Diagnosis of Gestational Diabetes Mellitus in the Community

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Abstract

Background and Objective: Diabetes in Pregnancy Study Group India (DIPSI) recommends 2-h Plasma glucose (PG) ≥ 140 mg/dL with 75g oral glucose load to diagnose GDM, akin to WHO criteria. Recently, International Association of Diabetes in Pregnancy Study Group (IADPSG) recommends any one value of Fasting plasma glucose (FPG) ≥ 92 mg/dL, 1-h PG ≥ 180 mg/dL or 2-h PG ≥ 153 mg/dL to diagnose GDM. The objective of this study was to find out whether DIPSI guidelines could still be continued to diagnose GDM in our country, as this requires one blood test compared to three tests of IADPSG, which is expensive.

Method: Consecutive pregnant women (N = 1463) underwent 75g oral glucose tolerance test (OGTT). The proportion of GDM was computed based on IADPSG and DIPSI criteria and the discordant pair of diagnosing GDM was examined by McNemar test. Analysis was two tailed and P-value <0.05 was considered for statistical significance.

Result: The prevalence of GDM was 14.6% (N=214) by IADPSG criteria and 13.4% (n=196) by DIPSI criteria. The discordant pair between the two criteria examined by McNemar’s test indicated that there was no statistical significance (P = 0.21) and thereby implying a close agreement between these two procedures.

Conclusion: DIPSI procedure is cost-effective, without compromising the clinical equipoise and can be continued to diagnose GDM in our country, as well as other less resource countries.

Introduction

Gestational Diabetes Mellitus (GDM) is characterized by carbohydrate intolerance of varying severity with onset or first recognition during pregnancy. Women with a history of GDM are at increased risk of future diabetes, predominantly type 2 diabetes, as are their children. The extent of this risk depends on the diagnostic criteria used to identify GDM. Studies conducted in different populations and with different methodologies, consistently reported an increase in GDM in all race/ethnicity groups, suggesting that there is an increase in GDM prevalence. A true increase in the prevalence of GDM aside from its adverse consequences for the infant in the newborn period might reflect or contribute to the ongoing pattern of increasing diabetes and obesity. This implies that Universal screening and care of women with GDM is of paramount public health priority in high risk population for GDM and diabetes like Asian Indians, rather than risk factor screening. In this aspect, except the existing diagnostic criterion of World Health Organization (WHO) 2-h plasma glucose (PG) ≥ 140 mg/dL with 75g oral glucose load, other diagnostic criteria are country specific or recommended by various associations. Recently, based on the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) consensus panel recommended that GDM can be diagnosed, if any one value of fasting plasma glucose (FPG), 1-h and 2-h PG concentrations meet or exceed 92 mg/dL, 180 mg/dL and 153 mg/dL respectively, with 75g oral glucose tolerance test (OGTT). India one of the most populous countries in the world was not a part of the HAPO study. Hence this prospective, collaborative study was undertaken to ascertain whether the present practice of diagnosing GDM by the guidelines recommended by Diabetes In Pregnancy Study Group India (DIPSI) based on WHO criterion of 2-h PG ≥ 140 mg/dL can still be followed in our country or adopt IADPSG recommendation.

Methods

The study was initiated with the approval of the Institutional Ethics Committee. The sample size was determined based on the overall prevalence of GDM in our population (13.9%) and with 90% statistical power. A total of 1,463 consecutive pregnant women registered at a community health centre at Chennai between April 2009 and February 2010 were recruited into the study. Key exclusion criteria included pregnant women in the first trimester of pregnancy, previous history of GDM or pre-GDM. A standardized questionnaire was used and details pertaining to their anthropometrics, family history, medical and obstetric history were collected. Their Body Mass Index (BMI) and blood pressure were recorded. All of them gave their informed consent to undergo 75g OGTT. After drawing the venous blood sample in the fasting state, they were given 75g oral glucose and their 1-h and 2-h venous blood samples were drawn. The plasma glucose was estimated in the central laboratory by glucose oxidase peroxidase (GOD-POD) method.
Table 1: Performance of fasting plasma glucose test for the prediction of gestational diabetes

<table>
<thead>
<tr>
<th>FPG (mg/dL)</th>
<th>Test positive</th>
<th>2-h PG value</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>13.3</td>
<td>99.0(96.0-99.8)</td>
<td>1.3(0.8-2.2)</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>11.9</td>
<td>88.8(83.3-92.7)</td>
<td>11.2(5.9-13.1)</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>8.1</td>
<td>60.2(53.0-67.0)</td>
<td>56.5(53.7-59.3)</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>3.9</td>
<td>29.1(22.9-36.1)</td>
<td>89.4(87.6-91.0)</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>3.2</td>
<td>24.0(18.3-30.7)</td>
<td>93.0(91.4-94.3)</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>1.8</td>
<td>13.8(9.4-19.6)</td>
<td>97.4(96.3-98.2)</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>0.9</td>
<td>7.1(4.1-11.9)</td>
<td>99.2(98.5-99.6)</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>0.6</td>
<td>4.6(2.3-8.8)</td>
<td>99.8(99.4-100.0)</td>
<td></td>
</tr>
<tr>
<td>2-h PG 140</td>
<td>13.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Diagnosis and the prevalence of GDM were assessed by applying both DIPSI and IADPSG criteria.

Statistical Analysis: The mean and proportion were computed for the basic characteristics of the study subjects. The proportion of GDM was computed based on IADPSG and DIPSI criteria and the discordant pair of diagnosing the GDM was examined by McNemar test. Analysis was two tailed and P-value <0.05 was considered for statistical significance. All analysis was performed by using SPSS 10 version package.

Results

The mean maternal age of the 1,463 pregnant women was 23.60 ± 3.32 years and BMI was 21.5 ± 4.06 kg/m². The mean gestational age was 27.9 ± 5.56 weeks. The pregnant women who had family history of diabetes were 18.3%. The percentage of pregnant women who came to the prenatal clinic in the second trimester was 52% and in the third trimester was 48%. Using the DIPSI criterion of 2-h PG ≥ 140 mg/dL, 196 (13.4%) women were diagnosed as GDM. By applying IADPSG recommendation of any one value of FPG ≥ 92 mg/dL, 1-h PG ≥ 180 mg/dL or 2-h PG ≥ 153 mg/dL, the prevalence of GDM observed was 14.6% (N=214). Measuring FPG alone identified 136 cohorts (9.3%) as having GDM. Adding measurement of 1-h PG identified an additional 36 (2.46%) and adding 2-h PG measurement identified another 42 (2.87%) of the cohorts. We found that there was no significant difference (P>0.05) in the discordant pair of diagnosing GDM by the two criteria which in turn implies, that the disagreement in diagnosing GDM by both criteria was not significant (P = 0.21).

We also assessed the FPG cut-off point 92 mg/dL recommended by IADPSG in relation to the diagnostic criterion of DIPSI. This cut-off point had a specificity of 93% and sensitivity of 24%. Thus, the ability of testing positive was 3.2% and the missing proportion of cases was 76% (Table 1).

Discussion

DIPSI follows 2-h PG to diagnose GDM, as in all GDM, the FPG values does not reflect the postprandial hyperglycemia. In this study, we also found that by applying this criterion of FPG ≥ 92 mg/dL, only 24% (3.2% of the total population) of those diagnosed as GDM using DIPSI criterion 2-h PG ≥ 140 mg/dL would have been identified as GDM. This is due to the ethnicity of Asian Indians who have high insulin resistance (IR) and as a consequence, their postprandial plasma glucose is higher compared to Caucasians. Asian and South Asian ethnicity are both independently associated with increased IR in late pregnancy. Siddhartha Das et al documented an increased IR during pregnancy in Asian Indian Women and IR escalates further in GDM. These studies provide evidence that FPG may not be an appropriate option to diagnose GDM in Asian Indian women. Further, the soundness of diagnosing GDM by 2-h PG ≥ 140 mg/dL has been established by both short-term and long-term outcome studies in the off-springs.

IADPSG recommends the diagnosis of GDM if any one or more value meet or exceed the cut off values: FPG 92mg/dL, 1-h PG 180mg/dL and 2-h PG 153 mg/dL. In this study population, we utilized both DIPSI and IADPSG criteria to ascertain the prevalence of GDM, which were 13.4% and 14.6% respectively. IADPSG recommendation necessarily requires estimation of PG in three blood samples after administering 75g oral glucose load. Pregnant women resent this procedure, as they are pricked three times and feel too much of blood is drawn. Whereas, DIPSI criterion requires one blood sample drawn at 2-h for estimating the plasma glucose. Interestingly, the difference in the diagnostic capability between IADPSG and DIPSI was 1.2% which was not significant (P>0.02). Further, the cost involved for performing IADPSG recommended procedure is high, as this procedure requires three blood tests compared to one blood test of DIPSI. In our earlier study, we also found that glucose tolerance test can be performed irrespective of last meal timing to diagnose GDM and DIPSI follows this one step diagnostic procedure. This procedure requires little preparation, without requiring the prior interposition of the screening test and it could be applied to the entire obstetric population. Thus, DIPSI procedure would still serve the purpose of implementing public health program to diagnose GDM in the community.

Conclusion

In less resource countries to diagnose GDM, DIPSI procedure based on WHO criterion of 2-h PG ≥ 140 mg/dL would be cost-effective without compromising the clinical equipoise.

Disclosure of Interest

There are no conflicts of interest with any of the authors and the contents of this report.

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References


