

Comparison Study of Two Glucose Beverages Used for Glucose Tolerance Tests

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Background

Diagnosing gestational diabetes mellitus (GDM) is important to reduce risks of adverse outcomes such as preeclampsia, large for gestational age fetuses, neonatal hypoglycemia and jaundice, and stillbirth. Pregnant females are evaluated for GDM at 24-28 weeks of gestation using 1-step or 2-step glucose tolerance test (GTT) options. In all options, a baseline blood sample is collected for plasma glucose testing and then the patient consumes a glucose load via a 10 ounce beverage. Blood samples are collected at timed intervals for plasma glucose testing and a GDM diagnosis is made based on defined criteria. The primary objective of this study was to evaluate the effectiveness of a new glucose beverage to the existing one used by our laboratory. The secondary objective was to use retrospective data to evaluate GTT test ordering practices and the incidence of a GDM diagnosis by test options.

Methods

Ten nonpregnant, non-diabetic subjects (1 male, 9 female) were consented to participate in this study that was approved by the WCG IRB. Following the collection of a baseline blood sample, each subject consumed a beverage containing 50 grams of glucose manufactured by Azer Scientific (reference beverage) and a second blood sample was collected one hour later. Plasma glucose concentrations in both sample were determined on a cobas c503 chemistry analyzer (Roche Diagnostics) and the delta glucose concentration (1-hour minus baseline) was calculated. One week later, the same process was repeated using a 50 gram glucose beverage (test beverage) manufactured by The Fresh Test. Delta glucose concentrations between the reference and test beverages were compared using the Wilcoxon matched-pairs t-test. Subjects were also surveyed regarding the qualities of the two beverages. For the secondary objective, all GTT results performed at TriCore in 2022 for GDM screening/diagnosis were evaluated for ordering practices and GDM incidence. Duplicate test orders were resolved by including only the first test performed. Chart review of representative patients was performed to investigate GTT ordering practices of providers.

Results

Mean $\pm$ SD delta plasma glucose values were 14 $\pm$ 23 and 7 $\pm$ 31 mg/dL between the reference and test beverages, respectively, and were not significantly different ($p=0.85$). All ten subjects preferred The Fresh Test beverage to the Azer Scientific beverage. In 2022 there were 7,420 (66.3%) 1-hour 50 gram glucose challenge tests (step 1 in the 2-step option), 2,019 (18.0%) 3-hour 100 gram GTTs (step 2 in the 2-step option), and 1,750 (15.7%) 2-hour 75 gram GTTs. The overall positivity rates seen for these tests were 25.1, 14.9, and 22.7%, respectively. Tests deviated from expected ordering patterns in 13.5% of cases with possible reasons being attributed to early GDM screening and further GTT testing based on ultrasound findings.

Conclusions

The Fresh Test glucose beverage is a suitable alternative to the Azer Scientific glucose beverage. The incidence of GDM was 1.5 times greater with the 2-hour 75 gram GTT compared to the 3-hour 100 gram GTT which is consistent with published literature. Atypical GTT test ordering patterns are common.