Very-low-energy diets and morbidity: a systematic review of longer-term evidence
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CRD summary
The review concluded that very low energy diets were associated with long-term weight loss and improvements in cardiovascular risk, fertility and respiratory disorders; conclusions were limited by differences across the studies. Quality issues and potential for biases limits the reliability of the overall results so caution is warranted when interpreting the review.

Authors' objectives
To investigate longer-term outcomes from studies using very low energy diets.

Searching
PubMed and Web of Science were searched from January 2000 to December 2010 for articles in English. Search terms were reported. Science Direct was searched. Reference lists of reviews and included studies were searched.

Study selection
Randomised controlled trials (RCTs), non-randomised controlled trials and retrospective studies of very low energy diets in participants with a mean or median body mass index (BMI) of 28kg/m² or more were eligible for inclusion. Very low energy diet was defined as a daily intake of 800kcal (3,347kJ) or less. Studies in children or adults were included. Studies had to have a duration of at least 12 months and report weight loss or weight gain prevention. Secondary outcomes included cardiovascular risk, liver and kidney function, fertility, bone health, respiratory disorders, eating disorders and adverse events.

The included studies considered very low energy diets in male and female patients with a mean weight at baseline ranging from 86.8kg to 148.0kg, where reported. The duration of the very low energy diet ranged from 25 days to nine months. Several studies incorporated aspects of exercise, medication, low fat diet, low carbohydrate diet or behavioural therapy.

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

Assessment of study quality
Quality assessment was undertaken using a modified Jadad scale to appraise randomisation, blinding, withdrawals and drop-outs to give a maximum score out of 6.

Three reviewers performed quality assessment.

Data extraction
Data were extracted on weight loss and weight gain prevention outcomes and secondary outcome.

The authors did not state how many reviewers extracted the data. Study authors were contacted.

Methods of synthesis
A narrative synthesis was presented.

Results of the review
Thirty-two studies (range 18 to 502 participants) were included in the review. Study quality scores ranged from zero to 6; 20 studies scored less than 3. Follow-up ranged from nine months to five years.

Thirteen studies demonstrated significant reductions in weight at the end of the very low energy period. Six out of 13 studies showed reductions in systolic blood pressure from baseline. Eleven out of 17 studies showed significant reductions in diastolic blood pressure. Seven out of 13 studies showed significant reductions in waist circumference from baseline to diet end. Three out of 12 studies showed significant reductions in total cholesterol from baseline to
diet end. Four out of 16 studies showed significant improvements in fasting blood glucose at study end. Two studies showed benefits on sleep apnoea. One study showed improvements in fertility at one-year.

Other secondary outcomes were reported in the review.

**Authors’ conclusions**
Very low energy diets were associated with long-term weight loss and improvements in cardiovascular risk, fertility and respiratory disorders; conclusions were limited by the differences across studies.

**CRD commentary**
Inclusion criteria for the review were clearly defined and relevant data sources were searched. There was potential for language bias as only studies in English were included. Publication bias was not assessed and could not be ruled out. The authors noted that excluding studies published before 2000 may have introduced publication bias. Attempts were made to reduce reviewer error and bias during quality assessment; whether this applied also to data extraction and study selection was not clear.

Quality assessment was undertaken using a standard checklist designed for trials; the authors acknowledged that this was not the most suitable tool for assessing the quality of non-RCTs. Using this tool most of the evidence appeared suboptimal. Data were narratively synthesised. A lack of clarity in reporting the results hampered interpretation. Some outcomes had few studies reporting data.

Quality issues and potential for biases limits the reliability of the overall results so caution is warranted when interpreting the review. The authors noted appropriately that review findings were limited by differences across the studies.

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

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

**Research:** The authors stated a need for more standardised research into very low energy diets. Use of very low energy diets in combination with other treatments such as behavioural therapy and exercise warranted further research. Use of very low diets in specific populations such as by sex or ethnicity needed further study.

**Funding**
LighterLife Limited, UK.

**Bibliographic details**

**PubMedID**
22800763

**DOI**
10.1017/S0007114512001924

**Original Paper URL**
http://journals.cambridge.org/action/displayAbstract?fromPage=online & amp;aid=8687808

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Caloric Restriction; Evidence-Based Medicine; Humans; Obesity /complications /physiopathology /therapy

**AccessionNumber**
Record Status
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