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GESTATIONAL DIABETES MELLITUS (GDM), MANAGEMENT OF MOTHER AND NEW BORN

Medicine

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ABSTRACT

Gestational diabetes mellitus (GDM), defined as diabetes diagnosed as Impaired Glucose Tolerance (IGT) with onset or first recognition during pregnancyin second and third trimesters of pregnancy.It has emerged as a global public health problem.[2 Worldwide, one in 10 pregnancies is associated with diabetes, 90% of which are GDM] In India, one of the most populous country globally, rates of GDM are estimated to be 10-14.3% which is much higher than the west. The incidence of GDM is expected to increase to 20% i.e. one in every 5 pregnant women is likely to have GDM. Undiagnosed or inadequately treated GDM can lead to significant maternal & fetal complications. Moreover, women with GDM and their off springs are at increased risk of developing type 2 diabetes later in life.

In India alone, GDM complicates nearly 4 million pregnancies annually, representing large subset of population at high risk for adverse perinatal morbidity and mortality if left inappropriately managed

Maternal risks of GDM include polyhydramnios, pre-eclampsia, prolonged labour, obstructed labour,cesarean section, uterine atony, postpartum hemorrhage, infection and progression of retinopathy which are the leading global causes of maternal morbidity and mortality.

Fetal risks include spontaneous abortion, intra-uterine death, stillbirth, congenital malformation,shoulder dystocia, birth injuries, neonatal hypoglycemia and infant respiratory distress syndrome. Longterm clinical effects of GDM are important contributors to the burden of non-communicable diseases in many countries.

KEYWORDS

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is defined as Impaired Glucose Tolerance (IGT) with onset or first recognition during pregnancy2. National guideline for diagnosis and management of Gestational Diabetes endorses the single step test recommended by WHO for diagnosis of GDM using a 75gm glucose, through Oral Glucose Tolerance Test (OGTT) irrespective of the last meal with a threshold value of 2-hour BS >140 mg/dL. Guidelines advocate for universal screening of all pregnant women at first antenatal contact. If the first test is negative, second test should be done at 24-28 weeks of gestation.GDM Pregnant women should be managed by Medical Nutrition Therapy (MNT), and insulin therapy/metformin as required. In the postpartum period, OGTT should be repeated at 6 weeks after delivery, if blood sugar <140 mg/dL, then women should be referred to NCD clinic for Post Prandial Blood Sugar (PPBS) testing annually.

Clinical Management

GDM is managed through medical nutrition therapy (MNT) along with physical activity, followed by subsequent 2-h postprandial blood sugar (PPBS) testing at 2 weeks. Two-hour PPBS level is maintained below <120 mg/dL. If 2-h PPBS remains ≥120 mg/dL, medical therapy (insulin/metformin) is added to MNT as per the guidelines. Metformin (oral antidiabetic drug) or insulin therapy is the accepted medical management for GDM. Insulin therapy can be started anytime during pregnancy whereas metformin can be initiated only at/after 20 weeks. However, if blood sugars are uncontrolled (2-h PPBS ≥120 mg/dL) with maximum dose of metformin (2 g/day), insulin therapy is added.Dose of insulin/metformin is titrated as per blood sugar level and follow-up schedule. Monitoring fasting blood sugar (FBS) and 2-h PPBS is done every third day or more frequently for insulin and bi-weekly for metformin dose adjustment to maintain normal blood sugar levels. GDM positivity is recognized as high-risk pregnancy. During each antenatal visit, GDM woman is monitored for abnormal fetal growth (macrosomia/growth restriction), polyhydramnios, hypertension in pregnancy, proteinuria, and other obstetric complications. Fetal heart sound is heard at each antenatal visit and ultrasonography (USG) is performed thrice during entire antenatal period: one at 18–20 weeks for fetal anatomical survey, followed by two growth scans at 28–30 and 34–36 weeks, respectively. USG also includes fetal biometry and amniotic fluid estimation. Each USG is separated by a minimum gap of at least 3 weeks. Follow-up visits are ensured for regular blood sugar monitoring as per specified “high-risk pregnancy” protocol. It includes additional four ANC visits, along with four routine visits (at least every month) until delivery and during sixth week postpartum. However, if blood sugars are uncontrolled or in view of any danger signs, GDM woman is referred to higher center/comprehensive emergency obstetric care services (CEmOC) centers where obstetrician is available.

Protocol for investigation

Testing for GDM is recommended twice during ANC.

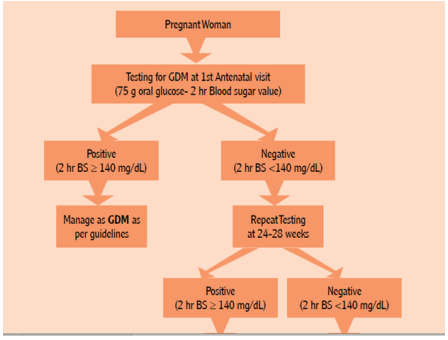
The first testing should be done during first antenatal contact as early as possible in pregnancy.

The second testing should be done during 24-28 weeks of pregnancy if the first test is negative. It is important to ensure second test as many pregnant women develop blood sugar intolerance during this period (24-28 weeks). Moreover, only one third of GDM positive women are detected during first trimester. If it could not be done during this time, then it can be done any time after 24 weeks of pregnancy.

There should be at least 4 weeks gap between the two tests.

The test is to be conducted for all pregnant women even if she comes late in pregnancy for ANC at the time of first contact.

If she presents beyond 28 weeks of pregnancy, only one test is to be done at the first point of contact.



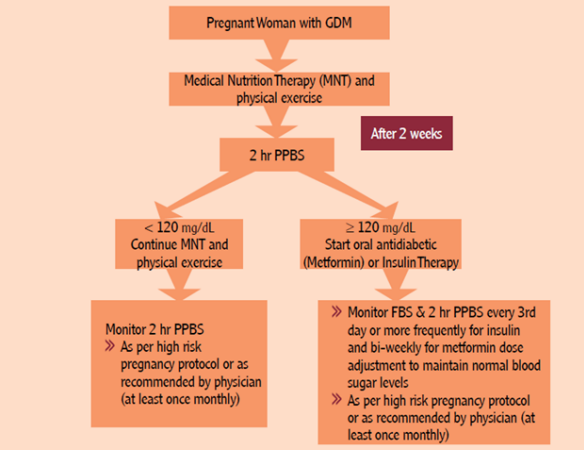
Universal testing for GDM
Management of GDM
Guiding Principles
All Pregnant women who test positive for GDM for the first time should be started on Medical Nutrition Therapy (MNT) and physical exercise for 2 weeks. The woman should walk/exercise for30 mins a day.

After 2 weeks on MNT and physical exercise, 2 hrs PPBS (post meal) should be done.

If 2hr PPBS is <120 mg/dL, repeat test as per high risk pregnancy protocol i.e. to undertake 8tests (4 regular tests and 4 additional). It is recommended to conduct at least one test every month during 2nd and 3rd trimester. More follow-up tests can be done as recommended by the treating physician.

If 2hr PPBS is ≥120 mg/dL, medical management (metformin or insulin therapy) to be started as per guidelines.

Management of pregnant women with GDM



Medical Management (Oral Antidiabetic Drug-Metformin; and Insulin) Therapy
Metformin or Insulin therapy is the accepted medical management of pregnant women with GDM not controlled on MNT. Insulin is the first drug of choice and metformin can be considered after 20 weeks of gestation for medical management of GDM.

Insulin can be started any time during pregnancy for GDM management. If pregnant women with GDM before 20 weeks, and Medical Nutrition Therapy (MNT) failed, Insulin should be started.

Metformin can be started at 20 weeks of pregnancy, if MNT has failed to control her blood sugar.

If the woman's blood sugar is not controlled with the maximum dose of metformin (2 gm/day) and MNT, Insulin to be added. The dose of metformin is 500 mg twice daily orally up to a maximum of 2 gm/day.

Hypoglycemia and weight gain with metformin are less in comparison to Insulin.

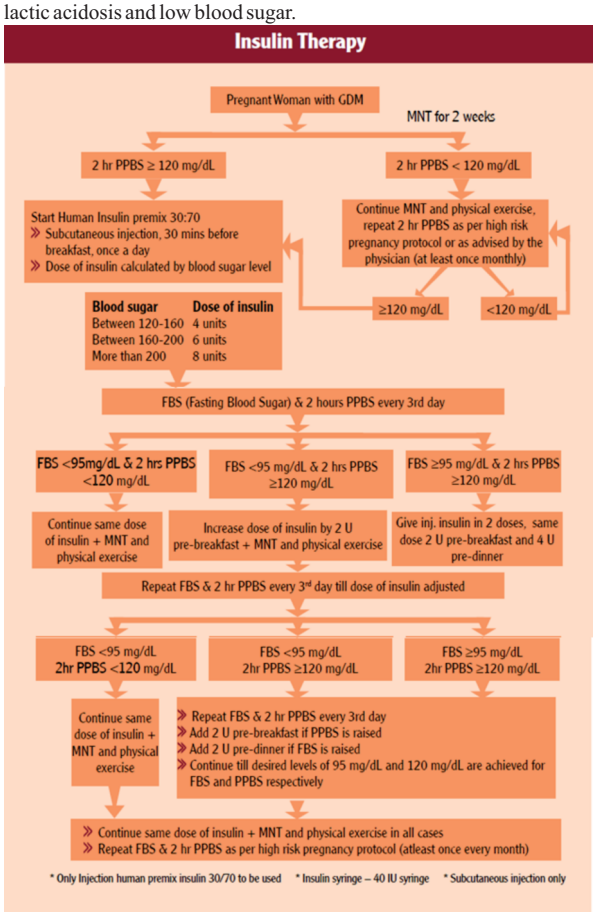
If Insulin is required in high doses, metformin may be added to the treatment.

Very high 2 hr PPBS:
If 2hr PPBS is >200 mg/dL at diagnosis, starting dose of insulin should be 8 units pre-mixed insulin.

The dose to be adjusted on follow-up and at the same time MNT and physical exercise has to be followed.

Precautions during Insulin therapy
Any pregnant women on insulin therapy should be instructed to keep sugar/jaggery/glucose powder handy at home to treat hypoglycemia if it occurs.

Side-effect of Metformin
The common side-effect that occur with metformin include diarrhoea, nausea, pain abdomen,heartburn, gas and the serious side-effects are lactic acidosis and low blood sugar.



Precaution during Insulin therapy
Any Pregnant women on insulin can develop hypoglycemia at any time Hypoglycemia is diagnosed when blood sugar level is < 70 mg/dL It is important to recognise symptoms of hypoglycemia & treat immediately

Features of hypoglycemia
Early symptoms - Tremors of hands, sweating, palpitations, hunger, easy fatigability,headache, mood changes, irritability, low attentiveness, tingling sensation around the mouth/lips or any other abnormal feeling

Severe - Confusion, abnormal behaviour or both, visual disturbances, nervousness or anxiety.

Uncommon - Seizures and loss of consciousness

Management of hypoglycemia

Ask pregnant women to take 3 TSF of glucose powder (15-20 grams) dissolved in a glass of water

If glucose is not available, take one of the following: Sugar - 6 TSF in a glass of water/fruit juice/honey/anything which is sweet/any food

After taking oral glucose, she must take rest & avoid any physical activity 15 minutes after taking glucose, she must eat one chapati with vegetable/rice/one glass of milk/idli/fruits/anything eatable which is available.

If hypoglycemia continues, repeat same amount of glucose and wait Take rest, eat regularly and check blood sugar.

Antenatal care care for pregnant women with GDM
In cases diagnosed before 20 weeks of pregnancy, a fetal anatomical survey by USG should be performed at 18-20 weeks.

For all pregnancies with GDM, a fetal growth scan should be performed at 28-30 weeks gestation& repeated at 34-36 weeks

gestation. There should be at least 3 weeks gap between the two ultrasounds and it should include fetal biometry & amniotic fluid estimation.

Pregnant women with GDM in whom blood sugar level is well controlled & there are no complications, should continue with antenatal visits as per high-risk pregnancy protocol (as least once monthly).

In pregnant women with GDM having uncontrolled blood sugar level or any other complication of pregnancy the frequency of antenatal visits should be as per high-risk pregnancy protocol (at least once monthly).

Monitor for abnormal fetal growth (macrosomia/growth restriction) and polyhydramnios at each ANC visit.

Pregnant women with GDM to be diligently monitored for hypertension in pregnancy, proteinuria and other obstetric complications.

In pregnant women with GDM between 24-34 weeks of gestation and requiring early delivery,antenatal steroids should be given as per GOI guidelines i.e. Inj. Dexamethasone 6 mg IM 12hourly for 2 days. More vigilant monitoring of blood sugar levels should be done for next 72 hours following injection. In case of raised blood sugar levels during this period, adjustment of insulin dose should be made accordingly.

Special precaution during labour

Pregnant women with GDM on medical management (metformin or insulin) require blood sugar monitoring during labour by a glucometer. The morning dose of insulin/metformin is withheld on the day of induction/labour and the pregnant women should be started on 2 hourly monitoring of blood sugar.IV infusion with normal saline (NS) to be started & regular insulin to be added according to blood sugar levels as per the table below.

Blood sugar level	Amount of Insulin added in 500 ml NS	Rate of NS Infusion
90-120 mg/dL	0	100 ml/hr (16 drops/min)
120-140 mg/dL	4 U	100 ml/hr (16 drops/min)
140-180 mg/dL	6 U	100 ml/hr (16 drops/min)
>180 mg/dL	8 U	100 ml/hr (16 drops/min)

Immediate neonatal care for baby of mother with GDM

All neonates should receive immediately essential newborn care with emphasis on early breastfeeding to prevent hypoglycemia.

If required, the sick neonates should be immediately resuscitated as per GOI guidelines.

Newborn should be monitored for hypoglycemia. The operational definition cut off of blood sugar by glucometer is 45 mg/dL. Any newborn with blood sugar less than 45 mg/dL and for IUGR baby with less than 54 mg/dL should be considered as 'baby with hypoglycemia .Monitoring should be started at 1 hour of delivery and continued every 4 hours (prior to next feed) till four stable glucose values are obtained.

The cut off capillary blood glucose for hypoglycemia in normal birth weight newborn is <45 mg/ dL and <54 mg/dL in case of intrauterine growth restriction (IUGR), to initiate treatment.

Neonate should also be evaluated for other neonatal complications like respiratory distress, convulsions, hyperbilirubinemia.

Symptoms of hypoglycemia

Most of the time, newborn baby may not have any symptom of hypoglycemia at all. Symptoms of hypoglycemia are very variable and seen only in a smaller proportion of patients.

Observe for following sign in a new born child for hypoglycemia:
Stupor or Apathy Jitteriness or tremors
Episodes of cyanosis

CONCLUSIONS

Intermittent apnoeic spells or tachypnea
Weak and high pitched cry, limpness and lethargy
Difficulty in feeding
Eye rolling
Episodes of sweating

Any unexplained clinical feature in baby of diabetic mother
Management of hypoglycemia
All cases of hypoglycemia should be managed in following manner:

Step1----

Whenever there is suspicion of hypoglycemia BS should be checked immediately with glucometer. In all babies born to diabetic mother, BS should be checked by glucometer between 1-2 hours after birth.

Step2----

blood sugar values is <45 mg/dL, this should be considered as 'hypoglycemia', move to next step

step3-----

Newborn with hypoglycemia – immediately ask mother to give breast feed without any delay. Direct breast feeding is the best management step for neonatal hypoglycemia. If the infant is unable to suck, expressed breast milk from mother should be given. If mother is not in a position to give breast feed or no breast milk secretion, baby should be given any formula feed. One of the good options is to dissolve one TSF of sugar in 100 ml of normal cow's milk and give. If the lactation management centres (Human Milk Banks) is available at the facility then it can also be involved in feeding the baby.

Step4----

Once feed has been given, check blood sugar again after one hour. If blood sugar is >45 mg/dL, 2 hourly feeding (breast feeding is the best option but if not available, formula feed can be given) should be ensured by explaining to mother/ relatives and supervised

step5-----If at any time blood sugar by glucometer is <20 mg/dL, give immediate intravenous bolus injection of 10% dextrose 2 ml/kg body weight of baby. This should be followed by intravenous infusion of 10% dextrose at a rate of 100 ml/kg/day. Blood sugar should be checked 30 minutes after starting the infusion infusion.

Post-delivery follow up of pregnant women with GDM

Immediate postpartum care of women with GDM is not different from women without GDM but these women are at high risk to develop Type 2 Diabetes Mellitus in future.

Maternal glucose levels usually return to normal after delivery.

Subsequently, ANM must perform 75 gm OGTT (fasting and 2 hr PP) at 6 weeks postpartum to evaluate glycemic status of woman. Cut off for normal plasma and abnormal blood sugar levels in the fasting and 75 gms OGTT values are:

Fasting blood sugar: ≥126 mg/dL
75 gms OGTT 2 hour blood sugar
Normal: <140 mg/dL
IGT: 140-199 mg/dL
vDiabetes: ≥200 mg/dL

Counselling Gestational diabetes mellitus (GDM) **patients**

Gestational diabetes mellitus (GDM) can be easily controlled by diet (MNT) and exercise

Only in few women in whom blood sugar is not controlled by diet and physical exercise, oral antidiabetic (metformin) or insulin injections are required GDM can be treated with oral metformin tablets as they do not harm the fetus.

Insulin injections are required only during pregnancy. Insulin will be stopped in most of the cases after pregnancy.

If you are injecting insulin over abdomen, it can not reach your baby in any condition.

Injecting insulin over abdomen is 100% safe.

Modification of diet is very easy and will not cost more. Sweets should

be avoided at all times during pregnancy

If blood sugar is controlled, you and your baby both are safe and healthy

If blood sugar is not properly monitored, it may harm both you and baby

If you are taking insulin, always keep glucose, sugar with you.

Pregnant women with GDM should deliver at health facilities. It will help in management of any complications which can be countered during delivery.

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