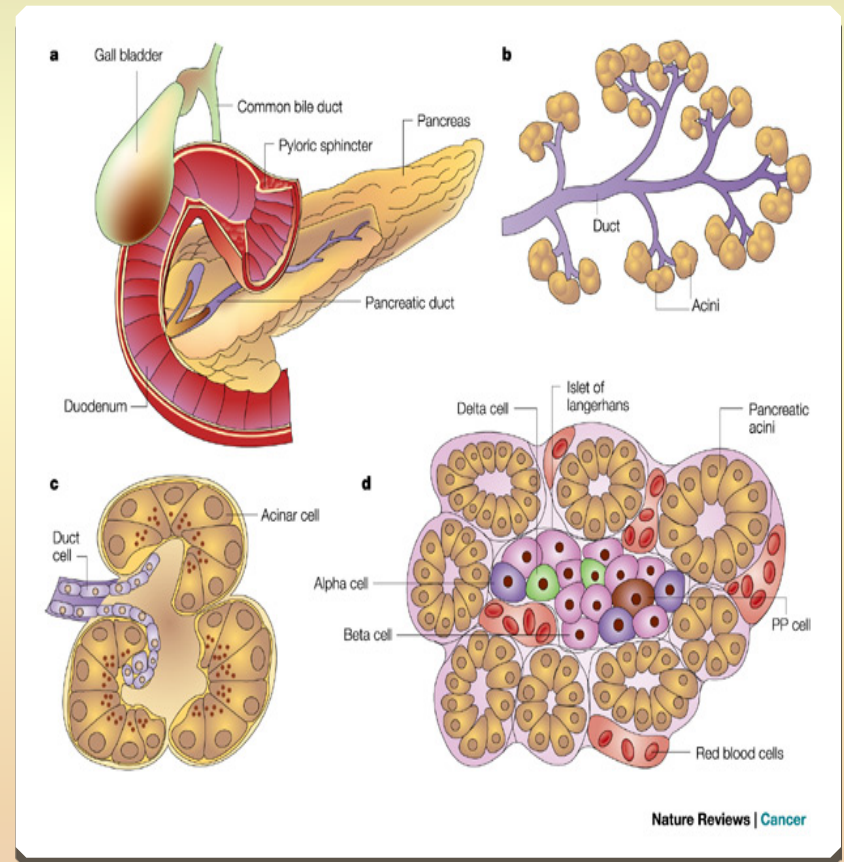
Background

- GDM is one of the most common complications of pregnancy and is associated with adverse health outcomes of both mother and offspring.
- **10-18.9%** of all pregnancies: maternal glucose abnormalities and **90%** is due to GDM.
- Understanding of GDM is important as the recurrence risk in subsequent pregnancies **(30-50%)** & lifetime risk of developing IGT or T2DM **(30-60%)**.



Definition

- **Glucose intolerance of variable degree, first recognized during pregnancy.**
- **So includes pre-existing but previously unrecognized diabetes.**



Classification

The **white classification** distinguishes between GDM and pre-gestational diabetes.

GDM is subdivided into :

Type A1 :

- Abnormal GTT
- **Normal plasma glucose-FPG & PPPG**
- Life style modification is sufficient.

Type A2 :

- Abnormal GTT
- **Abnormal plasma glucose-FPG & PPPG**
- Additional medical therapy is required.

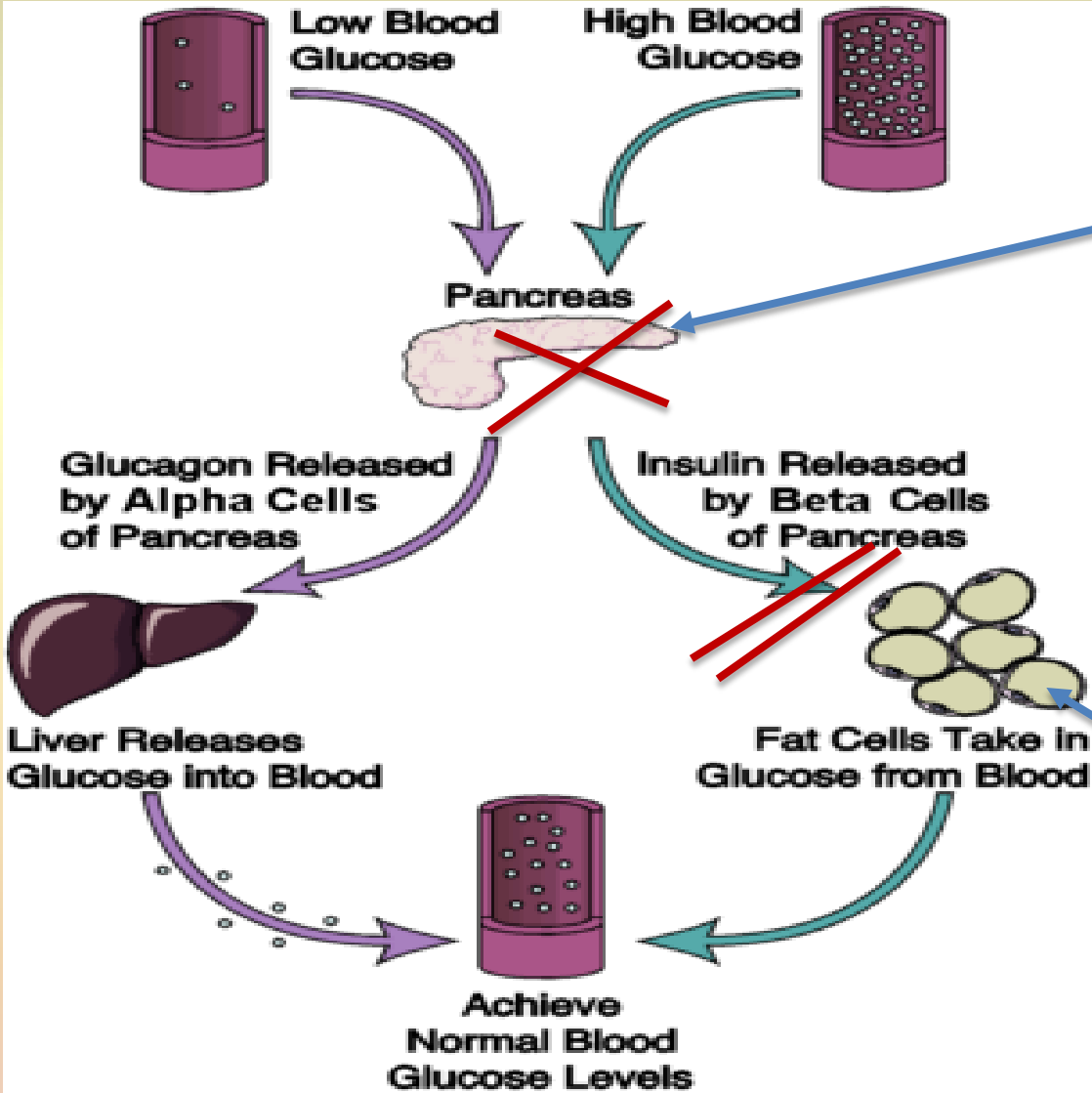


Glucose metabolism & pregnancy

- Due to placental production of **anti-insulin hormones**, there is a state of **insulin resistance**
 - Estrogen, Progesterone, hPL , Cotisol, Prolactin, and GH.
- Compared to non pregnant women, there is
 - Low FPG with high PPPG
 - Low renal threshold for glucose & ↑ GFR leads to glycosuria
 - Increased Insulin production may lead to functional failure of the Pancreas.



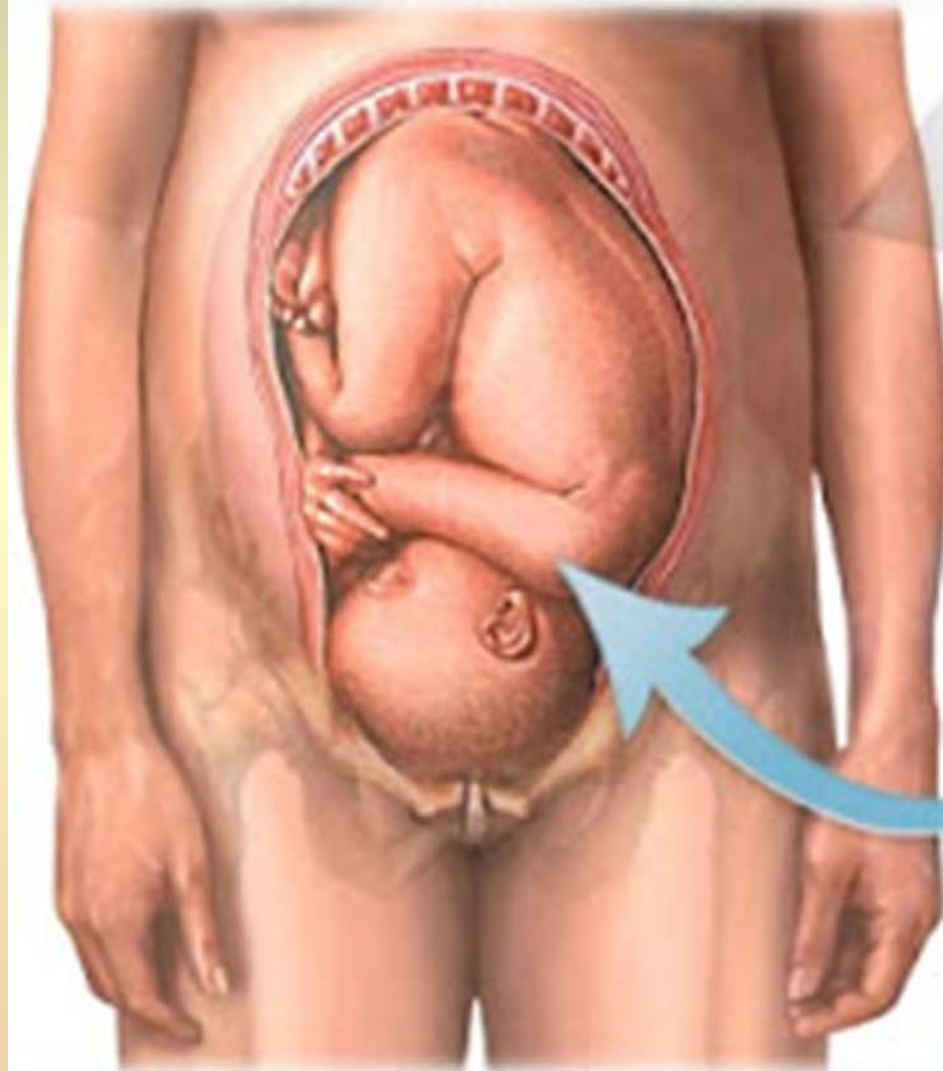
PATHOLOGIC CHANGES IN GDM



Insulin Deaficiency

Insulin Resistance

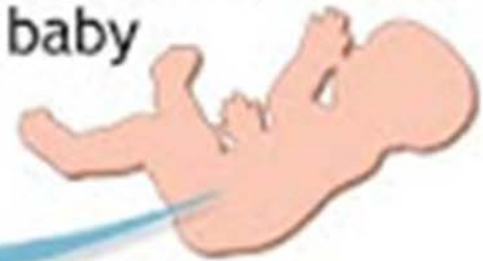
Gestational Diabetes



High blood
glucose levels
in mother

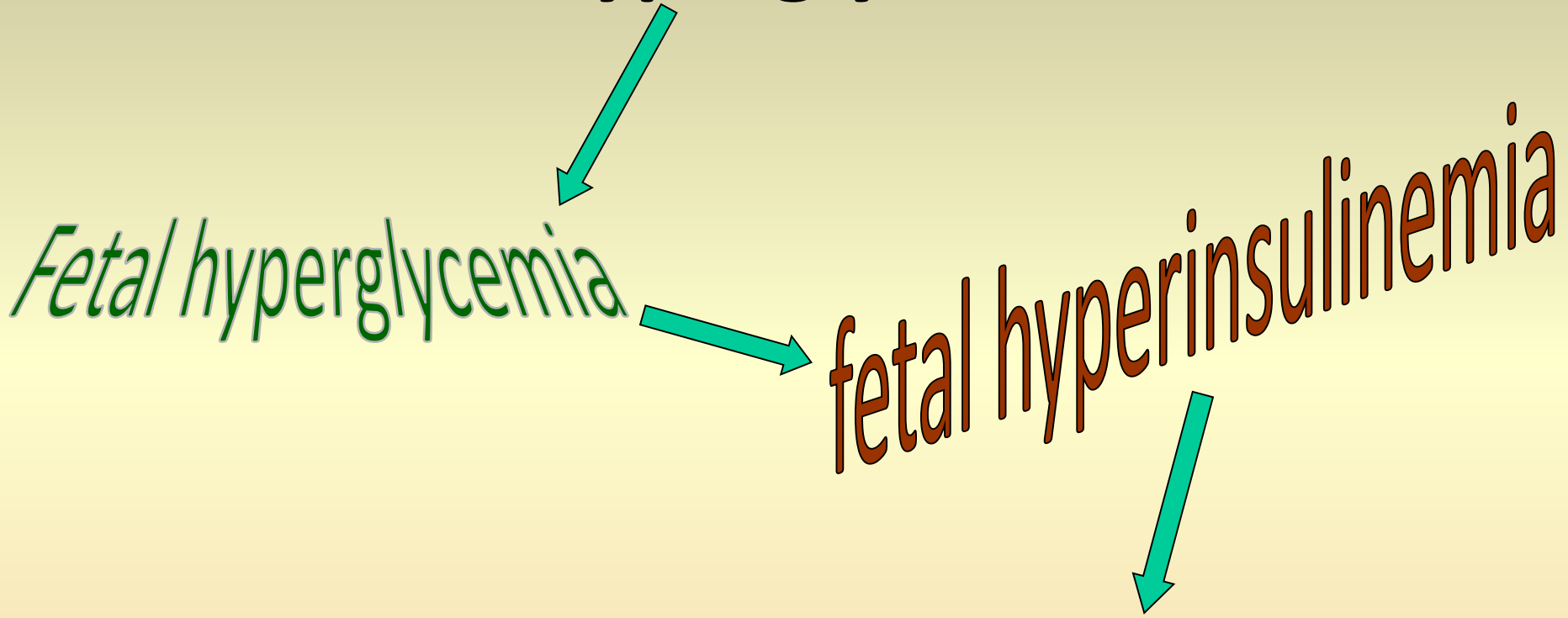


Brings extra glucose
to baby



Causes baby to put
on extra weight

Effects of **Hyperglycemia** in GDM



Risk factors



❖ High risk

- Obesity, smoking
- Maternal age >35 years
- F/H diabetes
- History of GDM
- Previous macrosomic baby
- PCOS
- Multiple pregnancy
- Asian and African race.

❖ Low Risk

- Age <25 years
- No bad obstetric history
- No DM in 1st degree relatives
- Normal wt. gain during pregnancy
- No H/O abnormal glucose tolerance.

Why GDM is a concern?

- Maternal complications.
- Fetal complications

Maternal complications

During Pregnancy

Abortion

Preterm labour

Pre-eclampsia

Polyhydramnios

Microangiopathy

Nephropathy, retinopathy, neuropathy

Large vessel disease

Coronary artery disease

Thromboembolic disease

Infection

Hypo and hyperglycaemia

During labour

Increased risk of Caesarean delivery

Prolonged labour

Perineal injuries

PPH

Puerperium

Puerperal sepsis

Lactational failure

Principal Danger

GESTATIONAL DIABETES:

Foetal hyperinsulinemia

PREGESTATIONAL DIABETES:

Foetal Anomalies



Fetal complications

1st trimester

- Congenital anomalies-
Risk is 2% in normal population, 4% in GDM, & 10% in pre existing DM in pregnancy.
 - Cardiac : ASD, VSD
 - Neural Tube Defect
 - Renal agenesis
 - Duodenal atresia

2nd Trimester

- **Macrosomia (BW >4 Kg)**

During delivery

- Shoulder dystocia
- Birth asphyxia

After delivery

- Hypoglycaemia
- Neonatal jaundice
- RDS
- Polycythaemia





Macrosomia

IMPLICATIONS OF DIABETES IN PREGNANCY

DOUBLE risk of serious birth injury

TRIPLE likelihood of C/S

QUADRUPLE incidence of NICU admission.

Diagnosis

Symptoms :

- Insidious onset
- Polyuria, polydipsia, polyphagia
- In established DM, complications like retinopathy or neuropathy.

Signs :

- Elevated plasma glucose
- Glycosuria
- Ketonuria
- Elevated : HbA1c
- USG finding

Screening test

75 g OGTT

- Low risk group- 24 – 28 week
- High risk group- 1st visit, if normal again 24 – 28 week

➤ **One abnormal value enough for diagnosis**

- Diagnosis is confirmed if plasma glucose level-
 - Fasting- **92** mg/dL or **5.1** mmol/L
 - 1 hour after- **180** mg/dL or **10** mmol/L
 - 2 hours after- **153** mg/dL or **8.5** mmol/L
(*American Diabetic Association 2016*).



Rationale of treatment



Controversy

- ✓ **No clear guidelines and universally accepted treatment plans available. However randomized trials show benefits in treating the GDM.**

Management plan

Multi disciplinary approach-

- **Physician**
- **Endocrinologist**
- **Dietician**
- **Obstetrician**
- **Pediatrician**
- **Expert nurse.**

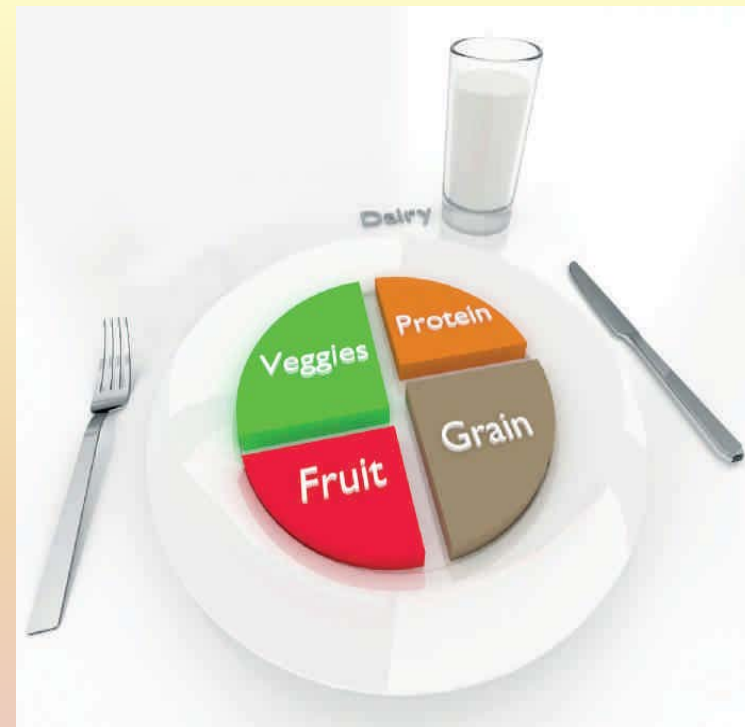


Medical management

- **Lifestyle modification**
 - Dietary control
 - Exercise
- **Pharmacotherapy**
 - Insulin
 - Oral Hypoglycaemic Agents

Dietary control

- By **3 major meals & 4 snacks**.
- **30-35 kcal** for non-Obese & **25 kcal/kg/day** for obese women.
- Ensure eating every 3 hours.
- Dietary pattern & calorie distributions
 - Breakfast- 10%
 - Lunch- 30%
 - Dinner- 30%
 - Bed time snack- 30%





- **Composition:**
 - 40-60% Carbohydrate**
 - 20-30% Protein**
 - 20-30% Fat (< 10% saturated).**
- **Choose complex high-fiber foods**
 - Fresh vegetables
 - Beans and legumes
 - Fresh fruits.
- **Avoid concentrated sweets.**

Exercise

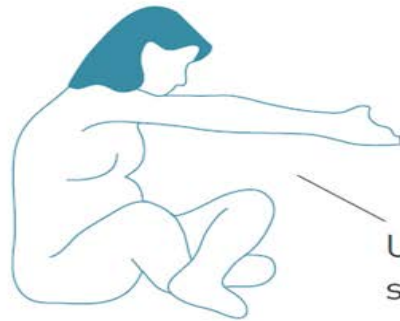
- ❖ **Women with GDM need regular, moderate physical activity**
 - **Walking**
 - **Prenatal aerobic exercise**
 - **Swimming.**

- ❖ **Exercise causes significant decrease in:**
 - ❑ **FPG**
 - ❑ **1 hr PPPG**
 - ❑ **HbA1c**
 - ❑ **Insulin requirement.**



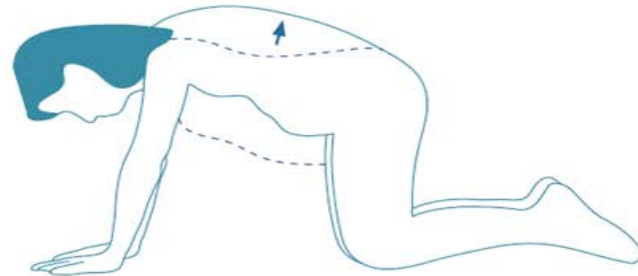
EXERCISES TO IMPROVE FLEXIBILITY

Do these exercises once a day. Try to do each one six times. Do them slowly and stop if you experience pain or discomfort.

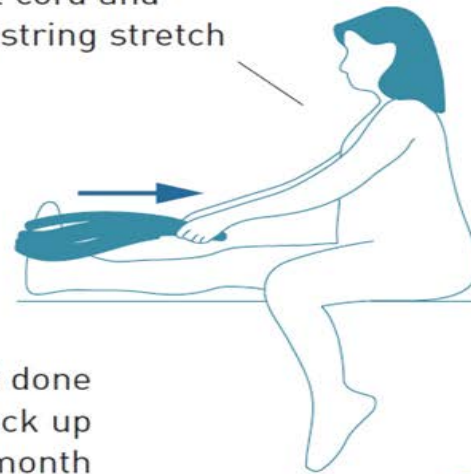


Upper-back stretch

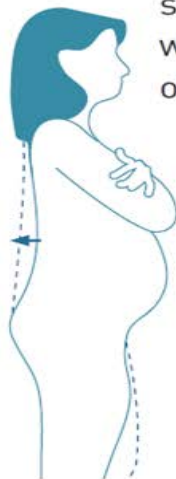
Cat stretch



Heel cord and hamstring stretch



Pelvic tilt done standing beginning with the 4th month of pregnancy



Pelvic tilt done on your back up to the 4th month of pregnancy



A daily intake of 2000 to 2200 :
30 kcal/kg for women with an ideal prepregnancy weight
In women who are obese (BMI: $>30\text{kg/m}^2$), calorie reduction by approximately one third (to approximately 25kcal/kg/d) may be acceptable, although caloric restriction during pregnancy must be viewed with caution.

Daily calories should be made up approximately 40% carbohydrate, 20% proteins and 40% fats.

Multidisciplinary approach

Increased fibre intake for constipation



Antenatal Care

Nutrition counselling from registered dietician

Avoid alcohol

Vitamins and supplements

Moderate exercise

Non caloric sweetener used in moderation

Dietary instruction with individual instruction based on height and weight

Pharmacotherapy-Insulin

- **Insulin**- 1st line therapy.
- Needs frequent titration.
- **Indicated if :**
 - Failed dietary control after 2 weeks.
 - FPG **>6** mmol /L
 - 1 hr PPPG **>7.2-7.8** mmol/L
 - High HbA1c, Ketonuria
 - Renal and hepatic dysfunction
 - Macrosomia, IUGR, Hydramnions.
- Insulin **lispro and aspart safe and effective.**
- Insulin glargine and detemir are considered category 3 (FDA).



Pharmacotherapy - OHA

- **Metformin-**

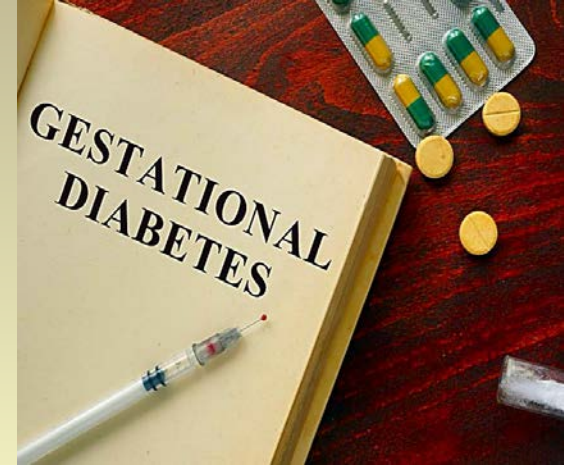
- Metformin crosses placenta
- May increase risk of prematurity
- Lower hypoglycemia & weight gain.

- **Glyburide-**

- 2nd generation Sulfonylurea
- Minimal maternal-fetal transfer.

- **Acarbose-**

- Reduces Glucose absorption from small intestine
- <2% reaches maternal circulation
- Have potential benefits in pregnancy.



- Glucose lowering oral drugs in pregnancy**

| | Metformin | Glyburide | Acarbose |
|--|-------------|-----------|----------------|
| Degree of Hyperglycaemia | + | ++ | + |
| Predominantly fasting hyperglycaemia | + | - | - |
| Predominantly post prandial hyperglycaemia | - | + | + |
| Risk of hypoglycaemia | Safe | High risk | Safe |
| Gastrointestinal tolerability | Possible | - | Possible |
| Effect on Insulin resistance | + | - | - |
| Effect on weight | Neutral | Gain | Neutral |
| Frequency of administration | 1 – 3 times | 1-2 times | With each meal |

❖ In the light of short term outcomes, **Metformin** and **Glyburide** should be considered as credible and safe alternative to Insulin in **mild to moderate hyperglycemia** specially in resource constraint developing countries.

Treatment monitoring

Glycemic targets

| | Premeal/ FPG | 1 hr PPG | 2 hr PPG |
|-------------|------------------------|------------------------|-----------------|
| ADA | 5.3 (95 mg/dl) | 7.8(140 mg/dl) | 6.7 (120 mg/dl) |
| ACOG | 5.3 (95 mg/dl) | 7.2(129 mg/dl) | |
| NICE | 3.5–5.9(63-106 mg/dl) | 7.8 (140 mg/dl) | |

Simmons D . Gestational Diabetes Mellitus: NICE for the U.S.? *Diabetes Care* 33:34–37, 2010

- Plasma glucose level needs to be tested 4 times a day:
 - Fasting
 - 1 or 2 hours after breakfast, lunch and dinner.

- **Glycosylated HbA1C-**

Due to enhanced Erythropoiesis during pregnancy, it's done every 6 weeks.

Target control- < 7%.

Antenatal care

- Frequent ANC (1-2 weekly)
- Detailed anomaly scan (18-20 wks)
- Growth scans (after 28 wks)
- BPP & Doppler (after 34 wks).



TIMING & MODE OF DELIEVERY

- Patients with **good glycemic control & without complications-** delivery by 40 weeks.
- **Poor controlled GDM with complications-** delivery at 38 weeks.
- GDM is not a contraindication for vaginal delivery.
- ❖ **C/S indicated when :**
 - Baby weight is more than 4.5 Kg
 - Hydrocephaly
 - Previous C/S scar
 - Emergency termination.

Intra natal care

- GDM requiring Insulin therapy are best managed by **IV insulin** drips and hourly glucose monitoring.
- Target plasma glucose range 4-7mmol/L (72-126mg/dl)
- Continuous fetal heart monitoring is advisable during labour.



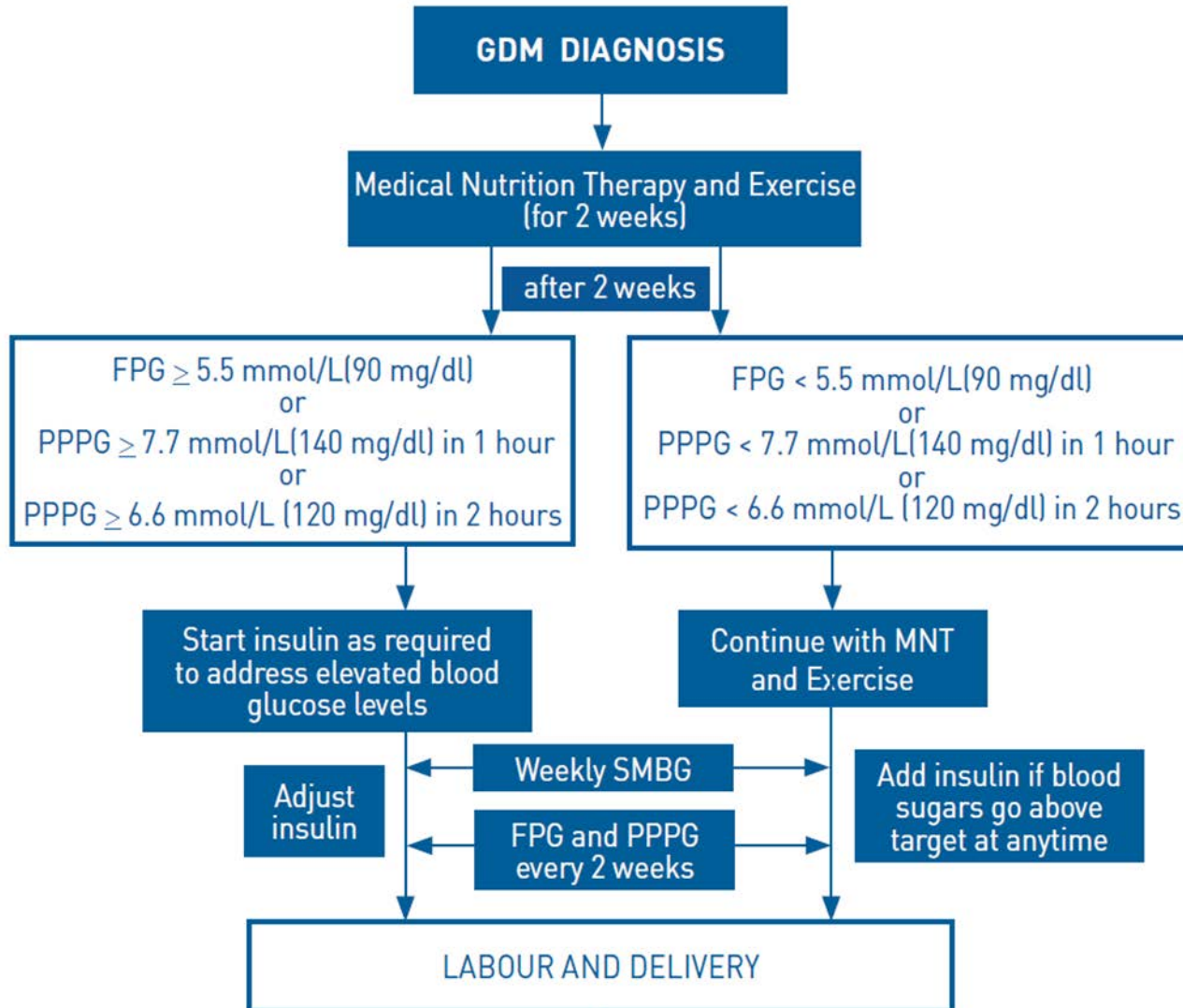
Postpartum care

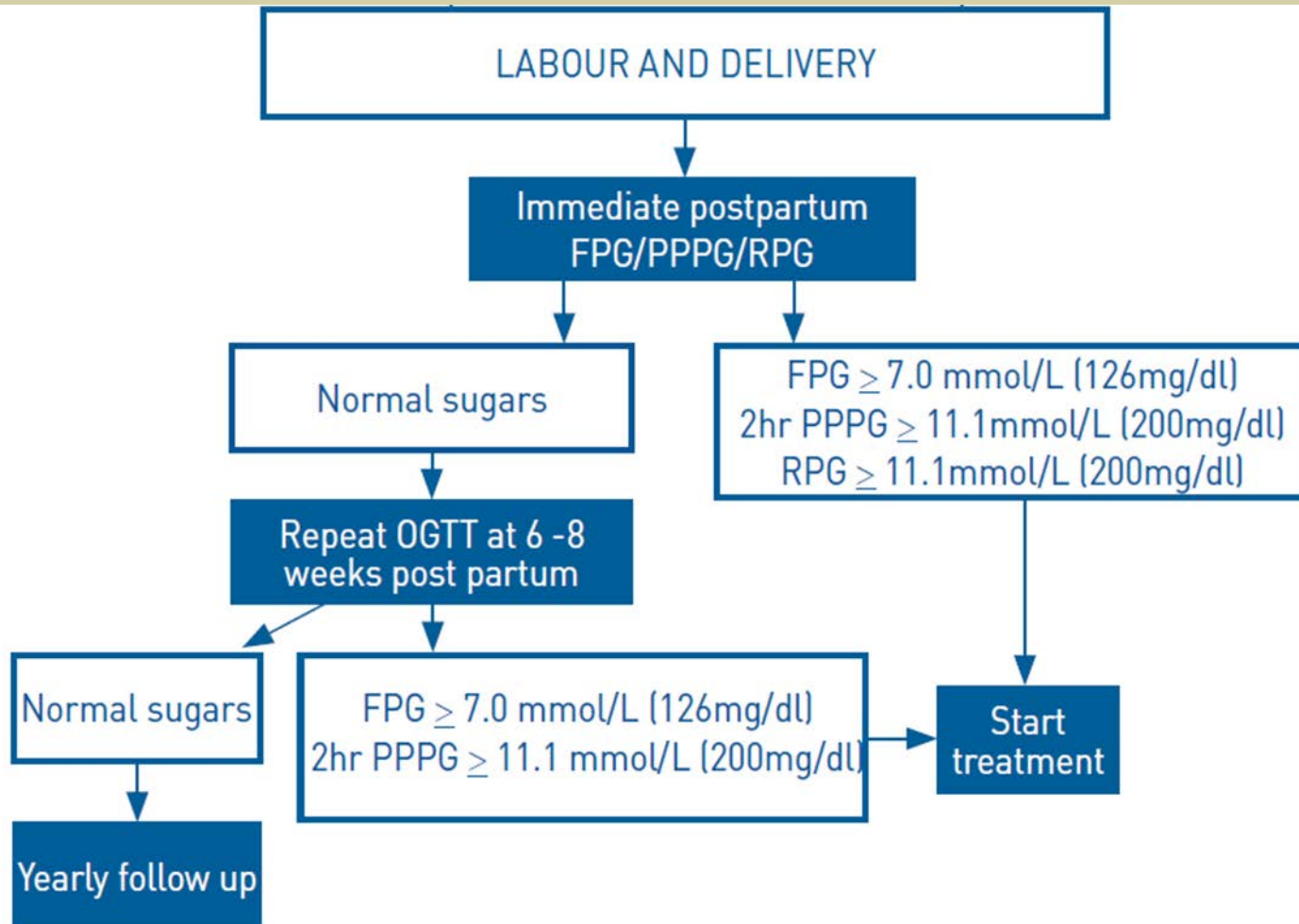
- **Stop Insulin** and exclude persisting hyperglycaemia before discharge (FPG or PPPG).
- Breast feeding is encouraged (reduces Insulin requirement by 50%) & neonate blood sugar to be checked 2–4 hours after birth.
- Lifestyle advice (weight control, diet and exercise).
- OGTT at the 6 weeks and every yearly thereafter.



Management protocol for GDM

This algorithm will help to decide on the line of management of women screened under the Model of Care.





*PPPG - Post-Prandial Plasma Glucose

Planning next pregnancy

- Evaluation of glycemic control
 - HbA1c – gives control 2-3 months
 - If high – control diabetes before conception
- Evaluation of BP
- Evaluation of retinal and renal status
- Change to Insulin prior to / when pregnancy is diagnosed.

Take home message

- GDM may be associated with a higher rate of fetal **macrosomia**, birth trauma, neonatal hypoglycaemia and malformation.
- Long term health risks to the mother have been confirmed.
- Early screening should be done in women with risk factors.
- **75 g OGTT** at **24-28 weeks** of gestation is recommended screening test for GDM.
- Glycemic control: FPG <5.3 mmol/L, 2 hr PPPG <6.7 mmol/L & HbA1c <7%.

- ❖ The goal of treatment is **maintaining euglycemia & preventing macrosomia.**
- LSM is first recommendation, followed by insulin in uncontrolled GDM.
- There is a growing interest in the use of OHA in GDM. 3 drugs are promising regarding effectiveness and safety: **Metformin, Glyburide and Acarbose.**
- Induction of labour should be **by 38weeks** in insulin requiring GDM.
- 75 g OGTT 6 weeks after delivery and yearly thereafter is recommended.



Thank You

