

Family Physician Corner

Screening for Gestational Diabetes

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The development of screening and diagnostic criteria for gestational diabetes mellitus (GDM) has been very controversial. The failure to reach agreeable threshold values has hampered the true comparisons between researchers in terms of fetal and maternal morbidity. The objective of this article is to outline a brief historical background of the evolution of the currently used criteria. It gives a historical preview of the use of screening and diagnostic methods for GDM in Bahrain.

GDM is defined as glucose intolerance with onset or first detection during pregnancy¹. GDM occurs in 2-5% of all pregnancies in the US¹. The incidence of GDM in Bahrain was 2.8% according to a study published in 1989². The prevalence of GDM is proportionate directly to the prevalence of type 2 diabetes mellitus (DM) and ethnic background¹. Major risk factors for GDM include: increasing maternal age, family history of diabetes, history of GDM in prior pregnancy and increased pre-gravid body mass index (BMI)¹.

Screening for GDM in North America is based on 50g one hour glucose challenge test (GCT) performed routinely during the 24-28 weeks of gestation. Whether to universally screen all pregnant women or to confine this screening test to high-risk group remains debatable. The threshold for abnormal screen is 140mg/dl³.

For women who screened positive on GCT, 100g three hour oral glucose tolerance test (OGTT) is performed. Different screening and diagnostic strategies recommended by the WHO are used outside North America³.

In Bahrain, the threshold value for 50g GCT is 140mg/dl. For women who screened positive on GCT, 75g OGTT is performed with three hours diagnostic readings.

The criteria adopted by the American Diabetes Association and the American College of Obstetric and Gynecology were initially proposed by the National Diabetes Data Group (NDDG). These criteria were derived from a pioneer work by O'Sullivan and Mahan in 1964⁴. Their landmark study remains to be the source of the currently used diagnostic criteria. The NDDG has modified and published their figures. Over the last few decades, however, these figures remained to be a high source of academic debate and practical uncertainty⁴.

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O'Sullivan and Mahan in their landmark study in 1964 study derived their figures from a major project on maternal and fetal medicine in 1950s initiated by the Boston City Hospital and Boston Lying-In Hospital⁵.

Threshold values were calculated and validated by their further ability to predict for future diabetes development in women in the non-gravid state.

In 1979, the NDDG published a conversion of the O'Sullivan values measured in whole blood to those measured in plasma⁵.

In 1973 O'Sullivan and associates proposed the use of one hour screening test. Whole blood glucose of 130mg/dl (143mg/dl, plasma) was considered a positive screening test⁶.

Carpenter and Coustan, in their work to evaluate and establish screening test for GDM, concluded that one hour post glucola plasma test is superior over other tests for routine GDM screening. They reviewed the NDDG three hours OGTT criteria and modified it with lower threshold points. These lower points were derived from the use of more specific enzymatic assays in blood sugar determination⁶.

In 1987 Langer et al, through their work, advised that one single abnormal reading on 100g OGTT NDDG readings warrants therapy, as it was associated with adverse fetal outcome if left untreated⁷.

Four international workshops on GDM took place since then but failed to gain universal agreement on diagnostic threshold values^{9,10,13}.

In Bahrain, the earliest document found was a guideline issued in 1982 by the Obstetrics and Gynae department in Salmaniya Medical Center (SMC). It states, "all pregnant women during their routine antenatal visits should be tested for glycosuria". If the lady was tested positive twice for glycosuria, then she should undergo fasting blood sugar test (FBS). If FBS was above 105mg/dl, sugar tolerance curve should be done.

The reference does not clarify whether the lady should test positive for glycosuria twice in the same setting to qualify for the "sugar tolerance curve" or on separate occasions. It does not state what is meant by "sugar tolerance curve" or what are the abnormal values. It does not clearly state that this sugar test is equivalent to OGTT.

From 1986 onward a screening program for the detection of GDM was first introduced in Salmaniya Medical center (SMC) and the health centers². All patients at 28-30 weeks gestation were screened with 50g GCT which was called Glucose Tolerance Test of Pregnancy (GTTP). Fifty gram load was chosen, as it's less nauseating and more tolerable².

GTTP was considered positive if the plasma glucose was 140mg/dl and above. Those who test positive on GTTP were offered 50g OGTT. The plasma glucose levels were measured by the glucose oxidase method using a Beckman analyzer². The criterion

for GDM or full raised GTT was the combination of one hour level of 162mg/dl or more *and* two hour level of 126mg/dl or more. This criterion was chosen as it has been shown to predict for the development of peri-natal morbidity and mortality and the subsequent emergence of overt diabetes in an Australian population².

Any one abnormal OGTT reading was considered half raised OGTT and the patient was referred to secondary care vicinity where she was treated and monitored closely.

From 1986 to 2000 no major alteration in the screening and diagnostic criteria took place.

In July 2000, the Biochemistry unit in SMC issued a circular notifying ante-natal services providers in the Ministry of health that OGTT loading dose has changed from 50gram to 75grams.

In October 2003, the Obstetric and Gynecology department in SMC in association with the ante-natal committee in the Primary Care Directorate issued a flowchart, adapted from the Joslin Center, updating the ante-natal services providers with the following points:

1-Pregnant ladies at risk should be screened as early as possible with GCT or GTTP. If GCT <7.8, another GCT should be undertaken in the 24th-28th weeks of gestation. If GCT ≥ 7.8, OGTT with 75 gram glucose load is to be done .

2-Ladies with Impaired Glucose Tolerance (IGT) or one abnormal reading on OGTT can be managed in the primary care setting.

The global controversy over the screening and diagnostic criteria for GDM has been reflected in the practice in Bahrain. This uncertainty mandates serious, thorough and local research dedicated towards achieving valid figures that can predict maternal and fetal morbidity as consequence of GDM.

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