Iranian Endocrine Society Guidelines for Screening, Diagnosis, and Management of Gestational Diabetes Mellitus

Presented by:
dr f.sadeghi morassa
Endocrinologist

- Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance, with the onset or first detection during pregnancy

- Previous studies have reported the association of GDM with the risk of adverse pregnancy outcomes, such as

I. preeclampsia,
II. macrosomia,
III. shoulder dystocia,

which may lead to operative vaginal delivery and birth trauma

- Gestational diabetes mellitus is also associated with unfavorable long-term outcomes, such as :

I. the development of type 2 diabetes in mothers

II. Obesity , diabetes mellitus (DM), in offspring

- Moreover , a systematic review of all studies conducted up to 2012 in Iran reported the overall prevalence of GDM to be 3.4% based on diagnostic criteria , ranging widely from 1.3% to 18.5%

- Considering the mentioned conflicting results, the World Health Organization (WHO) suggested that final decision about screening, diagnosis, and management of GDM be made for each country, depending on the prevalence rates, risk factors, resources, and priorities of that particular country.

Evaluation of Dysglycemia Before Pregnancy

- Who should be assessed for dysglycemia among women contemplating pregnancy?

all non-diabetic women with at least one of the known risk factors must be screened for dysglycemia

Box 1. Risk Factors for Gestational Diabetes Mellitus (GDM)

Risk Factors
1. Previous history of GDM
2. History of diabetes mellitus in first-degree relatives
3. Known glucose intolerance
4. Obesity (BMI $\geq$ 30 kg/m^2)
5. Low physical activity[a]
6. History of polycystic ovarian syndrome (PCOS)
7. History of hypertension and/or taking antihypertensive medication
8. Serum TG > 250 mg/dL and/or HDL< 35 mg/dL
9. History of stillbirth[b]
10. History of congenital anomalies or macrosomia [c] in the offspring

Table 2. Diagnostic Criteria for Glucose Intolerance Before Pregnancy [a, b]

	Normal	Prediabetes	Diabetes
Fasting plasma glucose (mg/dL)	< 100	100 - 125	≥ 126
Two-hour plasma glucose during OGTT (mg/dL)	< 140	140 - 199	≥ 200
HbA1C (%)	< 5.7	5.7 - 6.4	≥ 6.5

[a] Having a random plasma glucose ≥ 200 mg/dL with classic symptoms of hyperglycemia is also defined as diabetes.
[b] In the absence of overt hyperglycemia, the diagnosis should be based on two abnormal tests, the same or different tests.

Diabetes Screening in the First Prenatal Visit

Table 3. Diagnostic Criteria for Glucose Intolerance Based on Fasting Plasma Glucose Levels (mg/dL) in the First Prenatal Visit

Fasting Plasma Glucose Levels (mg/dL)	Glucose Intolerance
< 100	Normal
100 - 125	Gestational diabetes
≥ 126 [a]	Overt or pre-gestational diabetes

[a] Should be confirmed with another separate sample test.

- Which treatment is used for GDM in early pregnancy?

an appropriate diet, physical activity, and insulin therapy if needed.
Although there is no strong evidence regarding the effect of GDM treatment in early pregnancy, appropriate diet, increased physical activity, self-monitoring of blood glucose (SMBG), and drug therapy (if needed) are recommended for women diagnosed with GDM in early pregnancy.

- oral antidiabetic agents is not recommended during the first trimester of pregnancy.

- What are the glycemic goals in the management of GDM diagnosed in early pregnancy?

The treatment goals during the first trimester of pregnancy are not different from those of other trimesters and include

FPG < 95 mg/dL,

one-hour postprandial glucose (PPG) < 140 mg/dL

two-hour PPG < 120 mg/dL

- the measurement of HbA1c is not recommended for the diagnosis of GDM in Iran

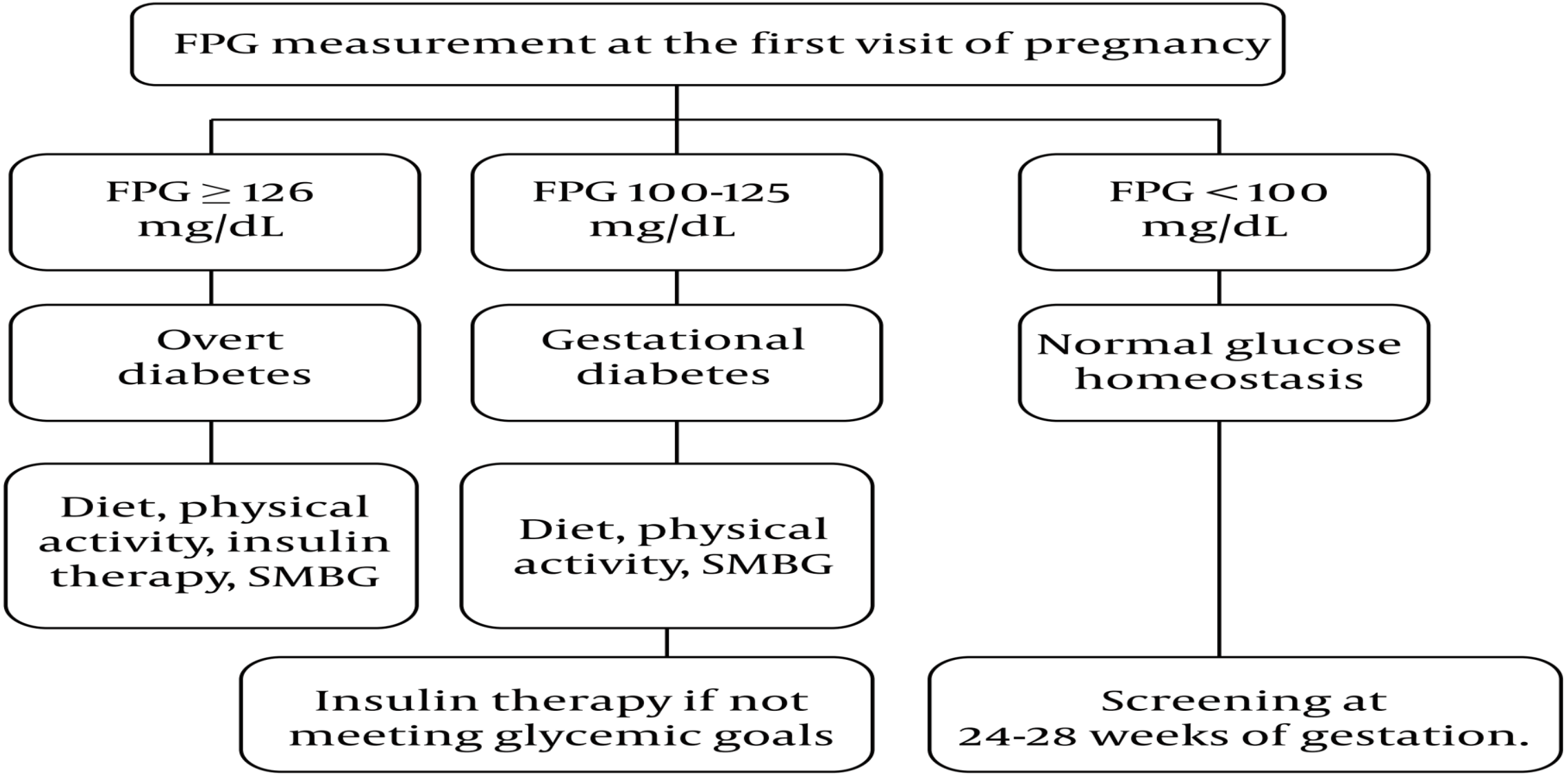


Figure 1. Algorithm for the screening of diabetes at the first visit of pregnancy. Abbreviations: FPG, fasting plasma glucose; SMBG, self-monitoring of blood glucose.

Screening Diabetes in Pregnant Women with Negative First Screening for GDM

Table 4. Diagnostic Criteria of Glucose Challenge Test (GCT) for Pregnant Women without a History of Diabetes at 24 - 28 Weeks of Gestation

One-Hour Plasma Glucose in GCT with 50 g Oral Glucose Solution (mg/dL)	Glucose Intolerance
< 140	Normal
≥ 200	Gestational diabetes
140 - 199	OGTT [a]

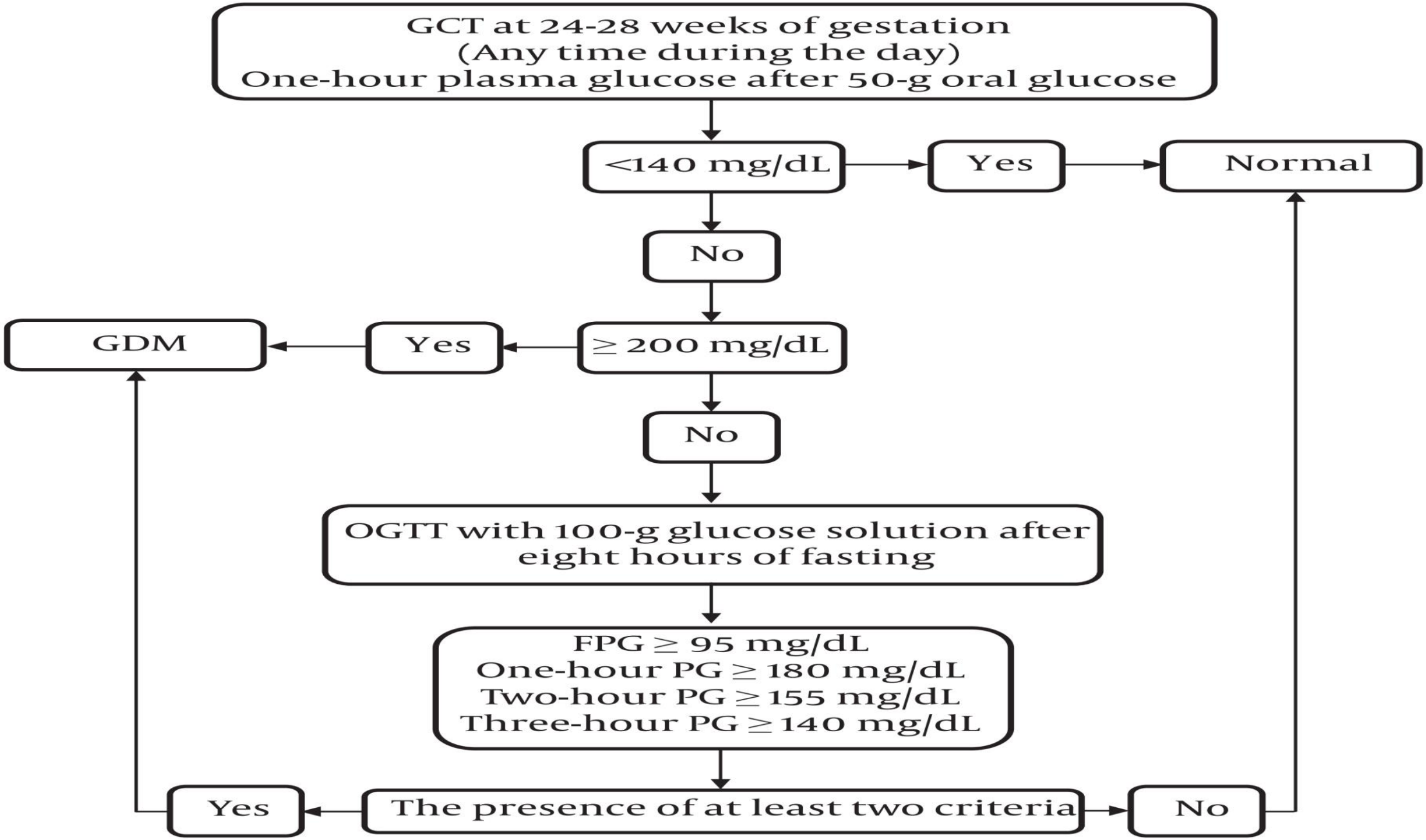
[a] 100-g oral glucose tolerance test

Table 5. Diagnostic Criteria of GDM in Two-step and One-step Approaches

Measurement Time	100 g OGTT in Two-Step Approach with Carpenter and Coustan Criteria (30) [a]	One-Step Approach with 75 g OGTT [b]
Fasting plasma glucose	95 mg/dL	92 mg/dL
One-hour plasma glucose	180 mg/dL	180 mg/dL
Two-hour plasma glucose	155 mg/dL	153 mg/dL
Three-hour plasma glucose	140 mg/dL	

[a] The diagnosis of GDM is made if at least two of four plasma glucose levels are met or exceeded.

[b] One abnormal value confirms GDM.


GCT at 24-28 weeks of gestation
(Any time during the day)
One-hour plasma glucose after 50-g oral glucose
<140 mg/dL
Yes
Normal
No
GDM
Yes
≥ 200 mg/dL
No
OGTT with 100-g glucose solution after eight hours of fasting
FPG ≥ 95 mg/dL
One-hour PG ≥ 180 mg/dL
Two-hour PG ≥ 155 mg/dL
Three-hour PG ≥ 140 mg/dL
Yes
The presence of at least two criteria
No

Management of GDM

appropriate diet, increasing physical activity (at least 150 min/week), and drug therapy, if needed .

Since interventions reducing the serum glucose level improve the outcomes of GDM, especially shoulder dystocia and delivery of a large-for-gestational-age (LGA) infant, the treatment of pregnant women with GDM is effective

- Is exercise recommended for women with GDM?

Moderate physical activity is recommended , and there are no exercise restrictions

Although aerobic training is more favorable, endurance training may be also helpful.

Moderate-intensity training is recommended for at least 30 minutes daily, four to five days a week.

Women without physical fitness should start physical activity at low intensity (15 minutes daily) and gradually increase the duration of training.

- How is blood glucose monitored in women with GDM?

fasting glucose and

two-hour PPG levels

using a glucometer four times a day

if not possible, at least 4 - 8 times a week, after achieving the goals of therapy

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- HbA1c may be helpful for glucose monitoring in pregnancy as the second measure after SMBG .

In a normal pregnancy, the HbA1c level is lower because of increased red blood cell turnover . It is suggested to maintain HbA1c in pregnancy < 6% if it can be achieved without significant hypoglycemia.

- What is the preferred pharmacologic intervention in GDM?

Insulin is the drug of choice for women with GDM who cannot meet the therapeutic goals, despite non-pharmacological interventions
a week

What are the indications for oral antidiabetic agents in GDM?

Oral anti-diabetic agents, especially metformin, can be used after 24 weeks of gestation in women with FPG ≤110 mg/dL (Weak recommendation, moderate-quality evidence).

Metformin is suggested for women with mild GDM (FPG ≤110 mg/dL), unwilling to use insulin . However, 30% of these women need to shift to insulin in the next weeks of gestation.

Glibenclamide (glyburide) should be considered as the last option due to the possible increase in neonatal hypoglycemia, overweight, and macrosomia.

As mentioned earlier, therapy with oral antidiabetic drugs is not recommended during early pregnancy. Nevertheless, if a pregnant woman is treated with metformin due to other reasons before pregnancy, therapy with metformin can be continued .

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- Insulin is the preferred medication for treating hyperglycemia in gestational diabetes mellitus. Metformin and glyburide should not be used as first-line agents, as both cross the placenta to the fetus. Other oral and noninsulin injectable glucose-lowering medications lack long-term safety data

- Metformin, when used to treat polycystic ovary syndrome and induce ovulation, should be discontinued by the end of the first trimester

- due to the potential for growth restriction or acidosis in the setting of placental insufficiency, metformin should not be used in women with hypertension or preeclampsia or at risk for intrauterine growth restriction

Postpartum Recommendations

■ How is a postpartum follow-up in women with GDM?

2-hour 75 g OGTT at 4 - 12 weeks after delivery.

In women with normal OGTT after delivery, the annual measurement of FPG is recommended.

For all prediabetic women diagnosed after delivery, lifestyle modifications (exercise and diet), with or without metformin therapy, are recommended.

Gestational diabetes mellitus usually resolves after delivery, as hormones secreted from the placenta, as the main source of insulin resistance, are removed from the body
. Therefore, the need for drug therapy mostly resolves after delivery although these patients are at risk of type 2 diabetes, which may occur in 50% of women in the next 20 years .

Women who develop GDM at younger gestational ages or those who require a higher insulin dosage are at a higher risk of type 2 diabetes. Therefore, pregnant women with GDM should be followed up after delivery .