Effects of low carbohydrate diets on weight and glycemic control among type 2 diabetes individuals: a systemic review of RCT greater than 12 weeks

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CRD summary
The review concluded that there were no consistent differences in weight and glycated haemoglobin changes over the long-term with low carbohydrate diet in patients with type 2 diabetes. Potential for biases and the small number and small size of trials limited the reliability of the review and the authors’ cautious interpretation of the evidence seems appropriate.

Authors' objectives
To determine the efficacy of 12 or more weeks of low carbohydrate diet, versus low fat diet, usual care diet or low glycaemic index diet, on weight and glycaemic control in patients with type 2 diabetes mellitus.

Searching
PubMed, The Cochrane library and EBSCOhost were searched from January 2000 to January 2010 for articles in English. Search terms were reported. Reference lists of retrieved articles were searched.

Study selection
Randomised controlled trials (RCTs) of low carbohydrate diets (defined as a maximum of 130g per day equivalent) for at least 12 weeks versus non-low carbohydrate diets in non-hospitalised adult patients with type 2 diabetes mellitus were eligible for inclusion. Trials had to provide information on daily calorie intake and carbohydrate intake. Cross-over trials and trials that used increased fibre or substitution by whole grains were excluded.

The included trials studied various low carbohydrate diets that ranged from 19g to 95g of carbohydrate per day. The control group included low fat diet, low glycaemic index diet, self-selected usual care diet and healthy eating diet. Intervention durations ranged from three to 48 months. Physically activity changes were generally not specified. Trials were published between 2003 and 2009.

The authors did not state how many reviewers undertook study selection.

Assessment of study quality
Quality assessment was undertaken using the GRADE tool to score trials out of a maximum 4 points.

Two reviewers undertook quality assessment. Disagreements were resolved by consensus or discussion with a third reviewer.

Data extraction
Data were extracted on weight change, glycated haemoglobin, total cholesterol, high density lipoprotein cholesterol, low density lipoprotein cholesterol and triglycerides.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Narrative synthesis.

Results of the review
Eight RCTs were included (664 patients, range 13 to 215). Trial quality ranged from 2 to 4 points. Six trials did not report on intention-to-treat, three trials did not report on randomisation method and three trials did not report on attrition.

One trial demonstrated a statistically significant greater weight reductions with low carbohydrate diets compared with control and four trials showed no significant differences. Weight reduction associated with low carbohydrate diets
ranged from 3.1kg to 11.4kg. Two trials demonstrated statistically significant glycated haemoglobin reductions with low carbohydrate diets and six trials showed no differences. The glycated haemoglobin reduction associated with low carbohydrate diets ranged from -0.02 to -1.5.

Other results were presented in the review.

**Authors' conclusions**
There were no consistent differences in weight and glycated haemoglobin changes over long-term treatment with low carbohydrate diet compared with low fat diet, usual care diet or low glycaemic index diet in patients with type 2 diabetes.

**CRD commentary**
Inclusion criteria for the review were clearly defined and three relevant data sources were searched. However, very few and very specific search terms were used which may mean that relevant studies were missed. There was potential for language bias as only articles in English were included. Publication bias was not assessed and could not be ruled out. Attempts were made to reduce reviewer error and bias during quality assessment; it was unclear whether the same attempts were made during study selection and data extraction. Quality assessment indicated that the quality of the evidence base was variable. A narratively synthesis seemed appropriate given the differences across the trials.

Potential for biases and the small number and small size of trials limited the reliability of the review and the authors’ cautious interpretation of the evidence seems appropriate.

**Implications of the review for practice and research**

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

**Research:** The authors stated that further trials are needed to investigate the long-term effects of low carbohydrate diets on cardiovascular outcomes and safety in patients with type 2 diabetes.

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