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Perspective

Diagnosis, prevention and management of gestational diabetes mellitus

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Abstract

Gestational diabetes mellitus (GDM) is a common complication during pregnancy, which is closely related to not only elevated perinatal morbidity and mortality in mothers and children, but also long-term adverse health events. Thus, a focus on the clinical diagnosis, prevention and management of GDM is of crucial importance. In this paper, we introduced the latest progress in the diagnosis and treatment of hyperglycemia during pregnancy and emphasized that the prevention and management of GDM must be given enough importance throughout pregnancy, that is, planning and preparation prior to pregnancy, lifestyle intervention and pharmacotherapy during pregnancy, and postpartum follow-up.

Keywords: Gestational diabetes mellitus; Diagnosis; Prevention; Management; Postpartum follow-up

Introduction

Gestational diabetes mellitus (GDM) is diabetes diagnosed during pregnancy that is not clearly type 1 or 2 diabetes.[1] Approximately 84% of hyperglycemia cases during pregnancy are due to GDM, while the remaining 26% are due to preexisting type 1 or 2 diabetes, which is defined as diabetes in pregnancy (DIP). The International Diabetes Federation indicates that 1 in 6 infants are born to mothers with some form of hyperglycemia during pregnancy.[2]

Accumulated evidence has shown that hyperglycemia during pregnancy not only increases perinatal morbidity and mortality in mothers and children but also increases the manifestation of disease later in life.[2] For example, women with GDM have a higher incidence of preeclampsia (PE), cesarean deliveries, and birth trauma. Their offspring are more likely to be large for gestational age and premature, and to have neonatal respiratory distress syndrome and congenital malformation. Moreover, both the mother and offspring are at a higher risk of obesity, type 2 diabetes mellitus (T2DM), and metabolic syndrome later in life. The main pathophysiological features are insulin resistance

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and hyperinsulinemia caused by excess maternal circulating glucose, lipids, and amino acids.[3] It is important to know that the Hyperglycemia and Adverse Pregnancy Outcomes Study (HAPO) also indicated that mild hyperglycemia in pregnancy can cause poor outcomes and that the risks of poor outcomes directly correlated with maternal blood glucose levels but without clear inflection points.[4]

The risk factors for GDM include older age, family history of diabetes, overweight and obesity, excessive weight gain during pregnancy, poor history of pregnancy outcomes, and high-risk ethnicity group.[5] China is a country with a high prevalence of diabetes. A national survey conducted by the China Noncommunicable Disease Surveillance Group reported that in 2010, the prevalence of diabetes in China reached 11.6%, which is much higher than the rates in 1994, 2000–2001, and 2007 (2.5%, 5.5%, and 9.7%, respectively).[6] Furthermore, with the development of the social economy, the urbanization, the adoption of a Western lifestyle, and the gradual implementation of the two-child policy, an increasing number of Chinese women of reproductive age become pregnant at an advanced age, with overweight or obesity, a history of GDM, and a high risk of hyperglycemia during pregnancy.

Screening for and treatment of GDM have a significant impact on cost-effectiveness estimates. Numerous studies have shown that the implementation of screening and intervention for GDM can reduce the risks of perinatal and, most likely, long-term diseases. Thus, the costs of diagnosis and intensive treatment of GDM permit significant monetary savings in terms of costs linked to maternal and neonatal morbidities.[7,8] Thus, a focus on prevention, screening, early diagnosis, and management of hyperglycemia in pregnancy is of great importance.

Diagnosis of GDM

The International Federation of Gynecology and Obstetrics (FIGO) Initiative on Gestational Diabetes Mellitus in 2015 adopts and supports the recommendations of the International Association of Diabetes in Pregnancy Study Groups (2010) and the World Health Organization (WHO; 2013) on the diagnosis of GDM and the WHO (2013) criteria for the diagnosis of DIP.[2]

Specifically, GDM needs to be defined using a single-step 75-g oral glucose tolerance test (OGTT) between 24 and 28 gestational weeks or at any other period during pregnancy. When the fasting plasma glucose (FPG) level is 5.1–6.9 mmol/L (92–125 mg/dl) and/or ≥10.0 mmol/L (180 mg/dl) 1 h post 75-g OGTT and/or 8.5–11.0 mmol/L (153–199 mg/dl) 2 h post 75-g OGTT, evaluation for GDM needs to be performed.[9,10] A diagnosis of DIP should be made at any time during pregnancy when the FPG level is ≥7.0 mmol/L (126 mg/dl) and/or the 2-h plasma glucose level is ≥11.1 mmol/L (200 mg/dl) after a 75-g OGTT or the random plasma glucose level is ≥11.1 mmol/L (200 mg/dl) with symptoms of diabetes.[10] However, FIGO emphasizes that all countries need to consider resource settings, and adapt and promote pragmatic options to ensure highly cost-effective GDM screening and testing methods.[2]

The recommendation for testing and diagnosis of GDM published by the National Health and Family Planning Commission in China in 2014 was similar to the FIGO guidelines.[5] However, China is a country with a vast territory and unbalanced distribution of health resources. Thus, to reduce the clinical economic burden, the two-step approach of screening with FPG level followed by a 75-g OGTT is recommended for low-resource rural areas. First, screening for FPG level should be performed between the 24th and 28th gestational weeks. If the FPG level is <4.4 mmol/L (80 mg/dl), no further testing is needed. If FPG level is ≥5.1 mmol/L (92 mg/dl), GDM can be diagnosed without a 75-g OGTT. Only women with 4.4 mmol/L ≤ FPG <5.1 mmol/L need to return for the 75-g OGTT. Based on this strategy, approximately one-half of the standard 75-g OGTTs in China can be potentially avoided.[11]

Another study in China also showed that FPG levels of ≥5.1 mmol/L (92 mg/dl) in the first trimester could not be used to diagnose GDM. Only 37.0%, 52.7%, and 66.2% of women with FPG levels of 5.10–5.59, 5.60–6.09, and 6.10–6.99 mmol/L, respectively, in the first trimester developed GDM. Thus, the 75-g OGTT needs to be performed between the 24th and 28th gestational weeks to rule out GDM and consider women with 6.10 mmol/L ≤ FPG levels <7.00 mmol/L in the first prenatal visit as having GDM to be treated with diet and exercise. Meanwhile, women with 5.10 mmol/L ≤ FPG levels ≤6.09 mmol/L should be considered a high-risk group for developing GDM and provided proper nutrition and exercise recommendation.[12]

Prevention and management of GDM

Planning and preparation before pregnancy

China is a country with a high burden of diabetes, and the age at onset of T2DM among women is decreasing. Furthermore, women of reproductive

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