
Efficacy of lifestyle interventions in reducing diabetes incidence in patients with impaired glucose tolerance: a systematic review of randomized controlled trials

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CRD summary

The review concluded that most trials reported a significant reduction in diabetes incidence through lifestyle interventions for patients with impaired glucose tolerance but there was no improvement in mortality, morbidity or other known risk factors for diabetic complications. The authors' conclusions reflect the data presented but limitations in review methods and available data make the reliability of the conclusions unclear.

Authors' objectives

To assess the effectiveness of lifestyle interventions to prevent the onset of type 2 diabetes in patients with impaired glucose tolerance.

Searching

PubMed, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews and HTA database were searched to 2009. There were no language restrictions. Search terms were reported. Reference lists from identified trials and reviews were searched.

Study selection

Eligible studies were randomised controlled trials (RCTs) that evaluated lifestyle interventions that aimed at reducing the incidence of diabetes in patients with impaired glucose tolerance. Trials had to report observation time of more than six months. The primary outcome of interest was incidence of diabetes. Various secondary outcomes such as all-cause mortality, diabetes mortality and quality-adjusted life-years (QALY) and clinical parameters were also of interest. Trials were excluded if they included patients with diabetes.

Lifestyle interventions included advice on healthy diet or diet modification and/or regular exercise. Some studies used face-to-face sessions and others used telephone contact. Control groups were described as using a standard intervention but the authors reported that some groups received minimal lifestyle interventions. Two trials included intervention arms that compared metformin to standard interventions (these results are not reported in this commentary). Mean ages of patients ranged between 45 and 55 years. Body mass index (BMI) varied between 24 and 34 kg/m². Where reported, 32% to 100% of the participants were men. Trials were conducted in India, Japan, Sweden, China, Netherlands, Finland and USA.

Two reviewers selected trials for inclusion blinded for author, journal and publication date.

Assessment of study quality

Trial quality was assessed using the SIGN 50 instrument for RCTs. The authors did not state how many reviewers conducted the assessment.

Data extraction

Two reviewers independently extracted data on the relevant outcomes on an intention-to-treat or a per protocol analysis. Data on number of events, absolute risk reductions and relative risk reduction (RRR) were extracted or calculated.

Methods of synthesis

Data were combined in a narrative synthesis.

Results of the review

Seven RCTs (5,663 patients) were included in the review. Reported drop-out rates ranged from 5% to 28%. The active intervention follow-up ranged from 2.8 to six years. Two trials also reported a post-intervention follow-up of three and 14 years. Four trials scored "+" for quality (some criteria were fulfilled) and three scored "-" (few criteria fulfilled and poor methodological quality).

There was a lower incidence of diabetes in intervention groups (3% to 46%) compared with control groups (9.3% to 67.7%). Five RCTs reported statistically significant reductions in diabetes incidence as a result of lifestyle interventions compared to control groups (RRR 28.5% to 64.7%).

There were no significant differences between intervention and control groups for overall mortality or cardiovascular events. None of the RCTs reported quality of life outcomes. Results were presented for clinical parameters such as BMI, blood pressure, triglycerides and cholesterol levels.

Authors' conclusions

Most trials reported a significant reduction in diabetes incidence through lifestyle interventions for patients with impaired glucose tolerance but there was no improvement in mortality, morbidity or other known risk factors for diabetic complications.

CRD commentary

The review question was broad with defined inclusion criteria. Several relevant sources were searched to 2009 without language restrictions. Limited efforts were made to locate unpublished studies so some data may have been missed. Appropriate methods to reduce reviewer error and bias were used for study selection and data extraction; it was unclear whether such methods were used for assessment of quality. Trial quality was assessed but full results were not reported for individual trials and this made it difficult to comment independently on the reliability of the trials.

Use of a narrative synthesis appeared appropriate given the variation between trials in terms of lifestyle interventions and control groups as well as variations in populations. The authors highlighted additional limitations that included the small number of included trials and almost half of the trials having poor methodological quality. Data for outcomes other than incidence of diabetes were based on just one or two trials.

The authors' conclusions reflect the data presented but limitations in review methods and in the available data make the reliability of the conclusions unclear.

Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that it was unclear whether evidence-based lifestyle intervention programmes can be replicated in community settings and further research focusing on larger populations was needed. Future research should also focus on data for individualised interventions (such as education level, genotype, compliance, comorbidity and intensity) and assess adherence, long-term effect, mortality, morbidity, QALYs and cost effectiveness. Analyses of subgroups related to genetic factors, ethnicity and BMI were needed.

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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.