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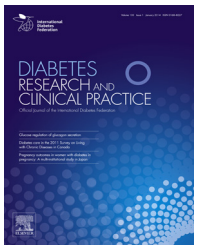

Report of a World Health Organization Consultation

Diagnostic criteria and classification of hyperglycaemia first detected in pregnancy☆

Executive summary

The high prevalence of diabetes globally and its increasing frequency in women of gestational age have generated new research data on the relationship between glycaemia and pregnancy outcomes. The diagnostic criteria for hyperglycaemia in pregnancy recommended by the World Health Organization (WHO) in 1999 were not evidence-based and needed to be updated in the light of previously unavailable data. The update follows the WHO procedures for guidelines development. Systematic reviews were conducted for key questions, and the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology was applied to assess the quality of the evidence and to determine the strength of the recommendation on the diagnostic cut-off values for gestational diabetes. Where evidence was absent (diagnosis of diabetes in pregnancy) or GRADE was not deemed suitable (classification), recommendations were based on consensus.

The systematic review of cohort studies showed that women with hyperglycaemia detected during pregnancy are at greater risk for adverse pregnancy outcomes, notably, macrosomia of newborn and pre-eclampsia, even after excluding the more severe cases of hyperglycaemia that required treatment. Treatment of gestational diabetes (GDM) is effective in reducing macrosomia, large for gestational age, shoulder dystocia and pre-eclampsia/hypertensive disorders in pregnancy. The risk reduction for these outcomes is in general large, the number need to treat is low, and the quality of evidence is adequate to justify treatment of GDM.

1. **Hyperglycaemia first detected at any time during pregnancy should be classified as either:**
   - **diabetes mellitus in pregnancy (see recommendation 2);**
   - **gestational diabetes mellitus (see recommendation 3).**

Quality of evidence: not graded
Strength of recommendation: not evaluated

Current definitions of gestational diabetes include women with diabetes and women with intermediate hyperglycaemia – impaired glucose tolerance (IGT) and impaired fastingglycaemia (IFG) as defined in non-pregnant adults. Concern has been expressed about the inclusion of such a wide range of glucose abnormalities in one definition, especially including those with more severe hyperglycaemia which defines diabetes in non-pregnant adults. This concern centres on special considerations about management during pregnancy and post-partum follow-up in women with more severe hyperglycaemia. Drawing conclusions about this group is particularly difficult because of the lack of good quality data at higher levels of hyperglycaemia since these women are excluded from epidemiological studies and randomized trials of GDM treatment.

Recent consensus has moved back in favour of distinguishing between diabetes and lesser degrees of glucose intolerance in pregnancy. Therefore this guideline recommends a distinct category for pregnant women with glucose levels diagnostic of diabetes in non-pregnant adults based on the following:

- consensus that diabetes during pregnancy, whether symptomatic or not, is associated with significant risk of adverse perinatal outcomes;
- pregnant women with more severe hyperglycaemia have been excluded from epidemiologic and intervention studies;
- management of women with this level of hyperglycaemia requires assessment of chronic complications and is more likely to require pharmacological intervention, especially when detected earlier in the pregnancy.

2. **Diabetes in pregnancy should be diagnosed by the 2006 WHO criteria for diabetes if one or more of the following criteria are met:**
   - **fasting plasma glucose** ≥ 7.0 mmol/l (126 mg/dl);
   - **2-h plasma glucose** ≥ 11.1 mmol/l (200 mg/dl) following a 75 g oral glucose load;
   - **random plasma glucose** ≥ 11.1 mmol/l (200 mg/dl) in the presence of diabetes symptoms.

Quality of evidence: not graded
Strength of recommendation: not evaluated

Diagnostic criteria for diabetes in non-pregnant individuals are based on the relationship between plasma glucose values and the risk of diabetes-specific microvascular complications.

☆ This work was originally published on the World Health Organization website (http://who.int/diabetes/en).

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There are no data on this relationship in untreated pregnant women and such data are unlikely to emerge. Therefore, it was decided to recommend the same diagnostic criteria for diabetes in both pregnant and non-pregnant individuals.

3. **Gestational diabetes mellitus should be diagnosed at any time in pregnancy if one or more of the following criteria are met:**
   - **fasting plasma glucose 5.1–6.9 mmol/l (92–125 mg/dl);**
   - **1-h plasma glucose ≥** 10.0 mmol/l (180 mg/dl) following a 75 g oral glucose load*;
   - **2-h plasma glucose 8.5–11.0 mmol/l (153–199 mg/dl) following a 75 g oral glucose load**

*there are no established criteria for the diagnosis of diabetes based on the 1-hour post-load value.

Quality of evidence: very low
Strength of recommendation: weak

Diagnostic criteria for GDM are based on the risk of adverse pregnancy outcomes. However since there is a continuous risk of adverse outcomes with increasing glycaemia, any diagnostic thresholds will be somewhat arbitrary. The IADPSG Consensus Panel decided to define diagnostic values on the basis of an odds ratio of 1.75 for adverse neonatal outcomes (birth weight > 90th percentile, cord C-peptide > 90th percentile, and neonatal percent body fat > 90th percentile) compared with mean values, for fasting plasma glucose, 1-h, and 2-h OGTT plasma glucose values.

The simulation study reported in Section 3.4 demonstrated some advantages of these criteria compared with the previous WHO criteria, with lower numbers needed to screen to prevent adverse outcomes. In the interest of moving towards a universal standard recommendation for the diagnosis of GDM, the WHO guideline development group decided to accept the general principles behind how the International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria were derived and adopt these criteria, rather than introduce another set of arbitrary cut-off values. This definition applies for the diagnosis of GDM at any time during pregnancy.

This guideline:

- takes into consideration new evidence from the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study;
- proposes a new classification for hyperglycaemia first detected in pregnancy;
- removes the ambiguity with regard to fasting plasma glucose values in the 1999 WHO guideline;
- clarifies ambiguities in the IADPSG criteria related to ranges of plasma glucose values for distinguishing diabetes in pregnancy and GDM.

1. Introduction

Diabetes complicating pregnancy is associated with adverse maternal and perinatal outcomes [1]. Lesser degrees of glucose intolerance have also been shown to be harmful [2]. However, how one defines what constitutes glucose intolerance in pregnancy has been an issue of considerable controversy, complicating clinical practice and research over the last three decades. The main reason for this diagnostic dilemma is the large number of procedures and glucose cutoffs proposed for the diagnosis of glucose intolerance in pregnancy. In 2010, the WHO convened an expert group to reviewed the current WHO recommendations on definition, diagnosis and classification of glucose intolerance in pregnancy [3].

1.1. *Objectives and target audience*

The objective of this guideline is to update the 1999 WHO recommendations for diagnosing and classifying hyperglycaemia in pregnancy [3]. The target users are health care professionals who care for pregnant women, most frequently primary care physicians and obstetricians/gynaecologists. However, researchers and policy makers will also find it useful.

1.2. *Members of the guideline development group*

A guideline development group (GDG) was constituted, which included external experts and WHO staff.

External experts

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