

## Simple Screening Using Ultrasonography for Prediction of Gestational Diabetes Mellitus

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Gestational diabetes mellitus (GDM) is a disease status of glucose intolerance that is first recognized during pregnancy. The ongoing epidemic of obesity has led to increased incidence of GDM and type 2 diabetes mellitus in women of childbearing age [1]. As maternal obesity and diabetes increases the risk of metabolic consequences in offspring [2], the prediction and treatment of GDM is essential. It is well-known that Asian women are at a high risk of GDM [3], and genetic factors related to pancreatic  $\beta$ -cell function rather than insulin resistance contribute to the development of GDM [4]. Koo et al. [5] reported the recent prevalence of GDM in Korea using data from nationwide health insurance and claimed that it is at about 7.5%, and that the rate was steadily increasing (5.7% in 2009 vs. 9.5% in 2011). In addition, they reaffirmed the gestational age as a major risk factor of GDM (age <30 vs. age  $\geq$ 30, 6.5% vs. 11.3% in 2011). Since marriage and pregnancy are being increasingly delayed in Korea, GDM screening is becoming more important.

The current screening test of GDM are performed at 24 to 28 weeks of gestation; 75-g oral glucose tolerance test (OGTT) or 50-g (non-fasting) screen followed by a 100-g OGTT for those who screen positive (Table 1) [1]. However, there is no official screening test to predict the occurrence of GDM before 24 weeks of gestation. In non-Asian populations, pre-pregnancy body mass index (BMI) is the most significant risk factor for GDM. On the other hand, in Korea, the contribution of pre-pregnancy BMI is low because of the low population fraction of GDM with BMI >25 kg/m<sup>2</sup> [6]. Sommer et al. [7] reported

that the risk of GDM increases when there is a large amount of subcutaneous fat during early pregnancy in South Asian population. In addition, Kennedy et al. [8] and Suresh et al. [9] revealed that abdominal subcutaneous fat thickness (ASFT) measurement was better for predicting adverse pregnancy outcome than pre-pregnancy BMI.

Yang et al. [10] measured ASFT at 1st trimester and performed 2-step OGTT at 2nd trimester in about 300 pregnant women. The authors found that ASFT is highly correlated with the risk of GDM than well-established risk factors such as age and BMI, and suggested a cut-off value to discriminate the high-risk groups. This could be helpful to physicians because ASFT can be easily obtained during routine obstetric screening and it is cost-effective. Furthermore, due to the limitation of choice of imaging during pregnancy, the proposed test is expected to be a preferable option for screening.

However, some questions remain about the role of subcutaneous fat in GDM. Although recent studies suggested subcutaneous adipose tissue as a surrogate of insulin resistance [11, 12], visceral adipose tissue has traditionally been regarded as a major cause of insulin resistance development. Visceral adipocytes are more metabolically active, lipolysis sensitive, and insulin-resistant than subcutaneous adipocytes [13]. Visceral fat thickness measurement is expected to be limited because of uterus and fetus, but it might be a more reliable indicator than ASFT measurement. In addition, further studies are warranted to determine the effect of ASFT measurement on progression from GDM to type 2 diabetes mellitus after childbirth.

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**Table 1.** Current recommendation for screening of gestational diabetes mellitus by Korean Diabetes Association

Screening test
1. All mothers should be tested for overt diabetes at their first prenatal visit by fasting plasma glucose, random plasma glucose, or A1C [A].
2. Gestational diabetes mellitus (GDM) can be diagnosed by either of two strategies.
2-1. Conduct a 2-hour 75-g OGTT at 24 to 28 weeks of gestation in pregnant women not previously known to have diabetes or GDM (one-step approach) [B].
2-2. When using “two-step approach,” conduct a 1-hour 50-g glucose loading test at 24 to 28 weeks of gestation in pregnant women not previously known to have diabetes or GDM. If the plasma glucose level measured 1-hour after the load is $\geq 140$ mg/dL (or $\geq 130$ mg/dL for mothers at high risk), proceed to a 100-g OGTT [E].

Adapted from Korean Diabetes Association [1].

A1C, glycosylated hemoglobin; OGTT, oral glucose tolerance test.

## CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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