Effects of monounsaturated fatty acids on glycaemic control in patients with abnormal glucose metabolism: a systematic review and meta-analysis

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CRD summary
High-monounsaturated fatty acids (MUFA) diets appeared to reduce haemoglobin A1c (HbA1c) and should be recommended for inclusion in dietary regimen for type 2 diabetes. These conclusions reflect the results but should be considered against the presence of clinical and statistical heterogeneity.

Authors' objectives
To compare the long-term effects of high monounsaturated fatty acids (MUFA) with low-MUFA diets on glycaemic control in people with abnormal glucose metabolism.

Searching
MEDLINE, EMBASE and the Cochrane Central Register of Controlled Trials (CENTRAL) were searched up to May 2011; search terms were reported. Reference lists of included studies were also searched for additional studies.

Study selection
Randomised controlled trials (RCTs) that compared high-MUFA (above 12% of total energy content) with low-MUFA diets (12% or less total energy content) given for at least six months in a population with abnormal glucose metabolism and an initial average body mass index greater than 25 kg/m², were eligible for inclusion. Abnormal glucose metabolism was defined as type 2 diabetes, impaired glucose tolerance or insulin resistant. Nutritional counselling had to be performed by a dietician.

The included studies compared high-MUFA diets with one or more diets from low fat, low glycaemic index (GI), high GI, high protein or control. One study assessed high-MUFA given in combination with both high and low GI diets. Reported outcomes were fasting glucose, fasting insulin, homeostasis model assessment-estimated insulin resistance and haemoglobin A1c (HbA1c). Most studies restricted energy intake. Study duration ranged from six to 48 months.

The authors did not state how studies were selected for the review.

Assessment of study quality
Study quality was assessed by two reviewers independently using the Jadad scale. This gave a maximum of five points for the use and method of randomisation, double-blinding, reporting of withdrawals and use of intention-to-treat analysis. Studies that scored 3 or more were considered high quality.

Data extraction
Means and standard deviations of post-intervention outcomes were extracted. If standard deviations were not reported then study authors were contacted. In one study the baseline value was used as an estimate of the final value.

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

Methods of synthesis
Random-effects meta-analysis was used to combine the post-intervention values and provided a weighted mean difference (WMD) between the intervention and control diets. Heterogeneity was assessed with $X^2$ and $I^2$ (greater than 50% represented substantial heterogeneity). Subgroup analyses were performed for specific dietary interventions.

Results of the review
Nine trials were included (1,547 participants). In terms of quality, three studies scored 4, two scored 3 and four scored 2 out of five. There were no significant differences in attrition rates between groups.
High-MUFA diets significantly reduced HbA1c compared with low-MUFA diets (WMD -0.21%, 95% CI -0.40 to -0.02; five trials with low heterogeneity $I^2=15\%$). Similar results were seen for high-MUFA diets compared with low fat diets but not for high MUFA compared with low glycaemic index diets. There was no evidence of any difference between high and low MUFA diets for fasting glucose, fasting plasma or homeostasis model assessment-estimated insulin resistance although these outcomes had high heterogeneity ($I^2$ greater than 80%). There was some evidence of publication bias for HbA1c.

Authors' conclusions

High-MUFA diets appeared to reduce haemoglobin A1c and should be recommended for inclusion in dietary regimen for type 2 diabetes.

CRD commentary

This review had clearly stated aims regarding study designs, interventions, participants and outcomes. Unpublished studies were excluded but it was unclear if there were any language restrictions, so there was a risk of language bias. This was assessed and the authors concluded it was a possibility. Study quality was assessed by two reviewers but it was not reported whether study selection and data extraction were performed the same way so there was a possibility of error and bias in the process. The analysis methods were appropriate and the authors considered heterogeneity and publication bias.

The authors' conclusions reflect the results of the review but should be considered against the presence of clinical and statistical heterogeneity.

Implications of the review for practice and research

Practice: The authors stated that international dietary recommendations for type 2 diabetes should consider specific MUFA percentages within the range of current guidelines.

Research: The authors did not state any recommendations for research.

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