The role of exercise in preventing and treating gestational diabetes: a comprehensive review and recommendations for future research

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CRD summary
The authors concluded that exercise may have positive and protective effects for the treatment and prevention of GDM (gestational diabetes mellitus). In view of poor reporting in the review, the small number of controlled studies, failure to assess or address heterogeneity between the studies and failure to systematically assess study quality, it is impossible to determine the reliability of the conclusions.

Authors’ objectives
To assess the effects of exercise for treating, preventing or delaying GDM.

Searching
PsycLit, MEDLINE, Dissertation Abstracts Online, and Online Abstract Submission were searched. Sample search terms were reported. Twenty-eight medical journals (listed in the review) were handsearched. Reference lists of articles retrieved were checked.

Study selection
Studies were eligible for inclusion if their primary variables were exercise (or physical activity) and GDM.

Participants in the included studies were pregnant or postpartum women with or without gestational or type one diabetes or abnormal glucose tolerance tests. Participants were volunteers, targeted or selected at random. Mean age (where reported) was 31 years (range 19-48). Maternal outcomes reported in the review included GDM, weight gain, blood glucose measures and insulin requirements. Primary studies diagnosed GDM using a variety of guideline-based criteria (where reported). Infant outcomes included gestational age at delivery and birth weight. Exercise commonly involved activities such as walking, cycling, arm ergometry and resistance training. The intensity, frequency and duration of exercise and the length of the intervention varied very widely from a single treadmill session to an 11-week routine several days a week (most studies did not provide these details). Control conditions included diet only, insulin and/or no exercise. Exercise characteristics were assessed mostly by self-report. The review included intervention (controlled) studies, treatment (before and after) studies, prospective cohorts and retrospective studies.

The authors stated neither how papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Data were extracted using a standardised coding format. Mean differences and standard deviations were extracted where possible for continuous data and converted to effect sizes (standardised mean difference: Cohen's d) using the pooled standard deviations of the two groups. Effect sizes were defined as small (0 to 0.2), medium (0.3 to 0.5) and large (at least 0.6). Odds/risk ratios were extracted for binary data; these were logarithm-transformed and converted to effect sizes by dividing by 1.81 (Chinn 2000).

Two reviewers extracted data. Discrepancies were resolved by discussion. Authors of primary studies were contacted for additional data as required.

Methods of synthesis
Data were combined where possible to calculate pooled effect sizes.
Results of the review

Twenty-one studies were included in the review: four intervention studies (n=157 for three studies; n not stated for fourth); seven treatment studies (n=228); three prospective cohorts (n=27,933); and seven retrospective studies (192,859). The mean participation rate was 81 per cent and the mean attrition rate was 7.5 per cent (where reported). Only two studies described conceptual frameworks.

Maternal outcomes

Five studies (two prospective cohorts; three retrospective) found a moderate effect size (0.40 to 0.46) favouring physical activity before and/or during pregnancy for reducing the risk of onset of GDM. One intervention study (n=96) found a medium–to-large effect on mean maternal weight increase per week, favouring exercise and diet compared to diet only (effect size 0.50).

Infant outcomes

Three studies (two intervention and one treatment, n=approximately 146) found that exercise did not appear to affect gestational age at delivery compared to control conditions (d=0.13). Results for infant birth weight were inconsistent, but overall showed little difference between the groups (d=0.04, two intervention and two treatment studies n=146).

Other results were reported in the review.

Authors' conclusions

Exercise may have positive and protective effects for the treatment and prevention of GDM.

CRD commentary

The review objectives were clear, but the inclusion criteria were poorly defined with no detailed criteria for interventions or outcome measures and no explicit criteria for participants or study design. The lack of specific inclusion criteria resulted in marked clinical and methodological heterogeneity between the primary studies. The search appeared adequate, but search dates were not reported. Steps were taken to minimise bias and error by having more than one reviewer undertake data extraction, but it is not clear whether this also applied to study selection. It does not appear that study validity was assessed systematically, although the authors discuss methodological problems in the primary studies such as the lack of consistency in reporting of outcomes. It was unclear whether any of the studies used random allocation. Statistical techniques used to combine data were not described. Statistical heterogeneity was not assessed. Neither confidence intervals nor p values were reported. It did not appear that publication bias was assessed. The authors focused appropriately mainly on controlled and before-and-after studies, but findings were poorly reported and difficult to interpret. Results were reported in the abstract that did not appear in the main text and there were several inconsistencies between the text and the tables. In view of the poor reporting in the review, the small number of controlled studies, failure to assess or address heterogeneity between the studies and failure to systematically assess study quality, it is impossible to determine the reliability of the authors' conclusions.

Implications of the review for practice and research

Practice: the authors did not make any recommendations for practice.

Research: the authors stated that future research in this area requires more consistent data reporting across studies. The review includes 11 detailed recommendations concerning study design, assessment methods, outcome variables and data management.

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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.