Interventions for preventing gestational diabetes mellitus: A systematic review and meta-analysis.

Oostdam N, van Poppel MN, Wouters MG, van Mechelen W

CRD summary
The authors concluded that there may have been some benefits of dietary counselling, low glycaemic dietary advice or an exercise programme in preventing gestational diabetes mellitus in pregnant women, but no strong conclusions could be drawn from the evidence presented.

The authors’ cautious conclusion accurately reflects the poor quality evidence presented and is likely to be reliable.

Authors’ objectives
To evaluate the effects of interventions to prevent gestational diabetes mellitus.

Searching
PubMed, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from January 1980 to March 2011. Search terms were reported. Eligible articles were published in English, German, Danish, Dutch, Finnish, Norwegian and Swedish. The references lists of included articles and relevant reviews were searched for further trials.

Study selection
Quasi-randomised controlled trials of interventions to prevent gestational diabetes mellitus in pregnant women were eligible for inclusion. The trials had to measure gestational diabetes mellitus incidence and maternal fasting blood glucose level. Secondary outcomes were macrosomia (birthweight above 4kg) or large for gestational age (above 90th percentile for gestational age). Pregnant women with existing gestational diabetes mellitus or pre-existing diabetes mellitus type I or II were excluded.

Most trials evaluated dietary interventions; others included metformin or an exercise training programme. Control group interventions included routine care, placebo, metformin, counselling and diet/exercise programmes. Some of the included women were obese or had polycystic ovary syndrome.

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

Assessment of study quality
Quality assessment of included trials was carried out using a 10-item checklist of randomisation, allocation concealment, blinding, similarity of baseline characteristics, drop-outs, use of intention-to-treat analysis, equal treatment and validity of results. The GRADE approach was used to assess the overall quality of evidence, taking account of trial limitations, consistency or results, generalisability, precision and publication bias. Overall quality was rated as high, moderate, low or very low. Authors were contacted for additional information where necessary.

Two reviewers independently carried out the quality assessment. Disagreements were resolved by consensus.

Data extraction
Data were extracted to enable calculation of relative risks (RRs), risk differences (RD) or mean differences, along with 95% confidence intervals (CI).

The authors did not state how many reviewers carried out the data extraction.

Methods of synthesis
Relative risks, risk differences and weighted mean differences (WMDs) were estimated, with 95% CIs, in a fixed-effect meta-analysis where statistical heterogeneity (measured by $I^2$) was less than 50%. A random-effects model was used where $I^2$ was more than 50%. Sensitivity analyses were conducted to explore reasons for heterogeneity and to assess the effect of removing outliers or the largest trial.
Results of the review

Nineteen trials (1,998 participants) were included in the review. Trials generally scored well on individual quality items (except for blinding), but the overall quality of the evidence base was rated low or very low.

Metformin versus no metformin (three trials): There were no statistically significant differences for the risk of gestational diabetes mellitus ($I^2=59\%$) or macrosomia infant ($I^2=18\%$).

Low glycaemic index diet versus high glycaemic/low fat diet advice (three trials): Low glycaemic index diet was more effective in reducing the risk of large for gestational age infant (RR 0.14, 95% CI 0.05 to 0.41; $I^2=43\%$). No statistically significant difference was found for maternal fasting glucose ($I^2=40\%$).

Any dietary counselling versus usual care (eight trials): Dietary counselling was more effective in reducing the risk of gestational diabetes mellitus (RD -0.05, 95% CI -0.10 to -0.01; seven trials, $I^2=41\%$). There were no statistically significant differences in maternal fasting glucose (three trials; $I^2=0\%$), or risk of macrosomia infant (five trials; $I^2=77\%$).

Exercise versus usual care (three trials): Exercise training was more effective in reducing the risk of macrosomia infant (RR 0.36, 95% CI 0.13 to 0.99; two trials, $I^2=38\%$). No statistically significant differences were found for maternal fasting glucose (two trials; $I^2=0\%$) or risk of gestational diabetes mellitus (three trials; $I^2=66\%$).

A statistically significant reduction in incidence of gestational diabetes mellitus was found with probiotics with dietary counselling versus dietary counselling alone (one trial). No statistically significant differences were found for the incidence of gestational diabetes mellitus or macrosomia from self-monitoring weight gain versus standard care (one trial).

The removal of trials in the sensitivity analyses showed significant effects on maternal fasting blood glucose following dietary counselling (WMD -0.29mmol/L, 95% CI -0.55 to -0.03), and advice on low glycaemic diet (WMD -0.27mmol/L, 95% CI -0.51 to -0.03). Further exploration of heterogeneity was reported in the paper.

Authors’ conclusions

There may have been some benefits of dietary counselling, low glycaemic dietary advice or an exercise programme in preventing gestational diabetes mellitus in pregnant women. No strong conclusions could be drawn from the evidence presented.

CRD commentary

The review question was clear and inclusion criteria were sufficiently detailed to enable replication. Relevant data sources were accessed. Publication bias was possible and some language restrictions were applied, so potentially relevant trials may have been overlooked.

Trial selection and quality assessment were carried out with attempts to minimise error and bias; the process was unclear for data extraction. Quality was assessed using appropriate criteria and the results were highlighted clearly in the discussion of findings. Sufficient trial details were presented to allow interpretation of generalisability. The chosen methods of synthesis were suitable in the context of measured heterogeneity.

The authors’ cautious conclusion accurately reflects the poor quality evidence presented and is likely to be 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 good quality, adequately-sized randomised controlled trials to assess all types of interventions (and the incremental effects of different interventions). Future trials should incorporate greater effort to address blinding.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.