

## Review Article

# Detection and Care of Gestational Diabetes Mellitus in the Present Scenario

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All efforts should be made in planning appropriate and possible methods of delivering health care for pregnant woman in the pandemic ocean of COVID-19, with limited medical facilities. Gestational Diabetes Mellitus (GDM) may play a crucial role in the increasing prevalence of diabetes and obesity and also may be the Origin of Cardio Metabolic Diseases. The Ministry of Health and Family Welfare, Government of India expects health care providers to screen all pregnant woman for glucose intolerance by a feasible, do able, economical and evidence-based test. "A Single Test Procedure" which is also followed by Diabetes in Pregnancy Study Group India. This test is ideal in the pandemic times. For a better perinatal outcome, the fasting plasma glucose (FPG) has to be maintained between 80 mg/dl (4.4 mmol/dl) and 90 mg/dl (5.0 mmol/dl) and 2hr Post Prandial Plasma Glucose (PPPG) 110 mg/dl (6.1 mmol/dl) and 120 mg/dl (6.7 mmol/dl) and mean plasma glucose 105 mg/dl (5.9 mmol/dl). Medical Nutrition Therapy (MNT) and life style modifications are recommended as an initial step to maintain normal maternal glucose, failing which insulin or Oral Hypoglycemic Agent (OHA) may be advised. Both small for gestational age and large for gestational age babies are prone to develop diabetes in the future. Hence, the aim in the treatment is to obtain newborn babies birth weight appropriate for gestational age of 2.5 to 3.5 kg.

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**Key words :** Hyperglycemia in Pregnancy (HIP), COVID-19 Pandemic, Single Test Procedure, Post Prandial Plasma Glucose (PPPG).

The whole world grapples with COVID -19 pandemic and its consequences. This situation adversely affects the medical profession, particularly in the diagnosis and care of people with diabetes. This is going to result in epidemic of diabetes. The prevalence of diabetes is increasing globally from 463 million in 2019 to 700 million in 2045a 51% increase<sup>1</sup>. While several reasons are ascribed for this rising trend including aging population, urbanization, genetic predisposition, nutrition and lifestyle transition, etc, one factor that has not received adequate attention is Glucose intolerance that occurs during pregnancy. Gestational Diabetes Mellitus (GDM) may play a crucial role in the increasing

### Editor's Comment :

- Covid -19 infection affects pregnant woman less frequently probably due to the development of immunity during pregnancy.
- Nevertheless, all pregnant woman should be screened with the simple and evidence based "Single Test Procedure" approved by the Ministry of Health and Family Welfare Government of India.
- Pregnant women should take 60 to 70 grams of protein daily and immune boosters like Zinc, Vitamin C and Vitamin D. The target glycemic control advised is FPG ~ 90mg/dl and 2hr PG ~ 120 mg/dl so as to obtain birthweight of new borns appropriate for gestational age, between 2.5 and 3.5 kg.

prevalence of diabetes and obesity<sup>2</sup>. In 2019 the global prevalence of Hyperglycemia in Pregnancy (HIP) in the age group 20-49 years was estimated to be 20.4 million or 15.8% of live births<sup>1</sup>. They had some form of hyperglycemia in pregnancy, of which 83.6% were due to GDM<sup>1</sup>. Hence, it has become necessary that all pregnant women should be screened for GDM, even if they have no symptoms<sup>3</sup>.

Wide spread anecdotal evidence suggests that both clinicians and pregnant women are increasingly unwilling to recommend or undergo OGTT<sup>4</sup>. The problem is, the blood glucose test results are available around three hours after the OGTT or next day and then GDM women have to undergo additional health service visits, for

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diabetes education, glucose monitoring review, and fetal ultrasonography, all of which carry exposure risk during pandemic. Hence, there is a need for guideline which is universally acceptable<sup>4</sup>.

### Problem of Screening:

Unfortunately, there is no uniformity in the guidelines for diagnosing GDM. All the diagnostic criteria require women to be infasting, including that of International Association of Diabetes in Pregnancy Study Group guideline (IADPSG). The concern of this guideline is that, it over diagnoses GDM without clear clinical benefit<sup>5</sup>. Another inadequacy of IADPSG criteria is, its recommendation for diagnosing GDM with FPG  $\geq 5.1$  mmol/dl (92mg/dl). It was observed in relation to FPG of 5.1 mmol/dl, there is a considerable variability between countries noted in the Hyperglycemia and Adverse Pregnancy Outcome study (HAPO). FPG diagnosing only 22% of GDM in women in Bangkok and Hong Kong compared with up to 71% in some US centers. A low diagnostic rate of 24% of GDM has also been reported in Asian Indians with a fasting plasma glucose of 5.1 mmol/l<sup>6</sup>. This is due to increased insulin resistance in non-Caucasian population<sup>7</sup>. Therefore, IADPSG procedure cannot be recommended as a universal guideline.

Most of the time pregnant women do not come in the fasting state because they may have to travel a long distance<sup>6</sup>. OGTT is resource intensive and many health services, especially in low resource settings, are not able to routinely perform an OGTT in pregnant women. In these circumstances, many health services do not test for hyperglycemia in pregnancy<sup>6</sup>. Therefore, options which do not involve an OGTT are required. For a pregnant woman, the request to attend in fasting, for a blood test may not be realistic because of the long travel distance to the clinic in many parts of the world, and increased tendency to nausea in the fasting state. Attending the first prenatal visit in the fasting state is impractical in many settings<sup>6</sup>, even in developed countries (eg: UK) a fasting blood test at the antenatal booking is often inconvenient<sup>8</sup>. The dropout rate is very high when a pregnant woman is asked to come again for the glucose tolerance test<sup>6</sup>. Consequently, non-fasting testing may be the only practical option<sup>6</sup>.

In this context, a study established that the two-hour Plasma Glucose  $\geq 7.8$  mmol/dl with 75g oral glucose administered to a pregnant woman in the fasting or non-fasting state, without regard to the time of the last meal was able to identify woman with GDM<sup>9-11</sup>. This "Single Test procedure" which is feasible to perform in all resource settings has been adopted by Diabetes in Pregnancy Study Group India(DIPSI) for diagnosing GDM (Fig 1). National Institute of Clinical Excellence (NICE) guidelines also recommend 2hr PG

$\geq 7.8$  mmol/dl as one of the diagnostic criteria for GDM based on the study performed in multi ethnic population of UK<sup>12</sup>. The DIPSI procedure is approved by the Ministry of Health & Family Welfare Government of India<sup>13</sup>, WHO<sup>6</sup>, FIGO<sup>14</sup> & IDF<sup>15</sup>. This procedure is being followed in Sri Lanka<sup>16</sup>, Pakistan<sup>17</sup>, Bangladesh<sup>18</sup> and may be in many other countries.

### Repeat Testing:

If the first testing is negative the test has to be repeated in the second trimester (between 22 to 28 weeks) and if negative to repeat in the third trimester (between 32 to 34 weeks) plasma glucose calibrated glucometer can be used.

### MANAGEMENT :

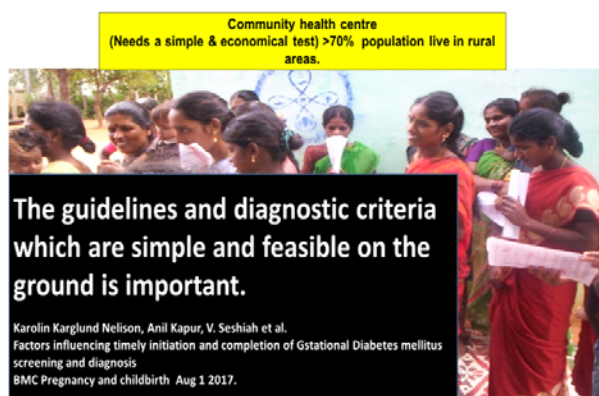
Treating GDM appreciably reduces the probability of serious neonatal morbidity compared with routine prenatal care<sup>19</sup>. Maternal-fetal Medicine Units Network conducted a randomized clinical trial for the treatment of gestational diabetes<sup>20</sup>, the results of which provided further compelling evidence that treatment, as necessary, reduces rates of adverse pregnancy outcomes including perinatal mortality, neonatal hypoglycaemia, neonatal hyperbilirubinemia, elevated cord blood C-peptide level, and birth trauma. This network also, observed lifestyle modification and dietary intervention will be effective in 80–90% of women with GDM.

### TARGET GLYCEMIC CONTROL :

The recommended glycemic control is FPG ~ 90 mg/dl (5.0 mmol/dl) and 2-hour postprandial plasma glucose ~ 120 mg/dl (6.7 mmol/dl) in GDM patients so as to avoid perinatal complications<sup>21,22</sup>. The goal is to obtain newborn babies birth weight appropriate for gestational age between 2.5 to 3.5 kg. This is to avoid both small for gestational age and large for gestational age newborns, as this is the first step to prevent offspring developing diabetes.

### Management Guiding Principles:

- All Pregnant women who test positive for GDM for the first time should be started on MNT and physical



exercise for 2 weeks. Dietary intake is foundational to optimal pregnancy outcomes because nutritional quality and quantity have an important impact on the overall growth and development of the fetus.

- Woman should walk/exercise (which she is used to) for 30 minutes or perform household work.
- If 2hr Post Prandial Plasma Glucose (PPPG) remains > 6.7 mmol/dl with MNT and lifestyle changes, Metformin or Insulin therapy is recommended.

**Medical Nutrition Therapy (MNT):** In facilities where nutritionists are not available for diet counselling, a readymade list of diet sheet containing the food items which can be taken in plenty and which should be avoided is made available. It is difficult to have a personal interaction with pregnant women due to COVID Pandemic.

#### **Drug Management (Metformin or 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
- Insulin can be started any time during pregnancy for GDM if MNT fails.
- If pregnant woman is not willing for insulin, metformin can be recommended provided gestation is more than 12 weeks<sup>23</sup>. The starting dose of metformin is 500 mg twice daily orally up to a maximum of 2 gm/day. If the woman's blood sugar is not controlled with the maximum dose of metformin (2 gm/day) and MNT, there is no other option but to advise Insulin.
- Hypoglycaemia and weight gain with metformin are less in comparison to Insulin.

#### **Insulin Therapy:**

- The recommended starting dose of insulin in GDM is 0.1 unit/kg of body weight per day. Dose can be increased on follow up till 2hr PPPG is around 6.7 mmol/dl.
- Rarely a GDM woman may require more than 20 units of insulin per day (two third of the dose before breakfast and one third before dinner. eg: If 18 units required, 12 unit in the morning and 6 unit in the evening preferable to use pre-mixed insulin). If she requires multiple doses of insulin, she may be referred to a higher center where physician is available.

#### **Monitoring Glycemic Control :**

- Fasting and 2 hr PPPG can be monitored to adjust the drug dosage. But most importantly monitoring 2hr PPPG is ideal as when 2hr PPPG is around 6.7 mmol/dl, FPG will never exceed 5.0 mmol/dl.
- Laboratory glucose measurement is often not available and testing with a portable plasma glucose standardized metre is the only option<sup>6</sup>.
- There are very little data on the use of HbA1c to

diagnose diabetes in pregnancy. Consequently, WHO guideline (2013) does not include HbA1c as a means of diagnosing diabetes in a pregnant woman and for monitoring<sup>6</sup>.

- After satisfactory glycemic control is achieved monitoring alternate days may be necessary in women who is taking insulin. Places with limited resources monitoring can be done every 2 weeks between 24th and 28th weeks and from 28th week every week till delivery.

- Self-monitoring of blood glucose: All GDM mothers, partners and family members should be taught about self-monitoring blood glucose.

**Post-partum care** — All GDM woman after confinement should be tested for glucose intolerance, 6 weeks after delivery. In the post-partum period, the “single test procedure” which was followed in the ante-partum period can be followed. This test which was good in the ante-partum period should also be good for the post-partum period.

If GDM woman is on insulin she may not require insulin immediately after the delivery and in the post-partum period. GDM woman who was on metformin may be advised to continue if her post-partum blood glucose is  $\geq 7.8$  mmol/dl. Metformin can be continued during breastfeeding.

#### **Summary and Conclusion :**

All available evidence suggests that pregnant women are at no greater risk of becoming seriously unwell than other healthy adults if they develop coronavirus<sup>24</sup>. Nevertheless, pregnant woman may be advised to undergo “Single Test Procedure” for diagnosing glucose tolerance, which is a doable and evidence-based test. To avoid waiting in the lab area, she may take at home 75g glucose mixed with 300 ml of water in the fasting or non-fasting state irrespective of the last meal timing. The intake of the solution to be completed within 5 minutes and then she can go to the lab around 2hrs after drinking glucose solution to have her venous blood glucose tested. To avoid crowded place like medical facility a plasma standardized glucometer can be used to evaluate capillary blood glucose and this procedure is recommended by the Ministry of Health & Family Welfare Government of India and WHO for diagnosing GDM.

Glycemic control requires health education on life style modifications. This can be done on individual basis or in group sessions. In the present scenario of COVID-19 Pandemic it is advisable to use digital media for sharing the knowledge. If this not possible printed pamphlet with all information can be given to pregnant women in the language they understand. They may be advised to maintain the target glycemic level off astring~ 5.0 mmol/dl or 2hr Post Prandial



Plasma glucose ~6.7 mmol/dl to minimize the risk of fetal macrosomia and to avoid perinatal morbidity. Women who fails to respond to lifestyle changes may be advised Oral Hypoglycemic Agent (metformin) or insulin. Only drawback for recommending insulin is, the person has to be given training in self-injection and needs to be followed frequently.

Optimal glycemic management during pregnancy leads to not only immediate well-being to the mother and the fetus but also to several transgenerational benefits. Hence even in the period of this pandemic of COVID-19, appropriate advice can be provided to GDM women by personal contact or using telephonic communication or other technological methods.

*"Most Complicated Problem in this Universe has a Simple Solution"*

— **Albert Einstein**

ONE Test with 75gm of oral glucose irrespective of last meal timing.

ONE Value To diagnose GDM 2hr PG = 140 mg/dl.

ONE Target 2hr PPG ~ 120mg/dl.

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