Lack of evidence on diets for obesity for children: a systematic review

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CRD summary
This review assessed the efficacy of dietary interventions in overweight or obese children or adolescents. The authors concluded that low carbohydrate and low glycaemic index diets appear as effective as energy-restricted low fat diets for short-term weight loss, while the long-term efficacy was less clear. The authors’ cautious conclusions were consistent with the strength of the evidence shown and are likely to be reliable.

Authors’ objectives
To review the evidence on the efficacy of dietary interventions in the treatment of overweight or obese children or adolescents.

Searching
PubMed, EMBASE, and the Cochrane CENTRAL Register were searched from January 1966 to September 2005; the search terms were reported. Reference lists of relevant articles and reviews were screened to identify additional publications. Only publications in the English language were eligible.

Study selection
Study designs of evaluations included in the review
Randomised or non-randomised clinical trials (RCTs). Patients were followed up beyond the dietary intervention phase in 5 studies; the follow-up length ranged from 18 weeks to 24 months.

Specific interventions included in the review
Studies evaluating a dietary intervention versus no dietary intervention or another dietary intervention were eligible. Studies providing recommendations on physical activity or behavioural therapies were eligible if the only difference in treatment was the recommended dietary intervention. Studies of dietary interventions as prevention were excluded. Four groups of diets were evaluated: low carbohydrate diets (less than 20 g or less than 10% of total calories); medium carbohydrate diets (45 to 50% of calories); low glycaemic index diets (medium carbohydrate with a low glycaemic index); and energy-restricted low calorie diets which included low fat diets (25 to 31% of calories). The three former diets were classified according to whether they involved calorie restriction or ad libitum consumption. The duration of the dietary interventions ranged from 8 weeks to 9 months. In some studies family participation was an essential component of the protocol, whereas others reported no direct family involvement.

Participants included in the review
Studies including overweight or obese children or adolescents were eligible. The criteria used to define overweight or obesity varied across the studies and included different cut-off points of weight, body mass index (BMI), or triceps and/or subscapular skinfolds. The number of patients included ranged from 16 to 121. Most studies included referred patients or those recruited from advertisements.

Outcomes assessed in the review
Studies that reported a change in body fatness, as measured by changes in weight and/or BMI, were eligible.

How were decisions on the relevance of primary studies made?
One reviewer selected the studies.

Assessment of study quality
The authors considered the method of randomisation, blinding assessment of the outcomes, and the description of participants lost to follow-up. The authors did not state how many reviewers performed the validity assessment.
Data extraction
Two independent reviewers extracted the data using a standard extraction sheet. The change in weight or BMI and 95% confidence intervals (CIs) were extracted or calculated from the corresponding standard deviations or standard errors. If necessary, data were extracted from the published graphs.

Methods of synthesis
How were the studies combined?
Differences in comparisons and outcomes precluded meta-analysis. The studies were combined in a narrative for energy-restricted diets, reduced carbohydrate diets and low glycaemic index diets. The results of individual studies were also presented in graphical format, grouped by length of follow-up (less than 1 year and greater than 1 year).

How were differences between studies investigated?
Differences in study design, interventions and outcomes were discussed in the text and further details tabulated.

Results of the review
Nine studies (n more than 525) including 7 RCTs met the inclusion criteria.

No study provided details of the random allocation procedure. Seven studies reported the proportion of patients completing the dietary intervention: this ranged from 56 to 100%. Seven studies monitored compliance through the regular completion of food diaries by the children, and 3 studies by measuring ketonuria. Six studies reported on attrition rates and showed percentage drop-outs after the intervention ranging from 0 to 77%, with no difference between study groups. One study reported the use of a power calculation. All studies described details of anthropometric measurement but no study reported within-observer and between-observer variability in anthropometric measurements, and in none of the studies was such ascertainment performed in a blinded fashion.

Energy-restricted diets (3 studies).
Energy-restricted diets were associated with a statistically significant greater weight loss at 6 and 12 months compared with a diet with energy intake judged appropriate to physiological requirements (1 study). Relative to no treatment, 1 study showed a lower percentage of overweight children at 6 months (-19.7 versus +2.6%, p<0.01), whereas another study reported a non-statistically significant reduction in both weight and body fat in the energy-restricted group.

Low or medium carbohydrate diets (4 studies).
Low carbohydrate diets were associated with a statistically significant short-term (less than 3 months) reduction in weight and BMI compared with energy-restricted low fat diets (3 studies, p<0.05). One study evaluated the long-term effects and showed a statistically significant reduction in BMI at 10 weeks (-5.2 +/- 1.3 versus -2.4 +/- 1.4, p<0.001) and 5.5 months (-5.6 +/- 2.5 versus -3.0 +/- 2.6, p<0.05). One study compared two similar energy-restricted medium carbohydrate/high protein diets as part of a 9-month residential intervention and showed comparable weight and BMI reductions in both treatment groups.

Low glycaemic index diets (2 studies).
Compared with an energy-restricted low fat diet, an ad libitum low glycaemic index diet was associated with a statistically significant weight loss (-2.03 kg versus +1.3 kg, p<0.001) and reduction in BMI (-1.53 versus -0.06, p<0.001) at 17 weeks in 1 study, while another study showed a statistically significant reduction in BMI at 12 months (-1.2 versus -0.6, p<0.02).

None of the included studies reported withdrawals due to side-effects.

Authors' conclusions
Low carbohydrate diets, low glycaemic index diets and energy-restricted low fat diets appear to produce a comparable...
short-term weight loss. The long-term weight control remains unclear.

**CRD commentary**
This review addressed a well-defined question in terms of the study design, participants, intervention and outcomes. Several relevant databases were searched and efforts were made to find further published and unpublished studies, thereby reducing the potential for publication bias. However, only studies in the English language were eligible, which might have introduced language bias. Publication bias was not assessed. Two independent reviewers carried out the data extraction, whereas only one reviewer selected the studies. It was not stated whether the study quality assessment was performed in duplicate, therefore reviewer error and bias might have been introduced into the review process.

The authors’ decision not to perform a meta-analysis was justified by the clinical and methodological heterogeneity amongst the studies. The small number of trials and participants included represents a major limitation. The authors’ cautious conclusions were consistent with the strength of the evidence shown and are likely to be reliable.

**Implications of the review for practice and research**
Practice: The authors stated that there is limited evidence to support current dietary recommendations for weight reduction in childhood and adolescence.

Research: The authors stated that well-designed intervention studies of the long-term effectiveness of alternative diets are urgently needed. Ad libitum diets might be of particular interest.

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