

The Harm and Prevention and Control of Gestational Diabetes Mellitus

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Abstract. Gestational diabetes is one of the challenges that many pregnant mothers face during this particular stage. Gestational diabetes is not only harmful to pregnant women, but also has adverse effects on offspring. Overcoming this difficulty is not so easy, expectant mothers need to control many aspects, from exercise, medication, and diet. This article analyzes the etiology and risk factors of gestational diabetes and makes recommendations based on this. The diet for gestational diabetes should be small and frequent meals, and the corresponding calorie intake should be based on one's body weight. The type of food should be less fat and easy to digest and eat more foods that have a low impact on blood sugar, such as whole grains, beans, cucumbers, and tomatoes. Patients with gestational diabetes are suitable for soothing aerobic exercise. Exercises ideal for pregnant women mainly include yoga, walking, gymnastics, etc. The time for each activity is generally 20 to 30 minutes.

Keywords: Gestational Diabetes; Pregnant Women; Nutrition; Public Health.

1. Introduction

Gestational diabetes is a widespread condition that affects pregnant women. Pregnant women with onset of diabetes during pregnancy is GDM, and women with diabetes before pregnancy is PGDM. Patients with gestational diabetes have persistently elevated blood sugar levels, which disrupt normal endocrine and other bodily systems and threaten the fetus's growth in the mother's womb. Because the fetus is absorbing the mother's nutrition, if the mother's nutrition supply is insufficient, it may affect the healthy development of the fetus. Gestational diabetes also has a significant impact on the health of pregnant women [1]. It will cause certain damage to various organs of pregnant women, especially kidney function. It will increase the burden on pregnant women's kidneys and lead to kidney diseases. In severe cases, the risk of kidney failure may occur, and it is easy to induce other complications of diabetes, leading to pregnancy abortion [1]. All pregnant women should have a fasting blood sugar test at their first antenatal visit. Suppose a pregnant woman's glycemic index is standard in the first trimester. If the pregnant lady is 24–28 weeks along, an oral glucose tolerance test with 75 grams of glucose is necessary to detect diabetes. Therefore, every pregnant woman needs to be tested for gestational diabetes during pregnancy, and there are many causes of gestational diabetes. Prevention of gestational diabetes is mainly through the intervention of diet and exercise, and drugs can also be used to assist. This article will analyze these contents to guide blood sugar management during pregnancy and avoid gestational diabetes.

2. Gestational Diabetes

2.1. What is The Gestational Diabetes?

Two forms of diabetes can occur in pregnant women. First, "diabetes with pregnancy," often known as gestational diabetes, occurs when a woman develops the disease before she conceives. During pregnancy, some women develop or are diagnosed with gestational diabetes mellitus (GDM), a form of diabetes that is not related to insulin resistance. To determine if a patient has PGDM, the FPG index should be higher than or equal to 7.0mmol/l, and the ogtt2h index and random blood glucose must all be above 11.1mmol/l. (Table 1, Table 2, Table 3) [2].

On the other hand, the primary methods for detecting another type of gestational diabetes, GDM patients, include the detection of OGTT at the 24th to 28th weeks of pregnancy and at the first visit

after the 28th week of pregnancy. The diagnostic standard of 75g OGTT is that the blood glucose value detected before and 1, 2, and 3 hours after taking sugar should be lower than 5.1, 10.0, and 8.5mmol/l. If any of the blood glucose values in the test exceeds this standard value, it is GDM. In addition, pregnant women also need to check the FPG index at 24 to 28 weeks of gestation. If the index of FPG is higher than 5.1mmol/l, this pregnant woman can be diagnosed as a GDM patient [3].

A hormone that is produced by the placenta can interfere with the body's ability to use insulin effectively in pregnant women who have gestational diabetes mellitus (GDM). Instead of being taken up by the cells, glucose builds up in the blood as it circulates through the body. In contrast to type 1 diabetes, gestational diabetes is caused by other hormones produced throughout pregnancy, which may reduce the effectiveness of insulin. Insulin resistance is the medical term for this condition. Type 1 diabetes is caused by a lack of insulin. Insulin resistance causes gestational diabetes. After the baby is born, the symptoms of gestational diabetes disappear.

Table 1. Changes in birth weight for babies born to women of various pre-pregnancy body mass indices

Gestational weeks	n	Total		Group A		Group B	
		Values (mmol/l)	P	n	Volume (mmol/L)	n	Volume (mmol/L)
4-5 weeks	1962	5.08+/-0.43	Less than 0.001	259	5.00+/-0.38	1378	5.05+/-0.42
6-7 weeks	3207	4.92+/-0.46	Less than 0.001	479	4.86+/-0.38	2136	4.90+/-0.47
8-9 weeks	2095	4.80+/-0.45	Less than 0.001	305	4.72+/-0.51	1378	4.78+/-0.42
10-11 weeks	4795	4.71+/-0.41	Less than 0.001	719	4.65+/-0.37	3269	4.69+/-0.40
12-13 weeks	11959	4.68+/-0.4	Less than 0.001	1780	4.59+/-0.37	8041	4.66+/-0.39
14-15 weeks	3746	4.62+/-0.41	Less than 0.001	618	4.51+/-0.40	2475	4.61+/-0.40

Table 2. Number of cases of gestational diabetes in four groups defined by fasting plasma glucose and body mass index before pregnancy

FPG	Total		Group A		Group B		Group C	
	n	GDM, n(%)	n	GDM, n(%)	n	GDM, n(%)	n	GDM, n(%)
<4.10mmol/L	2079	228(11.0)	473	43(9.1)	1395	140(10.0)	180	36(20.0)
4.10-4.59mmol/L	11563	1440(12.5)	2180	196(9.0)	7920	993(12.5)	1221	198(16.2)
4.60-5.09mmol/L	14562	2867(19.7)	2109	262(12.4)	9879	1863(18.9)	2081	587(28.2)
5.10-5.59mmol/L	4965	1759(35.4)	539	124(23.0)	3094	1001(32.4)	1020	475(46.6)
5.60-6.09mmol/L	745	422(56.6)	38	24(41.4)	416	217(52.2)	194	130(67.0)
6.10-6.99mmol	173	90(52.0)	10	1(10.0)	80	40(50.0)	48	31(64.6)

Table 3. Fetal plasma glucose 5.10 mmol/L between 19th and 24th weeks of pregnancy for screening of GDM in women of varying BMIs before pregnancy

FPG	Total		BMI<24.0kg/m ²		BMI >= 24.0kg/m ²	
	n	GDM, n(%)	n	GDM, n(%)	n	GDM, n(%)
<5.10mmol/L	2285	294(12.9)	1952	236(12.1)	333	58(17.4)
5.10-6.99mmol/L	200	126(63.0)	121	64(52.9)	79	62(78.5)
Total	2485	420(16.9)	2073	300(14.5)	412	120(29.1)

2.2. What Are The Reasons for Gestational Diabetes?

Gestational diabetes mellitus is a condition whose etiology and pathogenesis are extraordinarily convoluted and incompletely understood. Some pregnant women may be at risk for developing gestational diabetes because of the one-of-a-kind metabolic changes that take place during pregnancy, including increased insulin resistance and relatively insufficient insulin secretion. Risk factors for developing gestational diabetes include being over the age of 35 while pregnant, being a high position of weight, eating a diet high in sugar and fat for an extended period of time, and having a family history of diabetes. The need for more glucose is also a major consideration. Fasting blood glucose levels in pregnant women may be higher than expected because of adaptive changes in the mother, such as increased glucose utilization, insulin clearance of glucose, and continuous transfer of maternal glucose to the fetus throughout the night [4]. A third important factor is insulin resistance and relative insufficiency of insulin secretion. Placental lactogen, estrogen, progesterone, tumor necrosis factor, leptin, and other cytokines synthesized by the placenta all antagonize insulin, which reduces the sensitivity of pregnant women's tissues to insulin [5]. Pancreatic beta-cell function increases compensatively during pregnancy to promote insulin secretion, which increases as pregnancy progresses [4]. After the placenta is delivered, the anti-insulin substances secreted by the placenta disappear rapidly, and the state of insulin resistance during pregnancy gradually recovers.

The pregnant woman's age may also be a major factor in inducing gestational diabetes. Pregnancy age greater than or equal to 35 years, overweight or obese prior to pregnancy, having a previous history of having trouble tolerating glucose, polycystic ovary syndrome [5]. These pregnant women are at a higher risk for developing gestational diabetes compared to other groups of young women. Women who have a history of diabetes in their family are also at a higher risk of developing diabetes during pregnancy. Women who have had a stillbirth, miscarriage, macrosomia, fetal malformation, or polyhydramnios in a previous pregnancy and delivery are at an increased risk for developing diabetes during pregnancy [5].

Eating too much sugar can make pregnant women more likely to develop gestational diabetes, but eating sugary foods does not make a person more likely to develop gestational diabetes. However, if people have been diagnosed with gestational diabetes, controlling their carbohydrate intake is essential to effectively control the blood sugar levels.

2.3. Symptoms of Gestational Diabetes

The vast majority of pregnant women show no signs or symptoms of having gestational diabetes. A blood sugar test is the only way to find out, and doctors recommend getting one between the 24th and 28th week of pregnancy. An increase in thirst is one of the severe signs and symptoms of gestational diabetes, which can affect some pregnant women. Consuming more liquids than usual and experiencing persistent feelings of thirst are both possible symptoms of gestational diabetes [6]. Gestational diabetes can make them feel more tired than usual. The mouth is parched, despite excessive drinking, can be another indicator of gestational diabetes.

3. Methods for Managing Diabetes During Pregnancy

3.1. Maintain a Healthy Diet to Manage Pregnancy-Related Diabetes

For gestational diabetes mellitus, diet therapy is the most fundamental method. Most patients can control blood sugar very well by simply treating their blood sugar through diet. Therefore, once diagnosed, it is necessary to strengthen gestational diabetes mellitus. Control of diet. So how should gestational diabetes patients control their diet?

Patients with gestational diabetes should calculate their total calorie intake daily according to their physical condition. It is best to listen to the guidance and advice of professional doctors. For example, the staple food should be controlled at about corn flour, soba noodles, and oatmeal noodles should be used. Coarse grains such as etc. are the main ones, and the intake of rice, white flour, etc. should be reduced [7]. A reasonable total calorie intake is helpful for stable blood sugar control and weight loss. Gestational diabetes patients should achieve a reasonable and balanced diet, not picky eaters and partial eclipses, and diets should be diversified, such as eating more vegetables and fruits with low sugar content, leeks, carrots, tomatoes, etc. can be eaten appropriately [7].

After pregnant women have high blood sugar, the daily diet must be light, and the intake of vegetable oils and animal fats must be controlled. When cooking, try to choose cooking methods such as steaming, boiling, and stewing; instead of frying, stay away from foods such as lard and butter [8]. In addition, animal liver, egg yolk, butter, etc. should be eaten less or not, otherwise, it may lead to increased blood lipids and increase the probability of arteriosclerosis. Gestational diabetes controls blood sugar through diet, and avoiding overeat is very important. Therefore, there are developing good eating habits every day is necessary. The harmful effects of gestational diabetes on pregnant women and their unborn children can be mitigated by maintaining a healthy diet in conjunction with regular exercise, a positive state of mind, and various other forms of comprehensive conditioning [8].

3.2. Control Gestational Diabetes - Exercise Control

To effectively manage gestational diabetes, it is essential to maintain an active lifestyle and eat a balanced diet. Moderate exercise on a regular basis has been shown to help control blood sugar, which may reduce or postpone the need for insulin in people with type 2 diabetes [9]. This is because exercise and activity of this kind raise one's metabolism, lowering one's blood sugar. Exercises with a high aerobic component, such as walking, swimming, and dancing, should be performed for thirty minutes to one hour, three to five times a week (at least 150 minutes per week) [9]. Two or three times a week, engage in strength training activities such as Pilates, lifting weights, or utilizing resistance bands (have a day off in between sessions).

3.3. Control Gestational Diabetes - Insulin Control

It is necessary to know that doctor's advice must change the insulin dose, and pregnant women should not change it by themselves. Because insulin dosage is related to gestational age, basal blood glucose monitoring, and body weight, these values vary daily for pregnant women. More extraordinary is that the insulin content may gradually increase due to the increase in gestational age. With the increasing gestational weeks, the secretion of anti-insulin hormones in the body will also increase [10]. This is especially true in the later stages of pregnancy, gestational diabetes affects the vast majority of women, and the insulin needs of pregnant women also change significantly. Therefore, pregnant women try to do their fasting blood sugar and postprandial blood sugar for three meals every day as much as possible. An endocrinology examination is also required, and monitoring blood sugar and adjusting insulin dose during gestational diabetes, the daily diet of pregnant women is also essential. It is recommended that pregnant women eat more fruits and vegetables, reduce carbohydrate intake, and add whole grains to their staple food [10].

4. How to Control Gestational Diabetes?

4.1. Through Drugs to Treat- What is The Best Treatment for Gestational Diabetes?

When it comes to treating gestational diabetes, insulin is the first-choice medication. Isophane (NPH) and short-acting insulins such as normal recombinant (Humulin R) and insulin analogs aspart (Novolog) and lispro are commonly used in insulin regimens [11]. Regarding controlling blood sugar levels during pregnancy, insulin is the traditional first-choice medicine, as it is the most effective at regulating blood sugar levels and does not cross the placenta. It is, therefore, safe for the newborn. A syringe, an insulin pen, or an insulin pump can be used to administer insulin [11].

4.2. Gestational Diabetes - Nutritional Supplement

4.2.1 Balanced Diet - Dietary Guidance for Gestational Diabetes

Consuming a wide variety of nutritious foods is essential to maintaining a nutritious diet. While shopping, reading food labels might help pick out more nutritious options. When following a particular diet, discussing with the doctor about eating habits to ensure a well-rounded diet is necessary [12]. The majority of your daily calorie intake should come from whole foods like fruits and vegetables. Generally, a diet low in saturated fat and high in protein is recommended. Eat starchy vegetables like corn and peas in moderation and whole grains like bread and rice on a regular basis. [12] Sugary drinks, juices, and foods are high in calories and contribute little to your daily calorie needs, so cutting back on them can help you maintain a healthy weight. Reducing your portion sizes at each of your three main meals and your one or two snacks each day. Do not go too long without eating. Maintaining roughly the same levels of the three macronutrients (fats, proteins, and carbohydrates) in the diet from one day to the next may be helpful in maintaining a constant level of blood sugar [12].

4.2.2 Dietary Guidance For Carbohydrates

Carbohydrates should account for fewer than half of the calories consumed each day. The vast majority of carbs can be found in foods that are high in starch or sugar. This category includes items such as bread, rice, peas, corn, and a variety of another types of sweets. Substituting high-fiber carbs and whole grains for refined sugars and flours can improve health. All of these various carbohydrates are collectively referred to as "complex carbs." [13]. Keeping away from foods that are high in simple carbohydrates such as potatoes, French fries, and other types of sweets is something you should make it a point to do. This is due to the fact that they create a rapid increase in the level of blood sugar after consuming such items [13]. Consuming a diet high in vegetables is beneficial to both health and blood sugar levels. The amount of carbohydrates that are contained in food is measured in grams [13]. The best is consuming at least six servings every day. One portion is equivalent to 1 slice bread, 1-ounce (28 grams) cereals, 1/2 cup (105 g) of cooked rice or pasta is equivalent to 1 English muffin (full size).

5. Conclusion

There are two main types of gestational diabetes: some pregnant women develop diabetes before pregnancy, and some women have diabetes during pregnancy. Regardless of the type of diabetes, pregnant women should pay attention to adhering to a controlled diet, keep doing aerobic exercise every day, and control their insulin index. Maintaining balanced nutrition during pregnancy is critical in preventing pregnant women from acquiring diabetes. Gestational diabetes should be based on the patient's blood sugar level to arrange a proper diet, and it is best to check the blood sugar value every day. Eat more fresh vegetables in daily life. Vegetables do not contain sugar, which can increase satiety. When blood sugar is well controlled, you can eat lean meat, milk, egg yolks, and the like in moderation, improving the body's immunity—supplement vitamins and proteins to promote the fetus's growth and development. Generally, try to eat porridge and soft noodles as little as possible.

The sugar content is relatively high, and the fruit should be small. Generally speaking, the intake of sugar should be strictly limited. During pregnancy, aerobic exercise such as walking and swimming every day will help pregnant women control blood sugar very well. Every pregnant woman needs to be aware of some of the main symptoms of gestational diabetes and learn how to prevent the disease.

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