Gestational diabetes and pregnancy outcomes - a systematic review of the World Health Organization (WHO) and the International Association of Diabetes in Pregnancy Study Groups (IADPSG) diagnostic criteria

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CRD summary
This review evaluated the impact on pregnancy outcomes of using World Health Organisation (WHO) and/or International Association of the Diabetes in Pregnancy Study Group (IADPSG) criteria to diagnose gestational diabetes. Associations were similar when using each set of criteria and both identified a small increased risk of adverse events. The authors' conclusion and recommendation for research seem reasonable.

Authors' objectives
To evaluate the impact on pregnancy outcomes of using World Health Organisation (WHO) and/or International Association of the Diabetes in Pregnancy Study Groups (IADPSG) criteria to diagnose gestational diabetes mellitus.

Searching
Nine databases (including MEDLINE, EMBASE, LILACS, The Cochrane Library and CINAHL) were searched up to March 2011 for published articles. There were no language restrictions. Search terms were reported. Reference lists of retrieved articles were scanned for additional studies.

Study selection
Eligible studies were prospective or retrospective cohort studies that evaluated the association between WHO and/or IADPSG criteria (criteria details reported in the paper) and perinatal and maternal outcomes in all women. The two hour 75g oral glucose tolerance test had to be administered to all participants regardless of clinical risk factors for gestational diabetes. The test had to be performed during the second or third trimesters and provide a diagnosis on at least the two hour post-load glucose. Capillary glucose measurements were included. Studies were excluded if they did not distinguish between pre-gestational and gestational diabetes and if they did not report outcomes from women with a normal oral glucose tolerance test outcome. Perinatal outcomes of interest were large for gestational age births, macrosomia, foetal death and early neonatal death. Maternal outcomes of interest were caesarean delivery and pre-eclampsia. Outcome definitions were adopted as reported in the individual studies.

Included studies were conducted worldwide. Incidence of gestational diabetes mellitus varied between studies. All studies except one diagnosed gestational diabetes using venous plasma glucose based on the oral glucose tolerance test. Where reported, ethnicity varied, mean maternal age ranged from 18 to 30 years and mean gestational age ranged from 16 to 34 weeks.

Two reviewers independently selected the studies for inclusion. Disagreements were resolved by consensus.

Assessment of study quality
Study quality was assessed on criteria for adequacy of participant selection, test standardisation, reporting of loss to follow-up and whether medical staff were blinded to oral glucose tolerance test results (further details reported in the paper).

The authors did not state how many reviewers conducted the quality assessment.

Data extraction
Data were extracted to calculate relative risks (RR) and 95% confidence intervals (CI). Where data were unavailable from published literature, individual patient data from the database of the Brazilian Study of Gestational Diabetes (EBDG) was used to generate the required data set.

Two reviewers independently extracted the data. Disagreements were resolved by consensus.
Methods of synthesis
Relative risks were pooled in a random-effects meta-analysis using restricted maximum likelihood estimation. There was no adjustment for confounders. The analysis was based on untreated women. Statistical heterogeneity was assessed with the $X^2$ and $I^2$ statistics ($I^2>50\%$ was considered high heterogeneity).

Sensitivity analyses were performed to explore the influence of two large studies and by using other variance estimators such as DerSimonian and Laird, Empirical Bayes and a fixed-effect model to test the robustness of the random-effects analysis. Publication bias was reportedly assessed using a funnel plot and Egger’s test.

Results of the review
Eight studies (three retrospective and five prospective) were included. The total number of participants was 44,829 (range 416 to 23,316). Most studies met the criteria for adequate participant selection and half of the studies reported adequate test standardisation and loss to follow-up. One study reported blinding of medical staff.

Perinatal outcomes: Statistically significant associations were reported between WHO diagnostic criteria and foetal macrosomia ($RR\ 1.81, 95\%\ CI\ 1.47\ to\ 2.22$; five studies; $I^2=0\%$) and large for gestational age births ($RR\ 1.53, 95\%\ CI\ 1.39\ to\ 1.69$; four studies; $I^2=0\%$). There was no statistical association between WHO criteria and perinatal mortality (two studies; $I^2=0\%$). For IADPSG criteria there were statistically significant associations for foetal macrosomia (using the EBDG database: $RR\ 1.38, 95\%\ CI\ 1.14\ to\ 1.68$) and large for gestational age births (using the EBDG database: $RR\ 1.73, 95\%\ CI\ 1.28\ to\ 2.35$; three studies; $I^2=93\%$). There was no statistical association for perinatal mortality (using the EBDG database).

Maternal outcomes: Statistically significant associations were reported between WHO diagnostic criteria and pre-eclampsia ($RR\ 1.69, 95\%\ CI\ 1.31\ to\ 2.18$; three studies; $I^2=38\%$) and caesarean delivery ($RR\ 1.37, 95\%\ CI\ 1.24\ to\ 1.51$; four studies; $I^2=29\%$). For IADPSG criteria, statistically significant associations were reported for pre-eclampsia ($RR\ 1.71, 95\%\ CI\ 1.37\ to\ 2.14$; three studies; $I^2=73\%$) and for caesarean delivery ($RR\ 1.23, 95\%\ CI\ 1.01\ to\ 1.51$; three studies; $I^2=93\%$).

Sensitivity analyses did not substantially alter the main findings (results reported in the paper).

Authors’ conclusions
Associations with pregnancy outcomes were similar when using WHO and IADPSG diagnostic criteria, with both identifying a small increased risk of adverse events. There was a high level of inconsistency in the results for IADPSG criteria.

CRD commentary
The review question was clear and inclusion criteria were sufficiently detailed to allow replication. Several relevant data sources were searched and steps were taken to avoid language bias. The authors reported that there was insufficient data to enable an assessment of publication bias so this could not be ruled out. The review process was conducted with attempts to minimise error and bias during study selection and data extraction; the process was unclear for quality assessment but results indicated that study quality was reasonable. Adequate study details were presented. The method of synthesis and the sensitivity analyses seemed appropriate.

The authors acknowledged limitations of the review in terms of the small number of included studies and the possibility of publication bias and missed studies. With this caveat, their conclusions reflect the evidence presented and seem reliable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated a need for further studies to assess the impact of prevalence or characteristics of obesity on the association between IADPSG criteria and pregnancy outcomes.

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