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ANTENATAL, INTRAPARTUM AND POSTNATAL OUTCOME IN GESTATIONAL DIABETIC AND PRE- GESTATIONAL DIABETIC WOMEN

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ABSTRACT

Objective: maternal and fetal morbidity and mortality rate in pregnant women complicated by gestational and pre-gestational diabetes. Methods: Retrospective study of 200 randomly selected pregnant women affected by gestational and pregestational during the time period between 1st January 2017 and 31th of December 2017 at king Abdul Aziz specialist hospital in Taif. **Results:** total number of pregnant women during the study period was 8900 the number of diabetic patients was 1500 (16.8%), there were 1010 gestational diabetics (67.3 %) and 490 pre- gestational diabetics (32.6%) of the pre-gestational diabetics (patients 430 were type 1 87.7 %). maternal and fetal complications were more common in women with pre-gestational diabetes compared to women with gestational diabetes. **Conclusions:** the complications of pre-gestational diabetes higher than those of gestational diabetes in our hospital. Better screening programs and follow up are for both pre- gestational and gestational diabetes are required.

KEYWORDS: Diabetes Mellitus is a very common medical disorder.

INTRODUCTION

In the Saudi population, Diabetes Mellitus is a very common medical disorder Diabetes Mellitus can be classified into Two Types: Type l (Insulin Dependent IDDM) and Type ll (None – Insulin Dependent NIDDM). Type l commonly occurs in younger age groups, who are usually of normal weight and who present with clinical features that relate to Insulin deficiency. Type l is attributed to auto –immune destruction of the Insulin production cells in the pancreas. Type ll's symptoms: on the other hand, are caused more by peripheral Insulin

resistance rather than deficiency. As such, it usually presents in a much older group, who are obese and with a low level of physical activity.

Pregnant patients who are known diabetes, of either Type l or Type ll, are termed Pre- Gestational Diabetics, while Gestational Diabetes is defined as "Glucose intolerance diagnosed during pregnancy".[2] Gestational Diabetes can either be true Gestational Diabetes or unrecognized Pre- Gestational Diabetes.

While all pregnancies affected by diabetes are knows to have perinatal complications which include birth defects, maternal and neonatal mortality and morbidity, pregnancies with Pre-existent diabetes are at an increased risk of said complications than pregnancies with true gestational diabetes.

Older studies, both prospective and retrospective, by many institutes all over the world consistently analyzed pregnancies with both pre- gestational and gestational diabetes with the aim of improving the maternal and neonatal outcomes of diabetic patients compared to normal pregnancies (the Saint Vincent Declaration of (1989). many of those studies reported a high rate of perinatal mortality and morbidity and congenital anomalies in pre- gestational diabetes. Many countries initiated national programs to improve the care and outcomes of such pregnancies.

In Saudi Arabia, we have a much higher prevalence of Diabetes Mellitus the the countries with the previously mentioned programs, with higher rates of obesity and lower level of physical activity. Therefore, the incidence of and subsequently the complications of pregnancies affected by both pre- existent and gestational diabetes are more common. Our aim in this study is to determine the incidence in our hospital and compare it to the international data available A comprehensive comparison is beyond the score of this study, so two hundred diabetic cases, both gestational and pre- gestational were randomly selected and analyzed for comparison.

Gestational diabetes (GDM) is a glucose tolerance disorder that occurs or is diagnosed for the first time during pregnancy. GDM is a public health problem that currently affects a large part of the female population and has short- and long-term consequences for the fetus and the mother. It has been reported that GDM affects 1%–14% of all pregnancies, and that its incidence has been steadily rising. GDM is a major cause of perinatal morbidity and

mortality, as well as maternal morbidity. It is therefore highly important that these mothers are diagnosed during pregnancy and that they have a regular postpartum follow-up for identification and treatment of any complications.

Although the risks associated with GDM are well recognized, the impact on maternal and neonatal health outcomes is less clear. The factors that have been postulated to influence the risk of GDM among mothers include obesity, a positive family history of diabetes, treatment for infertility, recurrent urinary tract infections, macrosomic infant, unexplained neonatal death, prematurity, pre-eclampsia, diabetes in previous pregnancy, and advancing maternal age Women with GDM have increased risk for potential morbidity and for impaired glucose tolerance, and it identifies a population of women who are at high risk of developing type 2 diabetes in the years following the pregnancy. In addition to higher risk of perinatal morbidity, the offspring of mothers with GDM face increased risk of childhood obesity and early onset of type 2 diabetes mellitus. GDM is a condition that can be effectively controlled, thereby decreasing the associated risks and eventually leading to the delivery of healthy infants. Thus, appropriate management of GDM will improve both maternal and perinatal outcomes.

The prevalence of diabetes mellitus and its complications was high in Saudi Arabia. It was documented in the literature that GDM women and their offspring are more likely to develop metabolic syndrome or type 2 diabetes in later life Because Saudi Arabia has a high prevalence rate of diabetes mellitus, it is important to determine the prevalence of GDM in women.

Early diagnosis of GDM is necessary to reduce maternal and fetal morbidity and to help to prevent or delay the onset of type 2 diabetes. Therefore, this study was conducted to analyze the population characteristics of women with GDM and identify the risk factors associated with GDM.

Screening And Diagnostic Testing — the purpose of screening is to identify asymptomatic individuals with a high probability of having or developing a specific disease. Screening is usually performed as a two-step process where step one identifies individuals at increased risk for the disease so that step two, diagnostic testing, which is definitive but usually more complicated or costly than the screening test, can be limited to these individuals and avoided in low-risk individuals. Alternatively, a diagnostic test can be administered to all individuals,

which is a one step process.

One step and two step approaches

- **Two step approaches**– The two step approach is the most widely used approach for identifying pregnant women with gestational diabetes in the United States. The first step is a glucose challenge test. Screen positive patients go on to the second step, a 100-gram, three-hour oral glucose tolerance test (GTT), which is the diagnostic test for gestational diabetes.
- **One step approach**– The one step approach omits the screening test and simplifies diagnostic testing by performing only a 75-gram, two-hour oral GTT.
- **Screening methods-** Laboratory screening is generally performed with a glucose challenge test.
- **Glucose challenge test-** A 50-gram oral glucose load is given without regard to the time elapsed since the last meal and plasma glucose is measured one hour later (GCT, also sometimes called a "one-hour GTT"). Glucose concentration should be measured in venous plasma using an accurate and precise enzymatic method. The following thresholds have been proposed to define a positive screen:
  ≥130 mg/dL, ≥135 mg/dL, or ≥140 mg/dL (7.2mmol/L, 7.5mmol/L, or 7.8mmol/L)

The original threshold for an elevated test (equivalent to 143 mg/dL [7.9 mmol/L] with current methodology) was arbitrary, used whole blood and a non-specific glucose assay and was validated by its ability to predict a positive three-hour oral GTT Use of a lower threshold (≥130 mg/dL [7.2 mmol/L] with current methodology) provides greater sensitivity, but results in more false positives and would require administering an oral GTT to more patients In a systematic review of cohort studies of screening tests for gestational diabetes by the USPSTF, at the 130 mg/dL (7.2 mmol/L) threshold, sensitivity and specificity were 88 to 99 percent and 66 to 77 percent, respectively [At the 140 mg/dL (7.8 mmol/L) threshold, sensitivity was lower (70 to 88 percent), but specificity was higher (69 to 89 percent).

MATERIALS AND METHODS

This study is a retrospective analysis of (200) cases randomly selected pregnancies diagnosed as gestational and pre- gestational diabetes while following up at the King Abdul Aziz specialist Hospital in Taif, Western Region, Saudi Arabia, during the period from the first of January (2017) to the 31st of December (2017).

The data were collected from the department of Obstetrics and Gynecology's patient registry, covering all booked and unbooked patients following up in the clinics and delivering in the labor and delivery suite. The cases included in the studies are: pregnancies with births above (20) weeks of gestation and the information analyzed included maternal data, labor, method of delivery, complications during pregnancy, congenital anpmalies and neonatal outcomes.

In the hospital records diabetic pregnant patiesnts are classified in two categories: pre-gestational diabetes and gestational diabetes patients who are known to be diabetics are screened with a 50-g glucose challenge test, at (25-28) weeks gestation. For patients who are positive (>7.8 mmol/ L) a (75-g) glucose tolerance test (GTT) or a (100-g) GTT is done.

Many of the diabetic patients are referred to our hospital it is the regional tertiary care center and the most capable of caring for high risk pregnancies.

Patients with pre- gestational diabetes and patients with diabetes were compared regarding the rates of cesarean deliveries, Pre- Eclmpsia, diabetic Keto- acidosis (DKA), pulmonary embolism post- partum hemorrhage wound sepsis, urinary tract infections and birth canal trauma during labor.

Neonatal outcome of patients with pre- gestational diabetes and patients with gestational diabetes were compared regarding the incidence of macrosomia, hypoglycemia, still- birth, respiratory stress disorder, intra- uterine growth restriction, birth trauma, congenital heart disease, admissions to the neonatal intensive care unit (NICU) and neonatal sepsis. All data were analyzed using SPSS (v20) on an IBM compatible personal computer.

RESULTS

List of tables and figures

During the study period, (8900) pregnancies have been recorded, (1500) diabetic patients were identified (16.8 %). there were 1010 gestational diabetics (67.3 %) and 490 pre-diabetics (32.6 %) of the pre- gestational diabetic patients were type l (87.7 %).

Incidence	GDM	DM
Percent	67.3	32.6

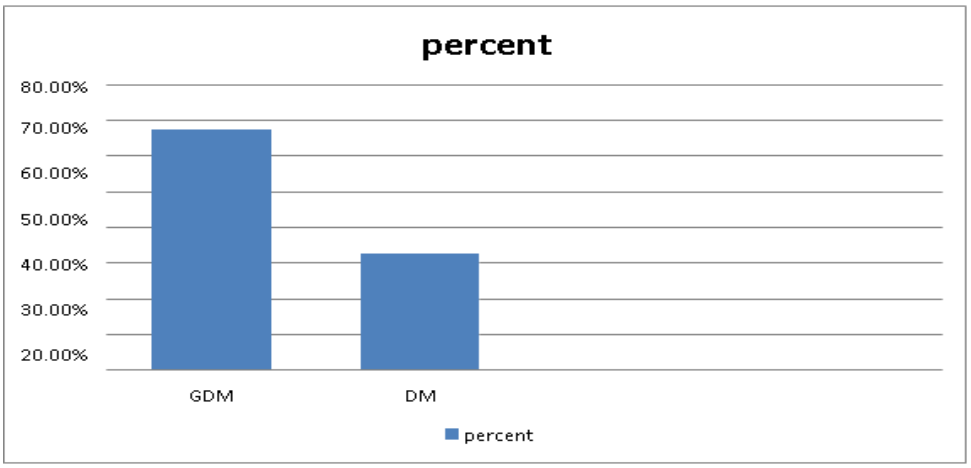


Figure (l): Incidence of GDM and DM.

Of all diabetic cases two hundred patients were randomly selected for analysis there were 125 booked patients who are following up in our hospital and 75 patients who are unbooked and presented for delivery. The booked patients were mostly gestational diabetics (73 %), while the un booked patients were mostly pre- gestational diabetics (27 %). patients were mostly of Saudi nationalities for both groups (75 – 80.

Booking	GDM	DM
Booked	73	27
Unbooked	12	50

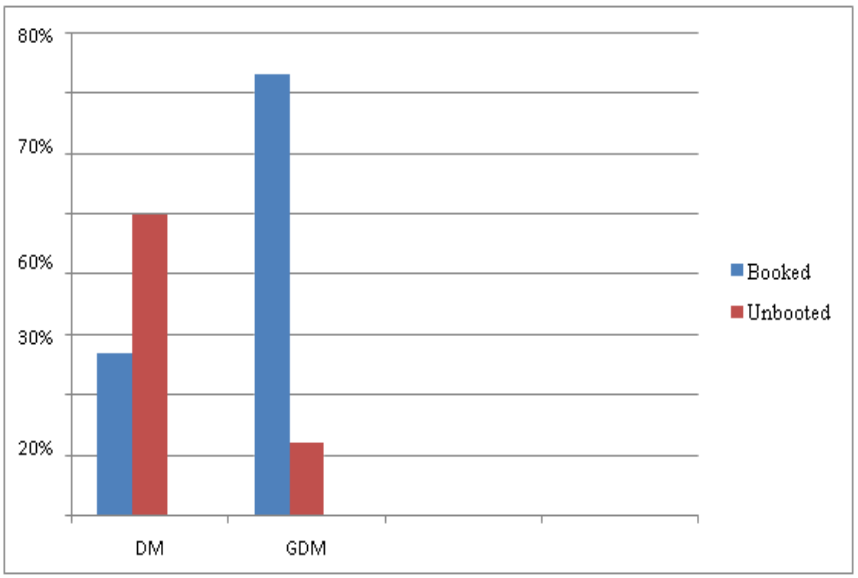


Figure (ll)

The known risk factors for diabetes were analyzed in both groups, starting with the body mass index (BMI) patients with pre- gestational diabetes had a much higher percentage of

obese patients (>25 BMI) than gestational diabetes (45 % compared to 16.7), while patients with BMI values within the normal range were more common with gestational diabetes.

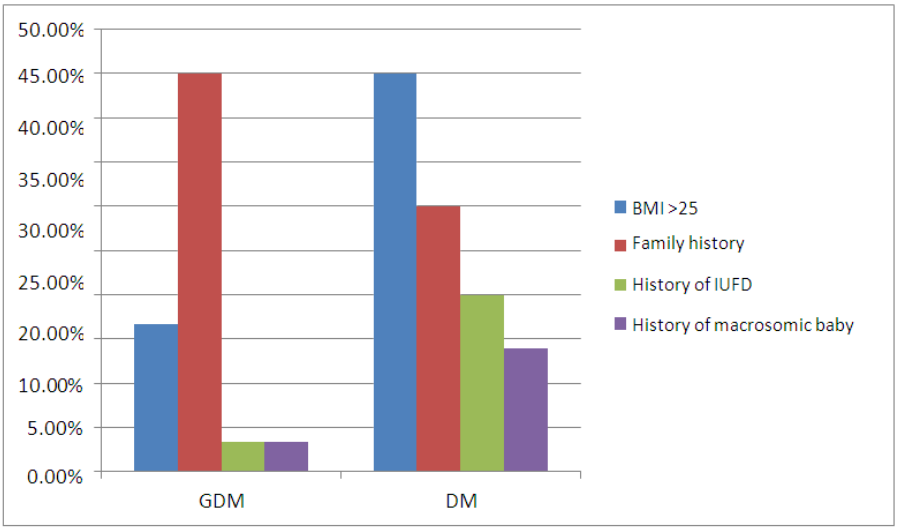
The other risk factors which were assesd are

Family history of diabetes mellitus which was positive in 45% of gestational diabetics and 30% in pre- gestational diabetics.

History of a previous intra- uterine fetal death was more common in pre- gestational diabetics (20%) than in gestational diabetics (3.4%).

Macrosomia occurred more often in pre- gestational diabetic patients (14%) than in gestational diabetics (3.3%).

Risk factors	GDM	DM
BMI > 25	16.7	45
Family history	45	30
History of IUFD	3.4	20
History of macrosomic baby	3.3	14



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Complications

When comparing the complications associated with pre- gestational and gestational diabetes were found the following

The rate of cesarean delivery in the analyzed cases between the two groups was comparable (39% GDM vs. 42% DM).

The incidence of both pre-eclampsia and diabetic ket-acidosis was higher in the pre-gestational diabetic froup than in gestational diabetes group (20% and 7% versus 20% and 1.8%) respectively.

Post- partum hemorrhage was found to be significantly higher in the pre- gestational diabetic patient (17%) compared to diabetics.

Pulmonary embolism and birth canal trauma were higher in gestational diabetics than pre-gestational diabetic patients which could be explained by the relatively low number of selected cases.

Wound sepsis was common in GDM.

Finally, urinary tract infections occurred much more often in pre- diabetics than gestational diabetics during pregnancy (35% compared to 6.8%).

Pregnancy outcome	**GDM**	**DM**
Rate of cesarean section	9	4
PET		
Ketoacidoses	1.8	
P.P.H		17
Pulmonary embolism	4	1
Birth truma	1	
Wound sepsis	1	4
UTI	6.8	5

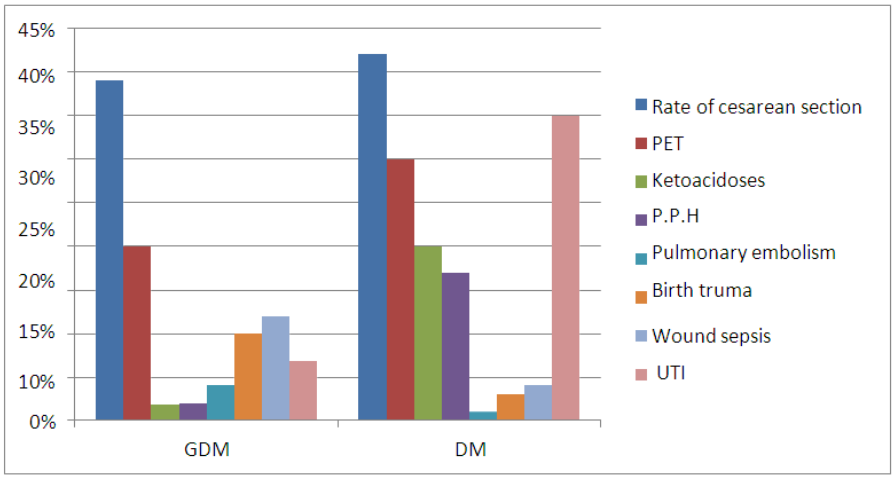


Figure (llll)

As regarding the neonatal outcome

Pre- gestational diabetes was associated with higher rates of complications which are detailed

as follows:

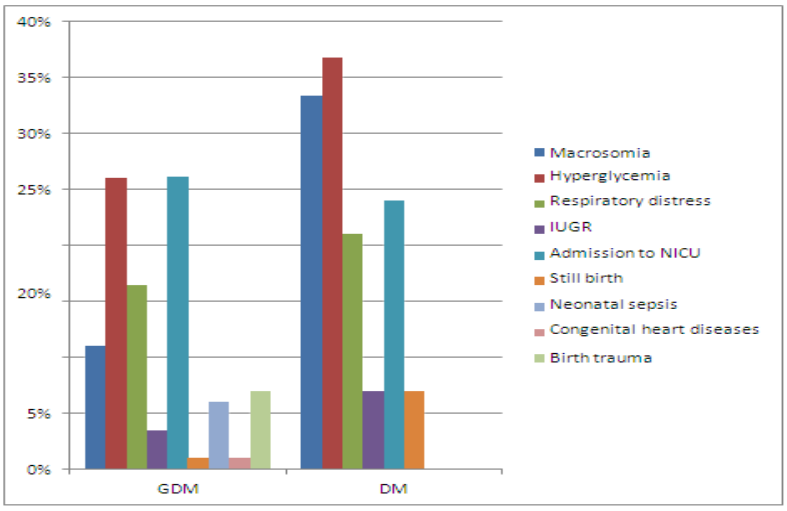
Macrosomia and hypoglycemia were significantly higher in pre- gestational diabetics (33. 4% and 36.8% versus 11% and 26%) respectively.

Respiratory distress and intra- uterine growth retardation incidence were also higher in pre-gestational diabetics (21% and 7% versus 16.5% and 3.5%) respectively.

Due to the relatively small sample size, only 1 case of congenital heart disease was found in gestational diabetes group.

Admissions to the Neonatal intensive care unit was comparable with both groups (26.8% and 24%).

Neonatal outcome	GDM	DM
Macrosomia	11	33.4
Hyperglycemia	26	36.8
Respiratory distress	16.5	21
IUGR	3.5	7
Admission to NICU	26.8	24
Still birth	1	7
Neonatal sepsis	6	
Congenital heart diseases	1	
Birth trauma	7	



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DISCUSSION

Pregnant patients with gestational diabetes and pre- gestational diabetes always had worse perinatal and maternal outcome than patients without diabetes the outcome of patients selected for our study is worse than old, published studies.

The number of stillbirths in our study was higher than comparable studies, which might be attributed to the higher number of un-booked patients.

The rate of macrosomic infants of patients with pre-gestational diabetes was higher than those with gestational diabetes, which agrees with previously published literature. the higher number of macrosomic infants can be explained by both the presence of un-booked deliveries which might have had minimal to no ante-natal care, and by the frequency and quality of follow up.

Surprisingly, the rate of cesarean delivery between the two groups was comparable.

This could be due to the presence of other factors that affected the decision for surgical delivery, such as the presentation of the fetus or other obstetric emergencies this is an area of future studies.

Other complications, such as urinary tract infections, were found to be higher in pre-gestational diabetics than gestational diabetics. in both groups the rates are higher than none-diabetic patients. Lower general immunity associated with diabetes in general is a cause, being with worse with long time disease in pre- gestational diabetes.

Our hospital is a tertiary referral hospital which has over 9000 deliveries per year, and it serves a large geographical area of mainly rural towns and villages. A large number of our patients present at a later stage in pregnancy or at delivery, which makes diagnoses and adequate care much more difficult.

This has led to a worse maternal and neonatal outcome for pre- gestational and gestational diabetic patients for patients who are diagnosed and received follow up early.

Ideally, proper care of diabetic patients of both types in pregnancy requires a multidisciplinary team that includes an endocrinologist, an obstetrician, a dietitian, a fetal medicine specialist, a peri – natalogist, a patient educator and a midwife.

The patient's care should include pre-pregnancy counseling, folic acid ingestion, glycemic control during pregnancy and the fetal observation throughout pregnancy. From the limited data in our study, we were not able to determine which specific part of the patient care was deficient and could be improved, other than improving the service provided as a whole.

Unfortunately, un-booked patients who present late in pregnancy or only for delivery usually have the worst outcome.

One of the main recommendations of our study is to re-enforce the need for early detection of diabetes and proper follow up. this requires the co- operation of public health care centers and the timely referral of said patients to a tertiary center like our hospital.

Recommendations

In pregnancies complicated by diabetes mellitus, a key therapeutic goal across gestation is avoidance of maternal Good glycemic control remains important intrapartum because maternal hyperglycemia during labor increases the risk of fetal acidemia and neonatal hypoglycemia.

Avoidance of hyperglycemia is less critical postpartum, but concern about maternal hypoglycemia increases because of large, rapid changes in maternal hormone concentrations after delivery of the placenta.

It should be noted that intrapartum maternal normoglycemia will not reduce the risk of neonatal hypoglycemia in women with poor antepartum glycemic control, since fetal pancreatic hyperplasia and excessive in utero insulin secretion have been established in response to prolonged exposure to hyperglycemia. These neonates are at risk of developing severe and prolonged hypoglycemia.

Self-blood glucose monitoring, administration of insulin if target blood glucose concentrations are not met with diet alone) resulted in reductions in:

- Preeclampsia
- Birth weight >4000 grams
- Shoulder dystocia

The only potential harm resulting from treatment of GDM was an increased number of prenatal visits. No statistically significant changes in rates of cesarean delivery, induction of labor, small for gestational age neonates, neonatal hypoglycemia, neonatal hyperbilirubinemia, neonatal respiratory complications, birth trauma, or neonatal intensive care unit admission were demonstrated compared with no treatment.

Patients with GDM should receive nutritional counseling by a registered dietitian (when

possible) upon diagnosis and be placed on an appropriate diet. The goals of medical nutritional therapy are to

- Achieve normoglycemia
- Prevent ketosis
- Provide adequate weight gain based on maternal body mass index (BMI)
- Contribute to fetal well-being

Medical nutritional therapy is the initial approach

- Calories are generally divided over three meals and two to four snacks and are composed of about 40 percent carbohydrate, 20 percent protein, and 40 percent fat.
- Self-blood glucose monitoring should be performed to evaluate the effectiveness of medical nutritional therapy.

We recommend a program of moderate exercise as part of the treatment plan for women with no medical or obstetrical contraindications to this level of physical activity.

We recommend initiating insulin therapy in women who do not achieve adequate glycemic control with nutritional therapy and exercise alone.

- We suggest administering insulin when fasting blood glucose concentration is ≥95 mg/dL (5.3 mmol/L) or one-hour postprandial blood glucose concentration is ≥130 to 140 mg/dL (7.2 to 7.8 mmol/L), or two-hour glucose is >120 mg/dL (6.7 mmol/L) on two or more occasions within a one-week interval despite dietary therapy).
- In women who require insulin therapy, we suggest monitoring glucose upon awakening and one or two hours after each meal to guide medical management. Our goal for fasting blood glucose concentration is <95 mg/dL (5.3 mmol/L) and for one- hour postprandial blood glucose concentration the goal is <130 to 140 mg/dL (7.2 to 7.8 mmol/L) and for two hours postprandial <120 mg/dL (6.7 mmol/L).

We suggest prescribing insulin rather than oral anti- hyperglycemic agents during pregnancy. Glyburide or metformin is a reasonable alternative for women who refuse to take, or are unable to comply with, insulin therapy. Although use of metformin results in a lower rate of macrosomia than use of glyburide, metformin users are more likely to require supplemental insulin to maintain euglycemia than glyburide users. The long-term effects of transplacental passage of oral anti-hyperglycemic agents are not known.

Women with gestational diabetes are at increased risk of developing diabetes after pregnancy. We suggest they be tested postpartum and that they receive screening at least every three years thereafter. Lifestyle interventions (weight loss, exercise) are clearly beneficial for reducing the incidence of diabetes.

Long-term risk

A history of GDM is predictive of an increased risk of developing type 2 diabetes, type 1 diabetes, metabolic syndrome, and cardiovascular disease.

- **Impaired glucose tolerance**
- **Metabolic syndrome** – Women with GDM in their prior pregnancy are more likely to have metabolic syndrome, an atherogenic lipid profile, and early vascular dysfunction at ≥3 months postpartum than women without previous GDM.
- **Type 2 diabetes**

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