



Correspondence

Maternal hyperglycemia and the oral glucose tolerance test



To the Editor,

I read the article entitled “Maternal hyperglycemia and the 100-g oral glucose tolerance test” [1] on gestational diabetes mellitus (GDM) with interest. The last sentence in the conclusion, “Further large-scale studies should continue to develop new diagnostic criteria for GDM, including mild hyperglycemia, to improve pregnancy outcomes,” may be correct. However, the conclusion in the abstract that GDM diagnosed using the 100-g oral glucose tolerance test (OGTT) is necessary for improving pregnancy outcomes is rather confusing. The authors have cited the large multicenter, multiethnic group study, published in 2008, on hyperglycemia and adverse pregnancy outcome using a 75-g OGTT in the introduction; however, they have not mentioned any associated problems involved in the adoption of the 75-g OGTT in the discussion. I would like to summarize some of the recently updated views on this aspect.

Firstly, I searched the most recent articles in the Cochrane Library Database. “There was insufficient evidence to determine if screening for gestational diabetes, or what types of screening, can improve maternal and infant health outcomes” [2]. In another study, the 75-g OGTT showed a higher relative risk for diagnosing GDM (risk ratio 2.55, 95% confidence interval 0.96–6.75) than the 100-g OGTT. However, the authors concluded that “the evidence is insufficient to permit assessment of which strategy is best for diagnosing GDM” [3]. When comparing women receiving a diet and exercise intervention with those receiving no intervention, no clear difference in the risk of developing GDM was observed (average risk ratio 0.92, 95% confidence interval 0.68–1.23) [4]. The authors concluded that “the ability to draw firm conclusions was limited by variations in the quality of trials, characteristics of the interventions and populations assessed, and outcome definitions between trials.” In addition, they identified an additional 16 ongoing trials and proposed to include them in the next update of their review [4]. A meta-analysis of randomized studies revealed that nutrition manipulation in pregnancy on the basis of the diet or mixed approach did not appear to reduce the risk of GDM. It was concluded that “nutritional supplements show potential as agents for primary prevention of GDM” [5]. A new report of a randomized trial among ethnically diverse pregnant women at an increased risk of GDM showed that a prenatal exercise intervention implemented in the second trimester did not result in a statistically significant reduction in the relative odds for GDM, impaired glucose tolerance (IGT), or abnormal glucose screening [6].

Secondly, we all know that the so-called traditional two-step approach, i.e., screening pregnant women for GDM with a 50-g oral glucose challenge test (OGCT) followed by a diagnostic test

using a fasting 3-hour 100-g OGTT, has been the most widely used. However, experts of the International Association of Diabetes and Pregnancy Study Groups (IADPSG) recommended the one-step approach in 2010, i.e., diagnostic testing using only a 75-g 2-hour OGTT, which was primarily based on the outcome data reported in the hyperglycemia and adverse pregnancy outcome study. This approach is considered more convenient, better tolerated, and more sensitive for identifying pregnant women at risk for adverse outcomes than the 100-g 3-hour OGTT, and it is becoming more popular.

A retrospective cohort study involving all pregnant women who underwent screening for GDM, between 2008 and 2011, was conducted [7], in which the diagnosis of GDM was based on universal screening using a 50-g OGCT (threshold 140 mg/dL) and a diagnostic test using a fasting 2-hour, 75-g OGTT according to the 2008 recommendations by the Canadian Diabetes Association (CDA). The diagnosis of GDM required the presence of two or more abnormal values, although a single abnormal value was indicative of IGT. Because the OGTT threshold values based on the IADPSG criteria are lower than the CDA 2008 thresholds, the authors concluded that using the IADPSG criteria instead of the CDA criteria would result in a considerable increase in the rate of GDM diagnosis; however, this also appeared to identify additional women at a similar risk of adverse pregnancy outcomes [7]. Another study showed that women with previous GDM based on the IADPSG criteria demonstrated a greater than three-fold prevalence of metabolic syndrome than women with normal glucose tolerance in pregnancy [8]. Nevertheless, identifying more pregnant women with GDM followed by appropriate therapy or pregnant women with impaired or even normal glucose tolerance followed by appropriate education and intervention may decrease fetal and maternal morbidity, particularly because of macrosomia, shoulder dystocia, and preeclampsia.

At present, the American College of Obstetricians and Gynecologists recommends a two-step approach, 50-g OGCT screening followed by a 100-g 3-hour OGTT for screening positive patients. The American Diabetes Association (ADA) supports use of either a one-step or a two-step approach in 2015. The authors of “Diabetes mellitus in pregnancy: Screening and diagnosis (UpToDate, Wolters Kluwer)” recommend a one-step testing, the same as the IADPSG criteria. The latest guideline by the World Health Organization also recommends the use of a 75-g 2-hour OGTT for GDM.

A diagnosis of GDM is made when one or more of the following glucose thresholds are met: fasting 92–125 mg/dL, 1 hour ≥ 180 mg/dL, or 2 hours = 153–199 mg/dL. In contrast, a diagnosis of “diabetes in pregnancy” is made if one or more of the following

criteria are met: fasting plasma glucose (FPG) level ≥ 126 mg/dL, 2-hours plasma glucose level ≥ 200 mg/dL following a 75-g oral glucose load, or random blood glucose level ≥ 200 mg/dL in the presence of diabetes symptoms. The IADPSG and ADA criteria for the diagnosis of overt diabetes are as follows: FPG level ≥ 126 mg/dL or hemoglobin A1c (A1C) level $\geq 6.5\%$. A random plasma glucose level ≥ 200 mg/dL is suggestive of overt diabetes; however, it should be confirmed with FPG or A1C.

According to the ADA criteria, the diagnostic thresholds for categories of increased risk for diabetes for adults (prediabetes) are as follows: impaired fasting glucose if the FPG level ≥ 100 – 125 mg/dL and IGT if the 2-hour plasma glucose level ≥ 140 – 199 mg/dL (using a 75-g OGTT) or A1C = 5.7 – 6.4% (the International Expert Committee recommended 6.0 – 6.4%). For a pregnant woman with GDM, after childbirth a follow-up OGTT is recommended at 6–12 weeks postpartum to test for diabetes or prediabetes if FPG levels < 126 mg/dL. In general, a 75-g OGTT can be performed by an internist, an endocrinologist, or a diabetologist. Women with prediabetes or a normal OGTT should be counseled about their future risk of developing diabetes as well as on the preventive interventions and follow-up (such as rescreening interval). If diabetes mellitus (type 2) is diagnosed, transferring the patient under a specialist is highly recommended.

Therefore, based on the foregoing discussion, I do not know why we as obstetricians insist on continuing the use of the traditional 100-g OGTT in pregnancy for the diagnosis of GDM and emphasize on the comment or conclusion that using “the 100-g OGTT is necessary” for improving pregnancy outcomes.

Conflicts of interest

The author has no conflicts of interest relevant in this article.

References

- [1] Park TC, Lee BH, Norwitz ER, Lee HJ. Maternal hyperglycemia and the 100-g oral glucose tolerance test. *Taiwan J Obstet Gynecol* 2015;54:137–42.
- [2] Tieu J, McPhee AJ, Crowther CA, Middleton P. Screening and subsequent management for gestational diabetes for improving maternal and infant health. *Cochrane Database Syst Rev* 2014;2:CD007222.
- [3] Farrar D, Duley L, Medley N, Lawlor DA. Different strategies for diagnosing gestational diabetes to improve maternal and infant health. *Cochrane Database Syst Rev* 2015;1:CD007122.
- [4] Nobles C, Marcus BH, Stanek 3rd EJ, Braun B, Whitcomb BW, Solomon CG, et al. Effect of an exercise intervention on gestational diabetes mellitus: a randomized controlled trial. *Obstet Gynecol* 2015;125:1195–204.
- [5] Bain E, Crane M, Tieu J, Han S, Crowther CA, Middleton P. Diet and exercise interventions for preventing gestational diabetes mellitus. *Cochrane Database Syst Rev* 2015;4:CD010443.
- [6] Rogozińska E, Chamillard M, Hitman GA, Khan KS, Thangaratinam S. Nutritional manipulation for the primary prevention of gestational diabetes mellitus: a meta-analysis of randomized studies. *PLoS One* 2015;10:e0115526.
- [7] Mayo K, Melamed N, Vandenberghe H, Berger H. The impact of adoption of the international association of diabetes in pregnancy study group criteria for the screening and diagnosis of gestational diabetes. *Am J Obstet Gynecol* 2015;212:224.e1–9.
- [8] Noctor E, Crowe C, Carmody LA, Kirwan B, O'Dea A, Glynn LG, et al. ATLANTIC-DIP: prevalence of metabolic syndrome and insulin resistance in women with previous gestational diabetes mellitus by International Association of Diabetes in Pregnancy Study Groups criteria. *Acta Diabetol* 2015;52:153–60.

Horng-Jyh Tsai*

Department of Obstetrics and Gynecology, Kuang Tien General Hospital, Shalu Taichung, Taiwan

* Department of Obstetrics and Gynecology, Kuang Tien General Hospital, 117 Sha-Tien Road, Shalu Taichung, Taiwan.
E-mail address: hjtsaics@yahoo.com.tw.